

Natural Gas Analyser

ES100

- ISO 6974-3, 6975, 6976, GPA 2286
- Integrated calorific value calculation
- High accuracy
- Based on Thermo Trace GC1600

Get ready for tomorrow's analytics

Natural Gas Analyser - ES100

The GAS NGA ES100 complies with several international standards, including ASTM D1945, D1946, ISO 6974, 6975, 6976, and GPA 2261, 2177, 2186, and 2286.

Principle of operation

The GAS ES100 Natural Gas Analyser is configured using a Thermo Trace GC1600 with TCD (Thermal Conductivity Detector) and FID (Flame Ionisation Detector), 3 diaphragm valves and 4 separation columns. The 10-port valve injects the sample and back flushes propane and higher boiling components. CO₂ and H₂S are separated on column 2 (Hayesep), while O₂, N₂, CH₄ and CO are analysed using column 3 (Molsieve), after initially being isolated using the 6-port valve. Hydrogen is analysed as well with reduced sensitivity and linearity since helium is used as carrier gas. See figure 2 for the chromatogram. C₁ to C₈ and higher hydrocarbons (e.g. up to C₂₀) are measured on FID, including baseline separation of neo-pentane, see figure 3.

Instrument configuration

- Thermo GC1600 with InstantConnect TCD and FID
- Three 1/16" micro-packed columns; Restek Rtx-1 capillary column or others available on request
- Heated valve oven with one 10-port and two 6-port diaphragm valves (rotary valves optional)
- Chromeleon CDS data system with optional NGA calculation pack for calorific value calculation

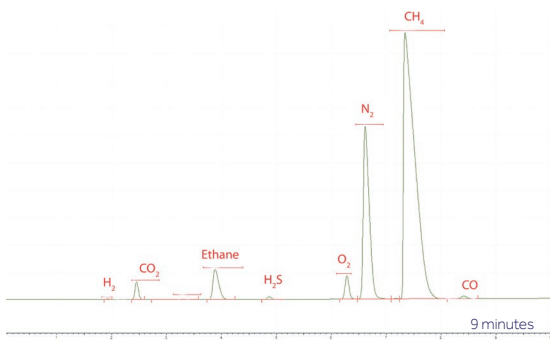


Figure 2 Chromatogram ES100 analyser, TCD channel

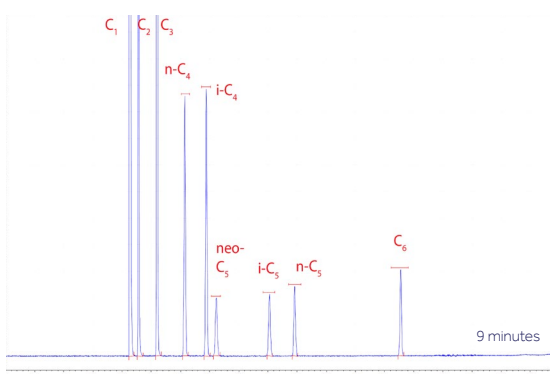


Figure 3 Chromatogram ES100 analyser, FID channel

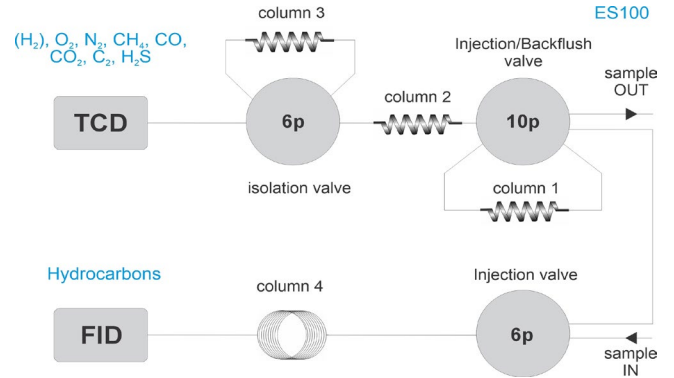


Figure 1 Diagram NGA ES100

Results

Figure 4 shows the calorific value report, which is an integral part of Chromeleon; therefore exporting data to external software is not required. Figure 5 presents an example of the excellent repeatability of the data.

