

SPECIFICATIONS

- Standard methods:** UOP 539, DIN 51666, ASTM D2163
- Configuration:** Three channel instrument using 2 TCDs and FID, based on CompactGC. Independent heated valve oven, 3 independent heated isothermal column ovens for multi-dimensional separations, using capillary columns. Injection: gas sampling valves with fixed sample loops.
- Optional:** Additional valve for gas injection at ambient pressure (stop flow), or back-pressure regulator for injection at constant pressure.
- Sample tubing:** Sulfinert® tubing for inert sample path (H₂S analysis).
- Application:** Custom configured analyser for the analysis of gaseous samples, containing hydrocarbons, permanent gases and sulfur (H₂S). All saturated and unsaturated hydrocarbons from C₁-C₅ including C₆+ composite are separated. Separate analysis channels for hydrogen, permanent gases, and hydrocarbon determination. The instrument can be applied for all types of refinery gases, including stack gases, flare gases and reformer gases.
- Sample requirements:** The sample must be offered to the analyser as a gas at room temperature. In case of high overpressure more than 3 bars, the excess pressure needs to be reduced. See our pre-installation guide for additional requirements
- Analysis Time:** Less than 200 seconds.
- Minimum Detectability:** Better than 0.01% for all individual components. H₂S: 0.05%.
- Dynamic Range:** Four decades for all components.
- Accuracy:** Dependant on external calibration and repeatability.
- Repeatability:** Better than 1% RSD at 1% concentration level for all analytes specified, measured over at least 10 consecutive runs.
- Custom reporting:** Calorific value and Carbon content calculation according to DIN 51666.
- Optional configurations:** Configuration with packed columns only (runtime 40 minutes) based on Trace GC.
Configuration with packed and capillary columns (runtime 15 minutes, based on TraceGC).

For more information:

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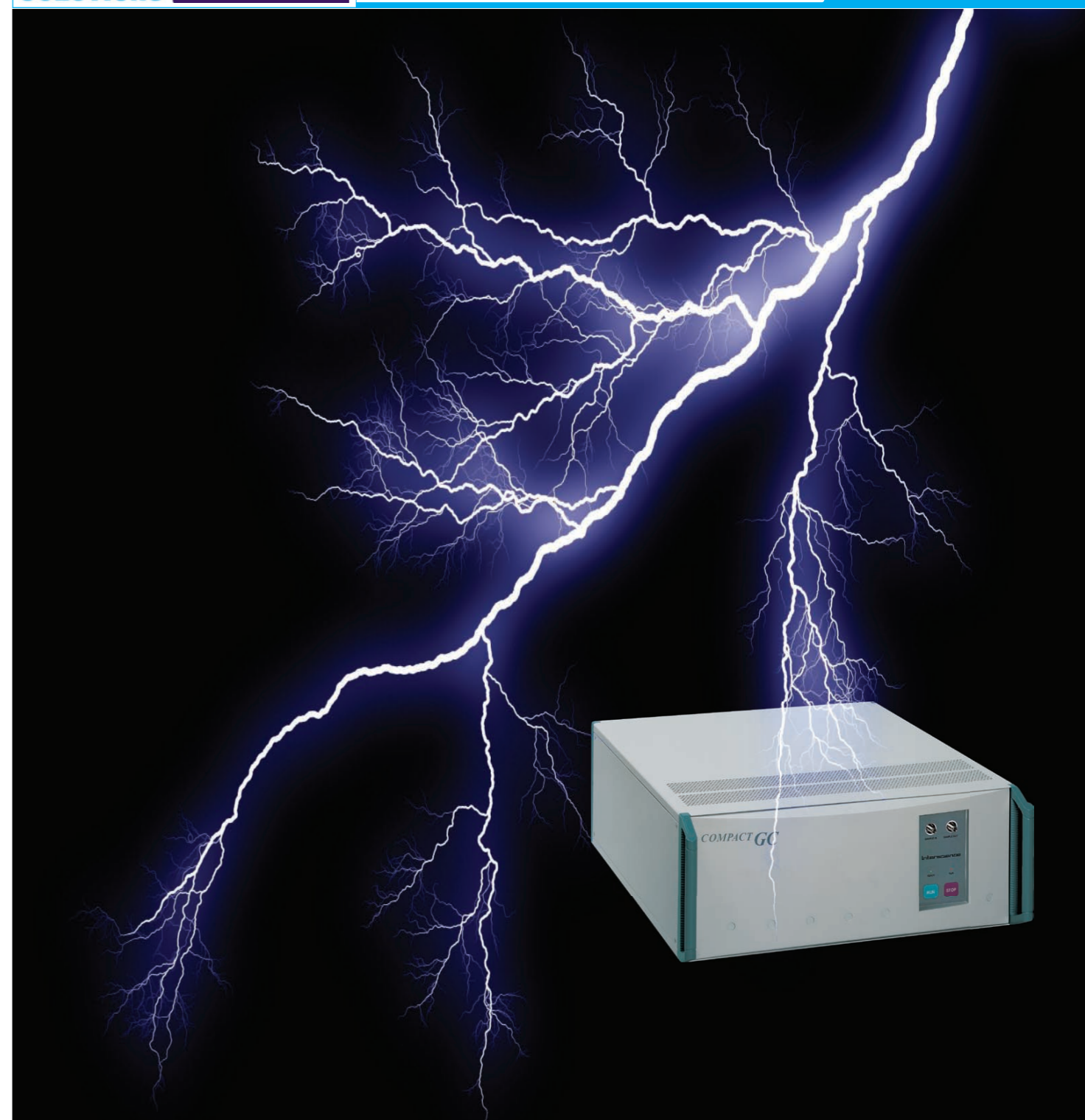


