

# High Flow Mass Flow Controller

## Features and Benefits

- Improved response for low command changes
- Easy maintenance
- Negligible flow overshoot/undershoot
- Removable sensor
- Insensitive to mounting attitude
- Wide flow range (up to 100 slpm N<sub>2</sub>, 200 slpm H<sub>2</sub>)
- End accessible zero and span potentiometers
- Jumper selectable soft start
- Electrically activated valve override
- Jumper selectable soft start
- Low command flow cutoff
- Normally closed valve (Normally open valve optional)
- Corrosion resistant valve

## Description

The Brooks® Model 5851E Mass Flow Controller accurately measures and controls gas flow. The heart of the system is the removable flow sensor which produces an electrical output signal linear with flow rate used for indicating, recording, and/or control purposes. It eliminates the need for continuous monitoring and readjustment of gas pressures to provide a stable gas flow.

## Principle of Operation

The operating principle of the Brooks Mass Flow Controller 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 the output to the control circuitry as well as 0-5 Vdc output signal.

The control circuitry compares the command setpoint to the flow signal and positions the precision solenoid control valve. When the command signal is below 1% of full scale, the control valve is positioned fully closed. The control valve can be latched fully open or closed by activating the valve override circuit.

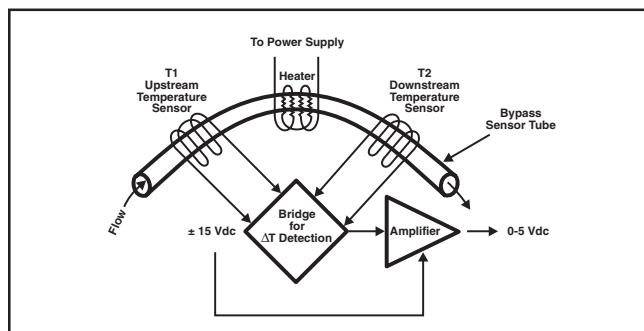
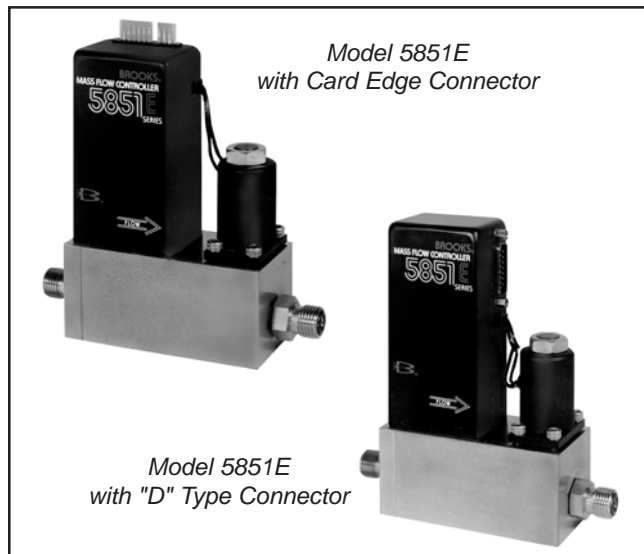


Figure 1 Principle of Operation

## Specifications

### Flow Ranges

Any full scale flow rate from 10 slpm to 100 slpm Nitrogen equivalent; up to 200 slpm H<sub>2</sub>.

\*Standard pressure and temperature in accordance with SEMI (Semiconductor Equipment and Materials Institute) standard: 0°C and 101 kPa.

### Ratings

Max. Operating Pressure: 1500 psig; 10-50 psid pressure drop (minimum pressure drop depends on gas and range)  
Temperature: Ambient/gas 40 to 150°F (5 to 65°C)

### Performance

Accuracy: ±1% full scale including linearity at calibrated conditions.

**Repeatability:** 0.25% of rate

**Settling Time:** Less than 3 seconds to within 2% of full scale of final value for a 0 to 100% command change. Per SEMI Guideline E17-91.

