GP200
Технические характеристики

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Казахстан (7172)727-132

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DATA SHEET

Mass Flow Controllers

Model GP200 with EtherCAT®

GP200 Series

Metal Sealed, Digital, Ultra-high Purity Pressure-based Mass Flow Controllers for Gases

The GP200 Series is the first fully (both inlet and outlet) pressure insensitive P-MFC, designed specifically for semiconductor applications. The GP200's unique differential pressure technology, coupled with its downstream valve architecture, removes the current limitations of pressure-based mass flow controllers, enabling the most precise process gas delivery over the widest range of operating conditions in the industry.

As the inventor and market leader in gas and flow range programmable Mass Flow Controllers, Brooks sophisticated and proprietary MultiFlo™ gas model is now embedded within each GP200 device enabling on-the-fly gas & range reconfiguration for maximum process flexibility.

The GP200's ultra-fast, highly repeatable Matched Transient Response and dynamic cross-talk insensitivity enable tighter process control, handling extreme supply pressure variations while maintaining precise mass flow control to the chamber. The GP200 platform supports a broad range of process conditions which enables drop-in replacement and upgrade of many traditional pressure-based mass flow controllers.

Features	Benefits
True Differential Pressure Measurement	By removing the requirement to match and compensate two separate pressure transducers, the GP200 differential pressure technology reduces measurement uncertainty for enhanced accuracy, repeatability and drift performance.
Lower Inlet Pressure Operation	Safer fab operation at lower inlet pressures is now achievable with a P-MFC due to the GP200's differential pressure sensor that is specifically optimized for low differential pressure measurement.
Cross-Talk Insensitive	Maintains tight process control under dynamic process conditions- the accuracy of the GP200 P-MFC will stay within ≤ ± 1% of S.P. during extreme pressure supply disruptions up to 40 psi/sec
Matched Transient Response	Ultra-fast, highly repeatable ascending and descending flow stabilization time enables tighter process control in advanced high cycle Deposition and Etch processes.
Downstream Valve Architecture	The GP200's downstream valve architecture ensures that accuracy is independent of downstream pressure, enabling flow delivery into pressures as high as 1200 Torr. The GP200's fast closing valve addresses non-productive recipe wait times, or "tail effects", that are seen in upstream MFC valve designs that require additional time to bleed down their internal volume of gas.
Zero Leak-by Control Valve	100X improvement in valve shut-down addresses the long standing "first wafer effect" where the accumulation of unmetered gas (between the MFC control valve & downstream isolation valve) contributes to non-uniformities and Critical Dimension (CD) defects on the first wafer of a process.
High Flow Rate Capability	10 sccm to 50 slm F.S. N2 equivalent P-MFC supports all process flow needs with just nine (9) standard bin configurations for maximum flexibility.

BROOKS® INSTRUMENT

Beyond Measure

PERFORMANCE		
Full Scale Flow Range	3 sccm to 50,000 sccm F.S. N2 Equivalent	
Process Gas Flow Accuracy[1]	**Zero Leak Valve:** < ± 1% S.P. (5 – 100% F.S.) < ± 0.05% F.S. (0.5 - 5% F.S.)	**Metal Seal Valve:** < ± 1% S.P. (5-100% F.S.) < ± 0.05% F.S. (2-5% F.S.)
Control Range	0.5– 100% F.S.	2– 100% F.S.
Repeatability & Reproducibility	< ± 0.15% S.P.	
Transient Response & Flow Settling Time	280 ± 20 ms Matched Transient Response, for any ascending or descending non-zero setpoint (Fast Response Option available via Customer Special Request.)	
Valve Leak-by	**Zero Leak Valve:** <0.005% of F.S. of the bin (Bins 42-46) <0.02% of F.S. of the bin (Bins 40-41) (@ 45 psia to VAC)	**Metal Seal Valve:** <0.15% of F.S. of the bin (@ 45 psia to VAC)
Supply Pressure Insensitivity/Cross-Talk	< ± 1% S.P. up to 40 psi/sec inlet pressure spike	
Steady State Back Pressure Insensitivity	Insensitive to steady state back pressure	
Dynamic Back Pressure Insensitivity	Maintains accuracy during disturbance from vacuum to 1200 Torr over a period of 1 sec	
Zero Stability	< ± 0.15% F.S. per year	
Temperature Coefficient	Zero: 0.005% F.S. per °C Span: 0.05% S.P. per °C	
Number of Standard Configurations	Nine (9) standard bin ranges	
Dynamic Gas and Range Programmability	Device may be configured via single tool command in less than 1 second or via BEST Software with independent USB diagnostic port	
Attitude Insensitivity [1] For Analog control, adder of < ± 0.05% F.S. applies	Insensitive to device orientation after re-zeroing	