Natural gas calculations											
Instrument	Trace 1300 NGA	Sequence name	Data G.A.S. NGA pack								
Instrument Method	Initial gas injection	Data Vault	ChromeleonLocal								
Processing Method	New Processing Method	Report Template	G.A.S. NGA Report Template								
Data File	NGA 1700 reporo TCDs	Seq. Line	10								
Injection Date	08/Jul/2014	Peaks	9								
Injection Time	13:21										
Calculation Type	Total										
Physical property report for the dry gas - combustion at 15°C according to ISO 6976											
Metering at 0°C and 101.325kPa											
Sup. Calorific Value	897.41 kJ/mol	Mass basis	49.60 MJ/kg	Volumetric basis	40.15 MJ/m ³	Calories	9587.93 kcal/m ³	Wobbe index	30.74 MJ/m ³	BTU	1077.55 BTU/lb
Inf. Calorific Value	809.73 kJ/mol		44.75 MJ/kg		36.23 MJ/m ³		8650.79 kcal/m ³		45.78 MJ/m ³		972.27 BTU/lb
Mean mol weight	18.093 g/mol										
Compression factor	0.9972										
Relative Density	0.6261										
Density	0.8094 kg/m ³										
Metering at 15°C and 101.325kPa											
Sup. Calorific Value	897.41 kJ/mol	Mass basis	49.60 MJ/kg	Volumetric basis	38.04 MJ/m ³	Calories	9084.12 kcal/m ³	Wobbe index	48.09 MJ/m ³	BTU	1020.97 BTU/lb
Inf. Calorific Value	809.73 kJ/mol		44.75 MJ/kg		34.32 MJ/m ³		8196.97 kcal/m ³		43.39 MJ/m ³		931.22 BTU/lb
Mean mol weight	18.093 g/mol										
Compression factor	0.9977										
Relative Density	0.6258										
Density	0.7669 kg/m ³										
Metering at 20°C and 101.325kPa											
Sup. Calorific Value	897.41 kJ/mol	Mass basis	49.60 MJ/kg	Volumetric basis	37.39 MJ/m ³	Calories	8928.14 kcal/m ³	Wobbe index	47.27 MJ/m ³	BTU	1003.44 BTU/lb
Inf. Calorific Value	809.73 kJ/mol		44.75 MJ/kg		33.73 MJ/m ³		8055.83 kcal/m ³		42.65 MJ/m ³		905.40 BTU/lb
Mean mol weight	18.093 g/mol										
Compression factor	0.9978										
Relative Density	0.6257										
Density	0.7538 kg/m ³										

Figure 4 Calorific Value report by Chromeleon

TRACE 1300 GC-FID				TRACE 1300 GC-TCD			
Sample ID	Methane Area	Ethane Area	Propane Area	Sample ID	CO2 Area	Ethane Area	Methane Area
Reprotest NGA 111	20138243	1738944	640911	Reprotest NGA 111	2226454	588353	5345064
Reprotest NGA 112	20068079	1734190	638430	Reprotest NGA 112	2217893	5912294	5346325
Reprotest NGA 113	20044487	1731425	637100	Reprotest NGA 113	2215985	5903676	5346802
Reprotest NGA 114	20036909	1732525	637037	Reprotest NGA 114	2227435	594121	5345091
Reprotest NGA 115	20018051	1730020	636031	Reprotest NGA 115	2213580	5897482	5346069
Reprotest NGA 116	20081304	1733729	637886	Reprotest NGA 116	2212296	5911606	5349411
Reprotest NGA 117	20025651	1728628	636297	Reprotest NGA 117	2222737	5903879	5349856
Reprotest NGA 118	20079526	1735024	637270	Reprotest NGA 118	2219658	5918692	5350448
Reprotest NGA 119	19994570	1727638	636303	Reprotest NGA 119	2223410	5922395	5351821
Reprotest NGA 120	20012133	1728947	635546	Reprotest NGA 120	2217703	594050	5353994
Reprotest NGA 121	20010572	1728331	635273	Reprotest NGA 121	2225062	5889589	5345321
Reprotest NGA 122	20031270	1730048	635884	Reprotest NGA 122	2219024	5902849	5351045
Reprotest NGA 123	19971088	1723629	634951	Reprotest NGA 123	2224970	5902603	5350286
Reprotest NGA 124	20019514	1728056	634889	Reprotest NGA 124	2228994	5911536	5349733
Reprotest NGA 125	20002092	1728500	635194	Reprotest NGA 125	2223668	594325	5345351
Reprotest NGA 126	19945816	1722529	632508	Reprotest NGA 126	2232354	5907475	5351045
Reprotest NGA 127	19970722	1723681	633248	Reprotest NGA 127	2224065	5903110	5350234
Reprotest NGA 128	20004032	1728207	636239	Reprotest NGA 128	2219309	5940337	53507039
Reprotest NGA 129	20023385	1729288	635917	Reprotest NGA 129	2216183	5913463	5352165
Reprotest NGA 130	19907280	1721256	634289	Reprotest NGA 130	2221091	5939800	5346745
Min:	19907280	1721256	632508	Min:	2213580	5897482	5345064
Max:	20138243	1739944	640911	Max:	2223254	5913463	5353904
Mean:	20019430	1729295	638074	Mean:	2221734	5903696	5348926
Std Dev:	51251	4519	1835	Std Dev:	4782	3839	2770
%RSD:	0.26	0.26	0.29	%RSD:	0.22	0.07	0.05

Figure 5 Excellent repeatability data

Ordering information ES10X - ABCDE

code X	0	1	2	3
GC model, power	1600, 230V	1610, 230V	1600, 115V	1610, 115V

For the selection of options ABCDE (e.g. valve type and passivation, pump and vacuum sampling, rotameter and sample connections, pressure and moisture sensors, hydrogen sensor for safety shut-off, power plug type and more), see the options table in the order guide.

About GAS

Global Analyser Solutions provides GC & GC-MS solutions for Energy, Refinery, Chemical and Environmental markets. Our analysers address a broad spectrum of measuring requirements with high precision and reliability. Please reach out for more information on our website. www.gassite.com