Product Specifications

The easy-to-maintain Thermo Scientific Flo-Cal online, high-speed calorimeter measures the heating value of combustible gases in either Wobbe Index or Calorific Value. This field-proven analyzer optimizes plant operations by offering fast response and reliable, continuous operation.

Thermo Scientific Flo-Cal

Online, High Speed Calorimeter

Applications

- Feed forward combustion control
- Mixing and blending of gas streams
- Fuel and flare gas quality monitoring
- Off-gas heating value
- LPG/air blending
- Coke oven and blast furnace
- Furnace and boiler control
- Landfill gas monitoring

Features & Benefits

- Basic mode of operation: Wobbe Index
  - Calorific Value via optional Specific Gravity Meter
- Fast response and continuous operation
- Modbus RS-485 network communications
- Two continuous 4-20 mA analog outputs
- Flame safety automatic interlock
- Standard and explosion-proof models
- Easy to maintain and calibrate

Fast, Reliable and Easy-to-Use

The Thermo Scientific Flo-Cal online calorimeter continuously measures the gas heating value during feed forward control and high-speed gas blending operations and enables automatic control of auxiliary fuel additions during flare gas measurement. Capable of measuring in Wobbe Index and Calorific Value, this versatile instrument offers fast response and reliable operation, and is easy to maintain and calibrate. When installed in an enclosure, ambient temperature variations have a minimal effect on the system, and Modbus output capabilities ensure it integrates easily into plant control systems.

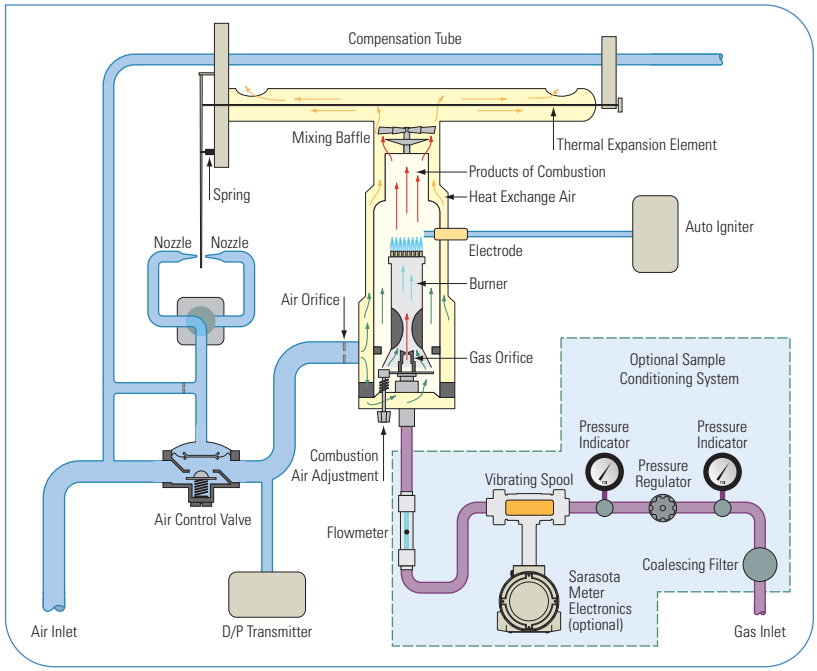
Versatile Measurement

The flexible Flo-Cal has two basic modes of operation. The base system provides a Wobbe Index measurement (a meaningful measurement of the heating characteristics of the gas mixture) that takes into consideration the compositional changes within the gas mixture. To provide a Calorific Value measurement, the base Wobbe Index unit must incorporate the Thermo Scientific Sarasota FD900 specific gravity (SG) meter, a highly accurate device that is based on the well accepted vibrating tube technology. It provides a continuous online SG measurement with accuracy to 0.1% of reading. This combination enables the Flo-Cal to reliably calculate Calorific Value, the heat value of the gas at standard conditions expressed as Net Heating Value, or the actual available heat value of the gas at standard conditions.

Principles of Operation

Sample gas and combustion air are metered and burned under closely controlled conditions. As the heating value of the sample gas changes, a constant exhaust temperature is maintained by precisely regulating the combustion air to the burner (i.e., air flow lower when heating value is higher; air flow higher when heating value is lower). These airflow variations are monitored and the intelligent pressure transmitter converts the pressure changes into the calculated output signals (4-20 mA and Modbus protocol) for the appropriate measurement range. Should the flame be extinguished due to a shortage of sample gas or combustion air, mechanical failure or electrical supply failure, a solenoid valve shuts off the sample gas supply. When all required conditions are established, the solenoid valve is opened and the burner is automatically ignited.

Flo-Cal system architecture



Thermo Scientific Flo-Cal

General Specifications

Operational Modes	Standard mode: Wobbe Index; Optional mode: Calorific Value via optional specific gravity meter; Either mode can be set and displayed in the following measuring units: BTU/scf, MJ/Nm^3 or Kcal/Nm^3	
Measuring Ranges	Wobbe Index with corresponding Calorific Value: Upper range <2000 BTU/scf; lower range 50% of upper range Auxiliary Gas: 0-3000 BTU/scf Wobbe Index with corresponding Calorific Value	
Precision	±1.0% of full scale value with Flo-Cal temperature controlled within ±5°C (±9°F) of ambient temperature at time of calibration; if ambient temperature drifts outside of ±5°C (±9°F) temperature range, a drift of 0.02% of full scale for each degree outside of the temperature range is possible	
Repeatability/Linearity	Wobbe Index:	Upper range <2000 BTU/scf; ±1.0% of upper range
	Auxiliary Gas:	0-3000 BTU/scf; output <1000 BTU/scf ±1.0% of 3000 BTU/scf (output between 1000-3000 BTU/scf ±7.0% of 3000 BTU/scf)
Response Time	Wobbe Index:	Upper range <2000 BTU/scf — 1.5 minutes (to 90% of new value) for changes >30% of the upper reading, plus sample transport time
	Auxiliary Gas:	0-3000 BTU/scf, reading <2000 BTU/scf — 1.5 minutes (to 90% of new value) for changes >30% of the upper reading, plus sample transport time; 2000-3000 BTU/scf — 3.5 minutes (to 90% of new value) for changes >30% of the upper reading, plus sample transport time
Ambient Temperature	+10°C to +40°C (+50°F to +104°F); must be controlled ±5°C (±9°F)	
Sample	Model 8000:	50 to 2500 ml/min
	Model 6000:	50 to 2500 ml/min
Utilities	Instrument air 60 to 125 psig (4.14 to 8.62 Barg) @ 2.5 to 6.0 SCFM (71 to 170 L/m) dry, oil free; 120 VAC ±10%, 60 Hz @ 600 Watts; 220 VAC ±10%, 50 Hz @ 600 watts (analyzer only)	
Area Classification	Model 8000:	General Purpose
	Model 6000:	NEC Class I, Div 1, Groups B, C & D - Explosion Proof, CSA approval
Weight	Model 8000:	approximately 68 kg (150 lb); with Specific Gravity Meter approximately 102 kg (225 lb)
	Model 6000:	approximately 250 kg (550 lb)
Dimensions (W x H x D)	Model 8000:	92 cm x 92 cm x 41 cm (36 in x 36 in x 16 in); with Specific Gravity Meter 122 cm x 92 cm x 41 cm (48 in x 36 in x 16 in)
	Model 6000:	190 cm x 95 cm x 68 cm (77 in x 38 in x 27 in) when rack mounted

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