

# atmosFIR<sup>s</sup>



Introducing the latest line of FTIR gas analyser technology from Protea - atmosFIR. The atmosFIR platform improves upon previous FTIR technology and represents one of the most cost-effective and flexible analytical products on the market today.

At the heart of atmosFIR is a high-resolution, robust and proven FTIR spectrometer offering high signal throughput, low-noise and long lifetime of components. The atmosFIR range has been developed to incorporate the latest improvements and advantages in technology, including:

- \* Low cost of ownership
- \* Low maintenance cost
- \* 3 configurations for different concentrations and applications
- \* Robust and light, including the latest in fabrication materials such as carbon fibre chassis
- \* atmosFIR<sup>s</sup> designed for ppm-level emissions monitoring, in either a fixed or portable configuration, with built in sampling system

These advantages come with the benefit of improved performance over existing products, due to the new small, robust, high resolution interferometer with low noise measurement. Protea continues to offer our powerful PAS software suite, training and support, so that the user is able to achieve the best performance out of the product.

Multi-component, multi-range FTIR gas analyser

Measure 1000's of gases with single unit

PAS software offers no-limit on number of gas measurements at once

Data can be downloaded and re-analysed offline for new gases

**Specific Applications for atmosFIR<sup>s</sup>:**

Stack Emission Testing

Continuous Emission Monitoring System

Combustion gases under WID, LCPD

Rea/TOC™ measurement

Speciated VOC with use of high resolution

Carbon Bed abatement efficiency – inlet and outlet

Ambient air monitoring from 0.5ppm

Fire Testing research

## Hardware Specifications

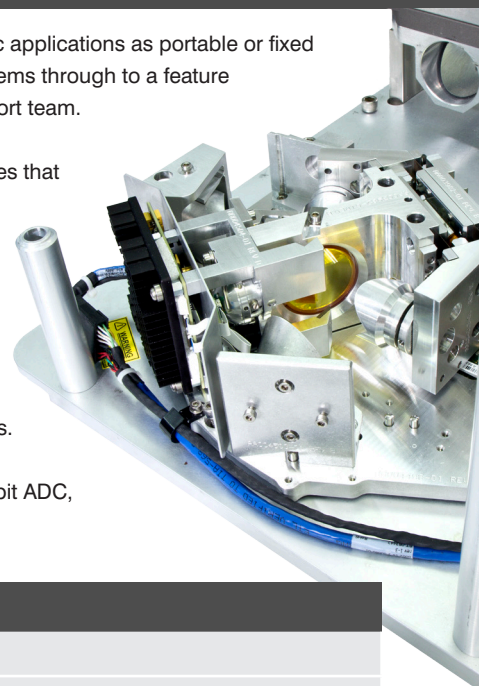
Double-pivot interferometer with increased robustness. Permanently aligned optics, giving repeatable measurements and high light throughput. The scanning mechanism has a lifetime guarantee.

Resolution	1 cm <sup>-1</sup> , 2cm <sup>-1</sup> , 4cm <sup>-1</sup> , 8cm <sup>-1</sup> typical resolutions, variable on application via software call
Optics:	Zinc Selenide beam splitter and cell windows (non-hygroscopic)
Spectral Range:	485 - 8500cm <sup>-1</sup>
Reference laser:	Solid state laser (no scheduled maintenance required)
Source:	Mid-IR source, ceramic Globar with electronic stabilization
Detector:	DTGS with signal sampling at 24-bit ADC
Sample Cell:	atmosFIR <sup>s</sup> , 20cm pathlength, low volume atmosFIR <sup>s</sup> , 4.2m standard, variable up to 6.4m atmosFIR <sup>s</sup> , >10m pathlength available in custom configuration All heatable to 200 °C with heated inlet filtration and pressure correction
On-board Sampling system:	Flow Control Automated Nitrogen Purge Valve Mass Flow Control for dilution and/or analyte spiking No need for separate pre-analyser sample conditioning box
Construction	Lightweight, rigid carbon-fibre baseplate and housing, vibration dampening mounts
Weight	18-20kg, depending on options
Dimensions	46cm x 45cm x 4U (19" rack mountable)

The atmosFIR products are available as stand-alone gas monitoring units or can be customised for specific applications as portable or fixed systems. They are flexible and can be set-up according to the needs of the user; from fully automated systems through to a feature rich analyser for the expert user. As always, the user is fully supported by Protea's in-house technical support team.

