



## FOX FLOW METERS OFFER NUMEROUS ADVANTAGES IN GAS APPLICATIONS

FOX Thermal Mass Flow Meters offer numerous advantages over other flow meter technologies in gas applications. These advantages include better accuracy, wide rangeability (turndown), reliability and very low pressure drop. Several volumetric flow meter technologies are available to measure gas flow rate including orifice plate/differential pressure, vortex, turbine and variable area. Although these flow meters can be applied to gas applications with pressure and temperature compensation techniques, their performance cannot match the FOX Thermal Mass Flow Technology. FOX provides these advantages:

### 1. **Direct Mass Measurement**

Mass flow measurement is fundamentally more accurate than volumetric flow measurement because mass is not affected by changes in process pressure and temperature. The Fox Flow meter measures gas flow directly in mass units including Standard Cubic Feet per Minute (SCFM), Normal Cubic Meters per Hour (NM<sup>3</sup>/ Hr), Pounds Per Hour (lbs/hr) or Kilograms per Hour (Kg/Hr). Pressure and temperature compensation is not required.

Changes in process pressure and temperature can cause significant measurement errors in volumetric flow meters. The rule of thumb is that a 10 PSI change in process pressure will result in a 10 percent measurement error. A direct mass measurement is your best solution.

### 2. **Accuracy, Repeatability, Turndown**

The topic of turndown is combined with the discussion of accuracy and repeatability for an obvious reason. If a flow meter is only accurate over part of the measurement range, the flow meter is only giving you usable information part of the time. A flow meter with wide turndown provides accurate and repeatable measurement over the entire range of interest. The high sensitivity of the Fox Flow Meter sensor provides accurate flow measurement at low and high flow rates. Turndown is up to 1000:1; 100:1 is typical. Volumetric flow meters cannot provide this wide range of flow measurement. The Fox Platinum Sensor achieves long-term stability because platinum is one of the most stable materials on earth.

### 3. **Installation**

Although typically overlooked when assessing the cost versus performance benefits of one flow technology with another, the effort required to install a flow meter can have a significant impact on the "total installed cost" of a device. Installation of most flow meter technologies typically requires cutting out a section of pipe and installing flanges and possibly support brackets. Alternatively, use of a Fox insertion style flow meter is easy and less costly. The insertion flow meter is installed by drilling a hole in the pipe and welding on a 3/4" NPT coupling. The insertion flow meter probe is inserted into the pipe and secured in place with a Fox supplied compression fitting. The pressure rating is 300-500 psig (depending on model). Additionally, there are no moving parts and pressure drop is extremely low. All Fox Models available with insertion probes.

Another issue related to installation concerns upstream and downstream straight pipe requirements. Most technologies, including insertion flow meters require 10 to 15 diameters of straight pipe upstream of the sensor and 5 to 10 diameters downstream. However, for situations where long, straight pipe runs are not available, Fox offers an in-line flow meter that provides a solution. The inline flow meter contains flow-conditioning plates that eliminate the need for long upstream and downstream straight pipe runs. Fox Models FT2A and FT3 available with inline styles.

### 4. **Reliability**

The Fox Flow meter has no moving parts. The all-welded, 316 stainless steel sensor construction was specifically designed for demanding industrial applications. The electronics housing is NEMA 4X for reliable operation indoors or outdoors.

### 5. **Pressure Drop**

There is virtually no pressure drop across the Fox sensor. Pressure drop across inline models is typically less than 0.2 PSI. See pressure drop charts in Fox Flow Meter Data Sheets.

(continued on next page)

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### 6. Safety and Reliability

**The Model FT1 is FM and FMc approved** for Class I, Div. 1, Gps B, C, D; Class II, Div. 1, Gps E, F, G; Class III, Div. 1; T4, Ta = -40°C to 70°C; Class I, Zone 1, AEx/Ex db IIB + H2 T4; Gb Ta = -40°C to 70°C; Type 4X, IP66/67.

**ATEX (FM16ATEX0013X) approved** for II 2 G Ex db IIB + H2 T4; Gb Ta = -40°C to 70°C; IP66/67  
II 2 D Ex tb IIIC T135°C; Db Ta = -40°C to 70°C; IP66/67.

**IECEX (IECEX FMG 16.0010X) approved** for Ex db IIB + H2 T4 Gb Ta = -40°C to 70°C; IP66/67  
Ex tb IIIC T135°C Db Ta = -40°C to 70°C; IP66/67\*\*

**The Model FT2A is FM and FMc approved** for Class I, II, III, Division 2, Groups A, B, C, D, E, F, G, T4A hazardous locations.

**The Model FT3 is FM and FMc approved** for Class I, Div. 1, Gps B, C, D; Class II, Div. 1, Gps E, F, G; Class III, Div. 1; T3C, Ta = -40°C to 70°C; Class I, Zone 1, AEx/Ex d IIB + H2 (T6, T4, or T1\*); Ta = -20°C to 70°C; Type 4X, IP67.

**ATEX (FM12ATEX0034X) approved** for II 2 G Ex d IIB + H2 (T6, T4, or T1\*) Gb Ta = -20°C to 70°C; IP67  
II 2 D Ex tb IIIC (T185°C, T135°C, or T450°C\*) Db Ta = -20°C to 70°C; IP67.

**IECEX (IECEX FMG 12.0010X) approved** for Ex d IIB + H2 (T6, T4, or T1\*) Gb Ta = -20°C to 70°C; IP67  
Ex tb IIIC (T85°C or T135°C\*) Db Ta = -20°C to 70°C; IP67\*\*

\* Temperature code ratings for Zones are dependent on external process temperature factors and equipment enclosure configuration. See the FT3 Brochure for specific temperature code ratings.

\*\* The IECEX dust rating does not apply to the Remote Enclosure.

The stainless steel wetted parts can be cleaned for oxygen service.

The Fox Flow Meter – the right flow meter for your gas applications!

Typical gases:

Air  
Compressed Air  
Ammonia  
Argon  
Biogas

Butane  
Carbon Monoxide  
Carbon Dioxide  
Chlorine  
Digester Gas

Ethane  
Ethylene  
Helium  
Hydrogen  
Methane

Natural Gas  
Nitrogen  
Oxygen  
Propane

Fox Model FT2A



Fox Model FT1



Fox Model FT3

