



## CO - CO<sub>2</sub> Analyser

- Robust analyser with high uptime
- Reliable diaphragm valves
- Modular detectors
- UOP 603-13
- Limit of detection: 50 ppb

AN 231WA0017A

GAS offers custom configured GC analysers for many application fields since 40 years. GAS analysers are designed to meet many standardised methods from GPA, ASTM, UOP, ISO, EN and others. The efficient configurations are based on proven GC technology, resulting in robust instruments with an optimal return on investment.

The GAS CO-CO<sub>2</sub> analyser is the customised solution for analysing CO, CH<sub>4</sub> and CO<sub>2</sub> in several gas matrices like hydrogen, hydrocarbon streams and industrial gases. A typical application is the analysis of sub-ppm levels in ethylene or propylene. The analyser complies with UOP 603-13. Various options are offered for extending the application range.

### Analysed Components

Diagram 1 shows the principle of the CO-CO<sub>2</sub> analyser. The instrument includes a high performance diaphragm valve for injection and backflush, two packed columns, a methaniser to convert CO and CO<sub>2</sub> in methane, and a FID (Flame Ionisation Detector). Column 1 separates the components of interest from the bulk, which is effectively backflushed in this way.

### Robust diaphragm valves

The CO-CO<sub>2</sub> analyser uses robust diaphragm valves with internal purge, mounted in an independently heated valve oven. These valves offer 5 times longer lifetime compared to rotary valves, with reduced maintenance costs as a result.

### Benchtop GC or Micro GC

The GAS CO-CO<sub>2</sub> analyser is available on Thermo Trace 1300/1310 benchtop GC, which offers unique InstantConnect injector and detector modules that can be exchanged by the user in minutes. The CO-CO<sub>2</sub> analyser is also offered on GAS CompactGC<sup>4.0</sup>, the 19" micro GC with fast analysis time.

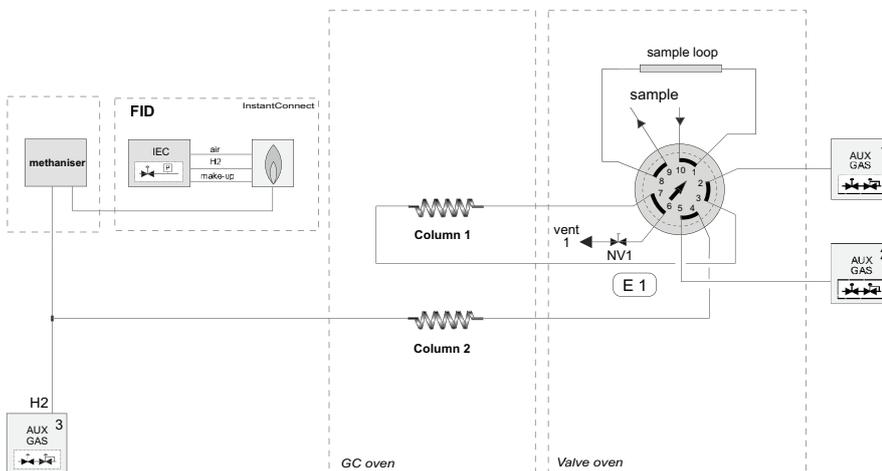


Figure 1. Diagram CO-CO<sub>2</sub> analyser



Figure 2. Diaphragm valve for extended lifetime

## Results

Figure 3 shows a typical chromatogram of the calibration standard containing 5 ppm CO, CH<sub>4</sub> and CO<sub>2</sub> in N<sub>2</sub>. The limit of detection is 50 ppb.

## Chromatography Data Systems

Powerful, easy to use data systems offer a high level of automation and reporting. The CO-CO<sub>2</sub> analyser is available with Chromeleon or OpenLab.

