Model GF125

Data Sheet

GF Series

Thermal Mass Flow

High Purity/Ultrahigh Purity Digital Mass Flow Controllers

Overview

Designed for semiconductor, MOCVD, and other gas flow control applications that require a high purity all-metal flow path, the Brooks GF Series mass flow controllers deliver outstanding performance, reliability, and flexibility. Highlights of the GF series industry-leading features include: ultra fast 300 millisecond settling time, MultiFlo™ gas and range programmability, optional pressure transient insensitivity (PTI), local display, extremely low wetted surface area, and corrosion resistant Hasteloy sensor tube and valve seat. The GF series has been marathon tested to over three times the semiconductor industry standard for reliability, ensuring repeatable low-drift performance over time. An independent diagnostic/service port permits users to troubleshoot or change flow conditions without removing the mass flow controller from service.

The flagship GF125 is a second generation multi-variable pressure transient insensitive mass flow controller. This product builds upon Brooks' leadership position in pressure transient insensitive (PTI) mass flow controller technology, minimizing process gas flow variation due to pressure and temperature fluctuations. The GF125 enables customers to simplify and reduce the size and cost of gas panels by eliminating the need for point of use pressure regulators, pressure transducers, and associated hardware.

MultiFlo™ gas and range programmability, a patented technology developed and refined by Brooks over the last 10 years, has changed the mass flow controller industry by offering customers the ability to select new gas calibrations and full scale ranges without the trouble and cost of removing the mass flow controller from the gas line. The GF Series fourth generation MultiFlo technology continues to lead the market with the most accurate and most rangeable performance through extensive refinement and physical validation on critical process gases.

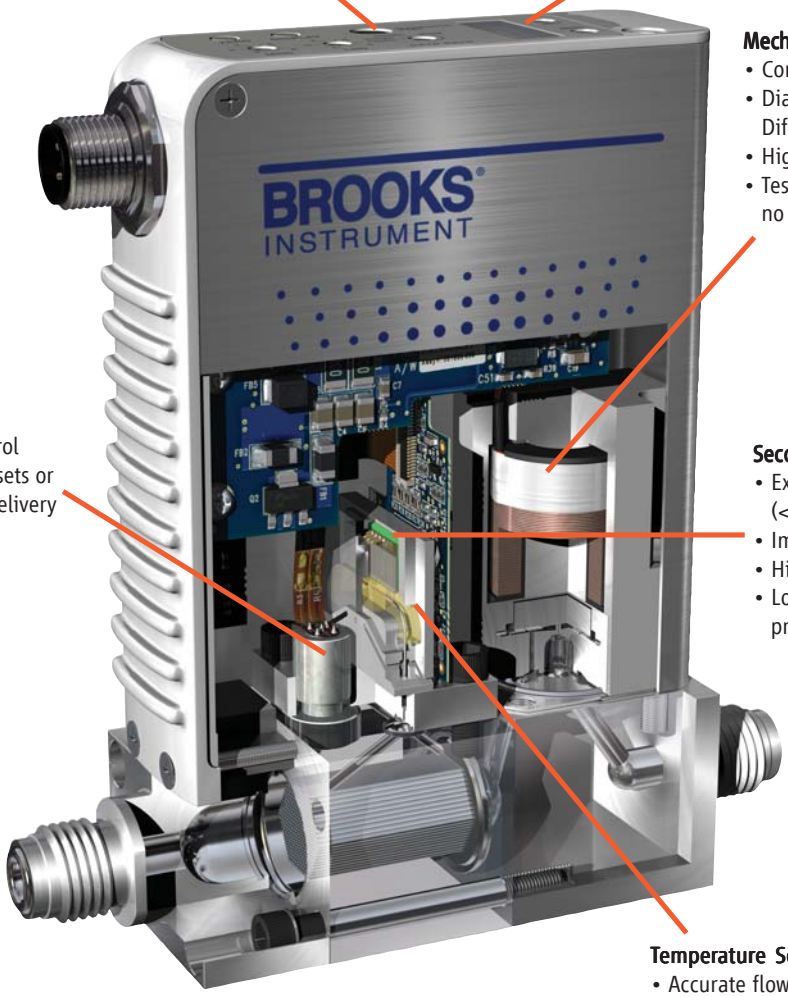
Product Description

The GF Series is a highly configurable platform based on a novel modular architecture. Already widely adopted by semiconductor, vacuum thin film, solar, and related customers, the GF Series feature set was carefully selected to enable drop-in replacement and upgrade of most brands of metal-seal mass flow controllers, including the former Celerity, UNIT, Tylan, and Mykrolis brands. With the wide range of options and features available, the GF Series provides users with a path to simplification and standardization, greatly reducing spares inventory and support costs.

Features and Benefits

Convenient Service Port
- Easy diagnostics and troubleshooting
- Independent of tool communication

User Interface
- Easy installation, start-up, and operation



Mechanically coupled Valve
- Corrosion resistant all metal valve
- Diaphragm free design, unaffected by Differential pressure
- High purge rate capability
- Tested for over four million cycles with no failures

Pressure Sensor
- Stable flow control regardless of upsets or fluctuations in delivery pressure

Second Generation T-Rise Sensor
- Excellent long-term stability (<±0.5% F.S/yr.)
- Improved signal to noise ratio
- High purge rate capability
- Lower temperature operation for gases prone to thermal decomposition

Temperature Sensor
- Accurate flow and temperature measurement over full temperature range (<0.02% FS/DegC)
- Real-time compensation for ambient temperature flucuations enable precise gas chemistry control

Features	Benefits
Pressure Insensitive Temperature Insensitive	Improves yield. Reduces overall gas panel costs. Improves yield. Reduces overall equipment costs.
User Interface User Accessible Service Port	Simplifies installation and startup for maximum uptime. Convenient interface to diagnostics for maximum uptime.
Advanced Diagnostics Superior Valve Technology	Ensures device operating within user specified limits for high process yield and maximum uptime. Minimum leak-by, maximum turndown and fast response reduces overall gas panel cost and increases throughput.
Adaptable Mechanical Configurations Calibration Systems	Easily retrofit to existing systems. Measurement accuracy is traceable to international standards.
Corrosion Resistant Hastelloy T-Rise Sensor	Provides unmatched long-term sensor stability ensuring maximum yield and throughput.
Multivariable Sensing	Flow, temperature, pressure and valve drive available for enhanced process control and diagnostics.

