



aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding







Gas Mass Flow Control Products







The Standard of Excellence in Mass Flow

Porter Mass Flow products reflect over four decades of experience in the design and manufacture of precision instruments for the measurement and control of gas flow. They incorporate design principles that are simple and straightforward, yet flexible enough to operate under a wide variety of process parameters. The result is flowmeters, flow controllers and control valves that are accurate, reliable and cost-effective solutions for many gas mass flow applications in the analytical, process, chemical/petro-chemical, environmental, biopharmaceutical and research markets.

Features

- 1 Removable Three Wire Sensor Reliable drift free performance, easy replacement and attitude insensitivity.
- 2 Unique Laminar Flow Element Package Individually scaled for inherent linearity at all flow ranges.
- 3 Choice of Control Circuitry Analog or digital controls with multiple I/O and power options allow configuration versatility. Card edge connection is available for retrofit applications.
- 4 Simplified Valve Design Reliability and flexibility with a normally open option.

Products



500/600 Series Mass Flow Meters and Controllers

The same quality and reliability as our 100/200 Series described below, with the added benefit of microprocessor electronics. They feature percent of reading accuracy, multi-gas capability and fast response with Analog, Modbus, DeviceNet and Profibus communication options.

Full scale flow rates from 5 SCCM up to 1000 SLPM. (See detailed specifications on page 5 and available capacities on page 3.)



100/200 Series Mass Flow Meters and Controllers

The latest evolution of the original Porter Analog MFC. With thousands installed worldwide, they are the proven solution when cost effective high performance gas flow control is the goal. The 100 Series Mass Flow Meters are available for applications where flow measurment only is required.

Full scale flow rates from 5 SCCM up to 1000 SLPM with 0-5, 0-10 Vdc and 4-20 mAdc I/O options. (See detailed specifications on page 5 and available capacities on page 3.)



3600 Series Mass Flow Meters & Controllers

Digital MFC performance in a robust package designed for severe duty applications. NEMA 4x, IP66, Class 1, Div 2, IECex and Atex Zone 2 Certifications* are available along with a variety of I/O, power requirement and process connection options.

Full scale flow rates from 100 SCCM up to 100 SLPM. (See detailed specifications on page 5 and available capacities on page 3.)

* IEC and ATEX Certifications pending.



3200 Series Mass Flow Meters and Controllers

Compact size and Class 1, Div 2 certification makes the 3200 Series the ideal choice for low flow applications in hazardous locations. Available as either a direct mount SP-76 device or with in-line compression fittings. 4-20 mAdc I/O and 24 Vdc power.

Full scale flow rates from 10 SCCM up to 10 SLPM. (See detailed specifications on page 5 and available capacities on page 3.)



2200 Series Mass Flow Meters and Controllers

Low cost without compromise in performance. The aluminum and brass constructed 2200 Series features the same sensor, control electronics, flow elements and valve internals as the 200 Series at 30% lower cost.

Full scale flow rates from 40 SCCM up to 10 SLPM. (See detailed specifications on page 5 and available capacities on page 3.)



MPC Series Mass Flow Controllers

A unique concept in cost-efficient mass flow control. These units combine a fast and accurate mass flow controller with the necessary electronics for a complete closed-loop control system and user interface. All in a compact, panel mount, $1/16~{\rm DIN}$ package.

Full scale flow rates of 0.5, 2.0, 5.0, and 20 SLPM. (See detailed specifications on page 5 and available capacities on page 3.)

Capacities

Туре	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)	Туре	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
	111	10	1500	2		511	10	1500	2
	121	10	3000	2		521	10	3000	2
	112	100	1500	2		512	100	1500	2
Analog Flow	122	100	3000	2	Digital Flow	522	100	3000	2
Meters	113	500	1000	2	Meters	513	500	1000	2
	114	1000	1000	2		514	1000	1000	2
	2111	10	200	2		3611	10	1500	2
	3211	10	1000	2		3612	100	1500	2
	201	10	1000	7		601	10	1000	7
	221	10	3000	7		621	10	3000	7
	251	50	1000	35		651	50	1000	35
	202	100	1000	60		602	100	1000	60
Analog Flow	222	100	3000	60	Digital Flow	602A	100	200	10
Controllers	202A	100	200	10	Controllers	603A	500	200	40
	203A	500	200	40		604A	1000	200	80
	204A	1000	200	80		3601	10	1500	7
	2201	10	200	7		3602	100	1500	30
	3201/3261	10	1000	7		MPC	20	75	22

¹The maximum full scale flow rate available.