RATINGS	
Operating Temperature Range[2]	10 – 60 ° C
Operating Inlet Pressure[3]	< 15 psia for Low Pressure (LP) bins, configurable based on application 15 to 30 psia 25 to 40 psia 35 to 50 psia 45 to 60 psia
Operating Outlet Pressure[3]	Vacuum to Atmosphere Up to 1200 Torr for some applications
Differential Pressure Range	Min: 7 psid typical Max: up to 50 psid
External Leak Integrity	1 x 10-10 atm cc/sec He
Proof Pressure	100 psia, Standard Gases 70 psia, Helium and Helium Mixtures 45 psia, Low Pressure Gases
Design Pressure	150 psia
Burst Pressure	1000 psia

MECHANICAL	
Valve Type	Normally Closed
Primary Wetted Materials	316L, Hastelloy C-22, 316/316L Stainless Steel, 304 Stainless Steel, KM-45, PCTFE
Surface Finish	5µ inch Ra avg.

[2] Device should be zeroed at ambient operating temperature per Brooks Instrument recommended procedure
[3] Consult Brooks Configurator for specific Product Sizing Options

Product Specifications

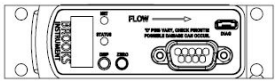
DIAGNOSTICS & DISPLAY	
Status Lights	DeviceNet: MFC Health, Network Status EtherCAT: Run, Error, Power, Network Status, Analog/RS485: Network Status
Alarms[4]	Process Control Deviations, Flow High/Low, Temperature High/Low, Pressure High/Low, Voltage Input High/Low, Communication Alarms, Hardware Failures, Page Create Errors, Warmup Alarm (alarms are model specific)
Display Type	Top Mount Integrated LCD
Viewing Angle/Viewing Distance	Rotatable / 10 ft
Units Displayed/Resolution	Flow (%), Temp. (°C), Pressure (psia, kPa) / 0.1 (unit)

ELECTRICAL	
Digital Communication	DeviceNet™, EtherCAT®, RS485 (model specific)
Electrical Connection	DeviceNet™ via 5-Pin M12 connector EtherCAT® via RJ45 jacks, Power via 5-pin M8 connector 0-5V Analog/RS485 (L-Protocol) via 9-pin D-Connector
Independent Diagnostics Service Port	RS485 via micro-USB
DeviceNet Power Supply/Consumption	545mA max. @ +11-25 Vdc, 250mA max. @ 24 Vdc (under typical operating conditions)
EtherCAT Power Supply/Consumption	360mA max @ 18-30 Vdc, 270mA max @ 24 Vdc (under typical operating conditions)
Analog/RS485 Power Supply/Consumption	6 Watts max @ ± 15 Vdc (± 10%) or +24Vdc (± 10%) (under typical operating conditions)
COMPLIANCE	
EMC	2014/30/EU EMC Directive EN:61326-1: 2013
Environmental Compliance	2011/65/EU & 2015/863/EU RoHS Directive EC 1907/2006 REACH Directive

Electrical Interface Options

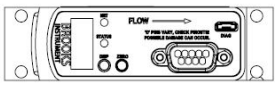
Base I/O Options

PDC Ordering Code G1
Description: Industry standard Analog / RS485 interface



Pin No.	Signals	
1	Valve Control	
2	Output (0-5 Vdc)	
3	+15 Vdc	+24 Vdc
4	Pwr Com	NC
5	-15 Vdc	Pwr Com
6	Setpoint (0-5 Vdc)	
7	Signal Common	
8	RS-485 (DX+)	
9	RS-485 (DX-)	

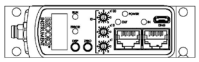
PDC Ordering Code TX
Description: Industry standard Analog only interface

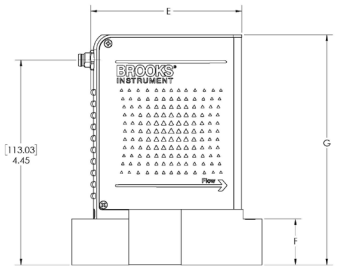


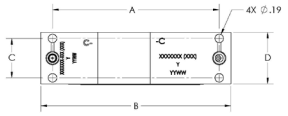
Pin No.	Signals	
1	Valve Control	
2	Output (0-5 Vdc)	
3	+15 Vdc	+24 Vdc
4	Pwr Com	NC
5	-15 Vdc	Pwr Com
6	Setpoint (0-5 Vdc)	
7	Signal Common	
8	No Connection	
9	No Connection	

