Thermo Scientific gas cells combine industrial design with the precision and configurability needed for real world gas analysis of today and tomorrow.

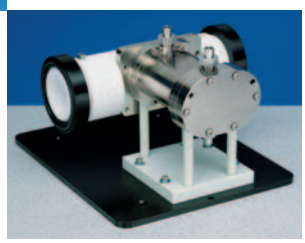
Product Specifications

10 Meter and 2 Meter Gas Cells

Optimized gas cells for improved results

2 meter gas cell in the Antaris IGS gas analyzer

10 meter gas cell disassembled



2 meter gas cell

Cell window holder disassembled

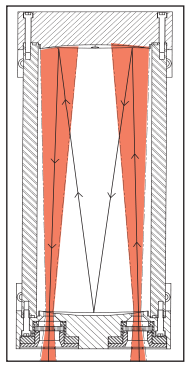
Optimized for integration with the Thermo Scientific Antaris IGS gas analyzer, our exclusive 10 and 2 meter multi-pass gas cells meet the needs of industrial customers in search of superior FT-IR gas analysis capabilities.

The highest quality optical components are used to ensure exceptional results. The selection of 10 or 2 meter cells allows coverage for a wide variety of samples ranging from exhaust gas to aviator's breathing oxygen. Furthermore, the unique design of the Thermo Scientific gas cells provides low cost-of-ownership with easy routine maintenance. These fixed-pathlength gas cells feature:

- 10 to 50 ppb detection limits for most components
- Permanent alignment for calibration stability
- Easy-to-assemble cell body components, with easy cleaning for routine maintenance
- Simplified window replacement, with specially designed window holders
- Chemical resistance to a wide variety of gases
- Leak-tight, industry-standard sample line connectors
- Factory cleaned for oxygen service

Principle of Operation

The White Cell configuration, a compact optical gas cell design, is used to achieve long optical pathlengths in the 10 and 2 meter gas cells. Infrared radiation is focused into the cell where it then passes between paired mirrors, alternately diverging and focusing. Forty passes are made to reach 10 meters. Twenty passes are made in the 2 meter gas cell.



Schematic of White Cell

Industrial Design

Our exclusive gas cells have a pinned-in-place, three-component design to eliminate accidental misalignments and to ensure optimized optical performance. The unique design of these fixed-pathlength, multi-pass cells provides exceptional sensitivity, especially in physically demanding environments. Rather than using mechanical mirror mounts or unreliable adhesives, our design uses diamond-turned optical manufacturing techniques to machine the field and objective mirrors directly into the end plates of the cell. The end plates are then bolted to the cell body to form a durable assembly. The cell body is constructed of nickel-coated aluminum, and the mirrors are gold coated.

Proper gas handling, whether sampling inert or toxic gases, is an important aspect of gas cell design. Our gas cell body does not use any leak-susceptible gas connections like pipe threads (e.g., NPT). Only industry-standard VCR® fittings are used to provide gas-tight connections with sample lines.

The window assemblies on these gas cells also address condensation problems often overlooked by other designs. The window is significantly recessed into the window holder, which in turn is recessed into the gas cell. When the cell is heated,

radiant energy warms the air outside the window. The windows are thus heated efficiently, reducing the potential for the condensation of water vapor or other gases.

Selecting a Pathlength

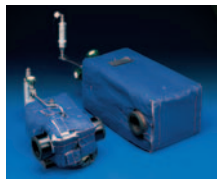
For simple gas mixtures, where the infrared spectral bands of the different components do not interfere, the only selection consideration is between the gas cell volume versus pathlength. For longer pathlengths and higher sensitivity, one must have a larger gas cell. This trade-off is not typically a problem where there is plenty of sample. The 10 m gas cell is capable of detection limits down to 10 – 50 ppb for most components and it has a volume of two liters. The 2 m gas cell has a volume of only 200 mL with detection limits capable of 50 – 200 ppb. The smaller size of the 2 m cell is ideal for low sample volumes, whereas the 10 m gas cell is preferred for better detection sensitivity.