NOTE: All flow and pressure specifications are based on N₂ gas. Consult factory for specifications on other gasses.

Accessories

Connector Kits

Part Number	Description
A-2420-000	Card Edge Connector Kit. Used to connect customer-fabricated cable assembly to an MFM/MFC, complete with card edge connector.
A-2420-001	Nine (9)-Pin D-Connector Kit. Used to connect customer-fabricated cable assembly to an MFM/MFC, complete with D-connector.
A-2420-002	Fifteen (15)-Pin D-Connector Kit. Used to connect customer-fabricated cable assembly to Model CM-4000.

General Purpose Power Supplies (+15 Vdc)

Part Number	Description
PS-2-115VAC	For use with up to four (4) Mass Flowmeters or two (2) Mass Flow Controllers
PS-4-115	For use with up to four (4) Mass Flow Controllers

Control Module

Part Number	Description
CM-400	4 Channel Power Supply/Setpoint Control Module. 110/240 VAC (See page 6)

Cable Assemblies

Part Number	Length (in ft.)	MFM/MFC Connector Type	Connects To
KC18040-010	10		Customer
KC18040-025	25	Card Edge	Supplied
KC18040-050	50		Electronics**
C-700-002	10		Customer
C-700-003	25	D-Type	Supplied
C-700-004	50		Electronics**
C-1666-010	10	D-Type	CM-400
C-1666-025	25	D-Type	CIVI-400

^{**}Electronics end is finished by tinning each conductor contained in the cable. Electrical connector for electronics is supplied separately, either by Porter Instrument or by customer. Refer to Connector Kits pricing for available electrical connectors.

² The maximum operating inlet pressure available.

³The minimum required pressure differential for maximum full scale flow rate.

Specifications

Series>>	100/200	2200	3200	500/600	3600	MPC						
Flow Capacity			See Capac	See Capacity Chart, page 3								
Response Time (per SEMI E17-91 Settling Time)	2 to 3 Seconds	3 to 4 Seconds	2 to 3 Seconds		to 2 conds	1 Second						
Accuracy and Linearity	±1% full scale*	±2% full scale	±1% full scale	(20%-100° ±0.8% of r ±0.2% full	of reading % full scale) reading plus scale (below ull scale)	±2% full scale						
Repeatability	With		scale at any cor erating tempera	•	ature	±1% full scale						
Rangeability (Control Range)	50:	:1 (2%-100%	full scale) (accu	racy and con	trol)	4-100% full scale (MPC 95, MPC024) 2-100% full scale (MPC05, MPC20)						
Ambient and Operating Temperature Range		10°C	to 70°C (14°F to	158°F)		-10°C to 50°C (14°F to 122°F)						
Maximum Operating Pressure			See Capac									
Temperature Coefficient (per SEMI E18-91)	±0.05%	full scale/°C	of zero, ±0.05%	of reading/°C	of span	±0.1% FS/°C						
Pressure Coefficient (per SEMI E28-92 Total Calibration Effect)		±0.1%/At	mosphere Typic	al using N ₂	$ \begin{array}{ccc} & .2\%\mbox{-}2\% \ \text{F.S./A} \\ \text{I using N}_2 & & \text{(Model \& flow dependant)} \\ \end{array} $							
Mounting Orientation		A	Attitude insensiti	/e		Horizontal, Top up						
Warm-up Time			10 Minutes			N/A						
External Electrical Connector	9 pin (Edge card on 100/20	d optional	10-foot, 22 AWG, 8-conductor power-limited tray cable, stripped and tinned ends	9 pin "D"	Screw Terminals							
Setpoint Input/Flow Signal Output	0-5 Vdc, (4-20 n 1-5 Vdc/4-	nAdc,	4-20 mAdc	plus Modb	00/200 Series us, Profibus, ceNet.	Touch Pad data entry, LED display, 0-5 Vdc & 1-5 Vdc external inputs						
Power Supply Requirements	+12-1; (0-5 Vdc I/O), (4-20 m/	+15-24 Vdc	dc +15-24 Vdc <250 mAdc 24 Vdc, <300 mA									

