

ETG 6700

Calorimetry and Wobbe Index Measuring Devices



- BTU/Wobbe content measurement
- C1-C5 hydrocarbon separation & total gas analysis
- Continuous flow-through analysis
- Very fast response
- New technology based on IR TF
- Any carrier gas or utilities
- Alternative to GC technique
- Permanent Span calibration

Online monitoring of calorific value in fuel gases.

The Wobbe Index (WI) expresses the heating value (known as calorific value) of gases used as fuels, taking into account the proportionality of calorific value to the specific gravity, or the density ratio between the given fuel gas and air. More precisely, the specific gravity is proportional to flow velocity through a constant orifice size at a constant pressure, and thus proportional to gas calorific value.

The ETG 6700 puts continuous Wobbe Index monitoring and control in the hands of fuel gas producers, distributors, or anyone requiring WI readings for process optimization.

Basically the ETG 6700 it's a Tunable Filter I.R. Analyser is an infrared absorption-based on line monitoring system, configured for measurement of light hydrocarbons (alkanes, alkenes and alkynes).

A real-time optical analyser, the ETG 6700 is capable of accurately separating hydrocarbon components, a process which could previously only be performed by gas chromatograph (GC) analysers.

The technology

Spectroscopic – Advanced NIR/IR absorption spectroscopy utilises state of the art spectral scanning and chemometric based data processing for exceptionally high accuracy, low cross sensitivity and a very fast speed of response. A flow-through cell utilises a patented spectrometer design for a highly stable and accurate measurement; an advanced Tuneable Filter Spectroscopy Analysis Algorithm delivers industry-leading interference compensation with a permanent span calibration, low cross-interference, high baseline stability and a linear response

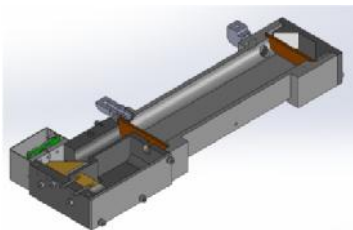
Main Applications

Natural gas quality and composition, BTU/Wobbe Index measurement, Fuel Blending and control, Gas turbine, engines, fuel cells, Biogas and Syngas fuel, Blast furnace gases, Biomethane production, Natural gas quality, Air demand for combustion control, Refineries flare stacks, etc....

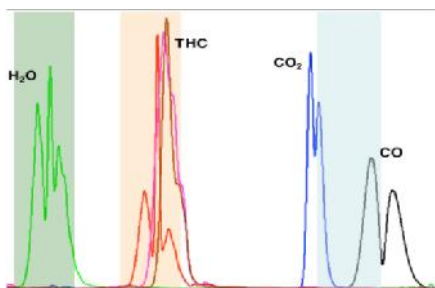
The heart of the system

Non-Contact Flow-Through Gas Cell

- no sensor poisoning
- long-term stability



Spectrometer assembly – light source, TF and detector



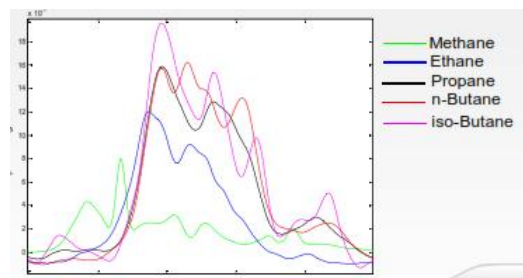
ETG 6700 is an infrared absorption based on-line monitoring system configured for measurement of hydrocarbon and VOC gases; including alkanes, alkenes, alkynes, alcohols, aldehydes and aromatics

at ppm to percent levels.

Non-Contact Flow-Through Gas Cell

- no sensor poisoning
 - long-term stability
- Versatile Optical Platform
- UV through IR wavelength regions
 - various light sources can be coupled
- High Etendue Optical System
- high optical throughput
 - high sensitivity
 - excellent signal:noise
 - fast measurement (<1second)
 - opaque liquid & solid measurement
- Wavelength Scanning
- simultaneous multi-compound
 - high stability and selectivity

Figure showing the highly overlapped spectra



ETG 6700 provides selective measurements of the hydrocarbon species and carbon-dioxide, and calculates the calorific value, Wobbe Index and other gas properties in real time.

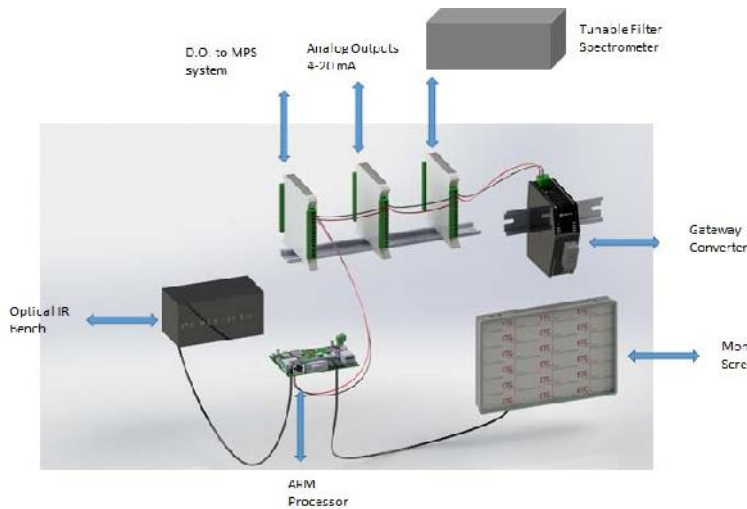
	Certified Gas A		Certified Gas B		Certified Gas C	
	ETG 6700	Reference	ETG 6700	Reference	ETG 6700	Reference
CH4 (%)	86.29	86.183	83.37	83.284	82.10	82.091
C2H6 (%)	8.47	8.542	3.07	3.056	3.88	3.893
C3H8 (%)	1.84	1.963	0.40	0.460	0.88	0.949
iC4H10 (%)	0.31	0.227	0.10	0.073	0.18	0.146
nC4H10 (%)	0.48	0.422	0.11	0.093	0.17	0.148
C5 lumped (%)	0.02	0.000	0.00	0.000	0.00	0.000
N2 (%)	1.10	1.120	11.23	11.344	9.80	9.793
CO2 (%)	1.55	1.543	1.72	1.690	3.01	2.979
C6+ (%)	N/A	0	N/A	0	N/A	0
CV (Superior, Gross) (MJ/m3)	43.1638	43.107	35.9752	35.975	36.7314	36.742
Wobbe Index (MJ/m3)	53.7128	53.676	44.9728	44.971	45.3103	45.336

