

Process Gas: CO2 25.00 L/min

# Flow Instrumentation

## For Biopharmaceuticals & Life Sciences



# Flow Instrumentation

## 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)

Process repeatability from batch to batch with varying utilization rates and NO unplanned downtime

Devices with high repeatability and industry leading reliability

Maximize uptime and system flexibility while managing costs

Ability to configure a single MFC for multiple requirements to reduce inventory carrying costs and enable process flexibility

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

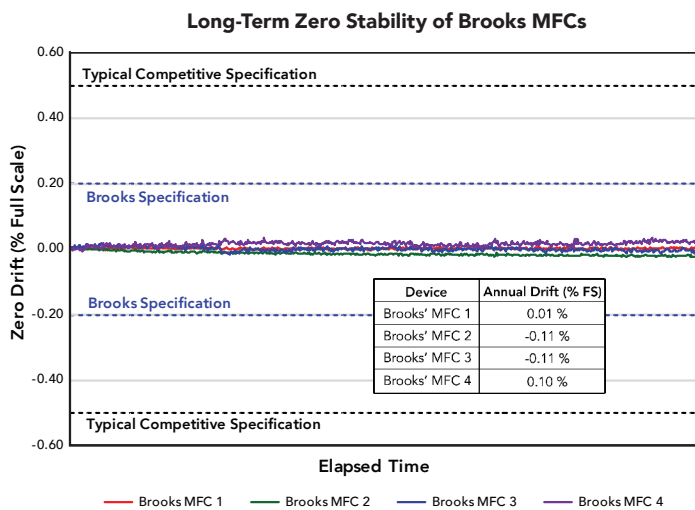
Externally accessible service port and calibration software supports in-situ verification or recalibration

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.



If the zero shifts, the entire process shifts, requiring maintenance and metrology intervention before starting the next lot

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.

**"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."**

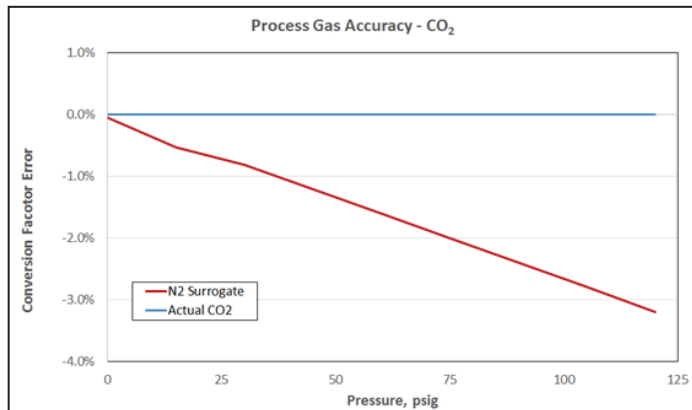


Lead Metrology  
Technician, Multinational  
Pharmaceutical Research &  
Development

# Gas Flow Controllers Optimized for Scale-up & Automation

## 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<sub>2</sub>) to ensure you get the best possible accuracy.



CO<sub>2</sub> is a refrigerant, which makes its conversion factor highly pressure dependent; using N<sub>2</sub> as a surrogate calibration gas introduces inaccuracy in CO<sub>2</sub> delivery.



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.

## Flexibility and ease of use

Your bioreactor MFC technology should improve your research and biopharmaceutical production processes, not complicate them.

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, investment in spare MFCs and providing process flexibility.

By taking full advantage of a Brooks digital MFCs multi-gas/multi-range capabilities, it is possible to reduce the number of SKUs required by 90 percent, reducing inventory and simplifying purchasing.



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10 lpm N<sub>2</sub>



9.88 lpm O<sub>2</sub>



7.41 lpm CO<sub>2</sub>



9.98 lpm Air

By taking full advantage of the multi-gas/multi-range capabilities of our digital mass flow controllers, it is possible to reduce the number of SKUs required by 90%, minimizing inventory and simplifying purchasing.





# Gas Flow Controllers Optimized for Scale-up & Automation

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

Use one MFC platform, 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.

## Certifications and approvals

We offer multiple certifications and approvals to meet your needs.

- Elastomer seals certified to FDA 21 CFR 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



SLA Series

## Biopharmaceuticals



## Biofuels



## Biofoods



## Biochemicals



## Algae



## Applications

## Biopolymers



## Biocosmetics



# Gas Flow Controllers Optimized for Scale-up & Automation



**SLA5800 Series IP40  
General Purpose MFC**

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

### Equipment Installations

- R&D
- Bioreactors
- Fermentors
- Filtration Skids

### Key Features

- Widest flow and pressure ranges
- Long-term sensor stability delivers sustained value
- Programmable gas and range capabilities
- ISO/IEC 17025:2005 certified calibration available
- Easy serviceability in the field or at the factory
- **New SLA Series Biotech model designed to meet the unique requirements of bioprocessing**



### Performance

- Fluid Type: gas
- Flow Range: 0.003-2500 lpm
- Accuracy:  $\pm 0.9\%$  of SP
- Temperature Range: -14 to 65°C



**SLAMf Series  
IP66 Hosedown  
Washdown MFC**

Precision mass flow control of the SLA platform with a specially engineered IP66 enclosure for harsh environments.