# Model 5851E

## Specifications (continued)

**Control Range:** 50 to 1

**Sensitivity to Mounting Attitude:**  $\pm 0.5\%$  F.S. maximum deviation from specified accuracy after rezeroing.

### 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:**  $\pm 0.03\%$  per psi up to 200 psig (N<sub>2</sub>)

### Command Input Voltage

0 to 5 Vdc (200 k ohms input resistance)

**Output Signal:** 0 to 5 Vdc into 1000 ohm (or greater) load; maximum ripple 3 mV

**Leak Integrity:**  $1 \times 10^{-10}$  atmosphere scc/sec. Helium

### Power Requirements

+15 Vdc ( $\pm 5\%$ ) at 350 mA dc

-15 Vdc ( $\pm 5\%$ ) at 350 mA dc

10.5 watts power consumption

### Materials of Construction

Wetted Parts - Standard: 316L, 316L VAR (Vacuum Arc Remelt), high alloy, ferritic, stainless steel with Viton® fluoroelastomers; Optional: Kalrez® or Buna-N

Connections - Standard: 9/16-18 UNF with Stainless Steel Compression Fittings; Optional: VCO™ and VCR™

**Electrical Connections:** Card Edge connector (gold plated) or D-type connector (DA-15P).

**Dimensions:** See Figure 2.

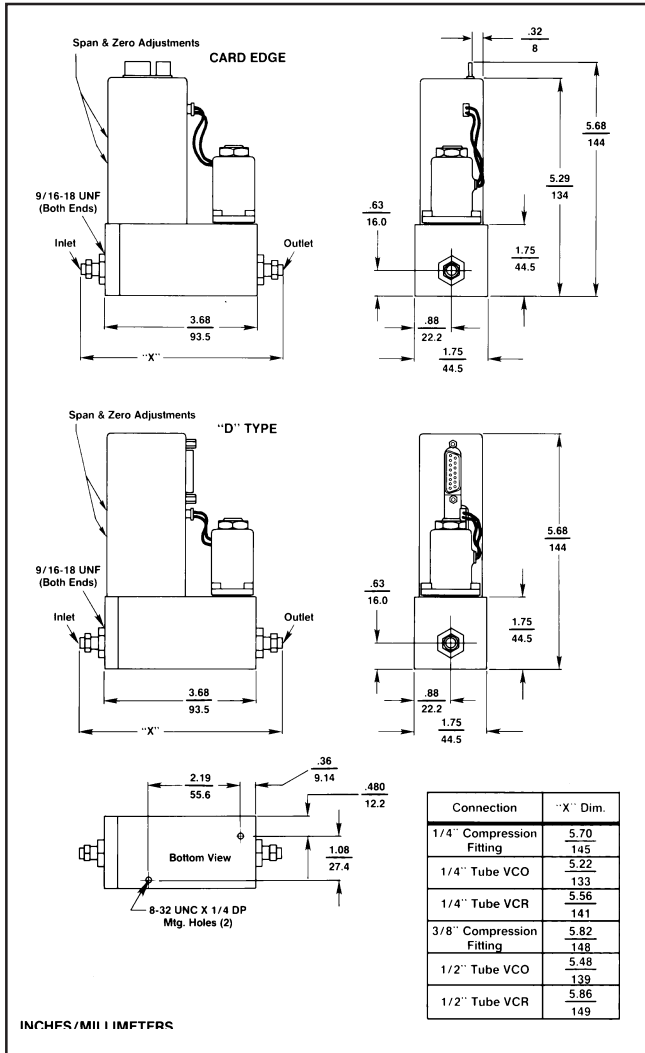


Figure 2 Dimensions

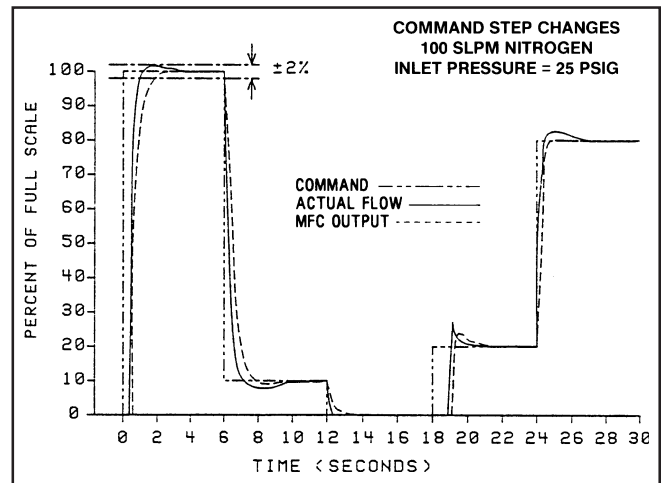


Figure 3 Model 5851E Performance Curve

### TRADEMARKS

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

Specifications Subject to Change Without Notice

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