

Natural Gas Analyser

ES100

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

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ES100v2

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)
- Optional NGA calculation pack for calorific value calculation
- Run time: 9 minutes
- LOD: < 0.01%

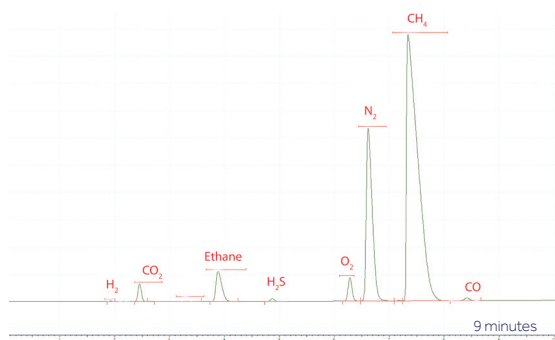


Figure 2 Chromatogram ES100 analyser, TCD channel

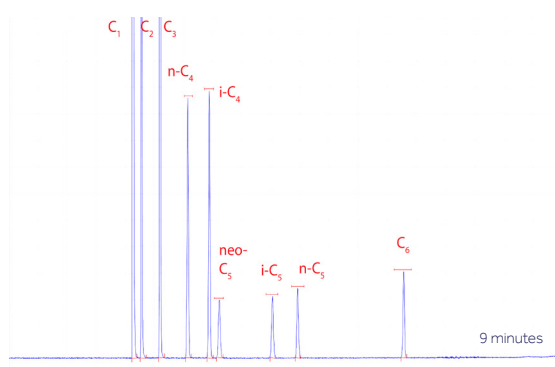


Figure 3 Chromatogram ES100 analyser, FID channel

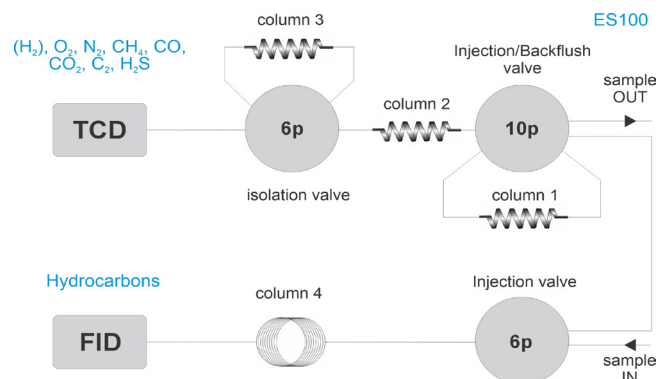


Figure 1 Diagram NGA ES100

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				Sequence name		Data G.A.S. NGA pack	
Instrument	Trace 1300 NGA				Data Vault		Chromenolocal
Instrument Method	initial gas injection				Report Template		G.A.S. NGA Report Template
Processing Method	New Processing Method				Seq. Line		9
Data File	NGA mix vapo TCDs				Peaks		
Injection Date	08/Jul/2014						
Injection Time	13:21						
Calculation Type	Total						
Physical property report for the dry gas - combustion at 15°C according to ISO 6976							
Metering at 15°C and 101.325kPa							
Molar basis		Mass basis		Volumetric basis		Calories	Webb index
Sup. Calorific Value	897.41 kJ/mol	49.60 MJ/kg	40.15 MJ/m³	9587.52 kcal/m³	50.74 MJ/m³	1077.55 BTU/m³	
Inf. Calorific Value	809.73 kJ/mol	44.75 MJ/kg	36.23 MJ/m³	8650.79 kcal/m³	45.78 MJ/m³	972.27 BTU/m³	
Mean mol weight	18.093 g/mol						
Compression Factor	0.9972						
Relative Density	0.6261						
Density	0.8054 kg/m³						
Metering at 15°C and 101.325kPa							
Molar basis		Mass basis		Volumetric basis		Calories	Webb index
Sup. Calorific Value	897.41 kJ/mol	49.60 MJ/kg	38.04 MJ/m³	9044.12 kcal/m³	48.09 MJ/m³	1020.97 BTU/m³	
Inf. Calorific Value	809.73 kJ/mol	44.75 MJ/kg	34.32 MJ/m³	8196.57 kcal/m³	43.39 MJ/m³	921.22 BTU/m³	
Mean mol weight	18.093 g/mol						
Compression Factor	0.9977						
Relative Density	0.6258						
Density	0.7660 kg/m³						
Metering at 20°C and 101.325kPa							
Molar basis		Mass basis		Volumetric basis		Calories	Webb index
Sup. Calorific Value	897.39 kJ/mol	49.60 MJ/kg	37.39 MJ/m³	9238.14 kcal/m³	47.27 MJ/m³	1003.44 BTU/m³	
Inf. Calorific Value	809.73 kJ/mol	44.75 MJ/kg	33.73 MJ/m³	8055.83 kcal/m³	42.65 MJ/m³	905.40 BTU/m³	
Mean mol weight	18.093 g/mol						
Compression Factor	0.9978						
Relative Density	0.6257						
Density	0.7444 kg/m³						