Product Description

Ultra Fast Response

By combining Brooks' patented flow sensor technology with a high speed ARM processor and fast acting diaphragm free valve assembly, the GF Series delivers up to 3 times faster response and settling time compared to other mass flow controllers, enabling:

- Improved wafer throughput by reducing nonproductive flow settling steps
- Critical Etch processes requiring ultrafast 1-2 second etch steps
- Reduced diverted gas consumption and associated abatement costs
- Time-sensitive gas delivery steps in Atomic Layer Deposition
- For processes requiring a slow ramped gas turn-on or time critical transions between flow rates. A user programmable ramp function is provided

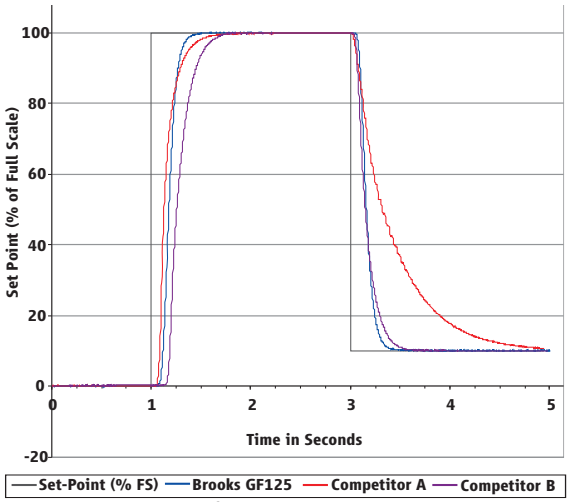
MultiFlo™ Gas and Range Configurability

A major advancement over traditional single point gas conversion factors, Brooks MultiFlo technology delivers up to a three-times improvement in process gas accuracy. This is achieved through advanced gas modeling optimized through actual gas testing providing compensation for non-linear gases. MultiFlow also allows the device to be quickly and easily configured for another gas and/or flow range without sacrificing accuracy or rangability. Selecting a new gas automatically creates a new calibration curve, establishes optimized PID settings for dynamic control, automatically compensates for gas density effects, and ensures smooth, overshoot-free transitions between flow rates with excellent steady state stability.

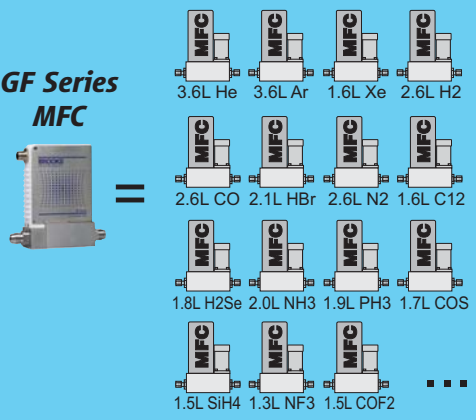
Brooks MultiFlo technology offers unparalleled flexibility; a single device can be programmed for thousands of different gas and flow range configurations.

Re-programming is simple and fast; a new gas and range can be programmed in under 30 seconds. Brooks provides a full gas database to ensure the true value of MultiFlo is realized:

- Dramatically reduces inventory costs
- Mass flow controller full scale flow range can re-scaled down typically by a factor of 3:1 with no impact on accuracy, turndown or leak by specifications, for optimum process and inventory flexibility.
- Up to 40% fewer configurations required to support typical etch and CVD processes verses our closest competitor
- Widest process gas coverage through extensive gas library.
- Mass flow controllers can be replaced in only a few minutes
- Off-the shelf spares programmability enables rapid process recovery
- Maximum flexibility for research applications



Comparison of GF vs Competitors response time to ascending & decending setpoints



MultiFlo™ technology allows one GF Series to be programmed for thousands of different gases and flow ranges

# of Platforms	GF1xx Series Range	Competitor A 2 Models Range	Competitor B 4 Models Range
1	3 - 10	10	1 - 5
2	11 - 30	17.5	6 - 14
3	31 - 92	30	15 - 27
4	93 - 280	55	28 - 38
5	281 - 860	100	39 - 71
6	861 - 2,600	175	72 - 103
7	2,601 - 7,200	300	104 - 192
8	7,201 - 15,000	550	193 - 279
9	15,001 - 30,000	1,000	280 - 754
10	30,001 - 40,000	1,750	755 - 2,037
11	40,001 - 55,000	3,000	2,038 - 5,500
12		5,500	5,501 - 11,000
13		10,000	11,001 - 30,000
14		22,000	30,0001 - 50,000
15		30,000	
16		50,000	

The Brooks Advantage! Less platforms means more process flexibility and lower cost of spares.

Product Description

MultiFlo Configurator Accessories

Multiflo kits are available in various configurations:

- Base kit includes:
  - -Diagnostic cable and RS-232C/RS-485 protocol converter; P/N A332293005
  - -Diagnostic cable and USB/RS-485 protocol converter; P/N 290-34750-000.
- Other kits which include a label printing system are available.

Pressure Transient Insensitivity (GF125)

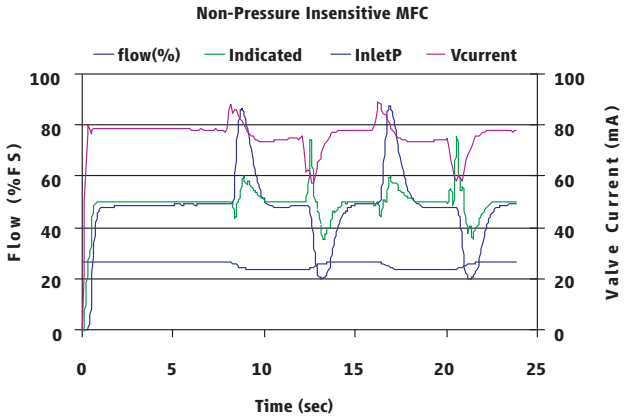
Cost and space constraints are driving gas panel designers to remove point of use pressure regulators and pressure monitoring components, placing more burden on the mass flow controller to control accurately under dynamic pressure conditions. Conventional mass flow controllers react strongly to small inlet pressure fluctuations resulting in unstable performance and unpredictable accuracy (see Non-Pressure Insensitive MFC). This drove Brooks to develop Pressure Transient Insensitive mass flow controller technology (PTI-MFC).

