

IRGAS Fieldview Combustion™



*IRGAS
Combustion*

CIC Photonics

IRGAS SYSTEM

CIC Photonics, Inc. is dedicated to providing today's growing industries with the highest sensitivity and fastest time response instrumentation. Our analyzers are used worldwide in a variety of different arenas, and although CIC Photonics has a set of core systems, we pride ourselves on truly meeting the needs of our customers by adapting the core analyzers to their specifications.

Our IRGAS Long Path Gas Analyzer incorporates a rugged FTIR spectrometer with a stainless steel 4m to 6m, or a 9.6m gas cell. This combination produces an analyzer that can handle some of the most demanding applications, while still providing high energy throughput of 36-48 %. The IRGAS Long Path Gas Analyzer is ideal for applications requiring limits of detection in the ppm level to 5 ppb, and has rapid gas exchange due to its low internal volume.

Included with the IRGAS Long Path Gas Analyzer is CIC Photonics patented SPGAS analytical software package. This package does everything from concentration tracking and hardware managing allowing the user to recalculate previously collected data within minutes.

The software package includes the following software: IRGAS 100 or IRGAS 100 with SpectraStream, QMax, Configuration Manager, and Reprocessing Tool. These programs provide a unique solution to analytical problems. All of the programs are extremely user friendly so that the programs can be operated by anyone regardless of skill level.

The IRGAS 100 software provides real-time monitoring of species concentration, while also having the capabilities to control various hardware components within the system. Some of the hardware components that can be managed by the software are valves, pressure transducers, temperature controllers, etc....

CIC Photonics has more than 15 years of experience in the gas analysis market, and 10 years of experience with our IRGAS systems as a solution to the needs of our customers.

The robustness, small foot-print and high level of performance of our equipment, together with our software makes them ideal for production or laboratories environments.



IRGAS FIELVIEW A 20CM SCOUT GAS CELL FOR COMBUSTION ANALYSIS

The combination of the IRGAS software, the high sensitivity of the IRGAS FieldView, and the 20cm Scout high energy throughput makes the IRGAS system for Combustion Analysis the ideal choice.

Traditionally, a way to improve the sensitivity of the instrument, long path gas cells have been used for combustion analysis. The drawback of this approach is that the intensity of the moisture spectrum is also amplified making it harder to detect those species where their absorption spectrum overlaps with the moisture spectrum. As a counter measure for this problem, additional equipment is required to reduce the total water content in the sample stream.

Another drawback of using a long path gas cell is the higher internal volume of the long path gas cell when compared to the short path gas cell. The higher internal volume requires high flow rates (10slpm) to accomplish a T90 under 10 seconds.

These type of approaches to combustion analysis are not required on the IRGAS FieldView. Its high sensitivity allows the use of a short path gas cell while offering the same sensitivity as other systems using a long path gas cell. For this reason, the analyzer does not require the sample to be dried out, and the flow rates to achieve a fast T90 are under 1 slpm.



20CM SCOUT GAS CELL



APPLICATIONS

- Combustion Analysis
- Monitoring of air pollutants
- Toxic and corrosive gases
- Process stream measurements
- Vacuum and high pressure environments
- Batch or flow samples
- Concentrations of pph(%) to ppm

