

Model 111

Mass Flow Instruments

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 flow applications in the analytical, process, chemical/ petrochemical, environmental, biopharmaceutical and research markets.

The 100 and 200 series are the latest evolution of the original Porter Analog Mass Flow Products. 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 measurement only is required.



SPECIFICATIONS:

Flow Capacity: Any Flow range from 0-5 SCCM to 0-10 SLPM (nitrogen equivalent).

Response Time (per SEMI E17-91 Settling Time): 1 to 2 Seconds

Accuracy and Linearity: $\pm 1\%$ full scale

Repeatability: Within $\pm 0.2\%$ full scale at any constant temperature within operating temperature range

Rangeability (Control Range): 50; 1 (2%-100% full scale) (accuracy and control)

Ambient and Operating Temperature Range: -10 to 70 °C (± 14 to 158 °F)

Maximum Operating Pressure: 1500 PSIG

Temperature Coefficient (per SEMI E18-91 Zero Effect and Span Effect):

$\pm 0.05\%$ full scale / °C of zero
 $\pm 0.05\%$ of reading/ °C of span

Pressure Coefficient (per SEMI E28-92 Total Calibration Effect):

$\pm 0.1\%$ /atmosphere typical using nitrogen (N₂)

Mounting Orientation: Attitude insensitive

Warm-up Time: 10 minutes

External Electrical Connector: Nine (9)- pin D-connector

Weight (approximate): 0.9 lbs

Power Supply Requirements:

(Current consumption <45 mAdc):

Voltage output models: +12 ($\pm 5\%$) (0-5 Vdc & 1-5 Vdc flow signal outputs only) or +15 ($\pm 10\%$) Vdc

Current loop models:

+15 ($\pm 5\%$) or +24 ($\pm 15\%$) Vdc

Setpoint Input/Flow Signal Output:

0-5 Vdc/0-5 Vdc (2K ohm minimum load resistance)

0-10 Vdc/0-10 Vdc (3K ohm minimum load resistance)

1-5 Vdc/1-5 Vdc (2K ohm minimum load resistance)

4-20 mAdc/4-20mAdc (refer to load resistance values below)

Load resistance values for 4-20 mAsc flow signal output:

0-450 ohm for 6.5-15 Vdc loop supply voltage

200-750 ohm for 15-30 Vdc loop supply voltage



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MATERIALS OF CONSTRUCTION

- Body:** 316 Stainless Steel
- Sensor Assembly:** 316L Stainless Steel
- Elastomers (O-rings and Valve Seat):** Buna N, EPDM, Kalrez®, Neoprene or Viton®
- Process Connections:** 316 Stainless Steel

Kalrez® and Viton® are the property of their respective owners

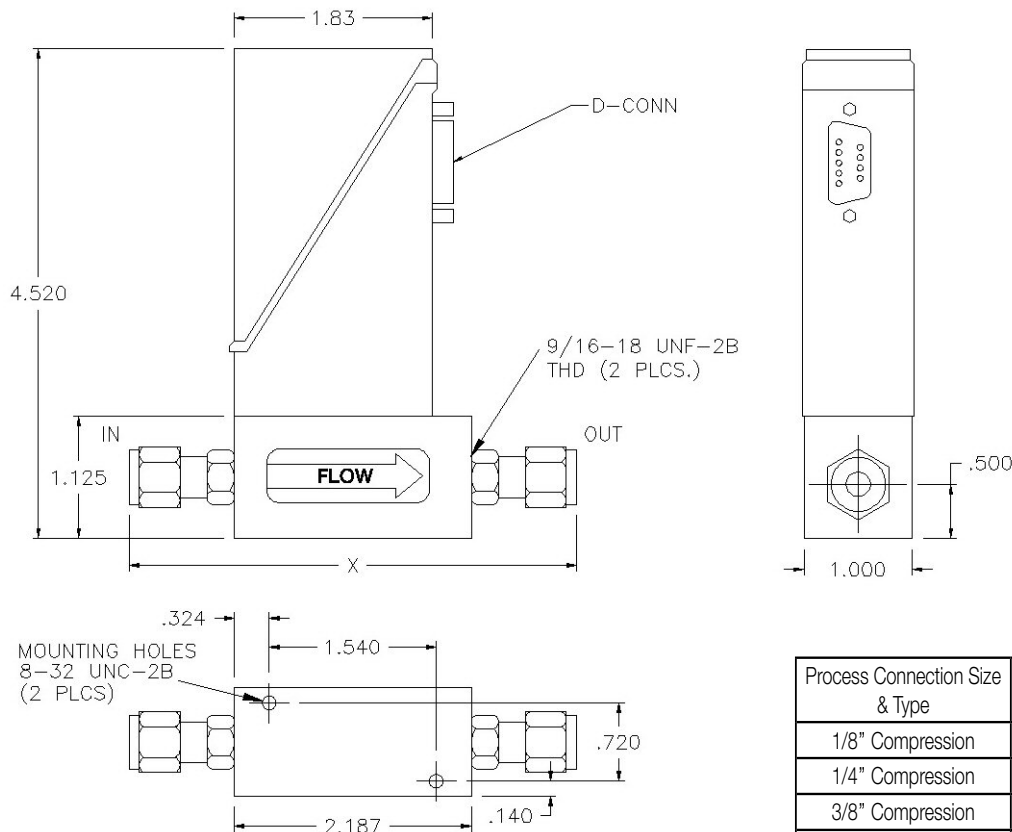
Specifications subject to change

ORDERING INFORMATION

To order, please specify:

- Model number
- Type of output signal
- Elastomer material
- Process connection size and type
- Flow capacity
- Gas type
- Operating temperature
- Inlet (supply) pressure
- Outlet pressure
- Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
- Additional accessories required

DIMENSIONAL DATA



Dimensions shown in inches

Process Connection Size & Type	'X' Dimension
1/8" Compression	4.027"
1/4" Compression	4.027"
3/8" Compression	4.327"
1/4" CPI™	4.207"
3/8" CPI™	4.327"
1/4" A-Lok®	4.207"
3/8" A-Lok®	4.327"
1/4" MMGFS ⁽²⁾	4.067"

MODEL NUMBER AND DESCRIPTION

Example: 111 - F K A S V C AA

Model
111

Model Revision Level
F: Current Revision

PC Board Electrical Connector
K: Nine (9)-Pin "D"

Setpoint Signal/Output Signal
A: 0-5 Vdc
B: 4-20 mAdc (sinking)
D: 1-5 Vdc
E: 0-10 Vdc
H: 4-20 mAdc (sourcing)

Body Material
S: 316 Stainless Steel

Assembly/Calibration Features
AA: Factory Standard

Process Connection Size and Type			
A	3/8" CPI™	M	1/4" UltraSeal®
B	1/8" Compression	P	1/4" MMGFS ⁽²⁾
C	1/4" Compression	Q	3/8" MMGFS ⁽²⁾
D	3/8" Compression	R	3/8" UltraSeal®
E	1/2" Compression	S	1/2" MMGFS ⁽²⁾
H	10 mm Compression	U	3/8" A-LOK®
I	1/4" CPI	W	6 mm Compression
J	1/4" MORFS ⁽¹⁾	X	No Connections
K	3/8" MORFS ⁽¹⁾	Y	1/4" A-LOK
L	1/2" MORFS ⁽¹⁾	Z	Special Connections

Elastomers (Valve Seat/O-Rings)
B: Buna N
E: EPDM
K: Kalrez
N: Neoprene
V: Viton

A-LOK®, CPI™, UltraSeal™, VacuSeal™ - Parker Hannifin Corp.
⁽¹⁾MORFS = Male O-Ring Face Seal
⁽²⁾MMGFS = Male Metal Gasket Face

For model number options not shown above, please consult factory

OTHER AVAILABLE ANALOG MASS FLOWMETER AND MASS FLOW CONTROLLER MODELS

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Meters	111	10	1500	2
	121	10	3000	2
	112	100	1500	2
	122	100	3000	2
	113	500	1000	2
	114	1000	1000	2
	2111	10	200	2
	3211	10	1000	2

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Controllers	201	10	1000	7
	261	10	1000	7
	221	10	3000	7
	251	50	1000	35
	202	100	1000	60
	222	100	3000	60
	202A	100	200	10
	203A	500	200	40
	204A	1000	200	80
	2201	10	200	7
	3201/3261	10	1000	7

Note: The flow ranges listed are the minimum and maximum nitrogen (N2) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory.