DOWNPORT CONFIGURATIONS

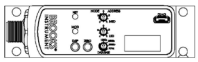
ELECTRICAL CONNECTOR
E0 SPECIFIC DIMENSIONS

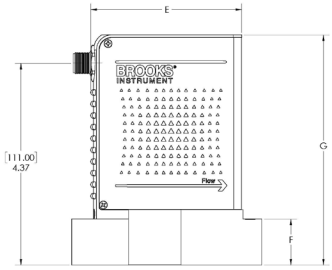


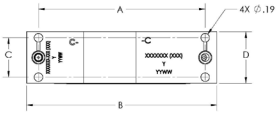




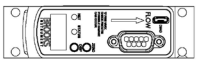
ELECTRICAL CONNECTOR
DX, D0-DE SPECIFIC DIMENSIONS

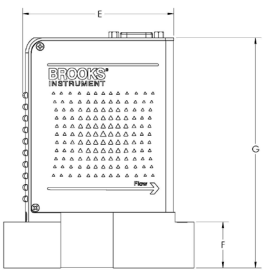


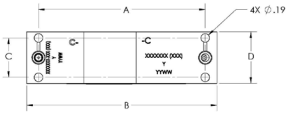


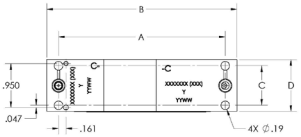


ELECTRICAL CONNECTOR
G1/1X SPECIFIC DIMENSIONS







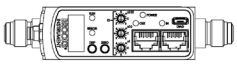


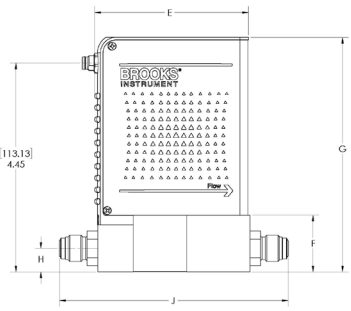
POKE YOKE CONFIGURATION

FITTING OPTION CODE	SEAL TYPE	A	B	C	D	E	F	G
CX	C-SEAL	3.62 in [92mm]	4.13 in [105mm]	0.86 in [22mm]	1.12 in [28mm]	3.28 in [83mm]	1.00 in [25mm]	5.00 in [127mm]
LX	C-SEAL	3.62 in [92mm]	4.13 in [105mm]	0.86 in [22mm]	1.12 in [28mm]	3.28 in [83mm]	1.00 in [25mm]	5.00 in [127mm]
WX	W-SEAL	3.62 in [92mm]	4.13 in [105mm]	0.86 in [22mm]	1.12 in [28mm]	3.28 in [83mm]	1.00 in [25mm]	5.00 in [127mm]

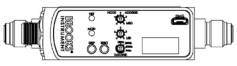
VCR CONFIGURATIONS

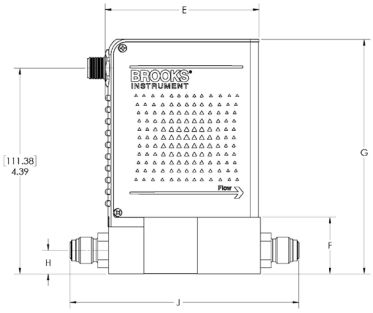
ELECTRICAL CONNECTOR
E0 SPECIFIC DIMENSIONS



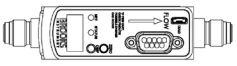


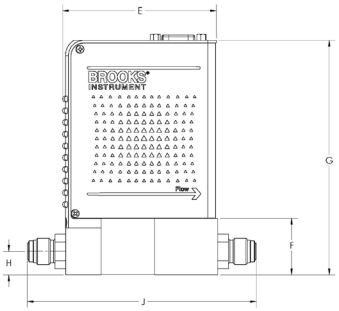
ELECTRICAL CONNECTOR
DX, DO-DE SPECIFIC DIMENSIONS





ELECTRICAL CONNECTOR
G1/TX SPECIFIC DIMENSIONS





FITTING OPTION CODE	VCR	A	B	C	D	E	F	G	H	J
VS	1/4"	2.72in [69mm]	3.24in [82mm]	0.72in [18mm]	1.12in [28.4mm]	3.28in [83mm]	1.21in [31mm]	5.00in [127mm]	0.50in [13mm]	4.88in [124mm]