STANDARD SPECIFICATIONS

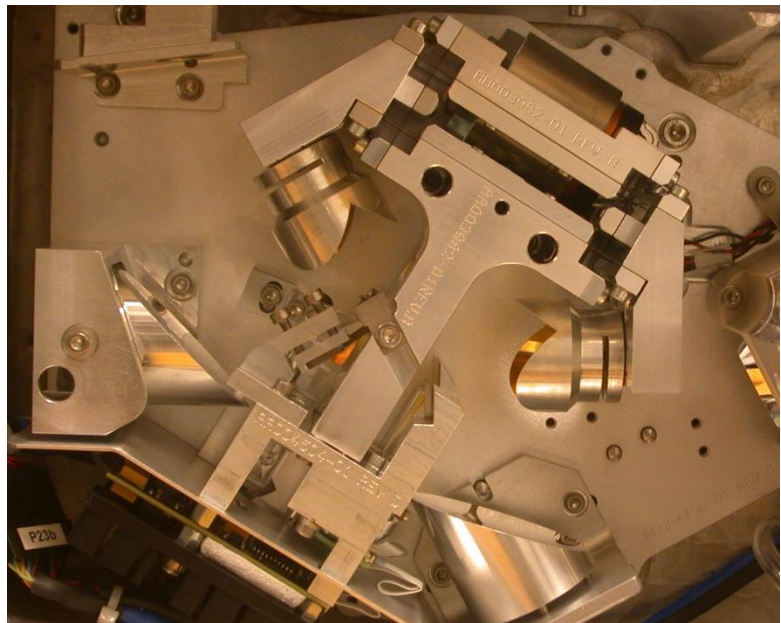
- Nickel plated stainless steel 20-cm gas cell for toxic and corrosive gas analyses; heated and unheated versions.
- 57 ml volume for 20-cm pathlength
- 316L stainless steel body with nickel plating for durability, high pressure loadings, wide chemical compatibility, simplified cleaning and effective heating. Available also in Hastelloy.
- Viton™, or Kalrez™ O-rings for chemical resistance and temperature considerations
- AgBr, KBr, CaF₂, ZnSe, quartz, or sapphire window materials for UV-VIS and NIR applications
- Integral stainless steel VCR fittings
- Evacuatable and pressurizable: 10⁻⁶ Torr to 150 psig. Leak rate < 1.0x10⁻⁸ cc/sec
- Heatable to 300° C with heating mantle, tape, or dual bands

ENHANCED MB3000 INTERFEROMETER

As a standard, the MB3000 comes with a DTGS detector and a 24bits ADC. The ADC module is an integral part of the detector module, and the instrument's rugged aluminum case provides an additional layer of protection against electromagnetic interference. The state of the art electronics, and careful design, allows the system to provide a Maximum Signal to Noise RMS of 50,000:1.

Key items are:

- Maintenance Free
- Non-hygroscopic optics
- IR-Source: 10 year average lifetime
- 24bit ADC
- Maximum Signal to Noise RMS: 50,000: 1 or better. (Ultimate 250,000: 1).
- Frequency Repeatability of 0.001cm^{-1} at 1918cm^{-1}
- Frequency Accuracy of 0.01cm^{-1} at 1918cm^{-1}
- High-throughput double pivot Michelson, fully jacketed interferometer
- VCSEL solid state laser is fully self calibrating and ensures better wavelength accuracy with precise results. 20 years lifetime average
- A permanently aligned optical system
- Rugged and durable modules



24BIT ADC AND EASY INTERCHANGEABLE DETECTOR MODULE



The 24bit ADC of the MB3000 is an integral component of the detector's PCB board. The conversion from analog to digital is performed directly within the same board. This greatly reduces the possibility of internal electromagnetic interference and noise to be added to the analog signal before conversion. The whole spectrometer and its compartments are encased into a rugged aluminum enclosure.

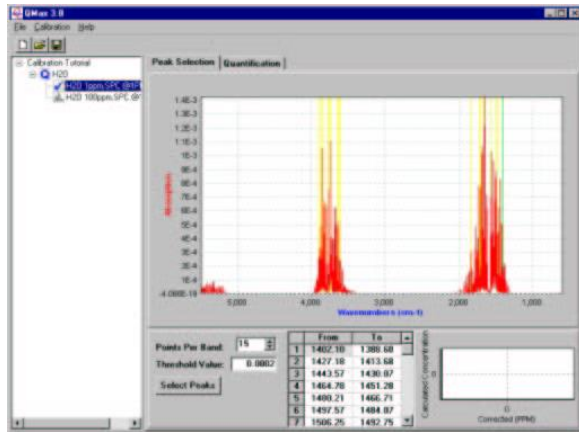
Once the analog signal has been converted, the digital values are then transmitted digitally to the spectrometer control board. The detector's electronic board and the spectrometer's electronic control board are physically separated by different compartments.