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ENGINEERING YOUR SUCCESS

Model 112

Mass Flow Instruments

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 flow applications in the analytical, process, chemical/ petrochemical, environmental, biopharmaceutical and research markets.

The 100 and 200 series are the latest evolution of the original Porter Analog Mass Flow Products. 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 measurement only is required.



SPECIFICATIONS:

Flow Capacity: Any Flow range from 0-10 SLPM to 0-100 SLPM (nitrogen equivalent).

Response Time (per SEMI E17-91 Settling Time): 1 to 2 Seconds

Accuracy and Linearity: $\pm 1\%$ full scale

Repeatability: Within $\pm 0.2\%$ full scale at any constant temperature within operating temperature range

Rangeability (Control Range): 50; 1 (2%-100% full scale) (accuracy and control)

Ambient and Operating Temperature Range: -10 to 70 °C (± 14 to 158 °F)

Maximum Operating Pressure: 1500 PSIG

Temperature Coefficient (per SEMI E18-91 Zero Effect and Span Effect):

$\pm 0.05\%$ full scale / °C of zero
 $\pm 0.05\%$ of reading/ °C of span

Pressure Coefficient (per SEMI E28-92 Total Calibration Effect):
 $\pm 0.1\%$ /atmosphere typical using nitrogen (N₂)

Mounting Orientation: Attitude insensitive

Warm-up Time: 10 minutes

External Electrical Connector: Nine (9)- pin D-connector

Weight (approximate): 2.1 lbs

Power Supply Requirements:

(Current consumption <45 mAdc):

Voltage output models: +12 ($\pm 5\%$) (0-5 Vdc & 1-5 Vdc flow signal outputs only) or +15 ($\pm 10\%$) Vdc

Current Loop models: +24 ($\pm 15\%$) Vdc

Setpoint Input/Flow Signal Output:

0-5 Vdc/0-5 Vdc (2K ohm minimum load resistance)

0-10 Vdc/0-10 Vdc (3K ohm minimum load resistance)

1-5 Vdc/1-5 Vdc (2K ohm minimum load resistance)

4-20 mAdc/4-20mAdc (refer to load resistance values below)

Load resistance values for 4-20 mAdc flow signal output:

0-450 ohm for 6.5-15 Vdc loop supply voltage

200-750 ohm for 15-30 Vdc loop supply voltage

MATERIALS OF CONSTRUCTION

Body: 316 Stainless Steel
Sensor Assembly: 316L Stainless Steel
Elastomers (O-rings and Valve Seat): Buna N, EPDM, Kalrez®, Neoprene or Viton®
Process Connections: 316 Stainless Steel

Kalrez® and Viton® are the property of their respective owners

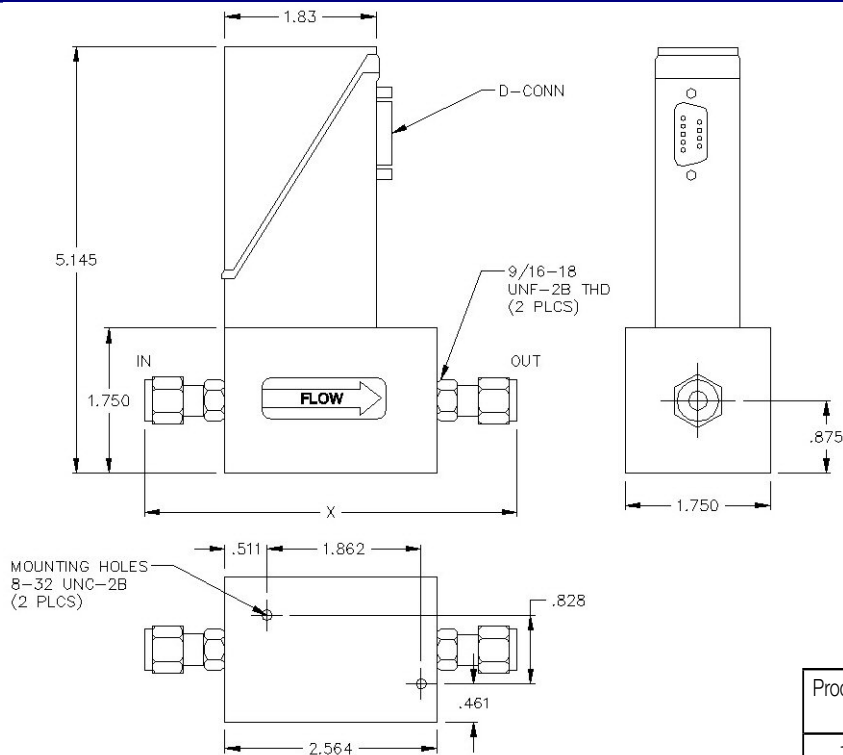
Specifications subject to change

ORDERING INFORMATION

To order, please specify:

- Model number
- Type of output signal
- Elastomer material
- Process connection size and type
- Flow capacity
- Gas type
- Operating temperature
- Inlet (supply) pressure
- Outlet pressure
- Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
- Additional accessories required

DIMENSIONAL DATA



Dimensions shown in inches

Process Connection Size & Type	'X' Dimension
1/4" Compression	4.584"
3/8" Compression	4.704"
1/4" CPI™	4.584"
3/8" CPI™	4.704"
1/4" A-Lok®	4.584"
3/8" A-Lok®	4.704"
1/4" MMGFS ⁽²⁾	4.444"

MODEL NUMBER AND DESCRIPTION

Example: 112 - F K A S V C AA

Model
112

Model Revision Level
F: Current Revision

PC Board Electrical Connector
K: Nine (9)-Pin "D"

Setpoint Signal/Output Signal
A: 0-5 Vdc
B: 4-20 mAdc (sinking)
D: 1-5 Vdc
E: 0-10 Vdc
H: 4-20 mAdc (sourcing)

Body Material
S: 316 Stainless Steel

Assembly/Calibration Features
AA: Factory Standard

Process Connection Size and Type			
A	3/8" CPI™	M	1/4" UltraSeal®
C	1/4" Compression	P	1/4" MMGFS ⁽²⁾
D	3/8" Compression	Q	3/8" MMGFS ⁽²⁾
E	1/2" Compression	R	3/8" UltraSeal®
H	10 mm Compression	S	1/2" MMGFS ⁽²⁾
I	1/4" CPI	U	3/8" A-LOK®
J	1/4" MORFS ⁽¹⁾	W	6 mm Compression
K	3/8" MORFS ⁽¹⁾	X	No Connections
L	1/2" MORFS ⁽¹⁾	Y	1/4" A-LOK
		Z	Special Connections

Elastomers (Valve Seat/O-Rings)
B: Buna N
E: EPDM
K: Kalrez
N: Neoprene
V: Viton

A-LOK®, CPI™, UltraSeal™, VacuSeal™ - Parker Hannifin Corp.
⁽¹⁾MORFS = Male O-Ring Face Seal
⁽²⁾MMGFS = Male Metal Gasket Face Seal

For model number options not shown above, please consult factory

OTHER AVAILABLE ANALOG MASS FLOWMETER AND MASS FLOW CONTROLLER MODELS

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Meters	111	10	1500	2
	121	10	3000	2
	112	100	1500	2
	122	100	3000	2
	113	500	1000	2
	114	1000	1000	2
	2111	10	200	2
3211	10	1000	2	

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Controllers	201	10	1000	7
	261	10	1000	7
	221	10	3000	7
	251	50	1000	35
	202	100	1000	60
	222	100	3000	60
	202A	100	200	10
	203A	500	200	40
	204A	1000	200	80
	2201	10	200	7
	3201/3261	10	1000	7

Note: The flow ranges listed are the minimum and maximum nitrogen (N₂) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory.



