

GAS 2000PH FTIR

Industrial Portable CEM Analyser

Hot Wet analysis of up to 12 flue gases simultaneously:
 H_2O , O_2 , CO_2 , CO , SO_2 , NO , NO_2 , CH_4 , NH_3 , HF , HCl , N_2O
 Accuracy and linearity: Compliant to EN 15267-3



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Overview

The **Portable GAS 2000PH FTIR** analyser provides a comprehensive mobile solution for flue gas analysis, ideal for industrial combustion process control, rapid **mobile CEMS back-up**, periodic emissions monitoring, or third-party **CEMS certification** under **EPA/QAL2** requirements.

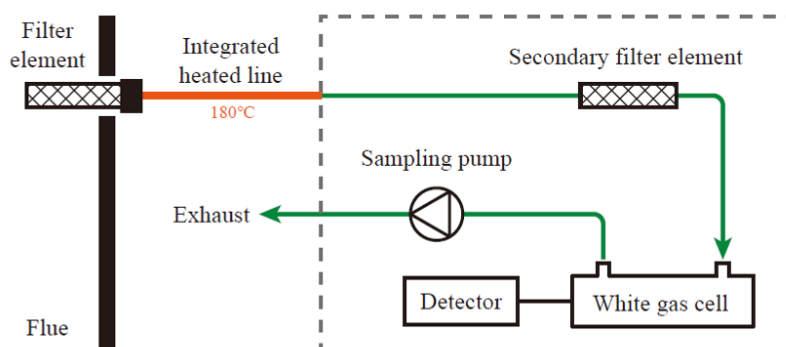
Specifically designed for **hot wet extractive analysis of gaseous emissions**, the analyser is suited to a wide range of industrial applications, including: power plants, refineries, chemical production facilities, cement plants, blast furnaces, heat treatment furnaces, waste incinerators, and biogas cogeneration units. It is equally applicable for **compliance testing** of engines, turbines, boilers, furnaces, and other combustion equipment.

Hot Wet Analysis principle by FTIR

The system consists of a portable FTIR analyser and a heated sampling line. The sampling probe and the heated line form an integrated assembly, powered and temperature-controlled via an aviation-grade connector and thermostat located on the pre-processor unit. The portable analyser features a high-performance built-in sampling pump, ensuring effective flue gas extraction and secondary filtration for optimal sample integrity.

Based on Fourier Transform Infrared (FTIR) spectroscopy, the analyser enables simultaneous, interference-free qualitative and quantitative analysis of up to 12 gas components commonly found in industrial emissions, including: H_2O , O_2 , CO_2 , CO , SO_2 , NO , NO_2 , CH_4 , NH_3 , HF , HCl and N_2O .

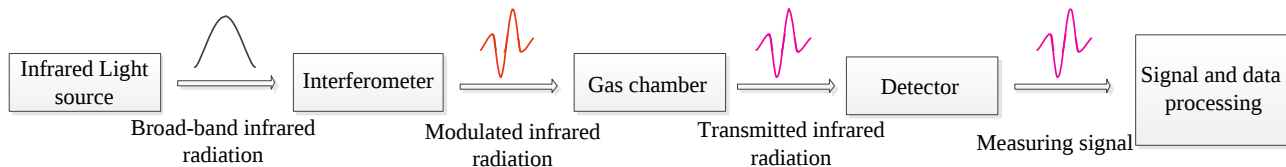
The software integrates a comprehensive library of infrared absorption spectra, enabling not only precise measurement of known gases, but also qualitative identification of unknown components based on their spectral signatures.



