



# FTIR

an advanced FTIR for continuous gas monitoring



THE BENCHMARK IN FIRE TESTING



## FTT FTIR

### An Advanced FTIR for Continuous Gas Monitoring

FTT FTIR is an advanced FTIR gas analyser used for continuous gas monitoring in conjunction with FTT's Cone Calorimeter and Smoke Density Chamber for online measurements of combustion gases in fire tests. The analysis of gases in fire effluents is very complex and challenging due to the great number of different organic and inorganic chemicals which representative atmospheres can contain. FTT FTIR is fully configurable to meet the requirements of ISO 19702, ISO 9705 and CEN TS 45545-2. In addition, various process monitoring applications are also possible. Measured components and calibration ranges can be selected according to application.

FTT FTIR is a modular construction that typically comprises of FTIR gas analyser; heated sampling unit and an industrial PC which are mounted in a 19" cabin with shelves for easy accessibility & service.



### FTIR Gas Analyser

The FTIR gas analyser is an integral part of the system which allows simultaneous measurement of up to 50 gas compounds. Typically concentrations of  $H_2O$ ,  $CO_2$ ,  $CO$ ,  $SO_2$ ,  $NO$ ,  $NO_2$ ,  $N_2O$ ,  $HCl$ ,  $HF$ ,  $NH_3$ , etc. are continuously measured. The FTIR gas analyser has a multi-pass sample cell which is heated to  $180^\circ C$  and features rhodium-gold plated mirrors which ensures high performance even in high water vapour concentrations or corrosive gases.

## Sampling System

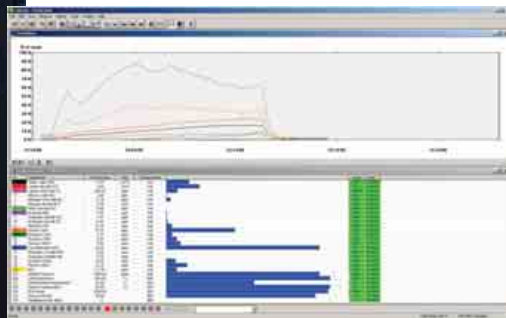


The hot-extractive sampling system consists of a heated sample gas probe, heated sample lines and heated sample pump unit. The whole system is kept at 150°C to 180°C to avoid condensation and subsequent washing of soluble fire gases out of the sample. Two-stage particle filtration is used in order to remove particles from the sample gas. The sample pump unit includes gas connections for the FTIR gas analyser.



## Industrial PC

The industrial PC is required to operate the analyser; to control the sampling system, to translate measured and analysed concentrations and send alarms to higher level automation and control systems. The industrial PC is also used for processing & storing the sample spectra with Calcmet™ - software. Two hard drives are configured as a RAID 1 to provide a complete backup and redundancy for both the operating system and the stored data. From the industrial PC, the analysis results can be exported and used in an external programme (e.g. Excel) for reporting. The FTT FTIR also provides different alarm functions. The alarms can be transferred with relay contacts. If any of the critical alarms are activated, instrument air starts to flow automatically into the system to prevent condensation.



# Calcmeter™ - From Spectrum to Results

The advanced, easy-to-use Calcmeter™ software provides outstanding analytical performance. Calcmeter™ analyses the sample spectrum using sophisticated and patent protected multi-component algorithms. Calcmeter™ is capable of simultaneous detection, identification and quantification of up to 50 different gas components. Cross-interference effects are compensated for and analysis accuracy is maintained even when analysing complex gas mixtures where there is a possibility of spectral overlapping. A resolution of  $4\text{ cm}^{-1}$  is configured to meet most requirements in fire tests. This allows the collection of several measurements every minute whilst retaining high sensitivity.

The software is also designed for easy and efficient processing of the results. Since water content of the sample gas is continuously measured, the results can be reported on either a "wet" or "dry" basis.

Accurate results are available within seconds. Since the sample spectra are stored as separate files on the industrial computer, they can be easily re-analysed with different analysis settings, even after several years. Calcmeter™ software also allows the identification of previously unknown components – a feature that has often shown its value in process control, for example.

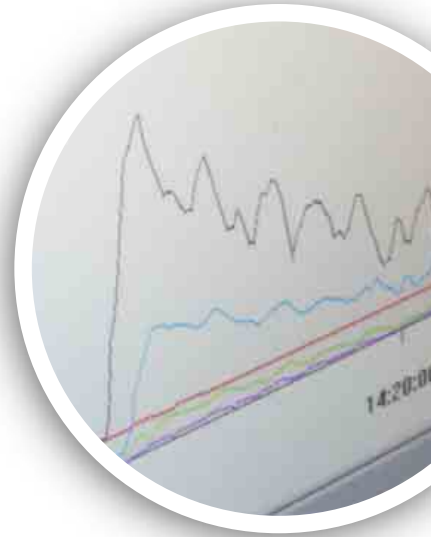
With FTIR measurement technology there is no need to do any span or re-calibrations, only zero calibration with nitrogen every 24 hours. Automated span checks are also supported as standard.

The FTT FTIR has been certified by TÜV (17th BImSchV) and MCERTS. It also fulfills the requirements of QAL I according to EN 14181 and EN ISO 14956. The system is also compliant with U.S. EPA 40 CFR Part 60 Appendix b Performance Specification 15 (Extractive FTIR Continuous Emissions Monitoring Systems in Stationary Sources).