For complex gas mixtures, sensitivity may be limited by spectral interferences. In combustion gas, for example, these interferences are typically water and carbon dioxide. If the water and carbon dioxide concentrations are below 3%, the 10 m gas cell is recommended. However if these concentrations are greater, better detection limits for other components in the gas sample can be obtained by reducing the intensity of the dominant interferences with the shorter pathlength of the 2 m gas cell. Likewise, for the detection of impurities in gases with strong infrared absorbances like ammonia and silane, the 2 m gas cell is recommended.

The small volume of the 2 m gas cell is ideal for sample streams where the component concentrations are changing over time. The 200 mL volume of this cell gives an exceptional mixing rate, which allows accurate recording of concentration changes over time.

Quick Selection Guide	10 m	2 m
Large volumes of sample (> 5 L), better sensitivity	•	
Small volumes of sample (< 1 L)		•
Better time resolution		•
Impurities in infrared inactive gas	•	
Impurities in infrared active gas		•
Water and carbon dioxide below 3%	•	
Water and carbon dioxide above 3%		•

Gas Cell Heating Options



2 meter and 10 meter gas cells shown with heating jackets for temperature control

Both the 10 m and the 2 m gas cells can be configured with heating options. A proportional temperature controller and heating assembly allow sampling up to 185 °C. Heating is recommended for samples that contain low boiling point components such as engine exhaust, and for samples with water vapor above 1%. Heating is also recommended for sampling corrosive gases.

Optimized Sensitivity

Figure 1 shows data taken from an Antaris™ IGS gas analyzer equipped with the 10 meter gas cell. Peak-to-peak noise levels illustrate the excellent sensitivity of the system and enable detection limits for other components to be estimated. Figure 2 demonstrates that the sensitivity of the system is better than 0.5 ppm for carbon monoxide with a 15 second measurement.

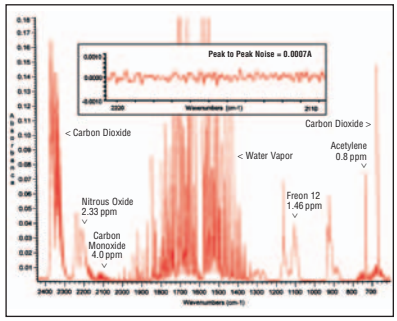


Figure 1: Trace contaminants in oxygen. Conditions: 1 cm^{-1}, 32 scans, 10 meter pathlength.

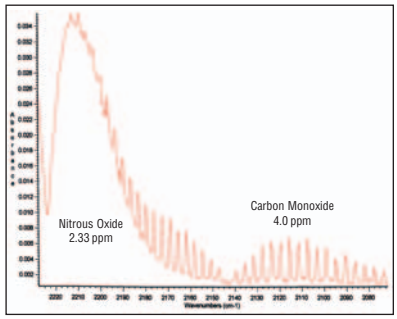


Figure 2: Nitrous Oxide and Carbon Monoxide in oxygen. Conditions: 1 cm^{-1}, 32 scans, 10 meter pathlength.

	10 Meter Gas Cell	2 Meter Gas Cell
Construction	Nickel-coated aluminum	Nickel-coated aluminum
Mirrors	Gold-coated aluminum	Gold-coated aluminum
Volume	2.0 L	200 mL
Connections	1/4" VCR	1/4" VCR
Valves	Nupro, H-series bellows sealed valve, 1/4" Swagelok® connection	Nupro, H-series bellows sealed valve, 1/4" Swagelok connection
Pressure relief	25 psi, self-seating check valve (VCR connection)	25 psi, self-seating check valve (VCR connection)
Maximum pressure	200 psi*	50 psi
Leak rate	< 0.1 Torr/min	< 0.1 Torr/min
Window material	KBr, a/r coated ZnSe, BaF_2	KBr, a/r coated ZnSe, BaF_2;
Temperature range	20 – 185 °C	20 – 185 °C
O-ring seals	Viton®, Kalrez® optional	Viton, Kalrez optional

** Maximum pressure is dependent upon the type and condition of the window material used. KBr and BaF_2 do not allow sampling to the maximum rated pressure.*

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