Key Advantages of Hot Wet Flue Gas Analysis vs. Cold Dry Technique

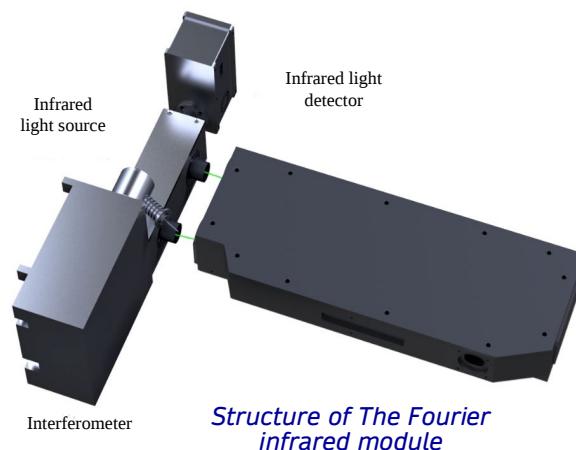
Aspect	Hot Wet Analysis	Cold Dry Analysis
Accuracy for Water-Soluble Gases	Prevents loss of soluble gases (e.g. SO_2 , NO_2 , HCl , NH_3) that dissolve in condensate.	Risk of underestimating gas concentrations due to dissolution in condensate.
Response Time	Fast – real-time measurement without gas drying.	Slower – requires gas conditioning and drying.
System Complexity	Simple – no need for chillers, dryers, or condensate management.	More complex – includes dryers, heated lines, and extra components.
Maintenance	Low – fewer moving parts, lower failure risk, minimal upkeep.	High – requires frequent cleaning, trap drainage, and monitoring.
Measurement Stability	Stable – performs reliably under varying humidity and temperature.	Can become unstable with environmental fluctuations.
Emissions Reporting Accuracy	Provides accurate, representative emission values (e.g. SO_2 , NO_x , HCl) for compliance.	Risk of inaccurate reporting if corrections for condensation are not properly applied.

Fourier-Transform Infrared spectroscopy (FTIR)



Key Components

1. **Infrared Source:** Emits a broad spectrum of IR radiation.
2. **Michelson Interferometer:** Modulates the IR beam by creating an interferogram through the movement of mirrors.
3. **Gas Cell:** Contains the gas sample; the IR beam passes through this cell, and specific wavelengths are absorbed based on the gas composition.
4. **Detector:** Measures the intensity of the transmitted IR radiation.
5. **Computer with Fourier Transform Software:** Processes the interferogram to produce an absorption spectrum, identifying and quantifying the gas components.



Principle of Operation – FTIR Gas Analyser

A Fourier Transform Infrared (FTIR) gas analyser is an advanced instrument used to identify and quantify multiple gas components simultaneously, based on their unique infrared absorption spectra. It operates on the principle that gas molecules absorb infrared (IR) radiation at specific wavelengths corresponding to their vibrational and rotational energy transitions.

1. Infrared Radiation and Molecular Absorption

When IR radiation passes through a gas sample, specific wavelengths are absorbed by the gas molecules. Each molecule absorbs IR energy according to its natural vibrational and rotational modes, such as bond stretching or bending. This interaction results in a reduction of the transmitted IR intensity at the absorbed wavelengths, forming an absorption spectrum that serves as a unique molecular fingerprint. If the IR source emits a broadband radiation, only certain wavelengths will be selectively absorbed, depending on the gas composition.

2. Transmittance and Absorption Quantification

The transmittance (T) at each wavelength is defined as the ratio of the transmitted IR intensity (I) to the incident IR intensity (I_0): $T = I/I_0$ where

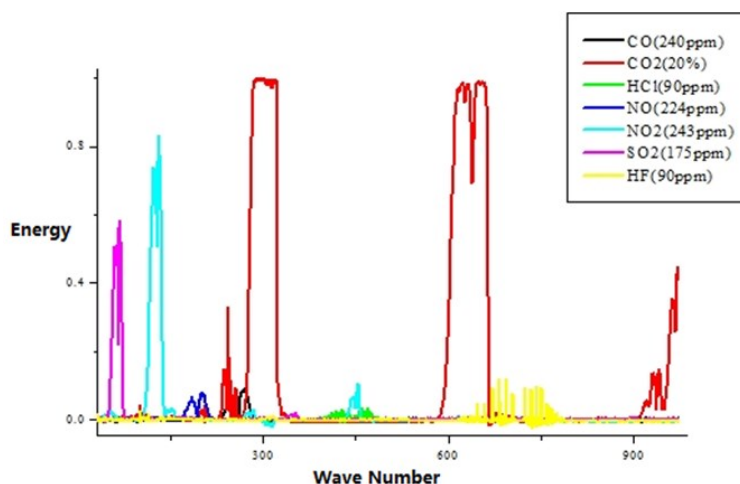
- T = Transmittance (dimensionless, 0 to 1 or 0–100%)
- I_0 = Intensity of the radiation entering the gas sample
- I = Intensity of the radiation exiting the gas sample