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APPLICATION NOTE 207WA0809A

Flash RGA

Introduction

The Flash Refinery Gas Analyser from G-A-S analyses a wide scope of sample streams in only 200 seconds! Complete characterisation is offered by fast analysis of 32 components. The instrument occupies little space, using the popular 19" standard industrial enclosure. The Flash RGA is based upon Proven GC Technology like Valco® valves, robust GC detectors and standard available columns. The result is a very stable and reliable instrument.



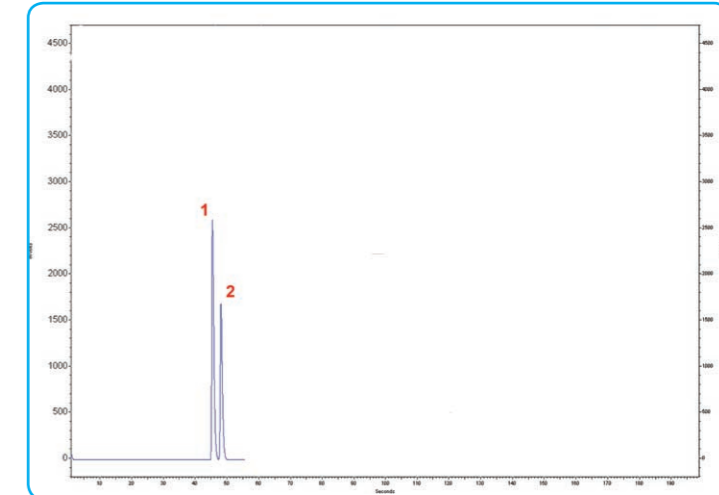
Benefits:

- ◇ Full Refinery Gas Analysis in only 200 seconds
- ◇ Including reporting according to DIN 51666
- ◇ Meets requirements of UOP539, DIN51666, ASTM D2163
- ◇ No additional cooling time: run time=cycle time
- ◇ Proven GC technology: reliable and robust instrument
- ◇ Full digital control