The GF125 PTI-MFC is a second generation PTI-MFC utilizing a patented control algorithm that inverts the pressure signal, compares it to the pre-fluctuation signal and drives real-time valve position compensation to maintain stable flow. Enhanced pressure transient insensitivity is achieved through faster sensing, faster processing, and a reduction in internal dead-volume between the sensors and valve orifice.

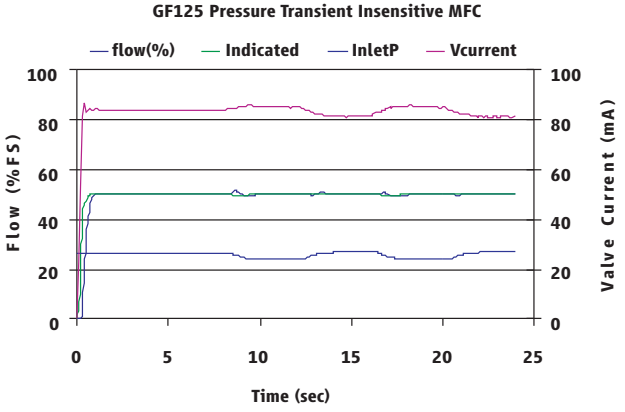
Advanced Thermal Flow Measurement Sensor

Brooks' new sensor technology combines:

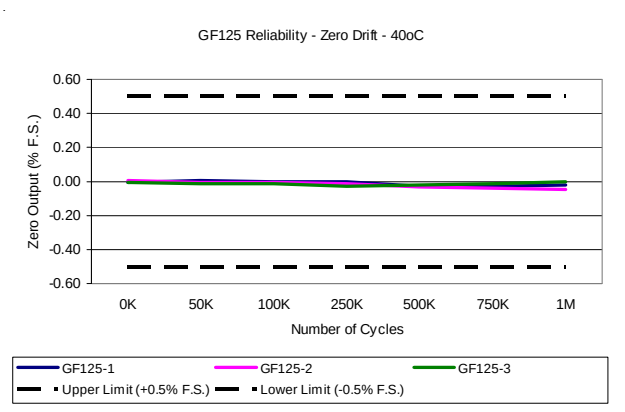
- Improved signal to noise performance for improved accuracy at low setpoints
- Improved reproducibility at elevated temperatures through new isothermal packaging, onboard conditioning electronics with ambient temperature sensing and compensation
- Improved long-term stability through enhanced sensor manufacturing and burn in process
- Highly corrosion resistant Hastelloy C-22 sensor tube
- Optimized temperature profile for gases prone to thermal decomposition
- Unique orthogonal sensor mounting orientation
  - -Eliminates sensor drift caused by valve heating effects
  - -Eliminates thermal siphoning effects for the most-common mounting orientations



Pressure Flucuations in Non-Pressure Transient Insensitivty MFC



Stable Pressure with Pressure Transient Insensitivty GF Device



Product Description

High Purity Flow Path

All metal, corrosion resistant flow path with reduced surface area and un-swept volumes for faster dry-down during purge steps:

- SEMI F-20 compliant wetted flow path
- 4 µ inch Ra max surface finish standard (10 µ inch Ra on GF100)

Extensive Mechanical Configuration Support

GF Series supports all metal seal / UHP industry gas connection interface standards for full OEM and process coverage

- Downport 80mm and 92mm C-seal and W-Seal, on 1.125" and 1.5" bodies
- Downport 80mm CS seal on 1.5" body
- 124 mm 4 VCR on 1.5" body

Advanced Diagnostics

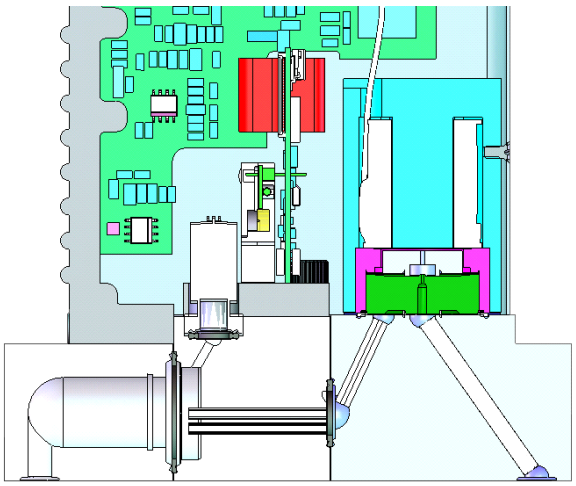
The mass flow controller remains the most complex and critical component in gas delivery systems. When dealing with UHP gas distribution or highly toxic or corrosive gases, removing the mass flow controller to determine if it is faulty should be the last resort. In response to this, Brooks pioneered smarter mass flow controllers with embedded self test routines and introduced an independent diagnostic/service port to provide the user with a simple interface, for troubleshooting without disturbing flow controller operation.