A transmittance of 1 (or 100%) indicates no absorption, whereas lower values reveal partial or complete absorption at that wavelength. By analysing the depth and shape of absorption peaks in the spectrum, the analyser can determine the presence and concentration of each gas component using calibration curves and the Beer-Lambert Law.

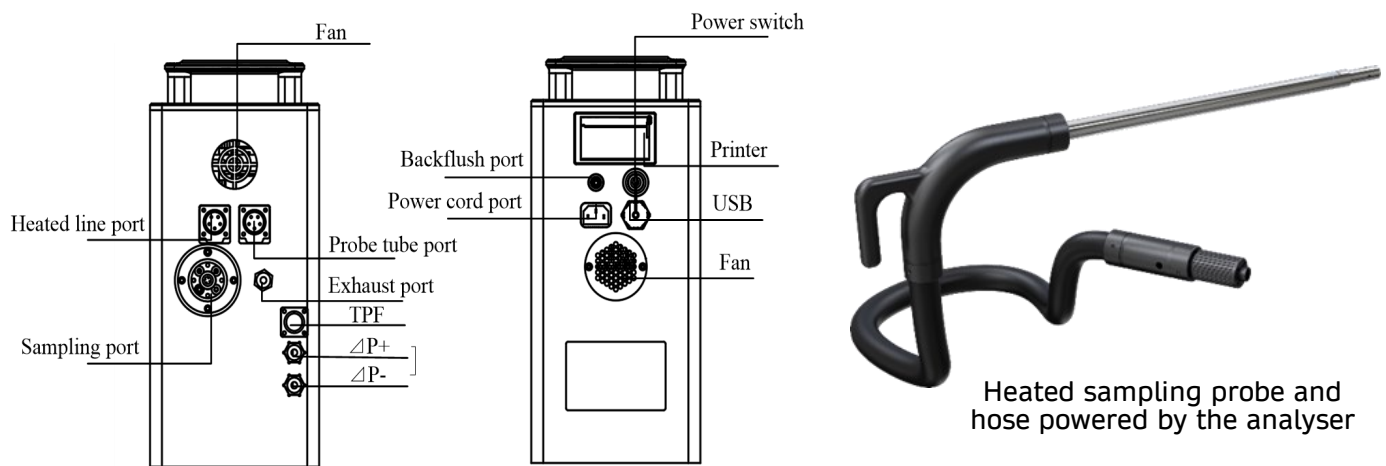
3. Fourier Transform and Interferometry

Unlike traditional dispersive infrared spectrometers, FTIR analysers use a Michelson interferometer to modulate all IR wavelengths simultaneously. The interferometer splits the IR beam into two paths, one directed toward a fixed mirror and the other toward a moving mirror. The beams recombine to create an interferogram containing information from all wavelengths.

This time-domain signal is then mathematically processed through a Fourier Transform to produce a frequency-domain spectrum, displaying the absorption intensity as a function of wavenumber or wavelength.