Figure 4 Calorific Value report by Chromeleon

TRACE 1000 GC-FID		Methane	Ethane	Propane	TRACE 1000 GC-TCD		CO ₂	Ethane	Nitrogen	Methane
Sample ID	Area	Area	Area	Area	Sample ID	Area	Area	Area	Area	Area
Reprotest NGA 111	2013242	173694	450911	Reprotest NGA 111	222645	589533	5345064	9053793		
Reprotest NGA 112	2006679	173419	638430	Reprotest NGA 112	2217093	5902294	5346925	9045589		
Reprotest NGA 113	2004487	1731425	637100	Reprotest NGA 113	2215965	5903676	5346602	9052642		
Reprotest NGA 114	2003999	1732525	637037	Reprotest NGA 114	2227435	5904121	5345091	9051786		
Reprotest NGA 115	2001051	1730020	636861	Reprotest NGA 115	2213580	5897482	5346469	9048589		
Reprotest NGA 116	2009104	1737329	637086	Reprotest NGA 116	2217296	5901490	5349411	9049316		
Reprotest NGA 117	2007628	1726628	636917	Reprotest NGA 117	2219379	5903079	5349378	9049379		
Reprotest NGA 118	2007506	1735024	637270	Reprotest NGA 118	2219585	5905802	5350448	9055564		
Reprotest NGA 119	19994570	1727838	636983	Reprotest NGA 119	2223140	5902205	5351021	9051461		
Reprotest NGA 120	20012133	1728047	635546	Reprotest NGA 120	2217703	5904050	5353904	9063011		
Reprotest NGA 121	20010572	1728331	635273	Reprotest NGA 121	2222662	5908899	5345121	9053121		
Reprotest NGA 122	20032720	1730048	635864	Reprotest NGA 122	2219104	5902649	5347045	9051348		
Reprotest NGA 123	20017490	1732629	635423	Reprotest NGA 123	2220769	5902803	5347045	9051348		
Reprotest NGA 124	20019514	1728056	634869	Reprotest NGA 124	2220094	5901536	5349375	9051348		
Reprotest NGA 125	20020092	1728500	635194	Reprotest NGA 125	2222668	5904325	5345351	9051343		
Reprotest NGA 126	19945816	1722529	632508	Reprotest NGA 126	2223354	5904775	5351045	9051343		
Reprotest NGA 127	19970722	1723681	633248	Reprotest NGA 127	2224065	5903110	5359224	9064097		
Reprotest NGA 128	20004032	1729027	636239	Reprotest NGA 128	2219399	5904037	5352404	9067003		
Reprotest NGA 129	20023385	1729266	635917	Reprotest NGA 129	2216183	5913463	5352165	9055697		
Reprotest NGA 130	19997289	1721256	634329	Reprotest NGA 130	2221691	5909806	5346745	9055822		
M in:	1990780	1721256	632608	M in:	2215580	5897482	5345064	9045589		
M ac:	200139243	1738944	640811	M ac:	2223254	5913463	5353904	9063011		
M ev:	20013940	1723295	636074	M ev:	2221734	5903986	5349828	9056223		
Std D:	51251	4519	1855	Std Dev:	4762	3539	2770	9865		

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.qassite.com