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ENGINEERING YOUR SUCCESS

Model 113

Mass Flow Instruments

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 flow applications in the analytical, process, chemical/ petrochemical, environmental, biopharmaceutical and research markets.

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SPECIFICATIONS:

Flow Capacity: Any Flow range from 0-100 SLPM to 0-500 SLPM (nitrogen equivalent).

Response Time (per SEMI E17-91 Settling Time): 1 to 2 Seconds

Accuracy and Linearity: $\pm 1\%$ full scale

Repeatability: Within $\pm 0.2\%$ full scale at any constant temperature within operating temperature range

Rangeability (Control Range): 50; 1 (2%-100% full scale) (accuracy and control)

Ambient and Operating Temperature Range: -10 to 70 °C (± 14 to 158 °F)

Maximum Operating Pressure: 1500 PSIG

Temperature Coefficient (per SEMI E18-91 Zero Effect and Span Effect):

$\pm 0.05\%$ full scale / °C of zero
 $\pm 0.05\%$ of reading/ °C of span

Pressure Coefficient (per SEMI E28-92 Total Calibration Effect):
 $\pm 0.1\%$ /atmosphere typical using nitrogen (N_2)

Mounting Orientation: Attitude insensitive

Warm-up Time: 10 minutes

External Electrical Connector: Nine (9)- pin D-connector

Weight (approximate): 5.2 lbs

Power Supply Requirements:

(Current consumption < 45 mAdc):

Voltage output models: +12 ($\pm 5\%$) (0-5 Vdc & 1-5 Vdc flow signal outputs only) or +15 ($\pm 10\%$) Vdc

Current loop models:

+15 ($\pm 5\%$) or +24 ($\pm 15\%$) Vdc

Setpoint Input/Flow Signal Output:

0-5 Vdc/0-5 Vdc (2K ohm minimum load resistance)

0-10 Vdc/0-10 Vdc (3K ohm minimum load resistance)

1-5 Vdc/1-5 Vdc (2K ohm minimum load resistance)

4-20 mAdc/4-20mAdc (refer to load resistance values below)

Load resistance values for 4-20 mAdc flow signal output:

0-450 ohm for 6.5-15 Vdc loop supply voltage

200-750 ohm for 15-30 Vdc loop supply voltage



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MATERIALS OF CONSTRUCTION

Body: 316 Stainless Steel

Sensor Assembly: 316L Stainless Steel

Elastomers (O-rings and Valve Seat): Buna N, EPDM, Kalrez®, Neoprene or Viton®

Process Connections: 316 Stainless Steel

Kalrez® and Viton® are property of their respective owners

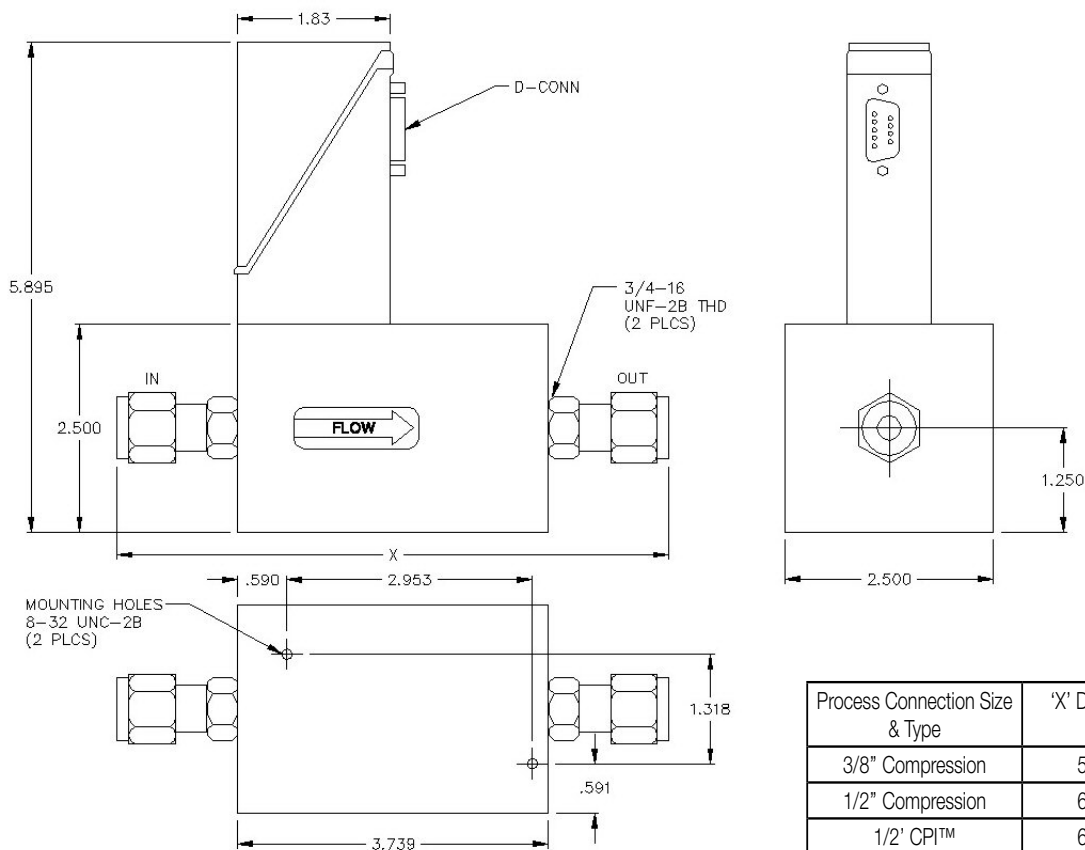
Specifications subject to change

ORDERING INFORMATION

To order, please specify:

- Model number
- Type of output signal
- Elastomer material
- Process connection size and type
- Flow capacity
- Gas type
- Operating temperature
- Inlet (supply) pressure
- Outlet pressure
- Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
- Additional accessories required