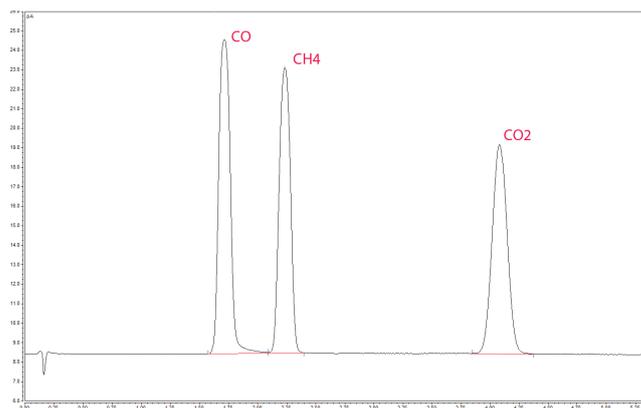


Figure 3. Chromatogram CO-CO<sub>2</sub> analyser, methaniser- FID detection, 5 ppm concentration level.

## Options:

### - Heartcut valve for high methane levels

Samples containing high methane levels can cause carbon build up in the catalyst. An optional valve is available to vent the high methane content.

### - Additional separation column in case of high O<sub>2</sub> levels

Hydrocarbon streams like ethylene and propylene normally contain low levels of oxygen, which do not interfere on methaniser-FID. In case of high oxygen content, for instance when analysing industrial gases, CO detection will be disturbed. To overcome this, an additional valve and separation column are offered.

### - Vaporiser

A vaporiser is available for liquid C<sub>3</sub> and C<sub>4</sub> samples.

### - Low level CO-CO<sub>2</sub> on CompactGC<sup>4.0</sup>

CompactGC<sup>4.0</sup> with methaniser-FID is offered for fast analysis of CO and CO<sub>2</sub> at sub-ppm levels in only 60 seconds. Robust diaphragm valves are used in a compact 19" industrial standard enclosure.

Inj. No.	Injection Name Selected Peak:	Type	Area pA*min		
			FID_Back CO	CH4	CO2
10	Reproducibility FID Bac	Unknown	1.851	1.679	1.586
11	Reproducibility FID Bac	Unknown	1.840	1.677	1.584
12	Reproducibility FID Bac	Unknown	1.841	1.674	1.591
13	Reproducibility FID Bac	Unknown	1.849	1.675	1.593
14	Reproducibility FID Bac	Unknown	1.851	1.671	1.596
15	Reproducibility FID Bac	Unknown	1.840	1.667	1.582
16	Reproducibility FID Bac	Unknown	1.840	1.665	1.582
17	Reproducibility FID Bac	Unknown	1.817	1.664	1.579
18	Reproducibility FID Bac	Unknown	1.828	1.670	1.589
19	Reproducibility FID Bac	Unknown	1.824	1.660	1.587
Maximum			1.851	1.679	1.596
Average			1.838	1.670	1.587
Minimum			1.817	1.660	1.579
Standard Deviation			0.012	0.006	0.005
Relative Standard Deviation			0.64%	0.38%	0.33%

Figure 4. Excellent repeatability at 5 ppm level.



Figure 5. UOP 603-13 analyser based on GC Trace 1300 with valve oven

## Specifications:

Standardised method:	UOP 603-13
Configuration:	1 channel instrument with gas injection and methaniser-FID
GC instrument:	Thermo GC Trace 1300 or GAS CompactGC <sup>4.0</sup>
Optional:	<ul style="list-style-type: none"><li>- Heartcut valve for high methane levels</li><li>- Extra column (Molsieve) in case of high (%) oxygen levels</li><li>- Sample stop flow valve for accurate results</li><li>- Selector valve for multiple stream analysis</li><li>- Vaporiser for LPG samples</li></ul>
Sample tubing:	Sulfinert <sup>®</sup> tubing for inert sample path
Application:	Custom configured analyser for the analysis of gaseous and liquefied samples containing CO, CH <sub>4</sub> and CO <sub>2</sub> . The instrument is factory tuned for the specific application intended.
Sample requirements:	See our pre-installation guide for additional requirements
Analysis Time:	< 5 minutes
Minimum detectability:	50 ppb for CO, CH <sub>4</sub> and CO <sub>2</sub> (100 ppb for CO when additional Molsieve column is used)
Dynamic Range:	Four decades for all components
Linearity:	10 <sup>4</sup>
Methaniser conversion efficiency:	within 5% relative to methane
Accuracy:	Better than 1 % RSD
Repeatability:	Better than 1 % RSD



Figure 6. iConnect injectors and detectors: flexible; low maintenance costs



Figure 7. UOP 603-13 on CompactGC<sup>4.0</sup>

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