Flow & Pressure Instrumentation

For Biopharmaceuticals & Life Sciences

BROOKS®
INSTRUMENT

Beyond Measure

Reliable and accurate instruments. To sustain yields and process control.

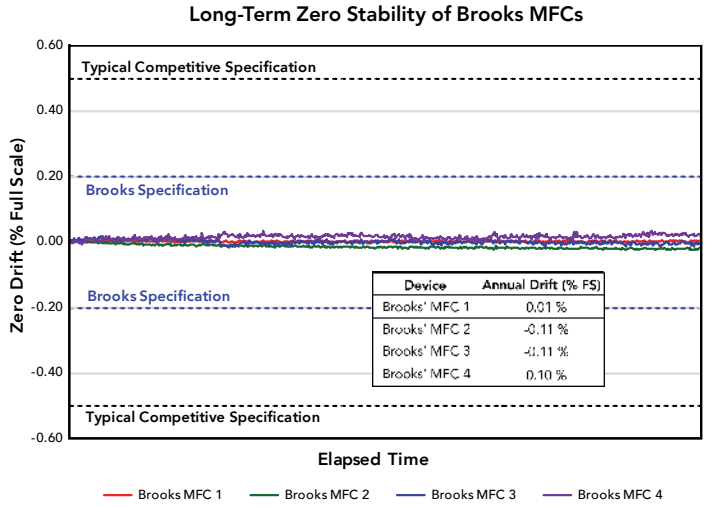
Producing biopharmaceuticals is one of the world's most demanding manufacturing processes. Brooks Instrument's mass flow and pressure control technology helps maximize cell culture yields and control bioprocess costs. Our flow and pressure controllers set global standards for reliability, repeatability and long-term stability.

Brooks Instrument mass flow controllers (MFCs) satisfy key biotechnology research and production requirements:

Biopharmaceutical Requirements	Brooks Instrument Provides
Tight control of DO and pH during experiments and production	Stable and accurate control of gas supply (low drift)
NO unplanned downtime due to high cost of losing a batch or experiment	Extremely reliable product — Mean Time Between Failure > 80 years
Ability to rapidly diagnose and resolve issues with bioreactors or fermentation equipment	Free software communicates directly with devices in-situ to confirm accurate MFC performance
Cost-effective method for adhering to regulatory requirements	Externally accessible service port and calibration software supports in-situ verification or recalibration
Excellent technical support and rapid response for equipment service	Local technical support and equipment service across the globe

Efficient and long-lasting process control

Bioreactors need accurate, stable gas control to maintain critical process parameters, combined with maximum uptime to reach target yields. Brooks Instrument mass flow controllers (MFCs) are engineered to deliver both, with superior long-term drift stability and the best mean-time-between-failures (MTBF) in the industry.

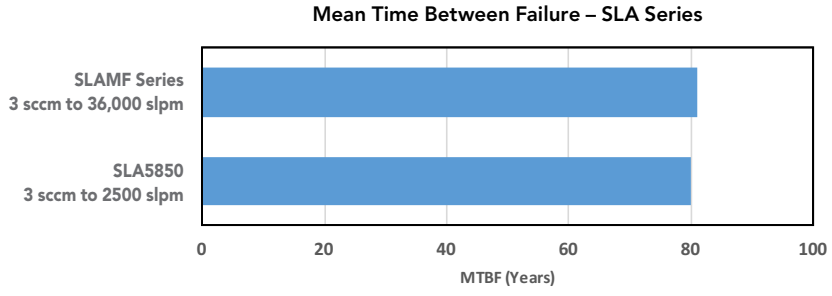


"I convinced one of the sites I support to purchase MFCs from Brooks to replace a competitor's devices by showing them how much less time I spent verifying Brooks' MFCs. In some cases, the competitor's devices were taking me four times longer to verify due to issues with drift."

Lead Metrology Technician,
Multinational Pharmaceutical
Research & Development

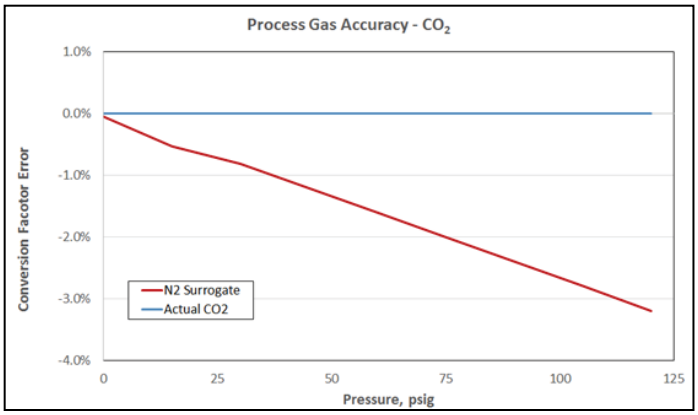
When a MFC has poor long-term stability, you spend more time verifying and then recalibrating the device, costing money, time and lost opportunity to operate your bioreactors to their fullest potential. Our long-term zero stability means device recalibration or replacement is less frequent. This helps ensure highly accurate research results and consistent biopharmaceutical production, during each batch run and from batch to batch.

