GF100 Mass Flow Controllers

High purity digital mass flow controller

» 1% digital set point accuracy and <1 second response time
» Multi-gas/multi-range user configurability for optimum process flexibility and reduced inventory investment
» Independent service port for data-logging and process development

High Performance Flow Control

The Brooks Instrument GF100 is a robust upgrade for standard high purity (HP) mass flow controllers, offering improved accuracy and cleanliness. Optional electrical adapters ensure drop in compatibility with older style analog flow controllers.

Brooks' new sensor technology with improved signal to noise performance and powerful control algorithms deliver enhanced measurement accuracy and reproducibility for optimal gas chemistry control.

The GF100 is designed for long-term reliability with embedded diagnostics and automated zeroing to reduce maintenance for a lower cost of ownership.

Standard Features

- High purity construction with reduced surface area and removal of unswept volumes for faster dry-down during purge
  - Surface passivated high purity wetted flow path
  - 10 µ inch Ra surface finish
- Independent service and diagnostic port for on-tool troubleshooting and process fingerprinting and optimization
- Integrated high visibility LCD display reports flow (%) and temperature (°C)
- Analog and Serial (RS-485), analog 0–5 VDC and DeviceNet™ communication interfaces
- Gas and range user configurable
  - Multi gas/multi range model created and proven using actual process gases to ensure real world accuracy
  - Change full scale flow range up to 3:1 for optimum process and inventory management flexibility
  - Select from hundreds of gases and gas mixtures

Applications

- Thin-film solar deposition and etch
- c-Si deposition
- Wear resistant surface coatings
- Physical vapor deposition
- MEMS manufacturing
- Fiber optic and glass coating
- Bioreactor gas management
- Flame control
- Gas blending

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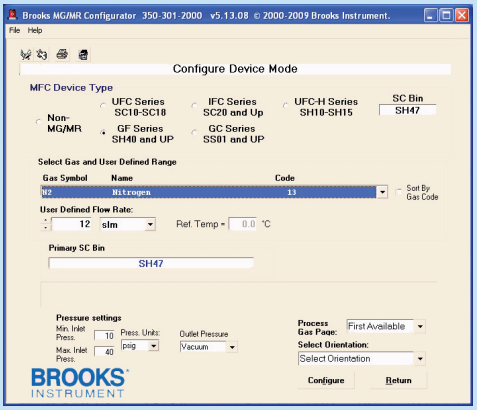
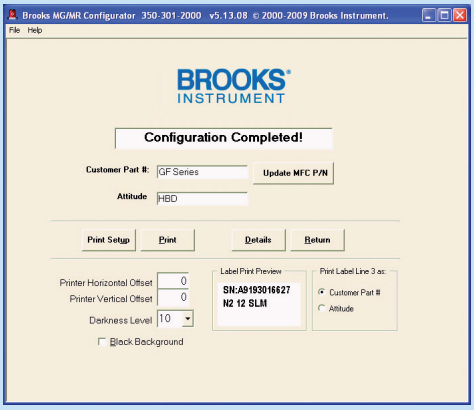
Gas and Range Configurable





Brooks configurator software enables range, gas, and calibration curve configuration to ensure flexibility for any application.

Multi Gas/Multi Range Technology

Multi gas/ multi range (MG/MR) is a proprietary technology available on all Brooks GF Series MFCs. Our MG/MR technology offers a host of benefits that increase tool uptime, reduce cost of ownership, and improve inventory requirements.

Brooks MFCs with MG/MR are offered in nine standard configurations, each programmable for a set of gases and flow ranges. Combined, the nine standard MFCs cover 85% of the gases and flow ranges used in a typical production fab (from 3 sccm to 30 slm, N_2 equivalent).

MG/MR is offered with a configuration kit which allows the user to program the MFC for desired gas and flow range anywhere, anytime without removing the MFC from the gas panel. Calibration does not require surrogate gases and can be completed in just a few minutes. In a recent benchmark study, we were able to cover an entire semiconductor fab's MFC inventory requirement with only 23 part numbers (nine configurable MFC part numbers and 14 other unique part numbers), significantly reducing the fab's inventory requirements.