atmosFIR<sup>s</sup> is the successor to Protea's previous emissions monitoring FTIR systems, keeping all the features that users found valuable in achieving their measurement results, but offering the benefits of the new atmosFIR platform with increased portability, lower ownership costs and increased measurement performance. atmosFIR<sup>s</sup> can be considered a simple multi-gas analyser for combustion gas measurements; indeed for some users that is all it will be and as such it provides a cost-effective and complete measurement system. However, for the expert user atmosFIR<sup>s</sup> will offer all the benefits of FTIR, with hundreds of gas measurements, multiple analytical ranges, in-depth chemometric result diagnoses and dedicated on-board sampling system. With Protea's in-house chemometrics application support and 15+ year history of emission monitoring projects, atmosFIR<sup>s</sup> offers the user the complete package for their monitoring needs.

With long-lifetime VCSEL reference laser diode, unique cell design, and air cooled DTGS detector with 24-bit ADC, atmosFIR<sup>s</sup> is a step-change in value and service lifetime for FTIR emission gas analysis.



### Chemometrics and Data Output

Data System:	Industrial rack mount, desktop or notebook PC running PAS
Chemometrics	<p>Univariate or Multi-variate analysis. Both CLS and PLS algorithms. Protea prefers the component specific, factor based PLS method for analysis, giving more accurate measurements in complex gas mixes.</p> <p>No need for local spectral libraries. Re-distributable chemometric model file can be uploaded to any analyser, anywhere in the world.</p> <p>Multi-range chemometrics. atmosFIR is programmed to select different models based on the measured gas mix – always using the best analysis band and range.</p> <p>Analysis quality indication for range, noise and interference.</p> <p>Full training in chemometric modelling provided</p>
Measurement Units	<p>Concentration: ppm, mg/m<sup>3</sup>, %Vol</p> <p>Mass Emission: g/hr, kg/hr (utilising external flow input)</p>
Ethernet	OPC Server and Client
Analogue (option)	16 channel 4-20mA
Manual data retrieval	USB, CompactFlash

### Typical Measurements for atmosFIR<sup>s</sup>

atmosFIR<sup>s</sup> runs a **Standard Analysis Mode** with fixed acquisition parameters and chemometric analysis for common emission gases. This makes it **incredibly simple to use even for users with no extensive FTIR background**. Further analysis methods can be uploaded by the trained user or remotely by Protea.

Typical measurement range(s)	0 – 10ppm; 0 – 100ppm; 0 – 10000ppm %Vol measurements can be achieved with on-board dilution MFC		
Typical detection limit	<0.5ppm (gas dependent)		
Typical Response Time (T90, direct)	150secs (1cm <sup>-1</sup> )		
<b>Standard Analysis Mode for Combustion Gas Analysis</b>	Hardcoded analysis for common emission gases. No complex set-up required Switch on →Zero →Measure →Report		
Please contact Protea for specific gas requirements	CO 0 – 75mg/m <sup>3</sup> ; NO 0 – 200mg/m <sup>3</sup> ; NO <sub>2</sub> 0 – 200mg/m <sup>3</sup> ; SO <sub>2</sub> 0 – 75mg/m <sup>3</sup> ; HCl 0 – 15mg/m <sup>3</sup> ; NH <sub>3</sub> 0 – 15mg/m <sup>3</sup> ; HF 0 – 15mg/m <sup>3</sup> ; HBr 0 – 50mg/m <sup>3</sup> ; CH <sub>4</sub> 0 – 50mg/m <sup>3</sup> ; C <sub>2</sub> H <sub>6</sub> 0 – 50mg/m <sup>3</sup> ; C <sub>3</sub> H <sub>8</sub> 0 – 50mg/m <sup>3</sup> ; C <sub>4</sub> H <sub>10</sub> 0 – 50mg/m <sup>3</sup> ; C <sub>2</sub> H <sub>4</sub> 0 – 50mg/m <sup>3</sup> ; C <sub>6</sub> H <sub>6</sub> 0 – 200mg/m <sup>3</sup> ; HCHO 0 – 20mg/m <sup>3</sup> ; HCN 0 – 15mg/m <sup>3</sup> ; H <sub>2</sub> O 0 – 40%Vol; CO <sub>2</sub> 0 – 30%Vol		
Linearity	<2% range	Repeatability (σ)	<1% range
<b>Unlimited measurements</b>	Standard Analysis Mode ranges are not fixed – increase via simple span correction Any number of additional gases can be added via user-defined analysis		