Lower LDL of some compounds (partial list)

CO (carbon monoxide)	0.3 ppmV
CO2 (carbon dioxide)	0.15 ppmV
H2O (water)	1.5 ppmV
CH4 (methane)	0.3 ppmV
C2H6 (ethane)	0.6 ppmV
C3H8 (propane)	0.3 ppmV
THC (total hydrocarbon)	1 ppmV
N2O (nitrous oxide)	0.15 ppmV
NO2 (nitrogen dioxide)	1.5 ppmV
NO (nitric oxide)	1.5 ppmV
HF (hydrogen fluoride)	1.5 ppmV
C2H2 (acetylene)	0.6 ppmV
HCl (hydrogen chloride)	0.6 ppmV
Ash3 (arsine)	0.15 ppmV

**Conditions: 1 atm pressure, 30-sec averaging time, non-absorbing background*

System layout



The ETG 6700 is composed mainly by the Tunable Filter Spectrometer which is capable of high-accuracy fuel gas composition measurements every 5 seconds. The ETG 6700 Gas Analyzer provides selective measurements of the hydrocarbon species and carbon-dioxide, and calculates the calorific value, Wobbe Index and other gas properties in real time. The analyzer provides real-time data through Modbus digital interfaces.

Other components are :

- IR Optical Bench for additional measurement of CH4, CO2, CO
- ARM processor with ETG proprietary SW
- 5,7 " Touch Screen Monitor
- DO module for MPS (Multipoint System)
- Analog Output for specie or Calorimetric value by 4-20 mA
- Gateway Converter for ModBus, Profibus

The ETG 6700 Gas Analyzer provides an accurate and real-time alternative to gas chromatographs and residual oxygen analyzers for monitoring fuel gas composition and heating value properties including liquid natural gas (LNG), pipeline natural gas, and other fuel gases containing C1 – C5 hydrocarbons.

Factory calibrated, the analyzer provides <0.15% relative CV accuracy in LNG type sample containing only C1 – C5 and < 1% error in pipeline natural gas samples containing C6+ heavier hydrocarbons

ETG 6700 Gas Analyzer specifications in Natural Gas Analysis Configuration

Measurement

Compounds Measured	Methane, Ethane, Propane, n-Butane, iso-Butane, C5 (lumped), CO2 (0-100%) BTU, CV Wobbe Index
Precision / Repeatability *	< +/- 0.05% (repeatability based upon 5-second averaging)
Accuracy *	- Methane (80-100%): +/- 0.2%, Methane (0 – 80%): - +/- 0.5% Ethane & Propane: +/- 0.2% - iso & n-Butane: +/- 0.1% - Pentanes: +/- 0.2% - CO2: +/- 0.2%
Zero drift	Less than ±0.2% (absolute) per month (zero on air or N ₂)
Span calibration	Factory calibrated (permanent calibration for the life of the analyzer)
Update rate	5 seconds (default) or 1-300second configurable (averaging time improves precision)
Additional channel(s)	Contact ETG for additional target gases

Sampling

Technique	Flow through
Flow rate	0.1 – 1 SLPM (up to 15 SLPM available upon request)
Pressure*	0 – 5 psig (up to 100 psia available upon request)
Sample temperature	0-50 °C
Sample connections	¼" Swagelok™ fittings
Multipoints	Up 6 different sampling points

Electrical and Signals

Electrical Signal Output	4-20 mA for each measured gas or as Wobbe Index
Communication Protocol	ModBus RTU, ModBus TCP IP, Profibus, Profinet and others on request
Multisampling System Signal	D.O. for each measured point driven by SW

Mechanical Dimensions & Various

Mechanical dimensions	The dimensions depending by APPLICATION and CONFIGURATION
Weight	18 Kg
Power requirements	100-240VAC 50 Hz
Operating temperature	-5 °C to + 40 °C
Enclosure Material & Protection	SS 304 - IP54



ETG 6700 is the Best Solution :

**The simplicity of an *NDIR-like hardware package*,
with *FTIR-like accuracy & specificity*,
and *GC-like speciation without physical separation***

ETG RISORSE E TECNOLOGIA

Via P. Carpignano 23 – 14026 Montiglio M.to AT Italy

Tel. +39 0141 994905-994952 fax 0141 994971

sales@etgrisorse.com infoetg@etgrisorse.com

www.etgrisorse.com