Better by Design

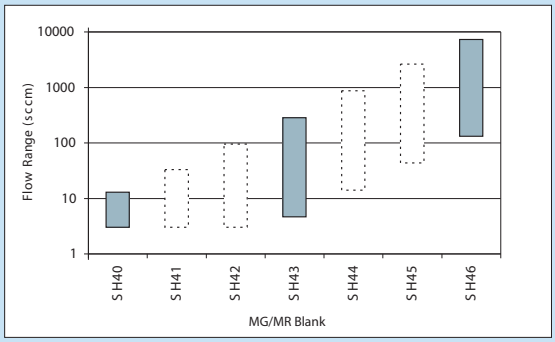
Brooks MFCs use a valve, sensor, and bypass design which has been perfected from years of research and testing. Brooks MFCs are robust, reliable, and field proven.

The Brooks solenoid valve has major advantages over other MFC valves (such as piezoelectric valves, which tend to shed particles). Our valve has only one moving part, and only three parts physically in the gas flow path. This results in no particle generation during normal operation. (Other valves, such as piezoelectrics, can release huge amounts of gas during a failure and can overtax abatement systems.)

Multi Gas/ Multi Range Benefits

- Replacement MFCs are available in only a few minutes
- Nine standard MFC part numbers cover 85% of all applications
- Enables on-site gas and range changes with no surrogate gas requirements
- Enables last minute changes in gas panel integration without impacting on-time delivery
- Dramatically reduces inventory requirements
- Increases tool uptime

Multi Gas/Multi Range Turndown Advantage



MG/MR covers a flow range from 1sccm to 30slm (Nitrogen equivalent) with as little as 3 “Blanks.”

Multi-Gas / Multi-Range Configurator System

The Multi-Gas/Multi-Range (MG/MR) Configurator allows users to configure and label MG/MR blank MFCs with customer part number, serial number and gas/range data. A complete system consists of Brooks’ MG/MR Configurator software with optional PC, printer and power supply.

GF100 Mass Flow Controllers Specifications

Display

Type	Top mount integrated
Viewing Angle	Fixed
Viewing Distance	10 feet
Unit Displayed	Flow (%), temp. (°C)
Resolution	0.1 (unit)

Diagnostics

Status Lights	MFC health, network status
Alarms	Sensor output, control valve output, over temperature, power surge/sag, network interruption

Materials

Gas Path	316L and 304 stainless steel, KM-45
Surface Finish	10 µ in Ra
Seals	Metal
Weight	<2.65 lbs (1.20 kg)

Electrical

Power Consumption	545 mA (max) @ 11 VDC and 250 mA (max) @ 24 VDC 6 watts (max) @ ±15 VDC
Certifications	EMC 89/336/3EEC (CE), ODVA, RoHS/WEEE

Electronic Communication Interface Options

Primary Connectors	Analog/RS-485 via 9-pin “D” Analog/DeviceNet - DeviceNet via 5-pin “M8” connector - Analog via Hirose connector DeviceNet via 5-pin “M8” connector
Diagnostic Port	RS-485 via 2.5 mm jack

Performance

Leak Integrity (external)	1 x 10^{-11} atm. cc/sec He
Linearity	±0.5% full scale
Repeatability and Reproducibility	±0.15% set point
Zero Drift	≤0.6% full scale per year
Auto Shut-Off	Valve off at set point <2% full scale
Warm Up Time	60 minutes
Settling Time	1 second
Standard Accuracy	
5% to 35%	±0.35% full scale
35% to100%	±1.0% set point

Operating Conditions

	SH40–SH44	SH45–SH46	SH47–SH48
Flow Range	3–860 sccm	861–7200 sccm	7201–30000 sccm
Proof Pressure	140 psia max		
Differential Pressure*	7–45 psid	10–45 psid	15–45 psid**
Valve Configuration	Normally closed		
Temperature Range	10°C–50°C		
Zero Temperature Coefficient	0.005 full scale per ºC		

Please refer to the user guide regarding recommended zeroing procedures and operating practices.

*Typical pressure drop. Actual pressure drop will be gas and flow range dependent. Consult technical support for details.

**Argon gas applications for these ranges require an additional 10 psid differential pressure. Unless otherwise stated, all specifications and features comply with factory calibration conditions.