Code Description	Code Option	Option Description
I. I. Base Model Code	GP200	Ultra-High Purity Pressure-Based Mass Flow Controllers
II. Valve Configuration	P	Positive Shut-off/Zero Leak-by Valve [5]
	C	Normally Closed Valve with Metal Valve Seat
III. Gas and Range[6]	0013 010C	10 sccm F.S. N2 Equivalent, CT40 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 030C	30 sccm F.S. N2 Equivalent, CT41 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 100C	100 sccm F.S. N2 Equivalent, CT42 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 300C	300 sccm F.S. N2 Equivalent, CT43 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 001L	1,000 sccm F.S. N2 Equivalent, CT44 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 003L	3,000 sccm F.S. N2 Equivalent, CT45 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 010L	10,000 sccm F.S. N2 Equivalent, CT46, Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 025L	25,000 sccm F.S. N2 Equivalent, CT47 Standard Bin Configuration at 35 psia inlet, vacuum outlet
	0013 045L	45,000 sccm F.S. N2 Equivalent, CT48 Standard Bin Configuration at 35 psia inlet, vacuum outlet
IV. Standard Type (CT) Bin		Consult Brooks Configurator or Bin Tables
	CT40	Standard Bin Configuration #40
	CT41	Standard Bin Configuration #41
	CT42	Standard Bin Configuration #42
	CT43	Standard Bin Configuration #43
	CT44	Standard Bin Configuration #44
	CT45	Standard Bin Configuration #45
	CT46	Standard Bin Configuration #46
	CT47	Standard Bin Configuration #47
	CT48	Standard Bin Configuration #48
Low Pressure (LP) Bin	LP40	Low Pressure Bin Configuration #40
	LP41	Low Pressure Bin Configuration 41
	LP42	Low Pressure Bin Configuration # 42
	LP43	Low Pressure Bin Configuration #43
	LP44	Low Pressure Bin Configuration #44
	LP45	Low Pressure Bin Configuration #45
	LP46	Low Pressure Bin Configuration #46
V. Fittings	CX	1-1/8" body width, 92mm C-Seal
	WX	1-1/8" body width, 92mm W-Seal
	VS	1-1/8" body width, 124mm 1/4" VCR male
	LX	1-1/8" body width, 92mm C-Seal w/Poke Yoke

VI. Communications/ Connector

	I/O	Power On State	Full Scale Setting			Producer	Consumer	Poll IO State Transition	External Baud Rate
D0	DeviceNet	Idle	Count	Integer	6000h	2	7	Executing	500KB
D1	DeviceNet	Idle	Count	Integer	6000h	21	7	Executing	500KB
D2	DeviceNet	Idle	SCCM	Float	7FFFh	13	19	Executing	500KB
D3	DeviceNet	Idle	Count	Integer	6000h	22	7	Executing	500KB
D4	DeviceNet	Executing	Count	Integer	6000h	22	8	Executing	500KB
D5	DeviceNet	Idle	Count	Integer	6000h	6	8	Executing	500KB
D6	DeviceNet	Idle	Count	Integer	7FFFh	3	7	Executing	500KB
D7	DeviceNet	Idle	Count	Integer	7FFFh	6	8	Executing	500KB
D8	DeviceNet	Idle	Count	Integer	6000h	3	7	Executing	500KB
D9	DeviceNet	Executing	Count	Integer	6000h	2	7	Executing	500KB
DA	DeviceNet	Idle	Count	Integer	7FFFh	22	7	Executing	500KB
DB	DeviceNet	Idle	Count	Integer	6000h	22	8	Executing	500KB
DC	DeviceNet	Idle	Count	Integer	7FFFh	3	7	Idle	500KB
DD	DeviceNet	Executing	Count	Integer	7FFFh	22	8	Executing	500KB
DE	DeviceNet	Executing	SCCM	Float	6000h	15	19	Executing	500KB
DX	DeviceNet	To Be Defined by Customer Special Request							

[5] Zero Leak Valve Option not currently available with bins CT47-CT48

[6] Consult Brooks Configurator or Bin Tables for specific Product Sizing Options

Code Description	Code Option	Option Description
VI. Communications/ Connector	E0	EtherCAT Communication
	G1	9-Pin D-Connector with Analog/RS485 Communication
	TX	9-Pin D-Connector with Analog Only
VII. Customer Special Request	XXXX	Customer Special Request (Consult factory for new requests)
VIII. Minimum Inlet Pressure	15	15 psia minimum inlet pressure, ~15-30 psia inlet pressure range
	25	25 psia minimum inlet pressure, ~25-40 psia inlet pressure range
	35	35 psia minimum inlet pressure, ~35-50 psia inlet pressure range
	45	45 psia minimum inlet pressure, ~45-60 psia inlet pressure range
IX. Downstream Condition	V	Vacuum
	A	Atmosphere
	P	Positive Pressure (760 Torr up to 1200 Torr)
X. Auto Shut-off	A	Auto Shut Off (Included)
	X	Auto Shut Off (Not Included)
XI. Reference Temperature	00C	0°C Reference Calibration (Standard)

Example Model Code

I	II	III	IV	V	VI	VII	VIII	IX	X	XI
GP200	C	0013003L	CT45	CX	E0	XXXX	35	V	A	00C

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