^{* ±1.5%} for Models 114 and 204A

Materials of Construction

Series>>	100/200	2200	3200	500/600	3600	MPC			
Body	316 SS	Aluminum	316	Stainless Stee	I	Brass			
Sensor Assembly		316L	Stainless Steel			MEMS			
Orifice	316 SS	Brass	316 Stainless Steel						
Valve Components (Wetted)			302 Stainless Steel, 316 Stainless Steel, 430F Stainless Steel and Sandvik® 1802						
Elastomers (O-rings and Valve Seat)	Same as 3200	Same as 3200, less Kalrez							
Process Connections	316 SS	Brass & Aluminum	316	I	Brass				

Model CM-400 MFC Power Supply/Control Module

Porter Model CM-400 is a high performance microprocessor based 4-channel power supply/ control module designed for use with Porter Mass Flow Meters and Controllers. An 8-line, backlit LCD display provides selectable data on the status of the 4 channels simultaneously; low noise, thermal overload protected +15 Vdc device power is provided on each channel. The CM-400 accepts user selectable current or voltage input signals and supplies a selectable setpoint signal for each channel. In addition to the analog I/O, a digital communication port is included for computer/ PLC interface. A programmable multi-channel blend control and totalizer with batch function allows the CM-400 to precisely interact with Porter MFCs in a versatile and functional gas management system.

For further information, see Bulletin FM-1180.



Product Features and Options:

- 4 Independent Channels
- Displays in Selectable Engineering Units
- Multiple I/O Configurations
- Programmable Gas Correction Factors
- Programmable Multi-Channel Blend Control
- Totalizer and Batch Control
- +15 Vdc MFC Power Output
- 110/240 Vac Operation

Ordering Information

Analog Mass Flow Meters/Controllers

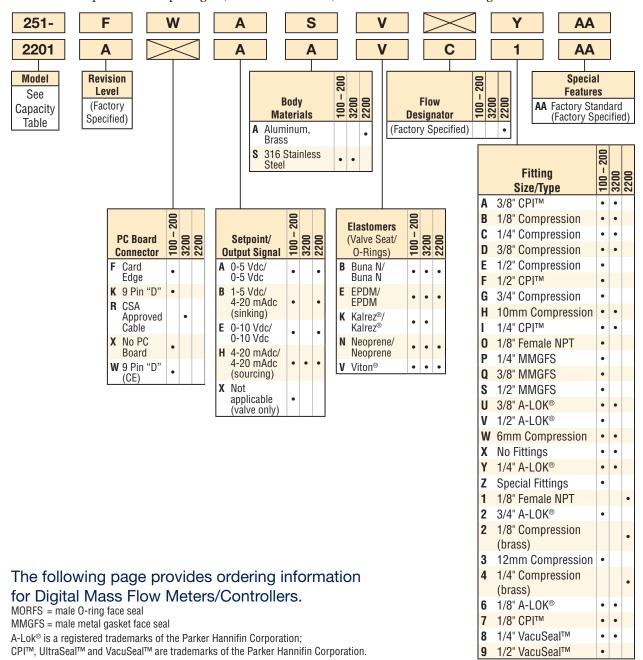
Use the following guides to determine the specific product number you require.

Example: 251-FWASVYAA

This example part numer describes a 251 model gas flow meter, factory revision F, with a stainless steel body, 9 Pin "D" (CE) PC board connector, 0-5 Vdc setpoint and output signal, Viton® elastomers and 1/4" A-LOK® fitting.

Example: 2201AAAVC1AA

This part number describes a 2201 model gas flow meter, factory revision A, with an aluminum/brass body, 0-5 Vdc setpoint and output signal, Viton® elastomers, and 1/8" female NPT fitting.



Ordering Information

Digital Mass Flow Meters/Controllers

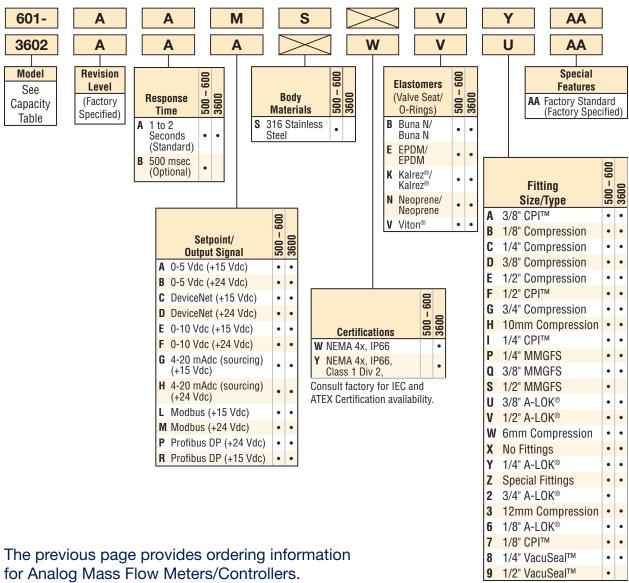
Use the following guides to determine the specific product number you require.