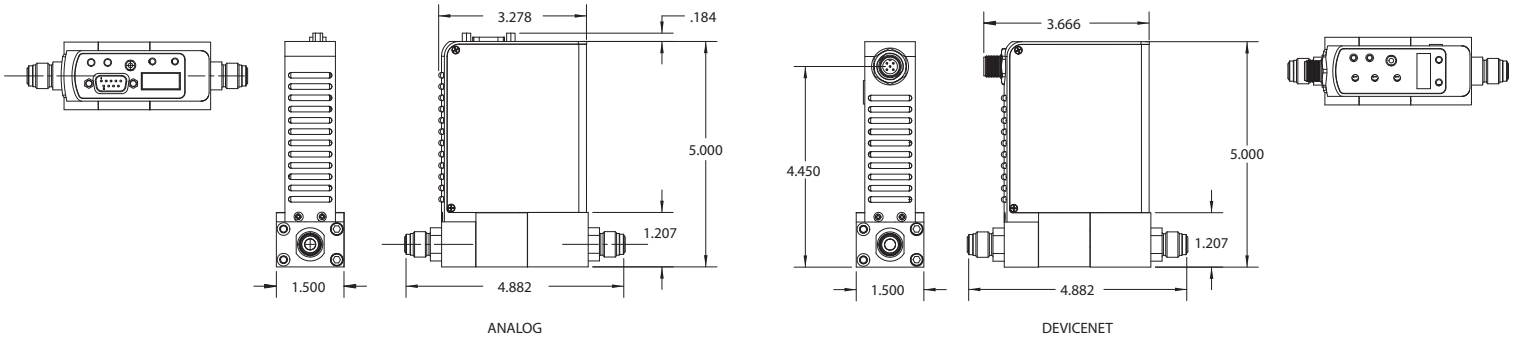
This document is subject to revision without notification. Please verify this copy is the most recent one before using.

GF100 Product Configuration

GF100		Flow Ranges from 3 sccm–30 slpm N_2 Equivalent
	C	Configurable
	X	Gas Specific
	XX	Standard Application
	C	Normally Closed Valve
===>	===>	Specify Gas Code and Range, i.e. "0004" = Argon and "010L" = 10 slpm
	SH40 010C	Standard Configuration # 40, 3–10 sccm N_2 Equivalent
	SH41 030C	Standard Configuration # 41, 11–30 sccm N_2 Equivalent
	SH42 092C	Standard Configuration # 42, 31–92 sccm N_2 Equivalent
	SH43 280C	Standard Configuration # 43, 93–280 sccm N_2 Equivalent
	SH44 860C	Standard Configuration # 44, 281–860 sccm N_2 Equivalent
	SH45 2.6L	Standard Configuration # 45, 861–2600 sccm N_2 Equivalent
	SH46 7.2L	Standard Configuration # 46, 2601–7200 sccm N_2 Equivalent
	SH47 015L	Standard Configuration # 47, 7201–15000 sccm N_2 Equivalent
	SH48 030L	Standard Configuration # 48, 15001–30000 sccm N_2 Equivalent
		VX 1-1/2" VCR 1/4"
		CX 1-1/8" C Seal 92mm
		DX 1-1/8" C Seal 80mm
		WX 1-1/8" W Seal 92mm
		YX 1-1/8 W Seal 80mm
		AX 1-1/2" C Seal 92mm
		BX 1-1/2" W Seal 92mm
		LX 1-1/8" C Seal 92mm w/Poke Yoke
		A Atmosphere
		V Vacuum
		O Standard Flow Sensor
		DX 5 Pin DeviceNet™ M8
		EX Cable Adapter to Cardedge (w/out VTP), RS485 through RJ11 Jacks; Display & Overlay w/ 180° Orientation
		GX 9 Pin D with RS-485 (UDG9), Display/Overlay w/180° Orientation
		G1 9 Pin D with RS-485 (UDG9)
		KX Cable Adapter to MKS 15 Pin D (UDK 15)
		BB 5 Pin DeviceNet™ M8 w/Analog
		XXXX Customer Special Request Number
		A Auto Shut Off (Included)
		X Auto Shut Off (Not Included)
		A Auto Zero (Included)
		X Auto Zero (Not Included)
		000 0°C Reference Calibration (Standard)
		021 21°C Reference Calibration (Normal)
		XXX Customer To Specify Temperature

Example:

GF100	C	XX	C	SH40	010C	VX	A	O	*DX	XXXX	A	A	000



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NOTE: Please contact Brooks Instrument product management for other configuration options. All dimensions in inches unless otherwise stated. Multiple standards exist for mounting hole locations which will vary between manufacturers and model generations. Contact Brooks Product Mgmt for help with your application.

For technical assistance, contact Brooks Instrument Applications Engineering at 972.359.4000.