That stability is combined with excellent reliability: actual production and service data demonstrates that our SLA Series MFCs deliver decades of failure-free operation in a wide range of industrial process systems. The result: bioreactors using Brooks technology operate uninterrupted longer, to help maximize production uptime and reduce maintenance and machine downtime costs.



Ensuring accurate results

Accurate control is essential to bioreactor reliability and efficient operation. Brooks Instrument MFCs deliver the absolute best actual process gas measurement and control accuracy. This starts with a superior design that delivers industry-leading device linearity, repeatability and reproducibility. Then we calibrate our devices on systems traceable to international standards, as well as calibrating on multiple gases (including CO_2) to ensure you get the best possible accuracy.



CO_2 is a refrigerant, which makes its conversion factor highly pressure dependent; using N_2 as a surrogate calibration gas introduces inaccuracy in CO_2 delivery.

Flexibility and ease of use

Your bioreactor MFC technology should improve your research and biopharmaceutical production processes, not complicate them. Brooks Instrument has engineered industry-leading efficiency into every one of our MFC devices:

- Our SLA and GF Series MFCs feature technology that enables one MFC to store up to six gas and range calibrations, reducing your inventory costs and investment in spare MFCs.
- Our Brooks Experts Support Tool (BEST) downloadable software lets you easily configure device settings and alarms, adjust tuning parameters and monitor devices, and perform in-situ verification and recalibration on your own schedule.

Quick and efficient changeover from low-flow to high-flow rates

Use one MFC device to serve all your biotechnology needs — from research and development to pilot to full-scale production. The SLA Series covers an extremely broad range of flow rates. Flow can be measured and controlled down to 0.06 ccm and up to 2500 lpm, with measurement capability extending up to 36,000 slpm.

Service and support focused on uptime

We understand the strict regulatory requirements that govern the biopharmaceutical industry, including the need to document MFC calibrations on a recurring basis. When it's time for instrument calibration or repair, trust Brooks Factory Certified Service centers around the globe. Nobody knows your device better than our trained technicians, field service experts and applications engineering professionals. The goal of our worldwide rapid response procedures is to minimize your downtime and help you sustain your bioreactor yields at the highest levels.

Certifications and approval

We offer multiple certifications and approvals to meet your needs.

- Elastomer seals certified to FDAZICFR 177.2600 compliance with both USP Class VI and ISO 10933 for toxicology (ADI-free materials upon request)
- Certified calibration traceable to international standards
- Certified cleaning for oxygen service
- Certified materials
- UL, Atex, IECEX, Kosha

Process control technology for bioreactors

Brooks Instrument has been innovating thermal mass flow technology for decades. Bioreactor systems equipped with our mass flow meters and controllers deliver the accuracy, reliability and long-term ease of use today's advanced life sciences researchers and biopharmaceutical producers need.

The result: You will maximize your bioreactor's value and sustain the return on investment your operations require.

"Most of the bioreactor vendors use Brooks. If they are not, sometimes we specify that they use Brooks. Not common to see other brands unless a company has a commercial agreement with someone other than Brooks."

Sr. Director,
Multinational Pharmaceutical Manufacturer

SLA5800 Series
IP40-General Purpose

Proven MFCs for widest range of mass flow needs deliver superior results and lowest total cost of ownership.

SLAMf Series
IP66 – Hosedown Washdown

Improved accuracy compared to plastic VA flow meters, supporting a wider range of flow rates, pressures and fluids.

GF40 Compact MFC

Multiple gases and flows in one device maximizes flexibility while preserving accuracy, all in a compact footprint.

SLA Series
Pressure Controller

Eliminate droop and hysteresis through closed loop control utilizing the core technology in our thermal MFCs.