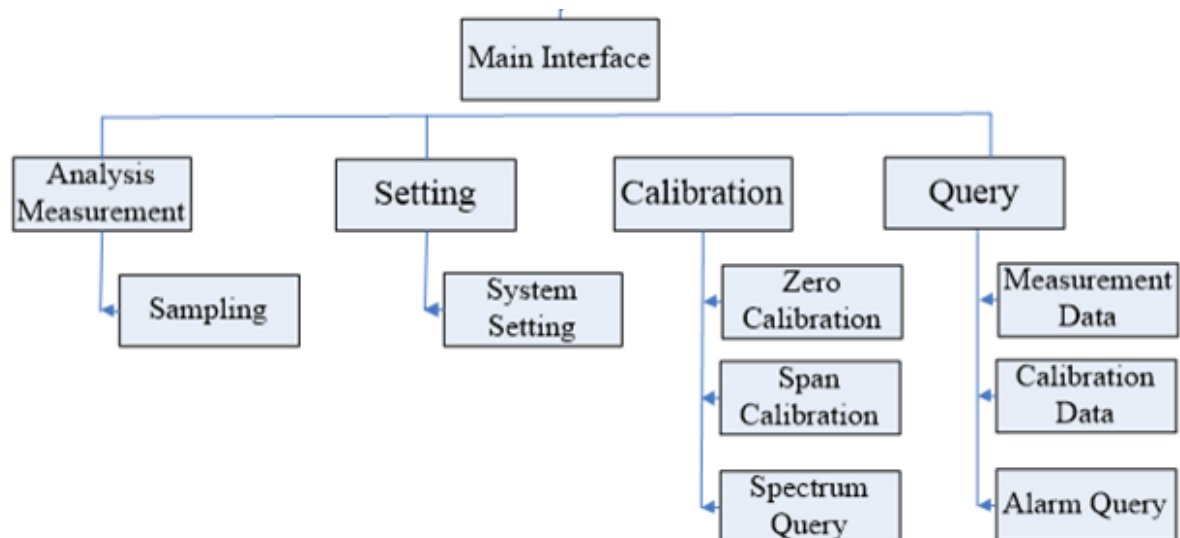
Side views with connections and gas sampling probe



Industrial PC with Graphic Touch screen



Intuitive and well-structured main interface with dedicated software functions



TECHNICAL SPECIFICATIONS

Measuring principle	All gases excepted O ₂ : Fourier-Transform Infrared spectroscopy Oxygen by Zirconium detector					
Analysis method	Hot wet extractive gas analysis					
Spectral range	(900-5000)cm ⁻¹					
Signal to noise ratio	Better than 15000:1					
Resolution	4cm ⁻¹					
Detection limit	≤0.5μmol/mol					
Response time	< 90s					
CEM Configuration	Up to 12 gases, configuration and ranges are customizable					
Other gases	%vol / mg/m ³	O₂	CO₂	H₂O	SO₂	NO
		0-25%	0-50%	0-40%	0-300-1000	0-500-2000
	mg/m ³	CO	CH₄	NH₃	HCL	HF
		0-1000-5000	0-100-1000	0-100-700	0-100-3000	0-150
Other gases	mg/m ³	CH₂O	C₂H₄	C₂H₆	C₃H₈	C₆H₁₄
		0-50	0-100	0-100	0-100	0-100
Accuracy / Linearity	≤±5% FS					
Repeatability	<1% FS					
Cross-interferences	Algorithms are used to effectively eliminate the interference caused by strong infrared absorption substances (e.g. H ₂ O, CO ₂).					
Zero/span drift	≤±2% FS / 4 hours					
Gas sampling	Built-in automatic operating and temperature controlled gas pump					
Analytical gas flow	> 2L/min					
Display	64-bit industrial touch screen PC with Win10 OS (multiple screen interfaces) Temperature display of gas chamber, probe and sampling hose					
Software functions	Real-time gas concentration measurement Zeroing or span calibration Spectrum query and spectral data export Historical measurement data and alarm query and export					
Communication	USB					
Blowback	External nitrogen blowback (optional)					
Power supply	220±22 VAC-50Hz-500W					
Operating temperature	5-45°C					
Operating pressure	80-106kPa					
Operating humidity	≤85%RH, non-condensing					
Enclosure Protection	IP41					
Dimensions &Weight	L385 x P170 x H345 mm / 15 kg					
Standard accessories	Heated gas sampling probe & hose / Bag / Power cord / Set of spare parts					

Non contractual specifications and pictures.
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