Example: 601-AAMSVYAA

This example part numer describes a 601 model gas flow meter, factory revision A, with a stainless steel body, a standard response time (1 to 2 seconds), a Modbus (\pm 24 Vdc) setpoint and output signal, Viton® elastomers and \pm 1/4" A-LOK® fitting.

Example: 3602AAAWVUAA

This part number describes a NEMA 4x, IP66 certified 3602 model gas flow meter, factory revision A, with a standard response time (1 to 2 seconds), a 0-5 Vdc (\pm 24 Vdc) setpoint and output signal, Viton® elastomers and 3/8" A-LOK® fitting.



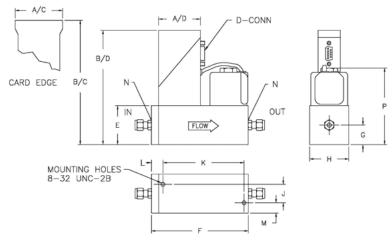
MORFS = male O-ring face seal MMGFS = male metal gasket face seal

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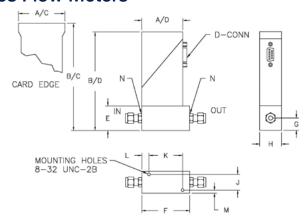
Dimensions

200/600/2200 Series Flow Controllers



Model	A/C	A/D	B/C	B/D	E	F	G	Н	J	K	L	М	N	Р
201/601	2.11	1.83	4.897	4.520	1.125	3.005	.500	1.000	.720	2.720	.145	.140	9/16 - 18	2.218
202/602	2.11	1.83	5.522	5.145	1.750	4.335	.875	1.750	.828	3.634	.511	.461	9/16 - 18	3.569
221	2.11	1.83	5.522	5.145	1.750	4.015	.875	1.750	.828	3.634	.191	.461	9/16 - 18	3.569
222	2.11	1.83	5.522	5.145	1.750	4.335	.875	1.750	.828	3.634	.511	.461	9/16 - 18	3.569
251/651	2.11	1.83	5.272	4.895	1.500	3.005	.750	1.000	.720	1.897	.963	.140	9/16 - 18	3.066
2201	N/A	1.83	N/A	4.511	1.125	3.005	.500	1.000	.720	2.720	.145	.140	1/8" FNPT	2.800

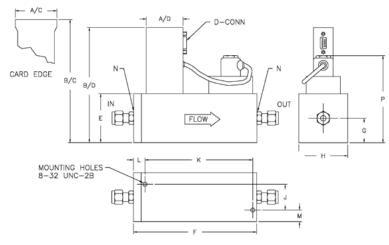
100/500/2200 Series Flow Meters



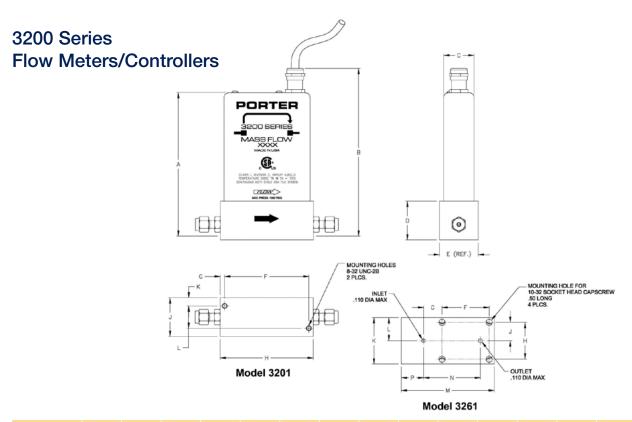
Model	A/C	A/D	B/C	B/D	E	F	G	Н	J	K	L	М	N
111/511	2.11	1.83	4.897	4.520	1.125	2.187	.500	1.000	.720	1.540	.324	.140	9/16 - 18
112/512	2.11	1.83	5.522	5.145	1.750	2.564	.875	1.750	.828	1.862	.511	.461	9/16 - 18
113/513	2.11	1.83	5.272	5.895	2.500	3.739	1.250	2.500	1.318	2.953	.590	.591	3/4 - 16
114/514	2.11	1.83	6.272	5.895	2.500	5.174	1.250	2.500	1.318	2.953	1.307	.591	3/4 - 16
121	2.11	1.83	4.897	4.520	1.125	2.187	.500	1.000	.720	1.540	.324	.140	9/19 - 18
122	2.11	1.83	5.522	5.145	1.750	2.564	.875	1.750	.828	1.862	.511	.461	9/16 - 18
123	2.11	1.83	7.022	6.645	3.250	4.055	1.675	3.250	1.318	2.953	.906	.966	3/4 - 16
2211	N/A	1.83	N/A	4.511	1.125	1.900	.500	1.000	.720	1.633	.145	.140	1/8" FNPT

