



Natural Gas Analyser

ES110-ES120-ES130



- ASTM D1945, 6974-5, GPA 2261, 2177
- Integrated calorific value calculation
- High accuracy
- Optional channels for hydrogen (ES120) and hydrocarbons (ES130)

Get ready for tomorrow's analytics

Natural Gas Analyser - ES110 / 120 / 130

The GAS NGA ES110 complies with several international standards, including ASTM D1945, 6974-5, GPA 2261, 2177.

Principle of operation

The GAS ES110 Natural Gas Analyser is configured using a Thermo Trace GC1600 with TCD (Thermal Conductivity Detector), 3 diaphragm valves and 4 micro-packed separation columns. Figure 1 shows the schematic diagram. The 10-port valve injects the sample and back flushes C₆ and higher boiling hydrocarbons to the detector. Hydrocarbons C₃-C₅ (including neo-C₅) are separated on column 2 (DC200/500), while CO₂ and C₂ are isolated and separated on column 3 (Hayesep). Finally O₂, N₂, CH₄ and CO are trapped and analysed using column 4 (Molsieve), see figure 2 for the chromatogram. The analyser can be expanded with optional channels for

- Hydrogen (ES120) or
- Hydrocarbons (ES130)

Instrument specification

- Thermo GC1600 with InstantConnect TCD, external valve oven, 3 diaphragm valves (rotary valves optional)
- Optional NGA calculation pack for calorific value calculation
- Runtime 38 minutes
- Minimum detectability < 0.01 %

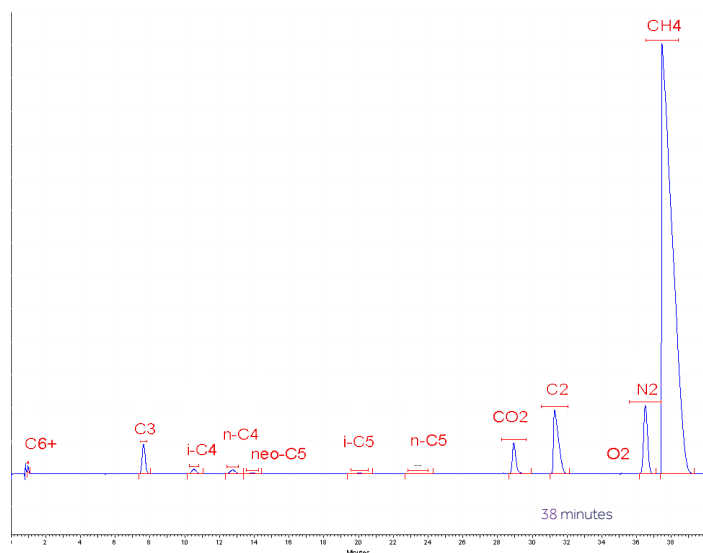


Figure 2 Chromatogram ES110 analyser

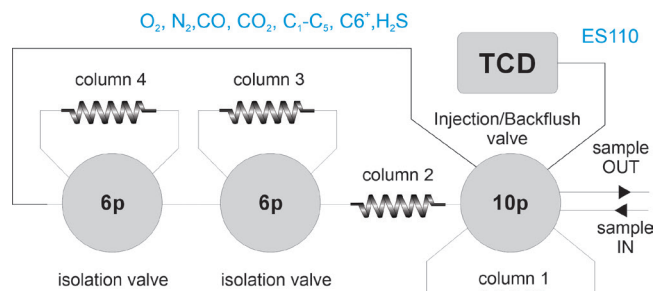


Figure 1 Diagram ES110 analyser

Results

Figure 3 shows the calorific value report, which is an integral part of Chromeleon; therefore exporting data to external software is not required. Figure 4 presents an example of the excellent repeatability of the data.

Natural gas calculations						
Instrument	Trace1300 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 mix repro 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						
	Molar basis	Mass basis	Volumetric basis	Calories	Wobbe Index	BTU
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/lb
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/lb
Mean mol weight	18.093 g/mol					
Compression Factor	0.9972					
Relative Density	0.6261					
Density	0.8094 kg/m³					
Metering at 15°C and 101.325kPa						
	Molar basis	Mass basis	Volumetric basis	Calories	Wobbe Index	BTU
Sup. Calorific Value	897.41 kJ/mol	49.60 MJ/kg	38.04 MJ/m³	9084.12 kcal/m³	48.09 MJ/m³	1020.97 BTU/lb
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/lb
Mean mol weight	18.093 g/mol					
Compression Factor	0.9977					
Relative Density	0.6258					
Density	0.7669 kg/m³					
Metering at 20°C and 101.325kPa						
	Molar basis	Mass basis	Volumetric basis	Calories	Wobbe Index	BTU
Sup. Calorific Value	897.41 kJ/mol	49.60 MJ/kg	37.39 MJ/m³	8928.14 kcal/m³	47.27 MJ/m³	1003.44 BTU/lb
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/lb
Mean mol weight	18.093 g/mol					
Compression Factor	0.9978					
Relative Density	0.6257					
Density	0.7538 kg/m³					

Figure 3 Calorific Value report by Chromeleon

Filename	2-methylbutane	n-pentane	carbon dioxide	ethane	nitrogen	methane
NGA testmix-008	0.050	0.050	1.500	4.000	4.000	88.900
NGA testmix-009	0.050	0.049	1.502	4.003	4.004	88.883
NGA testmix-010	0.050	0.050	1.500	4.005	4.002	88.845
NGA testmix-011	0.050	0.050	1.501	4.002	3.998	88.819
NGA testmix-012	0.050	0.050	1.499	4.000	4.001	88.865
NGA testmix-013	0.050	0.050	1.499	3.998	3.999	88.811
Average	0.050	0.050	1.500	4.001	4.001	88.854
SD	0.0002	0.0003	0.0012	0.0024	0.0021	0.0353
RSD (%)	0.47	0.64	0.08	0.06	0.05	0.04

Figure 4 Excellent repeatability data example

Ordering information		ES11X - ABCDE = NGA as figure 1			
		ES12X - ABCDE = ES110 + hydrogen channel (10p valve, TCD, 2 packed columns)			
		ES13X - ABCDE = ES110 + hydrocarbon channel (6p valve, TCD, capillary column)			
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](#).