

## Data Sheet

DS-TMF-5861E-MFM-eng

October, 2008

# Mass Flowmeter Model 5861E

## Features and benefits

- Mass flow measurement
- Fast response - flow signal less than 3 seconds to 98% of final value
- $\pm 1\%$  full scale accuracy including linearity
- Wide flow range  
(up to 100 slpm N<sub>2</sub>, 200 slpm H<sub>2</sub>)
- Repeatability:  $\pm 0.25\%$  of rate
- Linear output signal, 0-5 Vdc
- All wetted parts are 316 stainless steel
- No moving parts
- All solid state electronics
- Compact
- Removable sensor
- Insensitive to mounting attitude

## Description

The Brooks® Model 5861E Mass Flowmeter accurately measures gas flow. The heart of the system is the flow sensor which produces an electrical output signal linear with mass flow rate. This signal is used for indicating and/or recording. Many options are offered to provide a versatile system of mass flow measurement.

## Principle of Operation

The operating principle of the Brooks Mass Flowmeter is thermodynamic. A precision power supply directs heat to the midpoint of the sensor tube carrying a constant percentage of flow. On the same tube equidistant upstream and downstream of the heat input are resistance temperature measuring elements.

With no flow, the heat reaching each temperature element is equal. With increasing flow, the flow stream carries heat away from the upstream element, T1, and an increasing amount towards the downstream element, T2. An increasing temperature difference develops between the two elements, and this difference is proportional to the mass flow rate. A bridge circuit interprets the temperature differential and an amplifier provides a 0-5 Vdc linear output signal.

## Specifications

### Flow Ranges

Any full scale flow rate from 10 slpm\* to 100 slpm, Nitrogen equivalent (200 slpm H<sub>2</sub>).

\*Standard pressure and temperature in accordance with SEMI (Semiconductor Equipment and Materials Institute) standard: 0°C and 101.3 kPa (760 Torr).

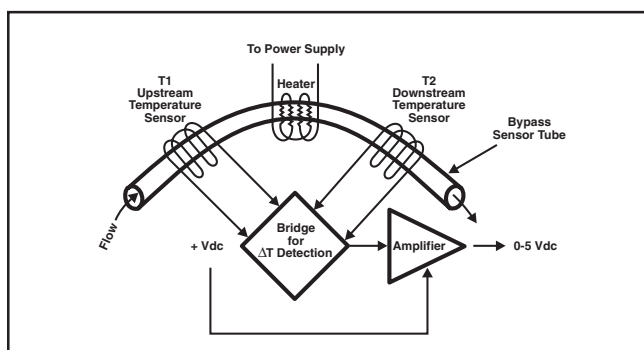
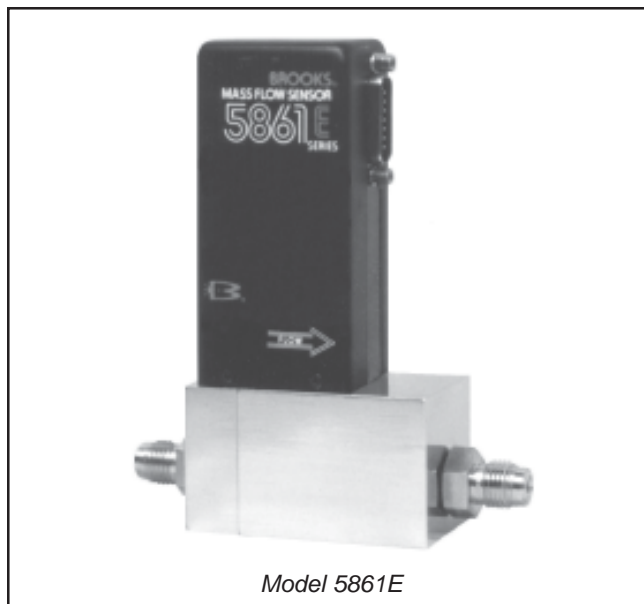


Figure 1 Principle of Operation

## Ratings:

Maximum Operating Pressure: 1500 psi (103 bar)

Ambient/Operating Temperature: 40°F to 150°F (5°C to 65°C)

Non-operating: -13°F to +212°F (-25°C to 100°C)

## Performance:

Accuracy:  $\pm 1\%$  full scale including linearity at calibrated conditions.

