Design Specifications
DS-5850E
April, 1997
(Supersedes issue dated January, 1994)

Mass Flow Controller

DESCRIPTION

The Brooks® Model 5850E Mass Flow Controller accurately measures and controls gas flows. 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.

DESIGN FEATURES

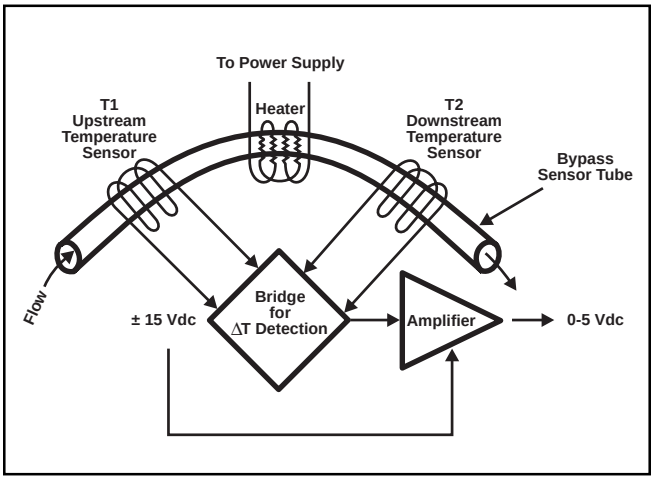
- Easy maintenance
- Fast flow response to command changes
- Negligible flow overshoot/undershoot
- Removable sensor
- Insensitive to mounting attitude
- Wide flow range (up to 30 slpm N_2)
- End accessible zero and span potentiometers
- Jumper selectable soft start
- Electrically activated valve override
- Jumper selectable external valve control
- Low command flow cutoff
- Normally closed valve (normally open valve optional)
- Mechanically and electrically compatible with other mass flow controllers
- Corrosion resistant valve

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 the 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 amount of gas flowing or the mass flow rate. A bridge circuit interprets the temperature difference 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 2% of full scale, the control valve is positioned to fully closed. The control valve can be held fully open or closed by activation of the valve override circuit.



Principle of Operation

Brooks Instrument

FISHER-ROSEMOUNT™ Managing The Process Better.™

SPECIFICATIONS

⚠ WARNING

Do not operate this instrument in excess of the specifications listed below. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

Flow Ranges
Any range from zero to 3 sccm* to zero to 30,000 sccm nitrogen equivalent.

***Standard pressure and temperature in accordance with SEMI (Semiconductor Equipment and Materials Institute) proposed standard: 0°C and 101 kPa (760 Torr).**

Note: For full scale flow ranges greater than 50sccm Nitrogen equivalent.

Performance: Accuracy: ±1% full scale including linearity at calibrated conditions. ±1.5% full scale for flow rates greater than 20 slpm.

Repeatability: 0.25% of rate

Control Range: 50 to 1

Sensitivity to Mounting Attitude: ±0.5% F.S. maximum deviation from specified accuracy after rezeroing.

Temperature Sensitivity
Zero: Less than ±0.075% F.S. per degree C
Span: Less than ±1.0% F.S. shift from original calibration over 10-50°C range (50-122°F)

Pressure Sensitivity: ±0.03% per psi up to 200 psig (N_2)

Command Input Voltage
0 to 5 Vdc (200 K ohms input resistance)

Output Signals
0 to 5 Vdc into 2000 ohms (or greater) load
5 Vdc ±0.01 Vdc reference output, max. load 2 K ohm.

Max. Operating Pressure
1500 psig; 5-50 psid pressure drop (minimum pressure drop depends on gas and range)

Temperature, Ambient/Gas: 41 to 149°F (5 to 65°C)