User Interface

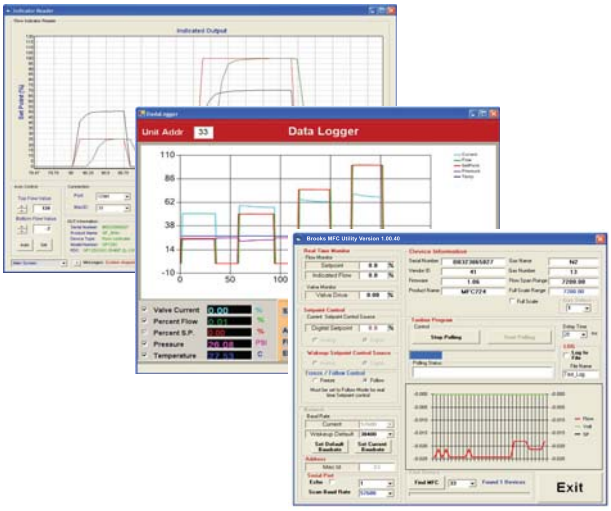
The user interface has a high visibility LCD display that provides a local indication of Flow (%), Temperature (°C), Pressure (PSIA/KPa) and Network Address, selectable through the Display button. A Zero button provides a simple means to re-zero the mass flow controller as part of scheduled maintenance.

Communication Interface

The GF Series supports analog 0-5 Vdc, RS485, and DeviceNet™ communication protocols. A range of low profile adapter cables facilitate replacing older MFCs with the GF Series eliminating the need to carry mass flow controllers of same gas/range but different electrical connectors.



High Purity Flow Path



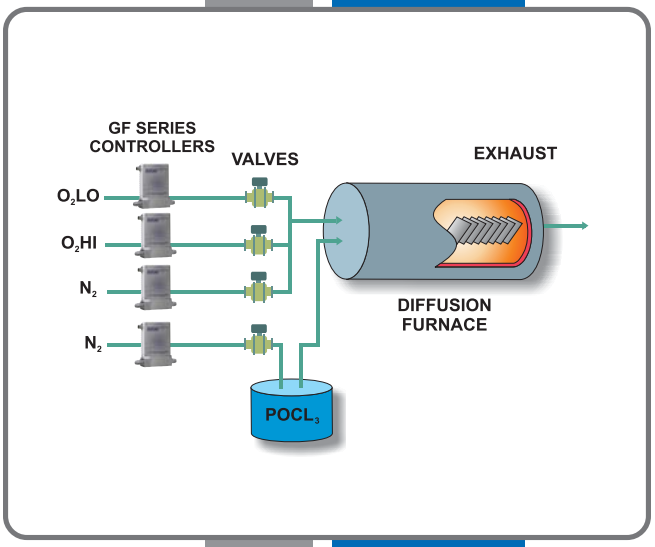
MFC on Gas Box

Communication Interface

Product Applications

Thin Film - Semi / Solar

Developed to meet the diverse process requirements in semiconductor, LED, vacuum thin film, solar, and related industries, the GF Series is a single platform solution for advanced etch, chemical vapor deposition (CVD, PECVD, ALD, MOCVD), physical vapor deposition (PVD), rapid thermal processing (RTP), diffusion, and similar processes.

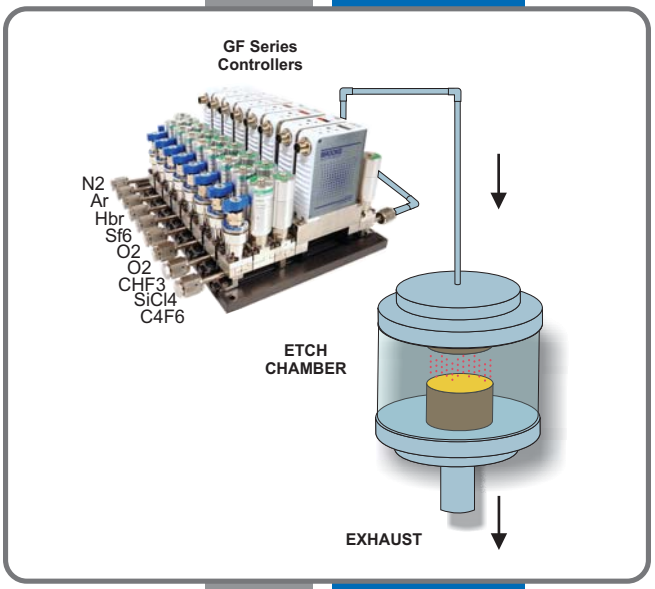


Etch Process

The transition to 22mn node and complex 3D device geometries place greater profile and variability control challenges on the etch tool and its gas delivery sub system.

Creating and maintaining highly reproducible gas chemistry requires leading edge Mass Flow Control.

The GF125 has become the preferred MFC of many of the leading etch OEMs though the combination of its ultra fast 300msec flow settling time, pressure transient insensitivity, rangeability and process gas accuracy.

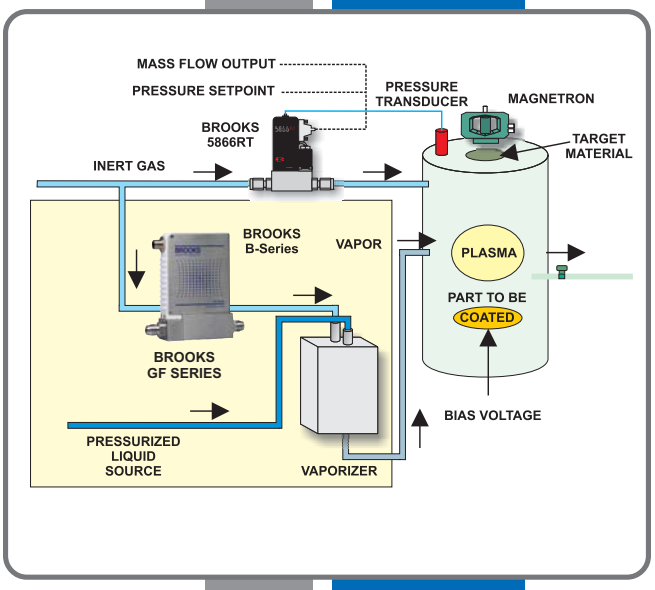


Deposition Process

Chemical Vapor Deposition, the broadest family of processes, requires a diverse range of gases, precursors and flow rates.

The GF platform has been selected by leading CVD Equipment OEMs requiring an MFC capable of meeting their broad process requirements.