This allow the instrument to achieve with a DTGS detector a maximum signal to noise RMS of 50,000: 1 or better. (Ultimate 250,000: 1 with a more sensitive detector)

SPGAS SOFTWARE SUIT,

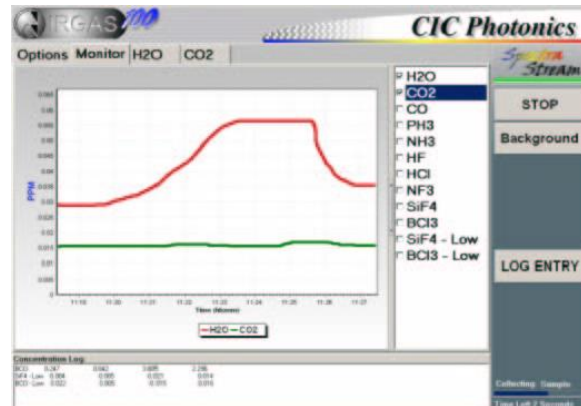
IRGAS100 with SpectraStream allows the user to view changes in species concentrations within seconds of the changes happening through the program's Fast Concentration Tracker by decreasing the response time that is typically associated with FTIR. A concentration estimation is reported with each scan of the instrument.

The system calibrations are generated in the QMax program which permits the user to easily generate calibrations and/or add new species to preexisting



to needs.

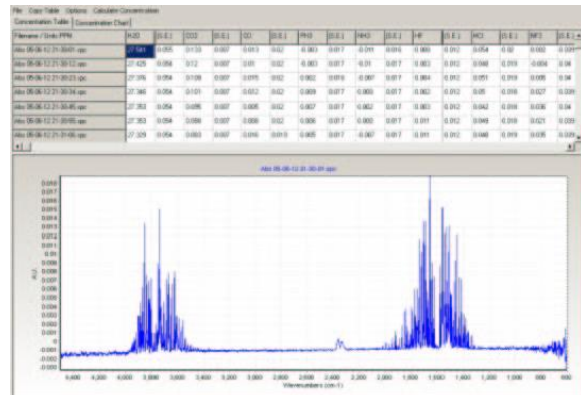
Our most recent program added to the software package is the Quantification Reprocessing Tool. This program allows the user to recalculate data that had been previously collected. Instead of having to recollect data for temperature and pressure changes, a user can enter the new parameters in the Quantification Reprocessing Tool and the program will recalculate the data with the new parameters. As well as recalculating new parameters it can reprocess using new calibration files that have more or less species being quantified. The Quantification Reprocessing Tool can also be used to determine the accuracy of a calibration file and help to determine the correction factor needed for calibrations. Collected spectra can also be displayed and viewed sequentially in the Quantification Reprocessing Tool, allowing the viewer to see slight changes in the spectra.



calibrations. In addition to creating new calibrations, QMax can be used to apply correction factors to current calibrations.

Its exclusive Weighted Multi-Band Analysis provides greater discrimination against false positives, improved precision, and greater sensitivity.

The IRGAS Configuration Manager is a program that contains all of the information regarding the system in one central location. In the Configuration Manager the user can find various parameters for the system that can be altered



IRGAS ESTIMATED LOD'S FOR MOISTURE CONTENT UP TO 40%, AND 20% CO2 (SIGMA-3)

1 Scan

Compound	LOD's (PPMV)
NH3	1.7
SO2	3.2
CO	1.8
Butane	14.1
CH3CHO	9.6
HF	2.6
NO2	18.2
HEXANE	8.5
MEOH	4.6
TOLUENE	6.9
C3H8	5.3
NO	9.9
CH4	1.3
ETOH	8.6
C2H6	3.2
HCHO	3.2
N2O	2.3
ACROL	9.9
IPA	5.5
Ethene	7.7
PENTANE	10.5
HCL	2.2
SF6	0.1