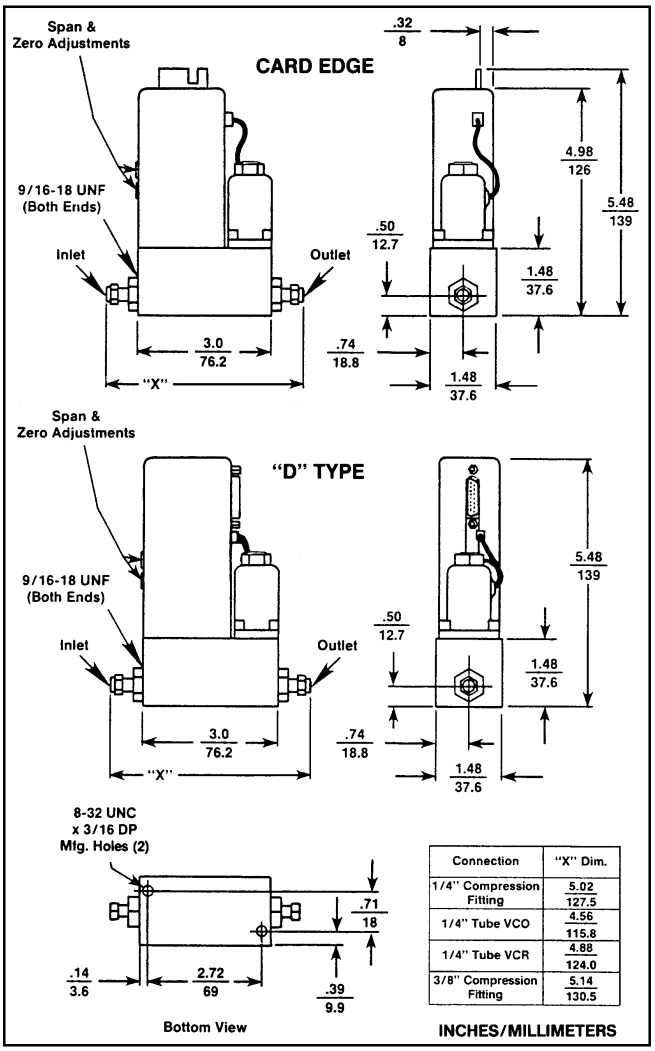
Leak Integrity, Outboard
1 x 10^{-9} atmosphere cc/sec. Helium

Power Requirements
N.C. Valve (or N.O. Valve with flow ≤2.5 slpm)
3.5 watts, +15 Vdc @ 35 mA, -15Vdc @ 180 mA
N.O. Valve with flow rate > 2.5 slpm:
10.5 watts, +15 Vdc @ 350 mA, -15 Vdc @ 350 mA

Materials of Construction
Wetted Parts - Standard: Stainless Steel with Viton®; Optional: Kalrez® or Buna-N

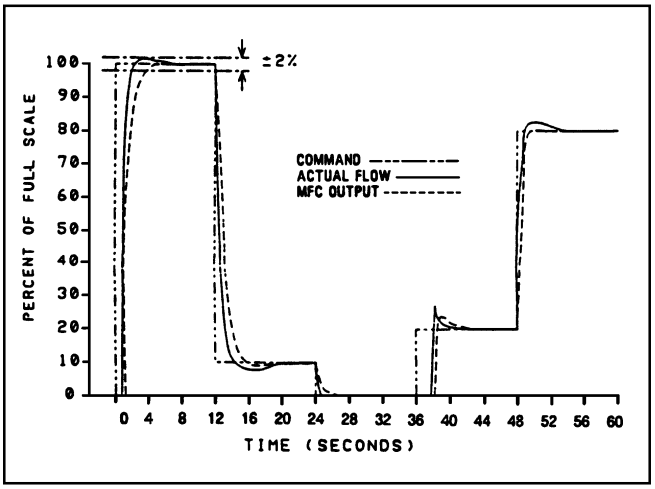
Connections
Standard: 9/16-18 UNF with Stainless Steel Compression Fittings; Optional: VCO™ and VCR™

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



Connection	"X" Dim.
1/4" Compression Fitting	5.02 / 127.5
1/4" Tube VCO	4.56 / 115.8
1/4" Tube VCR	4.88 / 124.0
3/8" Compression Fitting	5.14 / 130.5

Dimensions



Model 5850E Performance Curve (1 slpm N_2 @ 25 psig)

TRADEMARKS
Brooks ..... Brooks Instrument Division, Emerson Electric Co.
Fisher-Rosemount ..... Fisher-Rosemount Grp. of Companies
Kalrez ..... E.I. DuPont de Nemours & Co.
Managing The Process Better ..... Fisher-Rosemount Grp. of Companies
VCO, VCR ..... Cajon Co.
Viton ..... E.I. DuPont de Nemours & Co.

Specifications Subject to Change Without Notice

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