The GF Series combines operating range (typical 3:1 programmability), process gas accuracy and low pressure drop/ low temperature flow sensing to present the optimal feature - set for advanced CVD processing



Product Specifications (Base GF Specifications)

Performance

	GF100	GF120	GF125
Full Scale Flow Range	3 sccm to 55 slm		
Flow Accuracy	+/-1% S.P. > 35-100%, +/-0.35% F.S. 2-35%		
Repeatability & Reproducibility	< +/- 0.15% S.P.		
Linearity	+/- 0.5% F.S.		
Response Time (Settling Time)			Bins SH40-44 300ms, Bins 45-46 400ms,
Normally Closed Valve	< 1 sec	500 msec	Bins 47-548 500ms, Bins 49-50 <700 ms
Normally Open Valve	<1.5 sec		
Pressure Insensitivity	Not Applicable		< 5% SP up to 5 psi/sec upstream press. spike
Control Range	2-100%		
MultiFlo	optional	standard	
#of Bins	11		
Valve Shut Down (N.C. Valve)	< 1% of F.S.		
Valve Shut Down (N.O. Valve)	Bins SH40-SH42 <3% of F.S., Bins SH43-SH50 <1% of F.S.		
Zero Stability	< +/- 0.5% F.S. per year		
Temperature Coefficient	0.005% full scale per °C, Zero 0.001% F.S./ °C		

Ratings

Operating Temperature Range	10-50°C	
Differential Pressure Range*	3-860 sccm = 7-45 psid, 861- 7200 sccm = 10-45 psid, 7201-55000 sccm = 15-45 psid Typical pressure drop, Argon gas applications require an additional 10 psid differential pressure	
Maximum Operating Pressure	500 psia max	100 psia max
Burst Pressure	500 psia max	140 psia max
Proof Pressure	500 psia max	140 psia max
Leak Integrity (external)	$1x10^{-11}$ atm. Cc/sec He	

Mechanical

Valve Type	Normally Closed Normally Open	
Wetted Materials	SEMI F20 Compliant 316L VIM/VAR Hastelloy C-22 316L Stainless Steel 304 Stainless Steel KM-45	
Surface Finish	10µ inch Ra	4µ inch Ra (0.1 µm Ra)

Diagnostics & Display

Status Lights	MFC Health, Network Status
Alarms	Sensor Output, Control Valve Output, Over Temperature, Power Surge/Sag, Network Interruption
Display Type	Top Mount Integrated LCD
Viewing Angle / Viewing Distance	Fixed / 10 feet
Units Displayed / Resolution	Flow (%), Temp. (°C), Pressure (psia, kPa) / 0.1 (unit)

Electrical

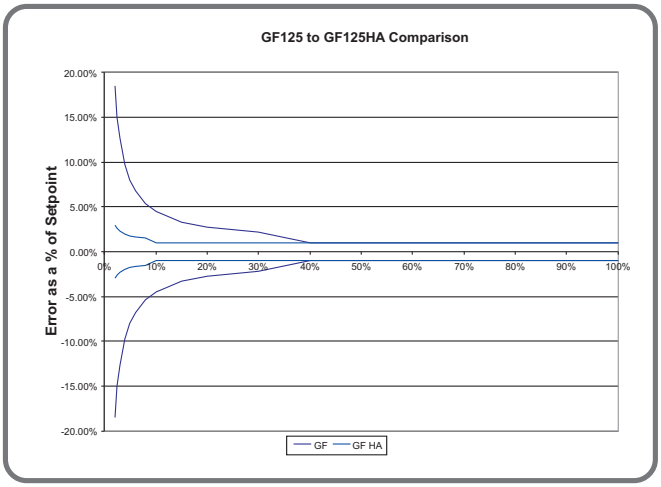
Electrical Connection	Analog/RS-485 via 9-Pin "D" connector, DeviceNet™ via 5-Pin "M12" connector
Digital Communication	RS-485+ (model specific), DeviceNet (model specific), RS-485 Diagnostic Port (all models)
Diagnostic /Service Port	RS485 via 2.5mm jack
Power Supply/Consumption	DeviceNet: +11-25Vdc., 545mA max. @ 11Vdc., 250mA (max.) @ 24Vdc., Analog: ±15Vdc. (±10%), 6 Watts (max)

Compliance

Environmental Compliance	CE: EN61326: 2006 (FCC Part 15 & Canada IC-subset of CE testing)
	Safety EN61010-1
	RoHS

Product Description (GF125HA)

The **GF125HA** is a gas and range specific model for critical flow control applications requiring the widest working range with tightest accuracy band. A typical application is for muti-step processes requiring a high flow rate and a very accurate low flow rate. Traditionally this has been addressed by using two MFCs. With the **GF125HA**, it is often possible to replace two MFCs with one, providing immediate cost savings while freeing up a gas line for greater gas panel flexibility.



Performance	GF125HA
Full Scale Flow Range	5 sccm - 10 slm N_2 equivalent*
Gas Supported	N2, O2, C12, HBr, SiC14, NF3*
MultiFlo Programmable	Not Available
Standard Accuracy	10-100%F.S.=+/-1.0%S.P. 2-10%F.S.=+/-1% S.P. plus +/0.04% F.S.
Repeatability & Reproducibility	< +/- 0.15% S.P.
Turn Down Ratio	100:1
Zero Stability	≤ 0.5% F.S. per year
Settling Time (to within ±2% F.S.)	300ms for flow rates up to 860 sccm N2 eq. 400ms for flow rates up to 7.2 slm N2 eq. 500ms for flow rates up to 55 slm N2 eq.
Warm Up Time	Minimum of 30 minutes
Leak Integrity	$1X10^{-11}$ atm. cc/sec He
Valve Shut Down (Leak by)	<0.5% F.S.

Operating Conditions	GF125HA
Burst Pressure	140 psia max
Proof Pressure	140 psia max
Transient Pressure	±5% S.P. for up to 5psi/sec. upstream press. spike
DifferentialPressure**	7-45 psid[3]
Valve Configuration	Normally Closed
Ambient Temperature Range	10°C-50°C
Zero Temperature Coefficient	0.005% full scale per °C

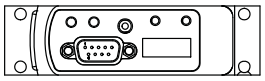
*Consult product management for other options.
**Typical pressure drop. Actual pressure drop will be gas and flow dependent. Consult Technical Support for details.