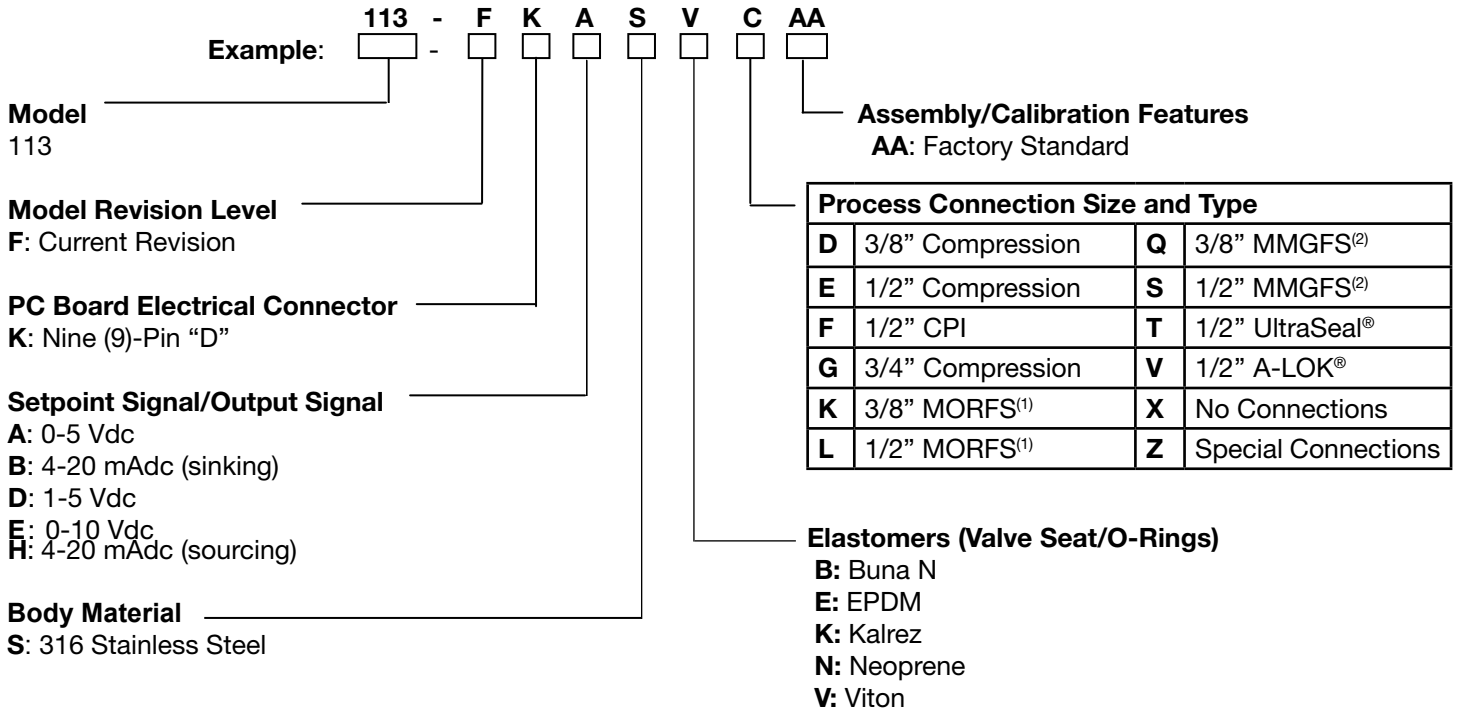
DIMENSIONAL DATA



Dimensions shown in inches

Process Connection Size & Type	'X' Dimension
3/8" Compression	5.939"
1/2" Compression	6.159"
1/2" CPI™	6.159"
1/2" A-Lok®	6.159"
3/8" A-Lok®	4.704"
3/8" & 1/2" MMGFS ⁽²⁾	6.179"

MODEL NUMBER AND DESCRIPTION



A-LOK[®], CPI[™], UltraSeal[™], VacuSeal[™] - Parker Hannifin Corp.

⁽¹⁾MORFS = Male O-Ring Face Seal

⁽²⁾MMGFS = Male Metal Gasket Face Seal

For model number options not shown above, please consult factory

OTHER AVAILABLE ANALOG MASS FLOWMETER AND MASS FLOW CONTROLLER MODELS

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Meters	111	10	1500	2
	121	10	3000	2
	112	100	1500	2
	122	100	3000	2
	113	500	1000	2
	114	1000	1000	2
	2111	10	200	2
3211	10	1000	2	

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Controllers	201	10	1000	7
	261	10	1000	7
	221	10	3000	7
	251	50	1000	35
	202	100	1000	60
	222	100	3000	60
	202A	100	200	10
	203A	500	200	40
	204A	1000	200	80
	2201	10	200	7
	3201/3261	10	1000	7

Note: The flow ranges listed are the minimum and maximum nitrogen (N₂) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory.



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ENGINEERING YOUR SUCCESS.

Model 114

Mass Flow Instruments

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SPECIFICATIONS:

Flow Capacity: Any Flow range from 0-1000 SLPM to 0-5000 SLPM (nitrogen equivalent).

Response Time (per SEMI E17-91 Settling Time): 1 to 2 Seconds

Accuracy and Linearity: $\pm 1.5\%$ full scale

Repeatability: Within $\pm 0.2\%$ full scale at any constant temperature within operating temperature range

Rangeability (Control Range): 50:1 (2%-100% full scale) (accuracy and control)

Ambient and Operating Temperature Range: -10 to 70 °C (± 14 to 158 °F)

Maximum Operating Pressure: 1500 PSIG

Temperature Coefficient (per SEMI E18-91 Zero Effect and Span Effect):
 $\pm 0.05\%$ full scale / °C of zero
 $\pm 0.05\%$ of reading/ °C of span

Pressure Coefficient (per SEMI E28-92 Total Calibration Effect):
 $\pm 0.1\%$ /atmosphere typical using nitrogen (N₂)

Mounting Orientation: Attitude insensitive

Warm-up Time: 10 minutes

External Electrical Connector: Nine (9)- pin D-connector

Weight (approximate): 6.6 lbs

Power Supply Requirements:

(Current consumption <45 mA_{dc}):

Voltage output models: +12 ($\pm 5\%$) (0-5 Vdc & 1-5 Vdc flow signal outputs only) or +15 ($\pm 10\%$) Vdc

Current loop models: +15 ($\pm 5\%$) or +24 ($\pm 15\%$) Vdc

Setpoint Input/Flow Signal Output:

0-5 Vdc/0-5 Vdc (2K ohm minimum load resistance)

0-10 Vdc/0-10 Vdc (3K ohm minimum load resistance)

1-5 Vdc/1-5 Vdc (2K ohm minimum load resistance)

4-20 mA_{dc}/4-20mA_{dc} (refer to load resistance values below)

Load resistance values for 4-20 mA_{dc} flow signal output:

0-450 ohm for 6.5-15 Vdc loop supply voltage

200-750 ohm for 15-30 Vdc loop supply voltage



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MATERIALS OF CONSTRUCTION

Body: 316 Stainless Steel
Sensor Assembly: 316L Stainless Steel
Elastomers (O-rings and Valve Seat): Buna N, EPDM, Kalrez®, Neoprene or Viton®
Process Connections: 316 Stainless Steel

Kalrez® and Viton® are property of their respective owners

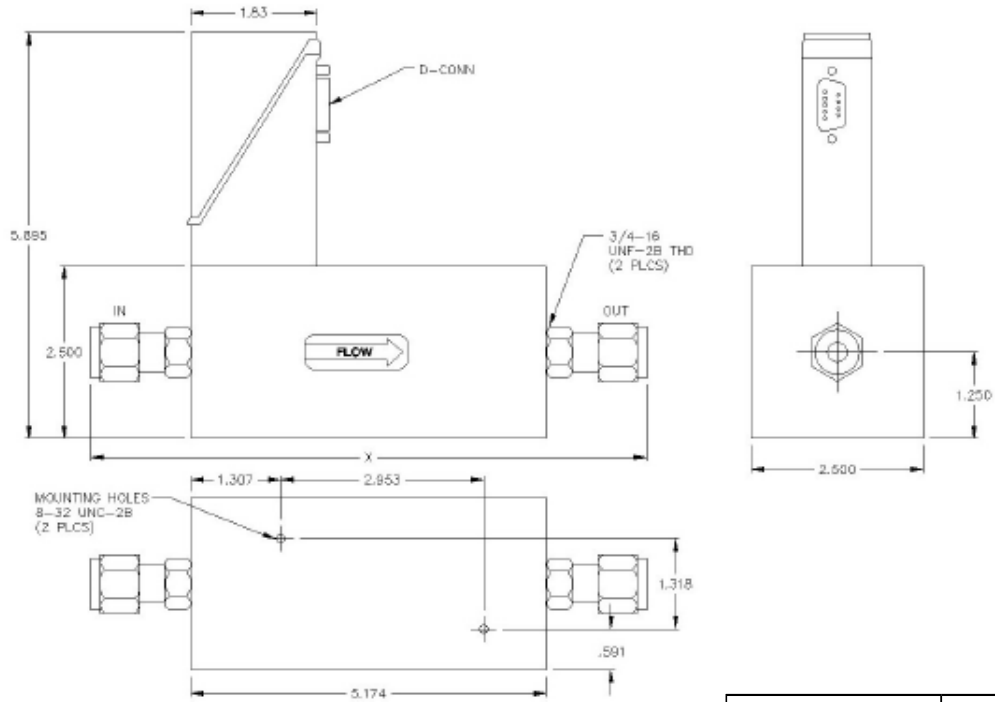
Specifications subject to change

ORDERING INFORMATION

To order, please specify:

- Model number
- Type of output signal
- Elastomer material
- Process connection size and type
- Flow capacity
- Gas type
- Operating temperature
- Inlet (supply) pressure
- Outlet pressure
- Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
- Additional accessories required

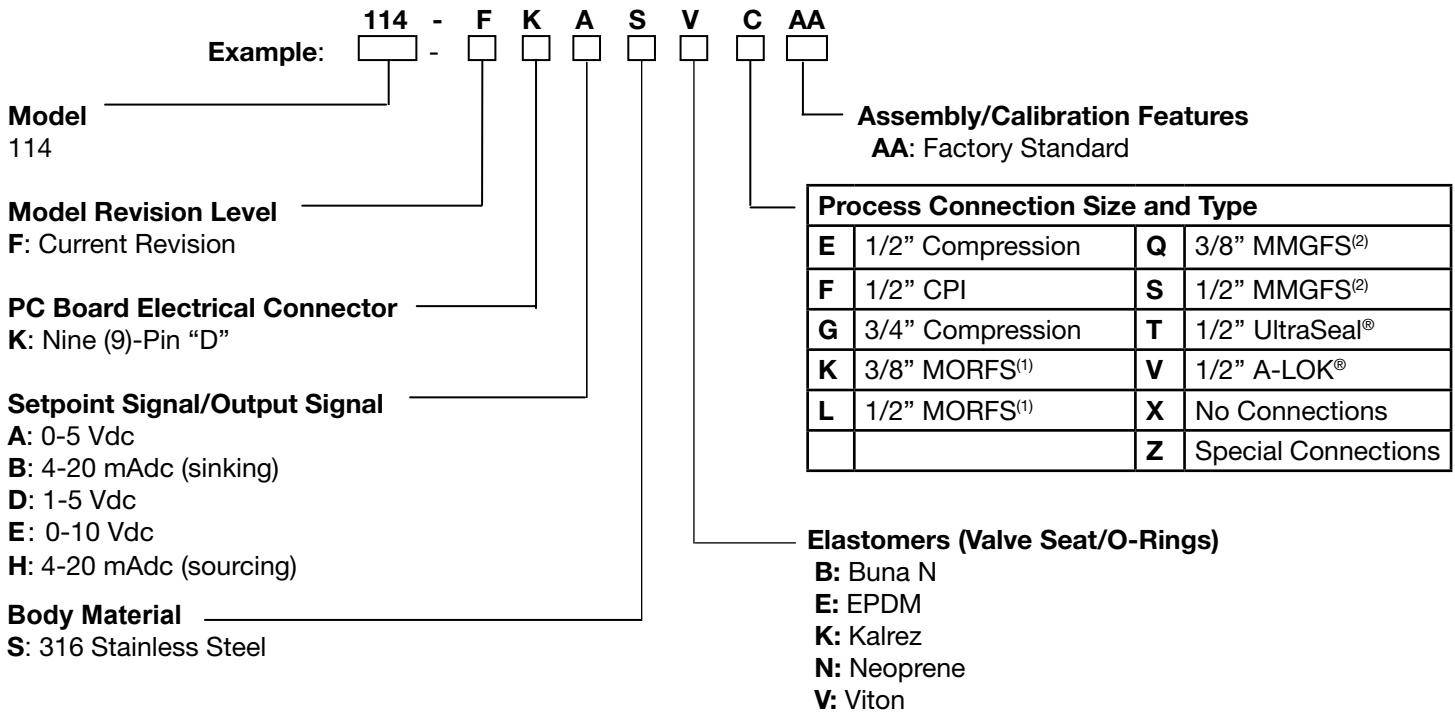
DIMENSIONAL DATA



Dimensions shown in inches

Process Connection Size & Type	'X' Dimension
1/2" Compression	7.594"
3/4" Compression	7.914"
1/2" CPI®	7.594"
1/2" A-LOK®	7.594"
3/8" & 1/2" MMGFS ⁽²⁾	7.614"

MODEL NUMBER AND DESCRIPTION



A-LOK[®], CPI[™], UltraSeal[™], VacuSeal[™] - Parker Hannifin Corp.

⁽¹⁾MORFS = Male O-Ring Face Seal

⁽²⁾MMGFS = Male Metal Gasket Face Seal

For model number options not shown above, please consult factory

OTHER AVAILABLE ANALOG MASS FLOWMETER AND MASS FLOW CONTROLLER MODELS

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Meters	111	10	1500	2
	121	10	3000	2
	112	100	1500	2
	122	100	3000	2
	113	500	1000	2
	114	1000	1000	2
	3211	10	1000	2

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Controllers	201	10	1000	7
	261	10	1000	7
	221	10	3000	7
	251	50	1000	35
	202	100	1000	60
	222	100	3000	60
	202A	100	200	10
	203A	500	200	40
	204A	1000	200	80
	2201	10	200	7
	3201/3261	10	1000	7

Note: The flow ranges listed are the minimum and maximum nitrogen (N₂) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory.



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SPECIFICATIONS:

Flow Capacity: Any Flow range from 0-5 SCCM to 0-10 SLPM (nitrogen equivalent).

Response Time (per SEMI E17-91 Settling Time): 1 to 2 Seconds

Accuracy and Linearity: $\pm 1\%$ full scale

Repeatability: Within $\pm 0.2\%$ full scale at any constant temperature within operating temperature range

Rangeability (Control Range): 50; 1 (2%-100% full scale) (accuracy and control)

Ambient and Operating Temperature Range: -10 to 70 °C (± 14 to 158 °F)

Maximum Operating Pressure: 3000 PSIG

Temperature Coefficient (per SEMI E18-91 Zero Effect and Span Effect):
 $\pm 0.05\%$ full scale / °C of zero
 $\pm 0.05\%$ of reading/ °C of span

Pressure Coefficient (per SEMI E28-92 Total Calibration Effect):
 $\pm 0.1\%$ /atmosphere typical using nitrogen (N₂)

Mounting Orientation: Attitude insensitive

Warm-up Time: 10 minutes

External Electrical Connector: Nine (9)- pin D-connector

Weight (approximate): 0.9 lbs

Power Supply Requirements:

(Current consumption <45 mAdc):

Voltage output models: +12 ($\pm 5\%$) (0-5 Vdc & 1-5 Vdc flow signal outputs only) or +15 ($\pm 10\%$) Vdc

Current loop models: +15 ($\pm 5\%$) or +24 ($\pm 15\%$) Vdc

Setpoint Input/Flow Signal Output:

0-5 Vdc/0-5 Vdc (2K ohm minimum load resistance)

0-10 Vdc/0-10 Vdc (3K ohm minimum load resistance)

1-5 Vdc/1-5 Vdc (2K ohm minimum load resistance)

4-20 mAdc/4-20mAdc (refer to load resistance values below)

Load resistance values for 4-20 mAdc flow signal output:

0-450 ohm for 6.5-15 Vdc loop supply voltage

200-750 ohm for 15-30 Vdc loop supply voltage

MATERIALS OF CONSTRUCTION

- Body:** 316 Stainless Steel
- Sensor Assembly:** 316L Stainless Steel
- Elastomers (O-rings and Valve Seat):** Buna N, EPDM, Kalrez®, Neoprene or Viton®
- Process Connections:** 316 Stainless Steel

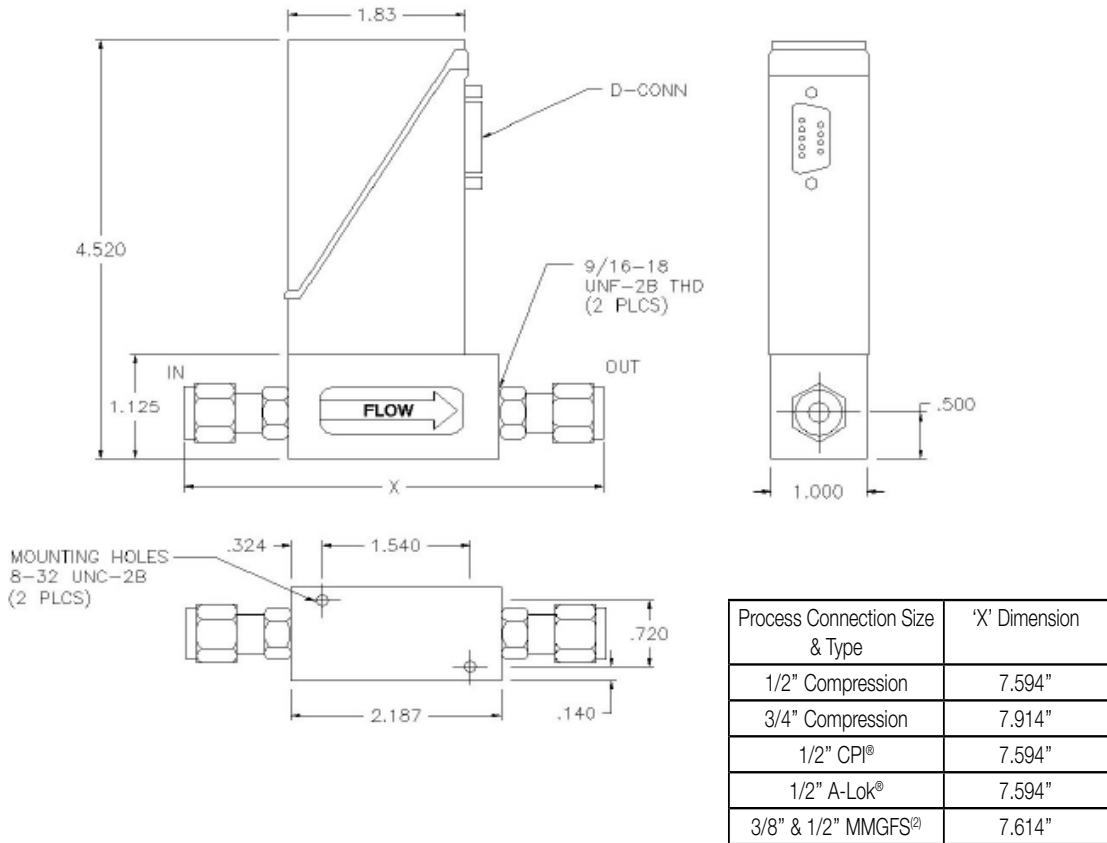
Kalrez® and Viton® are property of their respective owners

Specifications subject to change

ORDERING INFORMATION

- To order, please specify:
- Model number
 - Type of output signal
 - Elastomer material
 - Process connection size and type
 - Flow capacity
 - Gas type
 - Operating temperature
 - Inlet (supply) pressure
 - Outlet pressure
 - Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
 - Additional accessories required

DIMENSIONAL DATA



Dimensions shown in inches

MODEL NUMBER AND DESCRIPTION

Example: 121 - F K A S V C AA

Model
121

Model Revision Level
F: Current Revision

PC Board Electrical Connector
K: Nine (9)-Pin "D"

Setpoint Signal/Output Signal
A: 0-5 Vdc
B: 4-20 mA_{dc} (sinking)
D: 1-5 Vdc
E: 0-10 Vdc
H: 4-20 mA_{dc} (sourcing)

Body Material
S: 316 Stainless Steel

Assembly/Calibration Features
AA: Factory Standard

Process Connection Size and Type			
A	3/8" CPI™	M	1/4" UltraSeal®
B	1/8" Compression	P	1/4" MMGFS ⁽²⁾
C	1/4" Compression	Q	3/8" MMGFS ⁽²⁾
D	3/8" Compression	R	3/8" UltraSeal®
E	1/2" Compression	S	1/2" MMGFS ⁽²⁾
H	10 mm Compression	U	3/8" A-LOK®
I	1/4" CPI	W	6 mm Compression
J	1/4" MORFS ⁽¹⁾	X	No Connections
K	3/8" MORFS ⁽¹⁾	Y	1/4" A-LOK
L	1/2" MORFS ⁽¹⁾	Z	Special Connections

Elastomers (Valve Seat/O-Rings)
B: Buna N
E: EPDM
K: Kalrez
N: Neoprene
V: Viton

A-LOK®, CPI™, UltraSeal™, VacuSeal™ - Parker Hannifin Corp.
⁽¹⁾MORFS = Male O-Ring Face Seal
⁽²⁾MMGFS = Male Metal Gasket Face Seal

For model number options not shown above, please consult factory

OTHER AVAILABLE ANALOG MASS FLOWMETER AND MASS FLOW CONTROLLER MODELS

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Meters	111	10	1500	2
	121	10	3000	2
	112	100	1500	2
	122	100	3000	2
	113	500	1000	2
	114	1000	1000	2
	2111	10	200	2
	3211	10	1000	2

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Controllers	201	10	1000	7
	261	10	1000	7
	221	10	3000	7
	251	50	1000	35
	202	100	1000	60
	222	100	3000	60
	202A	100	200	10
	203A	500	200	40
	204A	1000	200	80
	2201	10	200	7
	3201/3261	10	1000	7

Note: The flow ranges listed are the minimum and maximum nitrogen (N₂) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory.



Parker Hannifin Corporation
Porter Instrument Division
 245 Township Line Road
 Hatfield, PA 19440 USA
 (215) 723-4000/ fax (215) 723-2199

WS-0006 Rev. C 02/12

ENGINEERING YOUR SUCCESS.

Model 122

Mass Flow Instruments

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 flow applications in the analytical, process, chemical/ petrochemical, environmental, biopharmaceutical and research markets.

The 100 and 200 series are the latest evolution of the original Porter Analog Mass Flow Products. 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 measurement only is required.



SPECIFICATIONS:

Flow Capacity: Any Flow range from 0-10 SLPM to 0-100 SLPM (nitrogen equivalent).