16 Scans

Compound	LOD's (PPMV)
NH3	0.5
SO2	0.8
CO	0.4
Butane	3.7
CH3CHO	2.5
HF	0.6
NO2	4.4
HEXANE	2.2
MEOH	1.1
TOLUENE	2.0
C3H8	1.4
NO	2.4
CH4	0.3
ETOH	2.3
C2H6	0.9
HCHO	0.9
N2O	0.5
ACROL	2.5
IPA	1.5
Ethene	1.8
PENTANE	2.9
HCL	0.6
SF6	0.03

LOD's Sampling Conditions:

Temperature: 120 Deg C

Pressure: 760 Torr



세종특별자치시 대평3길 18, 해피라운들루 606호.
T: 044-865-7172 F:044-865-7173 E:sales@altoss.co.kr
www.altoss.co.kr



CIC Photonics

IRGAS COMBUSTION SYSTEM ESPECIFICATIONS

MEASUREMENT TECHNIQUE: Fourier Transform Infrared Spectroscopy
DETECTOR TYPE: DTGS (Deuterated Triglycine Sulfate)
BEAM SPLITTER: Non-Hygroscopic ZnSe
MEASURABLE SPECTRAL RANGE: 6000 to 600 cm^{-1}
ADC (ANALOG DIGITAL CONVERTER): 24 Bits ADC Integrated into detector module for low noise and electromagnetic radiation interference
MAXIMUM SIGNAL TO NOISE RMS: 50,000:1
SPECTROMETER MAINTENANCE: Maintenance Free
INTERFEROMETER: High-throughput double pivot Michelson, fully jacket
FREQUENCY REPEATABILITY: 0:001 cm^{-1} at 1918 cm^{-1}
FREQUENCY ACCURACY: 0.01 cm^{-1} at 1918 cm^{-1}
LASER: VCSEL solid state laser for fully self calibration and better wavelength accuracy with precise results (20 years lifetime average)
OPTICAL ALIGNMENT: Permanent aligned optical system, with rugged and durable modules
GASES MEASURABLE: LOD specs for HBr. Other gases may be measurable by the system.
RANGE: low ppb to ppm levels
SOFTWARE: SPGAS Software Suite for continuous collection and quantification analysis. Spectral records compatible with Galactic SPC file format.
QUANTIFICATION ANALYSIS TECHNIQUE: Weighted Multi-Band Analysis
NUMBER OF COMPONENTS: Unlimited
THERMALLY STABLE SAMPLE GAS TEMPERATURE: Gas cell plenum area preheats gas before it enters the gas cell compartment (4Runner gas cell only)
GAS CELL EFFICIENCY: 100% Energy throughput w/o windows
GAS CELL WETTED PARTS: 316L SS Body, and Kalrez o-rings
RESPONSE TIME:

- 6 seconds scan time at 2 cm^{-1}
- Gas Exchange Flowrate dependent.
- 3 gas volume exchanges for T90

SYSTEM PRECISION: < +/- 1% FS with Temperature and Pressure correction factor module
SYSTEM ACCURACY: Span gas calibration source dependent

SYSTEM OPERATING TEMPERATURE (SPECTROMETER): 10-35°C
GAS CELL OPERATIONAL TEMPERATURE: Up to 300°C. A temperature of 120 °C-180 °C is recommended for combustion analysis
DIMENSIONS: \cong 16 in (W) x 15 in (D) x 19 in (H)
WEIGHT: \cong 70lbs (Depends on components)
POWER: 120/240 VAC, 50/60 Hz, 800 Watts Max.
COMPUTER REQUIREMENTS:

- PC with AMD or Intel Processor with recommended amount of memory per operating system
- Microsoft Windows XP/Vista/Windows 7/Windows 10
- 20GB of free disk space for spectral record and Quantification Log storage

COMMUNICATION: Ethernet, MODBUS RTU and TCP/IP MODBUS RTU
WARRANTY: 2 years on system, and 3 months on optical components (Windows).