Results and chromatograms

TCD R	RT (min)	NORM Conc (mol%0)	Molar Mass (g/mol)	Mass Fract (g/g)	Carbonfract (g/g)	Carbon Content (g/100g)	Calorific Value (kJ/100g)
H2	0.000	12.590	2.015	25.369	0	0.000	91.64
TCD L							
Carbon dioxide	0.000	3.012	44.01	132.558	0.2729	1.098	0.00
Hydrogen disulfide	0.000	0.196	31.998	8.272	0	0.000	0.00
Oxygen	0.000	38.151	28.013	1096.735	0	0.000	0.00
Methane	0.000	0.999	28.01	27.982	0.4288	0.361	8.51
FID AUS							
Methane	0.000	5.056	16.043	81.113	0.7487	1.930	122.26
Ethane	0.000	3.930	30.07	118.175	0.7989	2.944	169.18
Ethene	1.885	2.012	28.054	56.445	0.8563	1.456	80.21
Propane	0.000	5.947	44.097	262.244	0.8171	6.455	366.11
Propylene - Cyclopropane	0.000	3.015	42.081	126.878	0.8563	3.273	174.95
Propadiene	0.000	0.988	40.065	39.584	0.8994	1.073	55.21
Acetylene	0.000	0.999	26.038	26.012	0.9226	0.723	37.83
iso-Butane	0.000	4.965	58.123	288.580	0.8266	7.186	396.18
n-Butane	0.000	3.994	58.123	232.143	0.8266	5.781	319.75
Trans-2-butene	0.000	2.998	58.108	187.706	0.8563	4.326	227.86
1-Butene	0.000	1.986	56.108	111.430	0.8563	2.875	152.04
iso-Butylene	3.325	0.996	56.11	55.885	0.8563	1.442	75.75
Cis-2-butene	0.000	1.000	56.108	56.108	0.8563	1.447	76.35
iso-Pentane	0.000	0.997	72.15	71.933	0.8324	1.804	98.06
1,3-Butadiene	0.000	2.987	54.092	182.113	0.8882	4.338	217.48
n-Pentane	0.000	0.990	72.15	71.428	0.8324	1.791	97.59
Trans-2-Pentene	0.000	0.199	86.177	17.149	0.8363	0.432	23.31
2-Methyl-2-Butene	0.000	0.199	86.177	17.149	0.8363	0.432	23.31
1-Pentene	4.698	0.999	86.177	34.385	0.8363	0.866	48.73
Cis-2-Pentene	0.000	0.299	86.177	25.767	0.8363	0.649	35.02
n-Hexane	0.000	0.095	86.177	8.195	0.8363	0.206	11.14
		100.000	Total = 3319.340		100.000	52.682	7986.463
				Total Carbon		Calorific Value	

Additional DIN 51666 report (Calorific value; Carbon content)



Chromatogram 1: Channel 1, TCD

Analyser

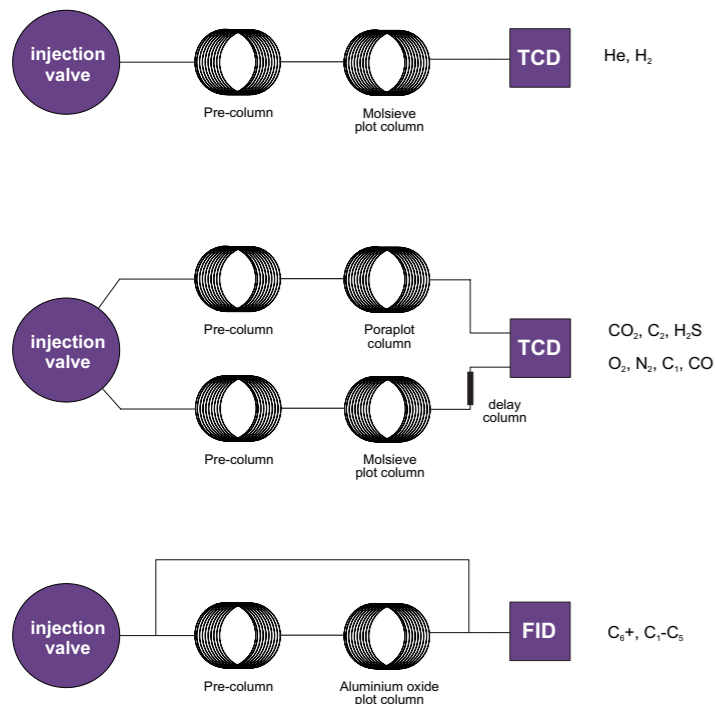


Figure 1: Diagram Flash RGA

Figure 1 shows the diagram of the Flash RGA. The analyser has 3 separate analysis channels; each channel has a backflush option to protect the separation column from high boiling components.