Electrical Interface Options

Base I/O Options

PDC Ordering Code G1

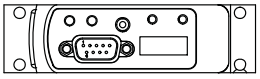
Description: Industry standard Analog / RS-485 interface



Pin No.	Signals
1	Valve Control
2	Output (0-5 Vdc)
3	+15 Vdc
4	Power Common
5	-15 Vdc
6	Setpoint (0-5 Vdc)
7	Signal Common
8	RS-485 (DX+)
9	RS-485 (DX-)

PDC Ordering Code GX

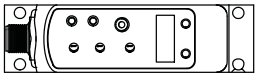
Description: OEM specific Analog / RS-485 interface. Display and top plate re-oriented 180°



Pin No.	Signals
1	Valve Control
2	Output (0-5 Vdc)
3	+15 Vdc
4	Power Common
5	-15 Vdc
6	Setpoint (0-5 Vdc)
7	Signal Common
8	RS-485 (DX+)
9	RS-485 (DX-)

PDC Ordering Code DX

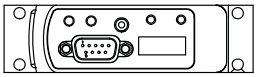
Description: Industry standard ODVA compliant DeviceNet interface



M12 Pin No.	Signals
1	Drain
2	V+ (11-25 Vdc)
3	V-
4	CAN-H
5	CAN-L

PDC Ordering Code TX

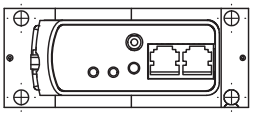
Description: Industry standard Analog / RS-485 interface



Pin No.	Signals
1	Valve Control
2	Output (0-5 Vdc)
3	+15 Vdc
4	Power Common
5	-15 Vdc
6	Setpoint (0-5 Vdc)
7	Signal Common
8	No Connection
9	No Connection

PDC Ordering Code SX

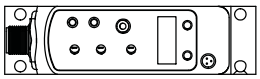
Description: Industry standard Analog 9-Pin Sub D connector and dual RJ11 RS-485 ports



D-Sub Pin No.	Signals
1	Valve Control
2	Output (0-5 Vdc)
3	+15 Vdc
4	Power Common
5	-15 Vdc
6	Setpoint (0-5 Vdc)
7	Signal Common
8	Signal Common
9	Valve Test Point
RJ11 J2 Pin No.	Signals
3	RS-485 (DX+)
2	RS-485 (DX-)

PDC Ordering Code BB

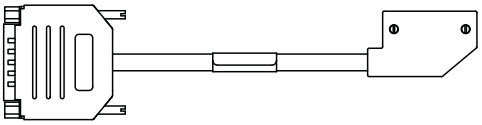
Description: Industry standard ODVA compliant DeviceNet interface, Plus an Separate Analog 0-5 Vdc Connector



M12 Pin No.	Signals
1	Drain
2	V+ (11-25 Vdc)
3	V-
4	CAN-H
5	CAN-L
HIROSE Pin No.	Signals
1	XXX
2	XXX
3	XXX

I/O Options Using Base Model and Adapter Cable

A range of low profile adapter cables have been deveoped to support replacing older generation MFC's with different pinout configurations. The base MFC will be either a, G1, TX or SX configuration, depending on the product being replaced.



PDC Ordering Code UX

Description: SX base I/O with 7003550 adapter for compatability with Unit UDU15

Pin No	Signals
9	VALVE OFF
6	OUTPUT (0-5 VDC)
4	+ 15 VDC
7	POWER COMMON
11	- 15 VDC
15	SETPOINT (0-5 VDC)
1,13,14	SIGNAL COMMON
2	ZERO ALARM
12	VALVE TEST POINT
8	CASE GROUND
3,5,10	NO CONNECTION

PDC Ordering Code: EX

Description: GX base I/O with 7003083 adapter for compatability with Unit "E", IN "L", "R"

Pin No	Signals
J	VALVE OFF
3	OUTPUT (0-5 VDC)
4	+ 15 VDC
2	POWER COMMON
F	- 15 VDC
A	SETPOINT (0-5 VDC)
B,C,10	SIGNAL COMMON
1	CASE GROUND
5,6,8,9	NO CONNECTION
I, D,E,H	NO CONNECTION
7,G	KEY WAY
D	VALVE TEST POINT
RJ11 J2 Pin No	
3	RS-485 (DX-)
4	RS-485 (DX+)

PDC Ordering Code: T1

Description: TX base I/O with 7003551 adapter for compatability with IFlow DB15 & TN 15 pin

Pin No	Signals
15	VALVE OFF
2	OUTPUT (0-5 VDC)
5	+ 15 VDC
1	COMMON
6	- 15 VDC
8	SETPOINT (0-5 VDC)
9	COMMON
10	COMMON
14	CASE GROUND
3,4,7	NO CONNECTION
11,12,13	NO CONNECTION

PDC Ordering Code: KX

Description: G1 base I/O with 7003298 adapter for compatability with Unit UDK15

Pin No	Signals
3,4	VALVE CONTROL*
2	OUTPUT (0-5 VDC)
7	+ 15 VDC
5	POWER COMMON
6	- 15 VDC
8	SETPOINT (0-5 VDC)
11,12	SIGNAL COMMON
1,9,10	CASE GROUND
13,14,15	NO CONNECTION

PDC Ordering Code: FX/JX

Description: SX base I/O with 7003069 (FX)/7003070 (JX) adapter for compatability with Unit UDF9/UDJ9

Pin No	Signals
1	VALVE CONTROL*
2	OUTPUT (0-5 VDC)
3	+ 15 VDC
4	POWER COMMON
5	- 15 VDC
6	SETPOINT (0-5 VDC)
7	SIGNAL COMMON
8	SIGNAL COMMON
9	VALVE TEST POINT

PDC Ordering Code: BX

Description: G1 base I/O with 7003550 adapter for compatability with Brooks 15-Pin D