Response Time (per SEMI E17-91 Settling Time): 1 to 2 Seconds

Accuracy and Linearity: $\pm 1\%$ full scale

Repeatability: Within $\pm 0.2\%$ full scale at any constant temperature within operating temperature range

Rangeability (Control Range): 50; 1 (2%-100% full scale) (accuracy and control)

Ambient and Operating Temperature Range: -10 to 70 °C (± 14 to 158 °F)

Maximum Operating Pressure: 3000 PSIG

Temperature Coefficient (per SEMI E18-91 Zero Effect and Span Effect):
 $\pm 0.05\%$ full scale / °C of zero
 $\pm 0.05\%$ of reading/ °C of span

Pressure Coefficient (per SEMI E28-92 Total Calibration Effect):
 $\pm 0.1\%$ /atmosphere typical using nitrogen (N₂)

Mounting Orientation: Attitude insensitive

Warm-up Time: 10 minutes

External Electrical Connector: Nine (9)- pin D-connector

Weight (approximate): 2.1 lbs

Power Supply Requirements:

(Current consumption <45 mA_{dc}):

Voltage output models: +12 ($\pm 5\%$) (0-5 V_{dc} & 1-5 V_{dc} flow signal outputs only) or +15 ($\pm 10\%$) V_{dc}

Current loop models: +15 ($\pm 5\%$) or +24 ($\pm 15\%$) V_{dc}

Setpoint Input/Flow Signal Output:

0-5 V_{dc}/0-5 V_{dc} (2K ohm minimum load resistance)

0-10 V_{dc}/0-10 V_{dc} (3K ohm minimum load resistance)

1-5 V_{dc}/1-5 V_{dc} (2K ohm minimum load resistance)

4-20 mA_{dc}/4-20mA_{dc} (refer to load resistance values below)

Load resistance values for 4-20 mA_{dc} flow signal output:

0-450 ohm for 6.5-15 V_{dc} loop supply voltage

200-750 ohm for 15-30 V_{dc} loop supply voltage

MATERIALS OF CONSTRUCTION

Body: 316 Stainless Steel
Sensor Assembly: 316L Stainless Steel
Elastomers (O-rings and Valve Seat): Buna N, EPDM, Kalrez®, Neoprene or Viton®
Process Connections: 316 Stainless Steel

Kalrez® and Viton® are property of their respective owners

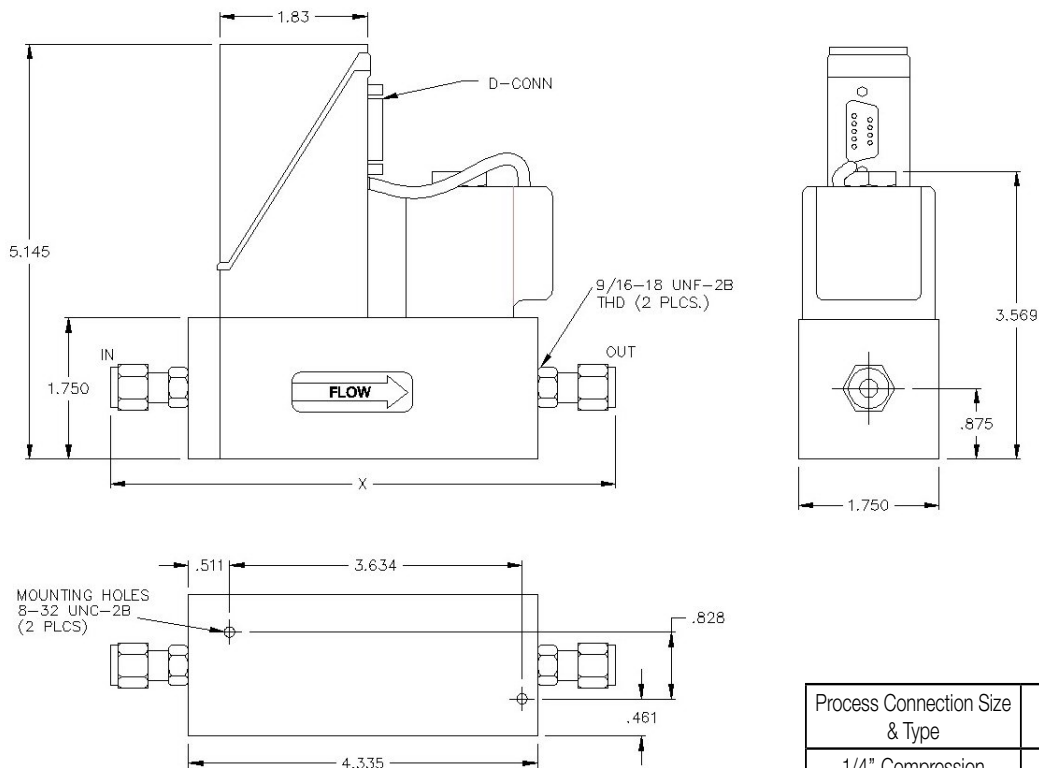
Specifications subject to change

ORDERING INFORMATION

To order, please specify:

- Model number
- Type of output signal
- Elastomer material
- Process connection size and type
- Flow capacity
- Gas type
- Operating temperature
- Inlet (supply) pressure
- Outlet pressure
- Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
- Additional accessories required

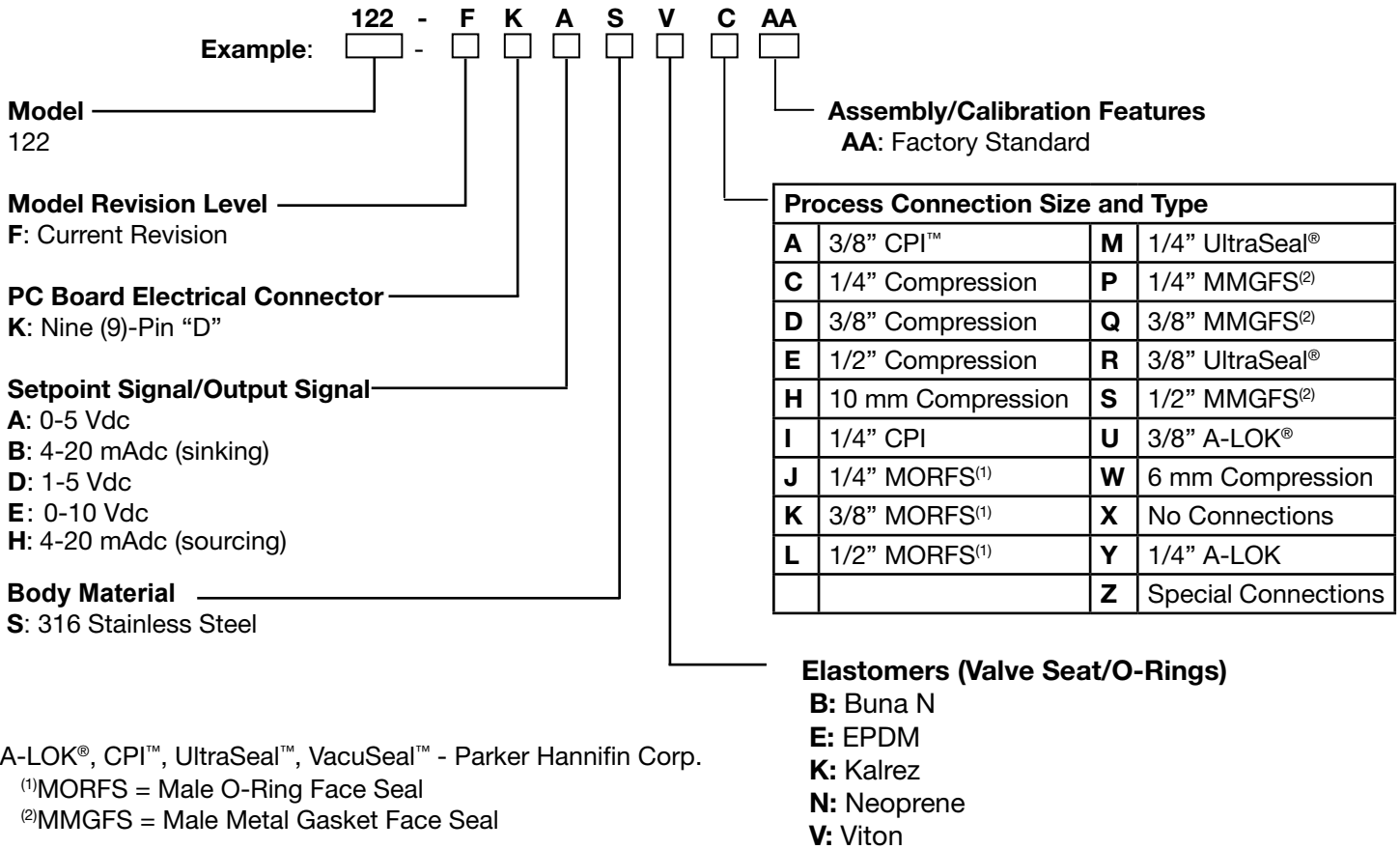
DIMENSIONAL DATA



Dimensions shown in inches

Process Connection Size & Type	'X' Dimension
1/4" Compression	4.584"
3/8" Compression	4.704"
1/4" CPI®	4.584"
3/8" CPI®	4.704"
1/4" A-LOK®	4.584"
3/8" A-LOK®	4.704"
1/4" MMGFS®	4.444"