- R&D
- Bioreactors
- Fermentors
- Filtration Skids

- IP66-rated hardened enclosure for hazardous areas and hosedown/washdown applications
- Hazardous Area Approvals: CE, UL (Recognized) Class I, Div 2, ATEX, IECEx
- Programmable gas and range capabilities
- ISO/IEC 17025:2005 certified calibration available
- **New SLA Series Biotech model designed to meet the unique requirements of bioprocessing**



- Fluid Type: gas
- Flow Range:
  - 0.003-2500 lpm (controller)
  - 0.003-36,000 lpm (meter)
- Accuracy:  $\pm 0.9\%$  of SP
- Temperature Range: -14 to 65°C



**GF40 Compact MFC**

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

- R&D
- Bioreactors
- Fermentors
- Filtration Skids

- MultiFlo™ 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

- Fluid Type: gas
- Flow Range: 0.003-50 lpm
- Accuracy: 1% SP
- Temperature Range: 0-50°C



**Quantim® Coriolis MFC**

Most accurate measurement and control technology for very low flow gas or liquid applications.

- R&D
- Nutrient feed for bioreactors
- Centrifuge

- True mass flow measurement, not inferred
- Inherent fluid densimeter
- Most accurate mass flow measurement available
- Insensitive to fluid type
- Variety of enclosure options — up to NEMA 4X/IP66
- High pressure capability for demanding research applications

- Fluid Type: gas and liquids
- Flow Range: 3-27,000 gm/hr
- Accuracy: 0.2-0.5% of rate
- Temperature Range: 0-60°C

Range of digital or analog I/Os to integrate with any system



**RS-485**

# Gas Flow Controllers Optimized for Scale-up & Automation

## Advanced in-situ flow diagnostics & trending maximizes process yield

Available on EtherNet/IP and PROFINET Enabled SLA Series MFCs



### Warnings & Alarms

- Informational notifications to the user from the MFC
- Customize how alarms are triggered and implemented



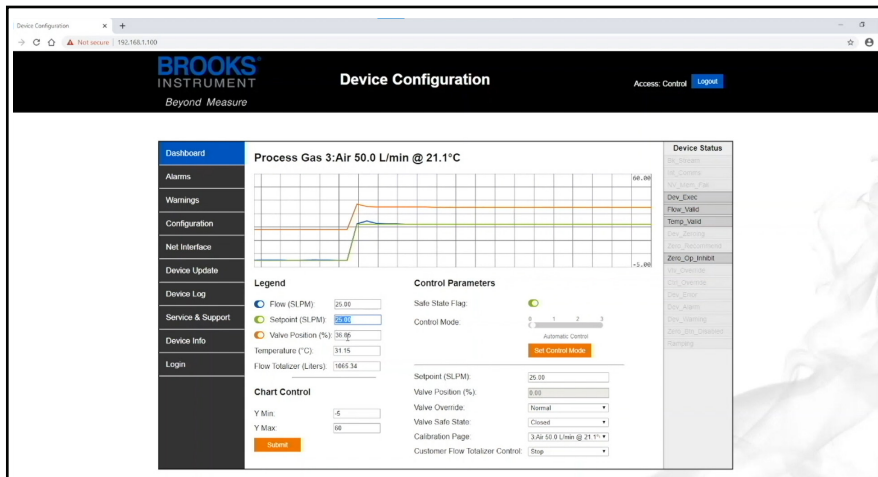
### Diagnostics

- Used to identify customer system failures
- Can be used as predictive indication system and to monitor reliability
- Can indicate when MFC maintenance is required



- Restricted Flow Alarm (low inlet pressure)
- Excessive Zero Drift/Failure
- High Flow
- Internal Power Supply Failure
- Low Flow
- No Flow Indication

## Web-based Interface for easy commissioning, configuration & troubleshooting



- Easily configure device settings
- Reading multiple variables simultaneously
- Set up thresholds and alarms
- Adjust tuning parameters
- Monitor devices

## BEST Software for Setup, Troubleshooting & Calibration



Our Brooks Expert Support Tool (BEST) downloadable software along with a cable kit is a Windows® based application that performs all of the functions of the web-based interface plus in-situ verification and recalibration of Brooks Instrument devices. It allows the user to take advantage of servicing tasks that include setup, attribute configuration, diagnostics, troubleshooting, valve tuning, verification and calibration.



EtherNet/IP

PROFI  
NET

**BROOKS**<sup>®</sup>  
INSTRUMENT

*Beyond Measure*

# Service and Support



## Global Service & Support

Brooks Instrument products are recognized as the most stable and reliable in the world. To keep your instruments operating at the highest level of accuracy and extend their life, trust the one that knows them best - Brooks Instrument Factory Certified Service.

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, our service centers and field service technicians around the globe ensure that your instruments are serviced utilizing the same metrology standards, work instructions, equipment and software as our manufacturing processes. We can even help with your preventive maintenance program to maintain FDA/USDA compliance, including ISO/IEC 17025:2005 certified calibrations.

Complete details are available at [www.BrooksInstrument.com/service](http://www.BrooksInstrument.com/service).



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