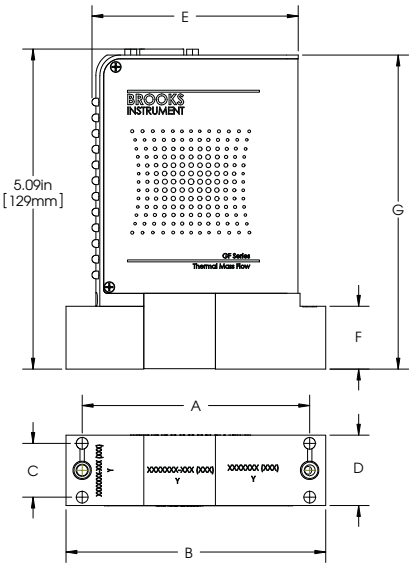
Pin No	Signals
12	VALVE OVERRIDE
2	OUTPUT (0-5 VDC)
5	+ 15 VDC
9	POWER COMMON
6	- 15 VDC
8	SETPOINT (0-5 VDC)
1,10	SIGNAL COMMON
3,4,7,11	NO CONNECTION
13,14,15	NO CONNECTION

Other adapter options are available for the GF Series. Please contact product management for more information.

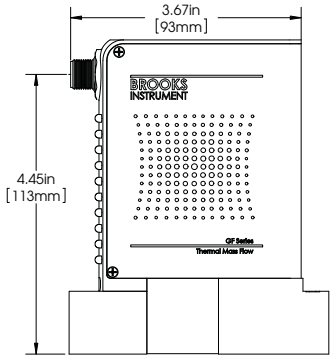
Product Dimensions

Downport Configurations

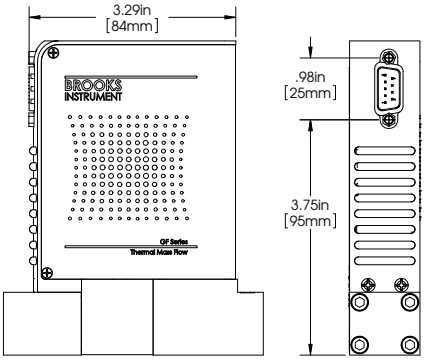
G1/GX/TX Specific Dimensions



DX/BB Specific Dimensions



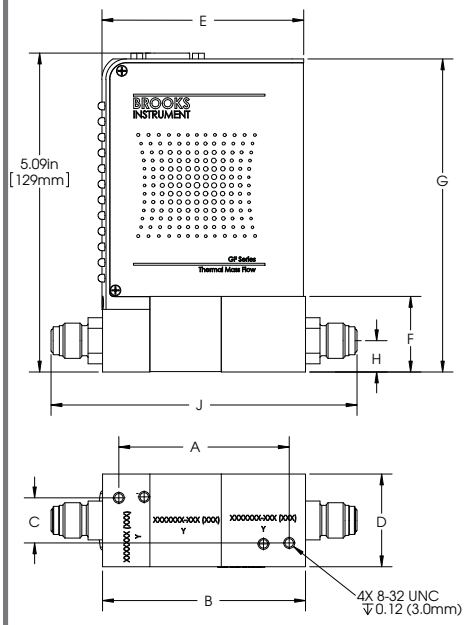
SX Specific Dimensions



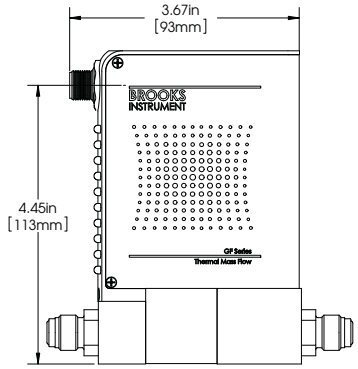
Fitting Option Code	Seal Type	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Dim G
CX	C-SEAL	92mm (3.62in)	105mm (4.13in)	22mm (0.86in)	28mm (1.12in)	83mm (3.28in)	25mm (1.00in)	127mm (5.00in)
EX	W-SEAL	80mm (3.15in)	93mm (3.66in)	30mm (1.18in)	38mm (1.48in)	72mm (2.82in)	25mm (1.00in)	127mm (5.00in)
WX	W-SEAL	92mm (3.62in)	105mm (4.13in)	22mm (0.86in)	28mm (1.12in)	83mm (3.28in)	25mm (1.00in)	127mm (5.00in)

VCR Configurations

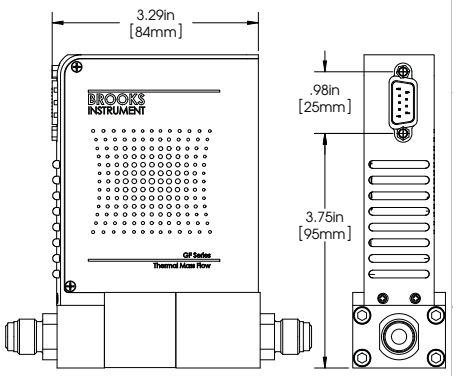
G1/GX/TX Specific Dimensions



DX/BB Specific Dimensions



SX Specific Dimensions



Fitting Option Code	VCR	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Dim G	Dim H	Dim J
VX	1/4"	69mm (2.72in)	82mm (3.24in)	18mm (0.72in)	38mm (1.48in)	83mm (3.28in)	31mm (1.21in)	127mm (5.0in)	13mm (0.50in)	124mm (4.88in)

Option Code	Seal Type	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F	Dim G	Dim H
CX	C-Seal	92mm [3.62in]	105mm [4.13in]	28mm [1.12in]	22mm [0.86in]	83mm [3.82in]	25mm [1.00in]	129mm [5.09in]	127mm [5.00in]
EX	W-Seal	80mm [3.15in]	93mm [3.66in]	38mm [1.48in]	30mm [1.18in]	71mm [2.81in]	25mm [1.00in]	129mm [5.09in]	127mm [5.00in]
WX	W-Seal	92mm [3.62in]	105mm [4.13in]	28mm [1.12in]	22mm [0.86in]	83mm [3.82in]	25mm [1.00in]	129mm [5.09in]	127mm [5.00in]

