



Low level sulphur analyser for natural gas and biogas

ES300 | 310 | 315



- Analysing sulphur components at ppb level
- FPD or PFPD. SCD and Mass Spectrometer optional
- Can be combined with natural/bio gas analyser
- ASTM D6228, D5504, ISO 19739

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ES300v3

Low level sulphur analyser

The GAS Low-Level Sulphur Analyser provides precise measurement of volatile sulphur species in natural gas and biogas. It can operate independently as a standalone analyser or be combined with existing natural gas or biogas instruments to provide an extra analysis channel.

Principle of operation

The low-sulphur analyser for natural gas and biogas comprises a gas sampling valve (GSV), a suitable separation column, and a sulphur-selective detector, either an FPD (Flame Photometric Detector) or a PFPD (Pulsed-FPD); see figure 1. As sulphur species readily adsorb onto active surfaces, Sulfinert (SilcoNert 2000) deactivation is applied to the entire sample path, a measure that is critical for reliable and accurate quantification.

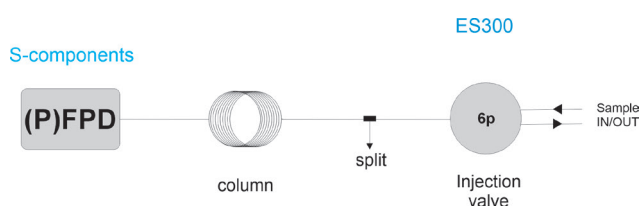


Figure 1 Diagram low level sulphur analyser

FPD or PFPD?

PFPD and FPD both offer excellent long term stability. PFPD offers best sensitivity (20-30ppb; see figure 6) while FPD provides a cost effective solution when detection limits of 100-200 ppb are sufficient.

Choice of separation column

The choice of the optimal separation column depends on the components being analysed and the sample matrix. Available column phases include non-polar, sulphur-selective, and porous polymer.

Specification

- Thermo Trace GC1600 or CompactGC^{4.0} with GSV, capillary column, FPD or PFPD detection
- Minimum detectability FPD: 100-200 ppb; PFPD: 20-30 ppb
- Repeatability < 1 %
- Optional: detection using Sulphur Chemiluminescence Detector (SCD; LOD 10 ppb) or mass spectrometer (MS-AEI; LOD>1 ppb)

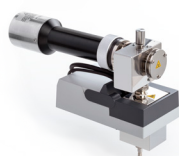


Figure 2 iConnect FPD detector module (Trace GC 1600)

Results

Figure 3, 4, 5 and 6 show an example chromatogram, repeatability, linearity and limit of detection.

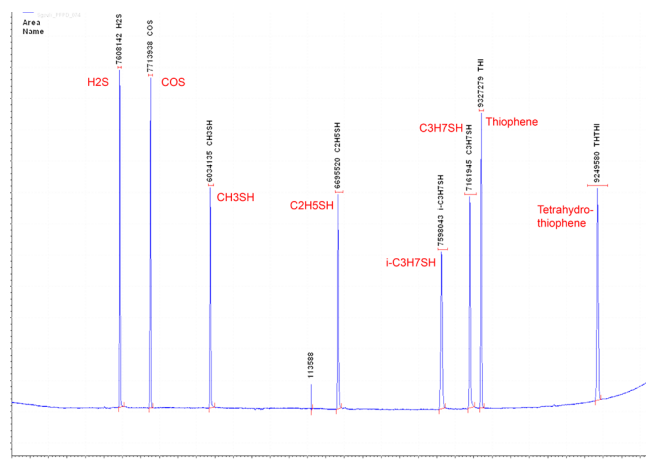


Figure 3 Chromatogram calibration standard. Concentration level: 5 ppm per component. Detector: PFPD. Column: Select Low Sulphur

GC-PFPD ID	H2S Area	COS Area	CH3SH Area	C2H5SH Area	i-C3H7SH Area	C3H7SH Area	THI Area	THTHI Area
PFPD_071	7653680	7716514	6026713	6764998	7612207	7096988	9317300	9228699
PFPD_072	7575351	7695225	5928568	6794048	7631111	7204149	9296086	9213385
PFPD_073	7640397	7686897	6013745	6725392	7641811	7193838	9352664	9246370
PFPD_074	7608142	7713838	6034135	6695520	7598043	7161945	9327279	9249580
Min:	7575351	7695225	5928568	6695520	7598043	7096988	9296086	9213385
Max:	7653680	7716514	6034135	6794048	7641811	7204149	9352664	9249580
Mean:	7621393	7708144	6007030	6744989	7620793	7164230	9323382	9244509
Std Dev:	36820	10646	46880	43352	19489	48294	23569	16811
%RSD:	0.48	0.14	0.81	0.64	0.26	0.67	0.25	0.18

Figure 4 Statistical data of the chromatogram shown in figure 3

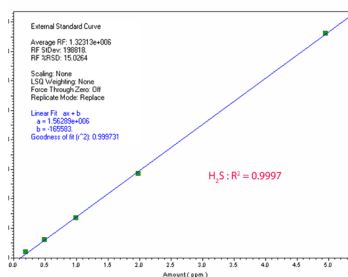


Figure 5 Linearity curve of H₂S: $r^2 = 0.9997$ (100ppb - 5 ppm) ($r^2 > 0.995$ for all components)

Component	LOD (ppb)
H2S	17
COS	18
CH3SH	25
C2H5SH	27
i-C3H7SH	39
C3H7SH	30
THI	22
THTHI	30

Figure 6 Limits of detection for PFPD

Ordering information	ES30X - ABCDE GC1600 - FPD			
	ES31X - ABCDE GC1600 - PFPD			
	ES325 - ABCDE CompactGC ^{4.0} - PFPD			
code X	0	1	2	3
GC model, power	1600, 230V	1610, 230V	1600, 115V	1610, 115V

For the selection of options (e.g. valve type and passivation, pump and vacuum sampling, rotameter and sample connections, pressure and moisture sensors, hydrogen sensor for safety shut-off, GC oven cryo valves, power plug type and more), [see the options table](#).