## Repeatability:

0.25% of rate

## Response Time:

Less than 3 seconds

## Control / Usable Range:

50 to 1

## Sensitivity to Mounting Attitude:

$\pm 0.5\%$  F.S. maximum deviation from specified accuracy after rezeroing under 200 psig

# Model 5861E

**Temperature Sensitivity:**

Zero: Less than  $\pm 0.075\%$  F.S. per degree C  
 Span: Less than  $\pm 1.0\%$  F.S. shift from original calibration over 10-50°C range

**Pressure Sensitivity:**

0.03% per PSI up to 200 PSIG

**Power Supply Sensitivity:**

$\pm 0.09\%$  full scale per % power supply voltage variation

**Output Signal:**

0 to 5 Vdc into 3000 ohms (or greater) load. Maximum ripple 3 mV

**Leak Integrity:**

$1 \times 10^{-9}$  atmosphere scc/sec. Helium

**Power Requirements:**

+15 Vdc ( $\pm 5\%$ ) at 35 mA dc  
 -15 Vdc ( $\pm 5\%$ ) at 35 mA dc  
 1.05 watts power consumption

**Materials of Construction**

Fittings and Transducer Assembly - Wetted parts 316 stainless steel  
 O-rings and Gaskets - Standard: Viton® fluoroelastomers and Buna-N; Optional: Kalrez®

**Electrical Connections:**

D-connector, 15-pin type (DA-15P)

**Dimensions:**

See Figure 2

**Accessories**

- Model 0151E: Power Supply/Indicator
- Model 0152/54: Power Supply/Indicator (2 or 4 meters)
- Inlet Filters
- Open Frame Power Supplies

**TRADEMARKS**

Brooks ..... Brooks Instrument, LLC  
 Kalrez ..... DuPont Dow Elastomers  
 VCO ..... Cajon Co.  
 VCR ..... Cajon Co.  
 Viton ..... DuPont Performance Elastomers

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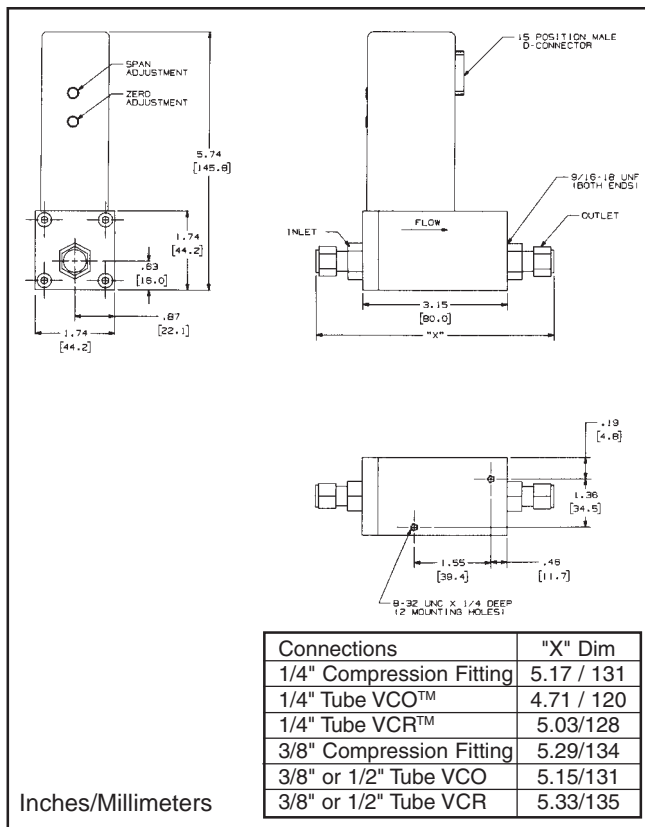


Figure 2 Dimensions, Model 5861E

**Ordering Information**

- A. Flow sensor
  1. Type of gas to be metered
  2. Operating temperature and pressure of gas
  3. Flow range
  4. Inlet and outlet connections
- B. Power Supply
- C. Indicator (digital)
- D. With or without interconnecting cable
- E. Additional accessories