## Key Advantages

- Time resolved results enabling continuous monitoring of species development
- Multiple species can be monitored simultaneously
- Low maintenance requirement
- No span calibrations required (automated span checks possible)
- Hot-extractive-sampling; no sample loss or change of composition
- Fully automated measurement system with comprehensive safety functions
- Fully modular system for maximum flexibility
- Fully configurable to meet requirements of ISO 19702, ISO 9705 and CEN TS 45545-2.
- Capable for individual analysis of airborne concentrations of CO, CO<sub>2</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, HCl, HF, Phenol, Acrolein, water vapour, etc.



FTT FTIR and FTT Smoke Density Chamber

# Technical Specification

## General Parameters

Measuring Principle:	FTIR (Fourier Transform Infrared)
Performance:	Simultaneous analysis of up to 50 gas components (20 in library as supplied)
Operating Temperature:	20 ± 5 °C, non-condensing, dust free ambient air
Storage Temperature:	-20 to +60 °C
Response Time (T90):	< 120 s, depending on the gas flow and measurement time
Gas Cell Temperature:	180 °C
Sample Gas:	Non-condensing, particle free
Flow Rate:	Approximately 4 l/min
Sample Gas Pressure:	Ambient
Dimensions:	Length: 800 mm x Width: 800 mm x Height: 1800 mm

## Measuring Parameters

Zero Point Calibration:	24 hours, calibration with Nitrogen (5.0 or higher N <sub>2</sub> recommended)
Zero Point Drift:	< 2% of measuring range per zero point calibration interval
Sensitivity Drift:	None
Linearity Deviation:	< 2% of measuring range
Temperature Drifts:	< 2% of measuring range per 10 K temperature change
Pressure Influence:	1% change of measuring value for 1% sample pressure change. Ambient pressure changes measured and compensated

## Heated Line

Tube Size:	4/6 mm (inner/outer diameter)
Standard Length*:	3m/1.5m (total/ used inside rack)
Core Material:	Teflon core
Operating Pressure:	Max. 400 kPa
Temperature:	Max. 200 °C
Fittings:	6 mm Swagelok
Power Density:	120 Watts / metre

\*Different lengths are available upon request. The maximum length for the heated line is 30m with 230 VAC and 15m with 115 VAC power supply.

## Alarm Outputs

Function Alarm:	FTIR Gas Analyser and Calcmet application software
System Alarm:	<ul style="list-style-type: none"> <li>■ Heated module temperature low / high</li> <li>■ Heated Line 1 temperature low / high</li> <li>■ Heated Line 2 temperature low / high</li> <li>■ Heated Line 3 temperature low / high</li> </ul>
Concentration Alarm:	Measured value low / high

## Sample Probe

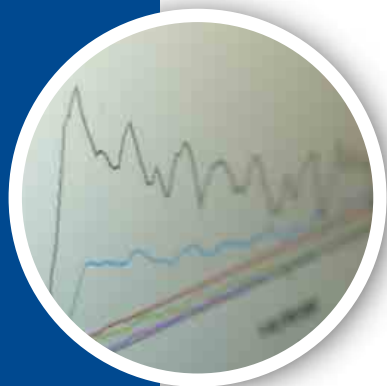
Sample Probe:	As per the required standard
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## Electrical Connections

Main Supply:	230 VAC at 50/60 Hz 16 Amp or 115 VAC at 50/60 Hz at 32 Amp
Power Consumption:	The full system including the FTIR Gas Analyser, PC, Sampling Unit, Sampling Probe and Heated Lines approximately 7.5 kW

## Gas Species

Gas Species:	<ul style="list-style-type: none"> <li style="width: 20%;">■ H<sub>2</sub>O</li> <li style="width: 20%;">■ CO<sub>2</sub></li> <li style="width: 20%;">■ CO</li> <li style="width: 20%;">■ N<sub>2</sub>O</li> <li style="width: 20%;">■ NO</li> <li style="width: 20%;">■ NO<sub>2</sub></li> <li style="width: 20%;">■ SO<sub>2</sub></li> <li style="width: 20%;">■ NH<sub>3</sub></li> <li style="width: 20%;">■ HCl</li> <li style="width: 20%;">■ HF</li> <li style="width: 20%;">■ CH<sub>4</sub></li> <li style="width: 20%;">■ C<sub>2</sub>H<sub>6</sub></li> <li style="width: 20%;">■ C<sub>2</sub>H<sub>4</sub></li> <li style="width: 20%;">■ C<sub>3</sub>H<sub>8</sub></li> <li style="width: 20%;">■ C<sub>6</sub>H<sub>14</sub></li> <li style="width: 20%;">■ CH<sub>2</sub>O</li> <li style="width: 20%;">■ HCN</li> <li style="width: 20%;">■ HBr</li> <li style="width: 20%;">■ Acrolein</li> <li style="width: 20%;">■ Phenol</li> </ul>
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fire testing technology limited



*Charlwoods Road*

*East Grinstead*

*West Sussex RH19 2HL*

*Tel: +44 (0)1342 323600*

*Fax: +44 (0)1342 323608*

*email: [sales@fire-testing.com](mailto:sales@fire-testing.com)*

*web: [www.fire-testing.com](http://www.fire-testing.com)*