Key Features

- Widest flow and pressure ranges
- Long-term sensor stability delivers sustained value
- Programmable gas and range capabilities
- Easy serviceability in the field or at the factory

- NEMA4X/IP66-rated hardened enclosure for hosedown/ washdown applications
- Hazerdous Area Approvals: CE, UL (Recognized) Class I, Div 2, ATEX, IECEx
- Widest range of flow, temperature and pressure ranges
- Programmable gas and range capabilities

- MulitFlo™ programmable gas and range capabilities
- Exclusive MultiFlo™ gas database contains thousands of native gas runs to establish correction functions
- Excellent process gas accuracy
- Suitable for a full suite of gases

- Available with NEMA4X/IP66 rated hardened enclosure for hosedown/ washdown applications
- Widest pressure measurement and control range
- Downstream or upstream control modes
- Independent and easily accessible diagnostic/service port

Performance

- Fluid Type: gas
- Flow Range: 0.003-2500 lpm
- Accuracy: ±0.9% of SP
- Max Pressure:
  - o Standard 1500 psi (100 bar)
  - o Optional 4500 psi (310 bar)
- Temperature Range: -14 to 65˚C

- Fluid Type: gas
- Flow Range: 0.003-2500 lpm (control)
  0.003-36,000 lpm (meter)
- Accuracy: ±0.9% of SP
- Max Pressure:
  - o Standard 1500 psi (100 bar)
  - o Optional 4500 psi (310 bar)
- Temperature Range: -14 to 65˚C

- Fluid Type: gas
- Flow Range: 0.003-50 lpm
- Accuracy: 1% SP
- Max Pressure: 150 psi (10 bar)
- Temperature Range: 0-50˚C

- Full Scale Pressures: 10 psla (0.69 bar) up to 4500 psia (310 bar)
- Pressure Control Range: 20:1 turndown
- Flow Range: 0.01-50 lpm
- Accuracies:
  - o ±0.25% of Transducer FS (FS>300 psia)
  - o ±0.12% of Transducer FS (FS<300 psia)

Sho-Rate Series
Glass Tube
VA Flow Meters

Improved accuracy compared to plastic VA flow meters, supporting a wider range of flow rates, pressures and fluids.

Key Features

- Rugged, single-piece frame construction
- Value-added features to meet OEM requirements
- Rotating lens provides 180° view with magnification ideal for panel mounting
- Optional needle valves and flow controllers mounted to inlet or outlet for precision flow control

Performance

- Fluid Types: clean gases, liquids
- Flow Range:
  - o Air: Up to 140 scfh/63 slpm
  - o Water: Up to 34 gph/2000 cc/min
- Accuracy: ±3, ±5, ±10% FS
- Max Pressure: 200 psig (13.8 bar)
- Temperature Range: 1-121°C

Software tools to unlock digital power

Our proven SLA Series of MFCs lets you easily and efficiently customize your MFC's performance to your specific bioreactor and process needs:

- Set a Low Flow Output Cutoff to force the flow output to read zero when it's below a value you specify
- Enable Setpoint Ramping to change how quickly the MFC responds to a new setpoint command
- Receive process deviation notifications by setting Flow Alarms or Setpoint Deviation Alarms
- Use the Device Calibration Due Alarm to be alerted when a specified amount of runtime has been reached

DeviceNet™

EtherCAT®

Fieldbus Foundation

PROFIBUS PROCESS FIELD BUS

RS-485

With a NEMA 4X/ IP66-approved enclosure, SLAMf devices are perfect for hazardous areas and hosedown/ washdown applications.

Tri Clover (aka Sanitary) connections are available on the SLA Series. Having one standard fitting for the entire system helps simplify installation. A DIN Rail adapter plate is also available.

BROOKS® INSTRUMENT

Beyond Measure

Brooks Service and Support

Visit www.BrooksInstrument.com to locate the service location nearest to you.

Global Service & Support

Brooks Instrument products are recognized as the most stable and reliable in the world. To keep your products operating at the highest level of accuracy and extend their life, your best choice is to trust Brooks Instrument Factory Certified Service repair and recalibration offerings. We can help with your preventive maintenance program to maintain your FDA compliance.

Only Brooks Instrument Factory Certified Service ensures that your Brooks Instrument flow, pressure, vapor and vacuum products are serviced utilizing the same metrology standards, work instructions, equipment and custom software as our manufacturing processes — by expert technicians trained exclusively on servicing Brooks products.

We have service centers located across the globe, to ensure fast turnaround on "As Found/As Left" calibration checks, repair and recalibration requests. Complete details are available at BrooksInstrument.com/globalsupportcenters.

BROOKS® INSTRUMENT
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70 YEARS 1946 2016

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