MODEL NUMBER AND DESCRIPTION



For model number options not shown above, please consult factory

OTHER AVAILABLE ANALOG MASS FLOWMETER AND MASS FLOW CONTROLLER MODELS

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Meters	111	10	1500	2
	121	10	3000	2
	112	100	1500	2
	122	100	3000	2
	113	500	1000	2
	114	1000	1000	2
	2111	10	200	2
3211	10	1000	2	

Type	Model	Max. Flow ¹ (SLPM)	Max. Pressure ² (PSIG)	Min. Delta ³ (PSIG)
Analog Flow Controllers	201	10	1000	7
	261	10	1000	7
	221	10	3000	7
	251	50	1000	35
	202	100	1000	60
	222	100	3000	60
	202A	100	200	10
	203A	500	200	40
	204A	1000	200	80
	2201	10	200	7
	3201/3261	10	1000	7

Note: The flow ranges listed are the minimum and maximum nitrogen (N₂) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory.



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WS-0007 Rev. C 02/12

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2200 Series

Mass Flow Instruments

Precise & Affordable Mass Flow Control

The Porter 2200 Series Mass Flow Instruments bring a new dimension to affordable mass flow control. Series 2200 utilizes the same proven thermal sensor assembly, control circuitry and unique laminar flow elements found in the standard Porter mass flow products. Model 2201 includes the Porter EPC proportional control valve, the same valve assembly used by many analytical instrument manufacturers for accurate gas flow control. This results in mass flow instruments that are affordable without compromising precision, control integrity or reliability.



Materials of Construction Specifications

Body	Aluminum
Valve Base (Body)	Aluminum
Orifice	Brass (Model 2201)
Valve Components (Wetted)	Stainless Steel (Model 2201)
Elastomers (O-rings and Valve Seat)	Buna N, EPDM, Neoprene or Viton®
Process Connections	Nickel-plated brass (inlet) and aluminum (outlet-integral to body)

Viton® is a registered trademark of DuPont Dow Elastomers L.L.C.

Flow Capacity	Maximum flows from 40 SCCM to 10 SLPM (based on nitrogen [N ₂] @ 70°F & 5 PSIG)
Response Time	3 to 4 seconds
Accuracy and Linearity	±2% full scale
Repeatability	Within ±0.2% full scale at any constant temperature within operating temperature range
Rangeability (Control Range)	50:1 (2%-100% full scale)
Ambient & Operating Temperature Range	-10°C to 70°C (+14°F to 158°F)
Maximum Operating Pressure	200 PSIG
Temperature Coefficient	±0.1%/°C
Pressure Coefficient	±0.1%/atmosphere typical using N ₂
Setpoint Input/Flow Signal Output	0-5 Vdc (2K ohm minimum load resistance for flow signal output)
Power Supply Requirements (current consumption <250 mAdc)	+12 (±5%) or +15 (±10%) Vdc +24 Vdc (used for 4-20 mAdc PCB)
Mounting Orientation	Attitude insensitive
Warm-up Time	10 minutes
External Electrical Connector	Nine (9)-pin D-connector
Inlet/Outlet Process Connections	1/8" female NPT

Contact Information:

Parker Hannifin Corporation
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245 Township Line Road
Hatfield, PA 19440

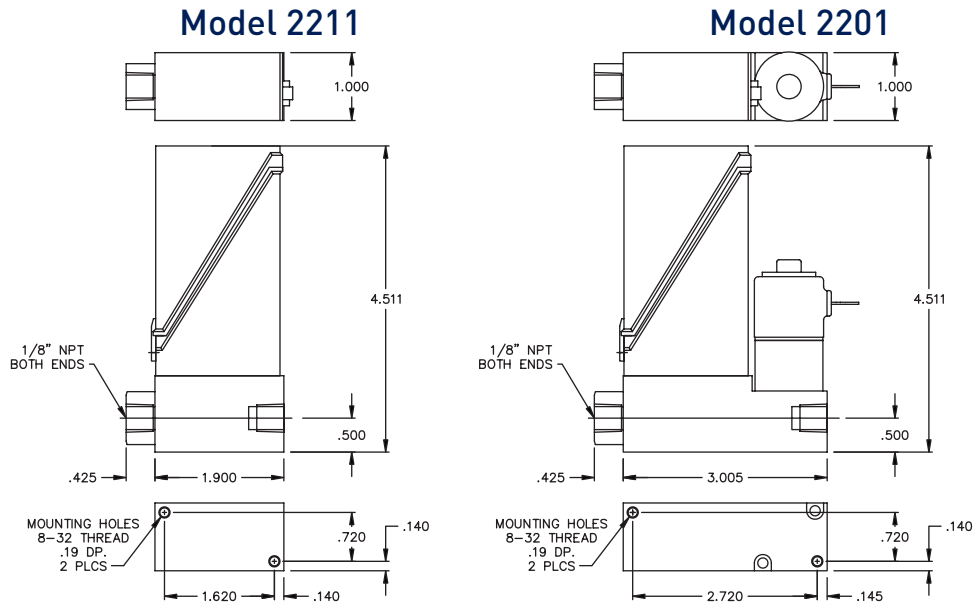
phone 215 723 4000
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Industrial@parker.com

www.parker.com



ENGINEERING YOUR SUCCESS.

Dimensions



Ordering Information

To order, please specify:

- Flow capacity
- Gas type
- Operating temperature
- Inlet (supply) pressure
- Outlet pressure
- Calibration standard (i.e. 0°C, 20°C, 21.1°C or 25°C)
- Elastomer material
- Additional accessories required (e.g., interface module, interconnecting cable assembly, etc.)

2201	A	A	A	V	C	1	AA
Basic Model Number	Model Revision	Body Orifice*/ Inlet Adapter Materials		Valve Flow Designator		Customer Application	
2211 Mass Flowmeter 2201 Mass Flow Controller	A Factory Specified	A Aluminum/Brass/Brass (nickel-plated)		(Factory Specified, based on flow and pressures) Use X for model 2211		AA (Factory Specified)	
	Setpoint Signal*/Output Signal		Elastomer Material (O-Rings/Valve Seat*)		Inlet & Outlet Process Connections		
	A 0-5 Vdc/ 0-5 Vdc B 0-5 Vdc/4-20 mAdc (sinking) (add \$50 for 4-20mAdc output signal) H 4-20 mAdc/ 4-20 mAdc (sourcing) (add \$50 for 4-20 mAdc output signal) J 4-20 mAdc/4-20 mAdc (sinking) (add \$50 for 4-20 mAdc output signal)		B Buna N/Buna N E EPDM/EPDM N Neoprene/Neoprene V Viton®/Viton®		1 1/8" Female NPT 2 1/8" Compression Fitting 3 1/4" Compression Fitting		

*Setpoint, valve orifice and seat applicable to Model 2201 only

Example: 2201AAAVC1AA

This example part number describes a 2201 model mass flow controller, factory revision A, with 0-5 Vdc setpoint and output signals, Viton® elastomers and 1/8" female NPT inlet and outlet process connections.

⚠ WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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