Dimensions

200A/600A Series Flow Controllers



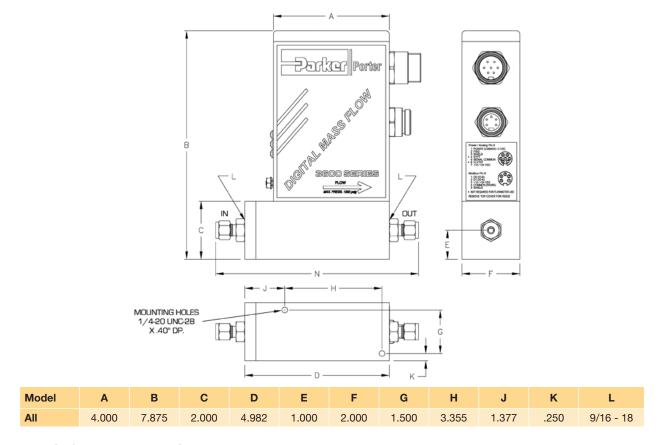
Model	A/C	A/D	B/C	B/D	E	F	G	Н	J	K	L	М	N	Р
202A/602A	2.11	1.83	5.647	5.270	1.875	5.241	.875	1.875	.828	4.539	.511	.523	9/16 - 18	3.770
203A/603A	2.11	1.83	6.272	5.895	2.500	6.299	1.250	2.500	1.318	5.512	.590	.591	3/4 - 16	4.395
204A/604A	2.11	1.83	6.272	5.895	2.500	6.299	1.250	2.500	1.318	5.512	.590	.591	3/4 - 16	4.395



Model	A/C	A/D	B/C	B/D	E	F	G	Н	J	K	L	M	N	Р
3201/3211	4.63	6.00	.98	1.25	1.25	2.72	.145	3.005	1.250	.265	.720			
3261/3271	4.63	6.00	.98	1.13	1.50	1.53	.594	1.188	.594	1.500	.750	3.000	1.835	.720

Dimensions

3600 Series Flow Meters/Controllers



MPC Series Flow Controllers

Model	Height	Width	Depth	Cut-Out
All	1.889	1.889	2.98	1.772 x 1.772

Electrical Connections

100/200 Series (9 Pin "D")		3200 Series (Certified Cable Assembly)		600/700 Series (9 Pin "D")		MPC Series (9 Pin Terminal Connector)	
PIN#	Function	Wire #	Function	PIN#	Function	PIN#	Function
1	ABZ Disable/	1/One Black	Flow Signal	1	TXD (RS-232	1	Power In
	Reference Voltage		Output	•	Flow Signal	2	Power Common
2	Flow Signal Output	1/One Red	ABZ Disable	2	Output	3	Event Output 1
3	Setpoint Input	2/Two Black	Power In	3	Setpoint Input	4	Event Output 2
4	Signal Common	2/Two Red	Setpoint Input	4	Power Common	5	External Switch Input 1
5	Valve Test/SIM VO	3/Three Black	octpoint input	5 Valve Test6 RXD (RS-232	Valve Test		
	Open		Power Common		6	External Switch Input 2	
6	Not Used	0/51 5 1	0: 10				
7	Power In	3/Three Red	Signal Common	7	Power In	7	Optional Setoint Input
8	Power Common	4/Four Black	Not Used	8	Signal Common	8	Flow Signal Output
9	Shield (Ground)	4/Four Red	Valve Test	9	Shield (Ground)	9	Signal Common

⚠ WARNING – USER RESPONSIBILITY

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