Model Code

Code	Description	Code Option	Option Description
I.	Base Model Code	**GF**	High Purity/Ultra High Purity Digital Mass Flow Controllers
II.	Package / Finish Specifications	**100**	Flow range 3sccm -30slpm N_2 Eq.; ± 1.0% SP Accuracy; 1 sec Response; 10 Ra
		120	Flow range 3sccm -30slpm N_2 Eq.; + 1.0% SP Accuracy; 500 msec Response; 4 Ra
		125	Pressure Transient Insensitive (PTI)Flow range 3sccm -30slpm N_2 Eq.; + 1.0% SP Accuracy; 300-500 msec Response; 4 Ra
III.	Configurability	**C**	Configurable; Gas & Flow may be specified for set-up on Gas Page 1 (Option for GF100)
		X	Gas Specific; GF125HA. Default for GF100
IV.	Special Application	**XX**	Standard
		HA	High Accuracy Calibration; available on GF125 only - Contact Product Management for this option
V.	Valve Configuration	**0**	Normally Open valve
		C	Normally Closed valve
		M	Meter (No Valve)
VI.	Gas or SH MultiFlo Bin	**XXXX XXXX**	Specific Gas Code & Range, i.e. "0004" = Argon and "010L" = 10 slpm
		SH40 010C	Standard Configurstion #40, 3-10 sccm Nitrogen Equivalent
		SH41 030C	Standard Configurstion #41, 11-30 sccm Nitrogen Equivalent
		SH42 092C	Standard Configurstion #42, 31-92 sccm Nitrogen Equivalent
		SH43 280C	Standard Configurstion #43,93-280 sccm Nitrogen Equivalent
		SH44 860C	Standard Configurstion #44, 281-860 sccm Nitrogen Equivalent
		SH45 2-6L	Standard Configurstion #45, 861-2600 sccm Nitrogen Equivalent
		SH46 7-2L	Standard Configurstion #46, 2601-7200 sccm Nitrogen Equivalent
		SH47 015L	Standard Configurstion #47, 7201-15000 sccm Nitrogen Equivalent
		SH48 030L	Standard Configurstion #48, 15001-30000 sccm Nitrogen Equivalent
		SH49 040L	Standard Configurstion #49, 30001-40000 sccm Nitrogen Equivalent
		SH50 055L	Standard Configurstion #50, 40001-55000 sccm Nitrogen Equivalent
VII.	Fitting	**VX**	1-1/2" VCR 1/4"
		CX	1-1/8" C Seal 92mm
		DX	1-1/8" C Seal 80mm
		EX	1-1/2" W 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 w/Poke Yoke
VIII.	Downstream Condition	**A**	Atmosphere
		V	Vacuum This will be the default configuration for all GF120s w/ Special Option code "**SD**" or "**SL**"
IX.	Sensor	**0**	Default Sensor Orientation
X.	Connector	**BX**	Cable adapter to 15 pin D Brooks (Unit "B","N")
		DX	5-Pin DeviceNet™ micro (unit "D", IN "D")
		EX	Cable adapter to Cardedge (w/out VTP), RS-485 through RJ11 jacks (Unit"E"; IN "L", "R");
		FX	Cable adapter with 9 pin STEC pin-out & thumbscrews (Unit"F","O")
		GX	9-Pin D with RS-485 (Unit"G"); display and overlay 180° orientation
		G1	9-Pin D with RS-485 (Unit"G")
		JX	Cable adapter with 9 pin STEC pin-out & thumbscrews (Unit"J","W")
		KX	Cable adapter to MKS 15-Pin D (Unit "K")
		SX	9 pin D with STEC pin-out (Unit"S","Q")
		TX	9 pin D with UDT9 pin-out (UDT9)
		T1	Cable adapter to 15 pin D (IFlow DB15 & TN 15 pin)
		UX	Cable adapter to 15 pin D (Unit & TN "U")
		BB	DeviceNet™ Analog (Not Available on 80mm fitting DX, YX)
XI.	Customer Special Request	**XXXX**	Customer Special Request Number; required with "DX" Connector Option to define DNET settings
XII.	Auto Shut-Off	**A**	Auto Shut-Off (Included)
		X	Auto Shut-Off (Not Included)
XIII.	Auto Zero	**A**	Auto Zero (Included)
		X	Auto Zero (Not Included)
XIV.	Reference Temperature	**000**	0°C Reference Calibration (Standard) - **this is Default Setting**

Sample Model Code

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
GF	120	C	XX	0	SH40010C	VX	A	0	GX	XXXX	A	X	000

Brooks Service and Support

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support to back it up. We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration and is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

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

START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required. For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users, and maintenance persons.

Please contact your nearest sales representative for more details.

HELP DESK

In case you need technical assistance:

USA	☎ 888 275 8946	Taiwan	☎ +886 3 5590 988
Europe	☎ +31 318 549 290	China	☎ +86 21 5079 8828
Japan	☎ +81 3 5633 7100	Singapore	☎ +6297 9741
Korea	☎ +82 31 708 2521		

Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

DS-TMF-GF Series-MFC-eng (1210)c

TRADEMARKS

Brooks ..... Brooks Instrument, LLC
DeviceNet ..... Open DeviceNet Vendors Association, Inc.
Hastelloy ..... Haynes International
IsoSensor ..... Brooks Instrument, LLC
MultiFlo ..... Brooks Instrument, LLC
VCR ..... Cajon Co.

Brooks Instrument
407 West Vine Street
P.O. Box 903
Hatfield, PA 19440-0903 USA
T (215) 362 3700
F (215) 362 3745
E-Mail BrooksAm@BrooksInstrument.com
www.BrooksInstrument.com

Brooks Instrument
Neonstraat 3
6718 WX Ede, Netherlands
T +31 (0) 318 549 300
F +31 (0) 318 549 309
E-Mail BrooksEu@BrooksInstrument.com

Brooks Instrument
1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
T +81 (0) 3 5633 7100
F +81 (0) 3 5633 7101
E-Mail BrooksAs@BrooksInstrument.com