

TFH 1000

Thermal Mass Flowmeter

The Reliable, Cost-Effective Monitoring Solution for Greenhouse Gas Emissions

The TFH 1000 thermal mass flowmeter is a practical solution to meet a wide range of GHG emissions monitoring challenges in gas transmission, gas plant, petrochemical and refinery applications. It provides high-precision, direct measurement of gas flow rate in standard units without the need for temperature or pressure compensation. The compact, robust unit also provides accurate measurement of process gas temperature.

The TFH 1000 is used with a variety of common gases, including air, natural gas, ammonia, biogas, butane, chlorine, compressed air, carbon monoxide, carbon dioxide, digester gas, ethane, ethylene, helium, hydrogen, methane, nitrogen, oxygen, propane and many more.

Accurate and Reliable

The TFH 1000 exceeds the accuracy requirements defined by the EPA rule. It utilizes direct mass measurement technology, which is more accurate than volumetric flow measurement because mass is not affected by changes in process pressure and temperature. It provides gas flow rate measurement in a variety of mass units, including SCFM, NM³/hr, lbs/hr and kg/hr.

The TFH 1000 flowmeter has a broad turndown (100:1 typical), providing accurate and repeatable measurement of high flow rates and low end sensitivity for leak detection. The unit features a platinum sensor for long-term stability.

TFH 1000 flowmeters are rugged and reliable, with no moving parts. The all-welded, 316 stainless steel sensor construction is specifically designed for demanding industrial applications. The electronics housing is NEMA 4X for reliable operation indoors or outdoors.

Economical and Easy to Install

Installation of TFH 1000 flowmeters is simpler and more economical than other technologies. They can be installed via a single insertion point on a pipe or duct and have very low



Benefits:

- Accuracy exceeds EPA requirements
- Direct reading of mass flow rate with no additional pressure and temperature instruments required
- Wide turndown with extreme low-flow sensitivity
- Economical to install
- Negligible pressure drop
- Reliable design with no moving parts

pressure drop. It is available in both insertion and in-line models with built-in flow conditioners that eliminate the need for long upstream and downstream straight pipe runs.

Safety

The TFH 1000 is FM (USA) and FMc (Canada) approved for Class I, II, III, Division 2, Groups A, B, C, D, E, F, G, T4A hazardous locations. It is NEMA 4X and CE approved.



www.tfhudgins.com 713.682.3651

TFH 1000

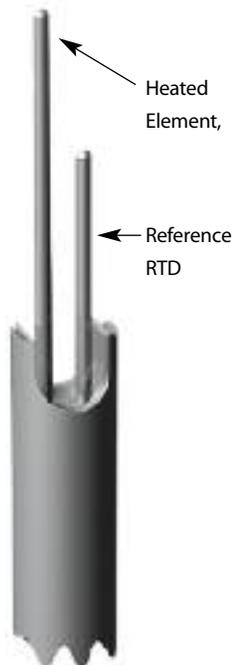
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Principle of Operation

TFH 1000 flowmeters use constant temperature differential (ΔT) technology to measure the mass flow rate of air and gases. The thermal mass flow sensor consists of two Resistance Temperature Detectors (RTDs). The sensor elements are constructed of a reference grade platinum wire wound around ceramic mandrels that are inserted into stainless steel or Hastelloy tubes.

The Reference RTD measures the gas temperature. The instrument electronics heat the mass flow sensor, or heated element, to a constant temperature differential (T) above the gas temperature and measures the cooling effect of the gas flow. The electrical power required to maintain a constant temperature differential is directly proportional to the gas mass flow rate.

The microprocessor then linearizes this signal to deliver a linear 4-20 mA signal.



Thermal Mass Flow Sensor

Performance Specifications

FLOW ACCURACY:	$\pm 1\%$ of reading $\pm 0.2\%$ of full scale* *Point velocity for insertion flowmeters. T.F. Hudgins recommends a minimum of 15 diameters of straight pipe upstream of the flowmeter and 10 diameters downstream for insertion flowmeters. T.F. Hudgins recommends a minimum of 8 diameters of straight pipe upstream of the flowmeter and 4 diameters downstream for inline flowmeters.
FLOW REPEATABILITY:	$\pm 0.2\%$ of full scale
FLOW RESPONSE TIME:	0.9 seconds (one time constant)
TEMPERATURE ACCURACY:	$\pm 1.8^\circ\text{F}$ ($\pm 1.0^\circ\text{C}$) over -40 to 250°F (-40 to 121°C); $\pm 3.6^\circ\text{F}$ ($\pm 2.0^\circ\text{C}$) over 250 to 650°F (121 to 343°C) Minimum velocity 60 SFPM

Physical Specifications

SENSOR MATERIAL:	316 stainless steel standard; Hastelloy C276 optional
ENCLOSURE:	FM (U.S.) and FMc (CANADIAN) approved for Class I, II, III, Division 2, Groups A, B, C, D, E, F, G, T4A hazardous locations. NEMA 4X and CE approved. Options: Remote NEMA 4X electronics enclosure with explosion-proof sensor j-box.
CABLING:	To T.F. Hudgins remote enclosure: 5-conductor, 18 AWG, twisted, shielded, 100 feet maximum.
RETRACTOR ASSEMBLIES:	
Packing gland assembly:	125 psig (8.6 barg) max.
High pressure (crank) retractor:	NPT 600 psig (41.4 barg), ANSI 150 flange and ANSI 300 flange, no valve supplied.

For more information, contact your T.F. Hudgins representative or call 713-682-3651.



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