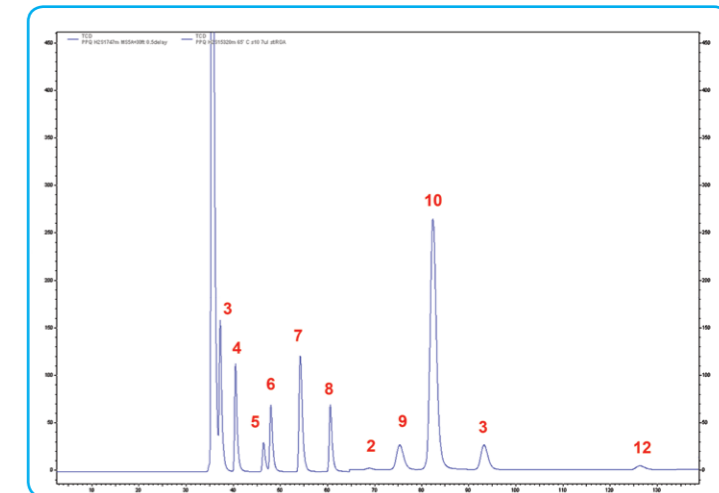
- Channel 1 determines helium and hydrogen, using TCD detection.
- On channel 2, the sample is injected on two columns. A delay column is added to prevent simultaneous eluting of both columns on TCD. Carbon dioxide, C₂-components and hydrogen sulfide are analysed, followed by oxygen, nitrogen, methane and carbon monoxide.
- On channel 3, C₆+ is backflushed to the detector, eluting as the first peak in the chromatogram, before C₁-C₅ hydrocarbons. For this component group, FID is the preferred detector.

- ◇ All gas flows and pressures are digitally controlled.
- ◇ The Valco® valves are located in an independent heated valve compartment. Sample condensation is avoided in this way, and valve lifetime is enlarged.
- ◇ All channels have separate columns ovens, for optimal parameter setting, resulting in a short runtime.
- ◇ The analysers uses standard available capillary columns.
- ◇ The components are detected by standard highly stable GC detectors with a very reliable and robust instrument as a result.

The EZChrom® data system is used for data handling, providing all needed processing, reporting and quality control features.

Additional reports are available as well, for instance reporting of Calorific value and Carbon content according to DIN 51666.

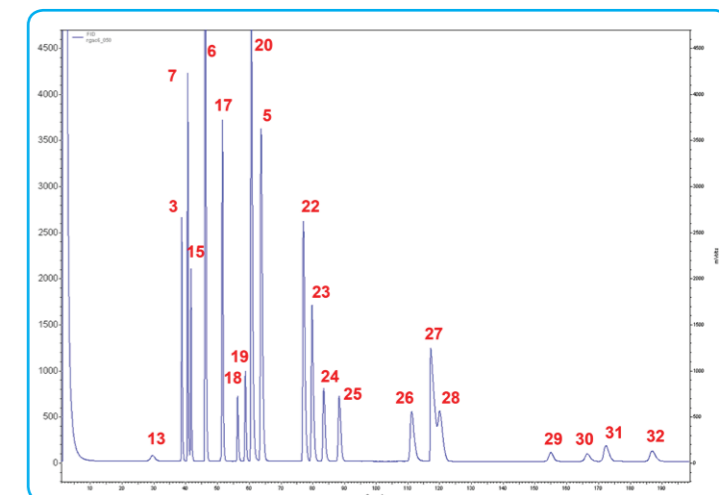
The results are excellent. Percentage levels of hydrogen sulfide are handled without any problem because robust parts and inert Sulfinert® treated materials are used. The minimum detectability is 0.01 % for all components (0.05 for H₂S).



Chromatogram 2: Channel 2, TCD

1 Helium	18 iso-Butane
2 Hydrogen	19 n-Butane
3 Methane	20 Propadiene
4 Carbon dioxide	21 Acetylene
5 Acetylene	22 t-2-Butene
6 Ethylene	23 1-Butene
7 Ethane	24 Isobutylene
8 Hydrogen Sulfide	25 c-2-Butene
9 Oxygen	26 Isopentane
10 Nitrogen	27 n-Pentane
12 Carbon monoxide	28 1,3-Butadiene
13 C ₆ +	29 t-2-Pentene
14 Ethane	30 2-me-2-Butene
15 Ethylene	31 1-Pentene
16 Propane	32 c-2-Pentene
17 Propene	

Table 1: Analysed components (see chromatograms)



Chromatogram 3: Channel 3, FID