

Technical Data for Alicat **M-Series** Mass Flow Meters

0.5 sccm full scale through 5 sccm of full scale

Standard Specifications (Consult Alicat for available options.)



Tel: 888-290-6060

www.alicat.com/m

SENSOR PERFORMANCE	
Mass Flow Accuracy at calibration conditions ¹	±0.8% of reading and ±0.2% of full scale
High Accuracy Option ¹	±0.4% of reading and ±0.2% of full scale Available for ≥5 sccm models
Bidirectional option ¹	±0.2% of full scale in addition to base accuracy (above)
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Flow Measurement Range	0.01–100% of full scale
Temperature Sensitivity	Mass flow zero shift and span shift: 0.02% of full scale per °C from 25°C
Pressure Sensitivity	Mass flow zero shift and span shift: ±(0.08% of reading + 0.02% of full scale) per atmosphere from calibration conditions
Operating Temperature Range	-10–60°C (expanded range available)
Temperature Accuracy	±0.75°C
Operating Pressure full scale	160 PSIA (additional options available)
Pressure Accuracy above 1 ATM	±0.5% of reading
Pressure Accuracy below 1 ATM	±0.07 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time ²	100–1000 ms (flow rate dependent)
Typical Warm-Up Time	<1 s

¹ Stated accuracy is after tare under equilibrium conditions. Extreme gas behavior (especially near state boundaries) can introduce additional flow uncertainties.

² Indication response time includes user adjustable averaging up to 255 ms.

MECHANICAL	
Minimum Operating Pressure	11.5 PSIA common mode pressure (lower operating pressures available) Differential pressure must exceed 1 PSID
Maximum Operating Pressure	Damage possible above 175 PSIA common mode pressure Damage possible above 75 PSID differential pressure
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–95%, non-condensing
Wetted Materials	302 / 303 stainless steel, Viton®, polyamide, alumina, ceramic, glass, gold, silicon, heat-cured epoxy, heat-cured silicone rubber

COMMUNICATIONS	
Analog I/O Options	4–20 mA, 0–5 VDC, 1–5 VDC, 0–10 VDC
Digital I/O Options	RS-232 Serial by default RS-485 Serial, Modbus RTU (over RS-232 or RS-485), Modbus TCP/IP, DeviceNet, EtherCAT, EtherNet/IP, Profibus
Electrical Connection Options	6 pin locking, 8 pin mini-DIN, 8 pin M12, DB-9, DB-15
Power Requirements ³	9–24 VDC, 40 mA (12–24 VDC, 80 mA if equipped with 4–20 mA or 0–10 VDC output)
Digital Data Update Rate ³	40 Hz at 19200 baud
Data Update Rate Analog	1 kHz
Display Update Rate	10 Hz
Analog Signal Accuracy	±0.1% of full scale additional uncertainty

³ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

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FEATURES	
STP Reference Conditions	25°C and 1 ATM (default), user configurable
NTP Reference Conditions	0°C and 1 ATM (default), user configurable
Monochrome LCD or Color TFT Display with integrated touchpad	Simultaneously displays mass flow, volumetric flow, pressure and temperature
Gas Select™	98 user selectable gases stored internally. Each gas optimized to match NIST's REFPROP 10 gas property calculations across the operating temperature and pressure ranges for highest accuracy.
COMPOSER™	20 user definable gas mixes. Each mix may have up to 5 gases with 0.01% precision.

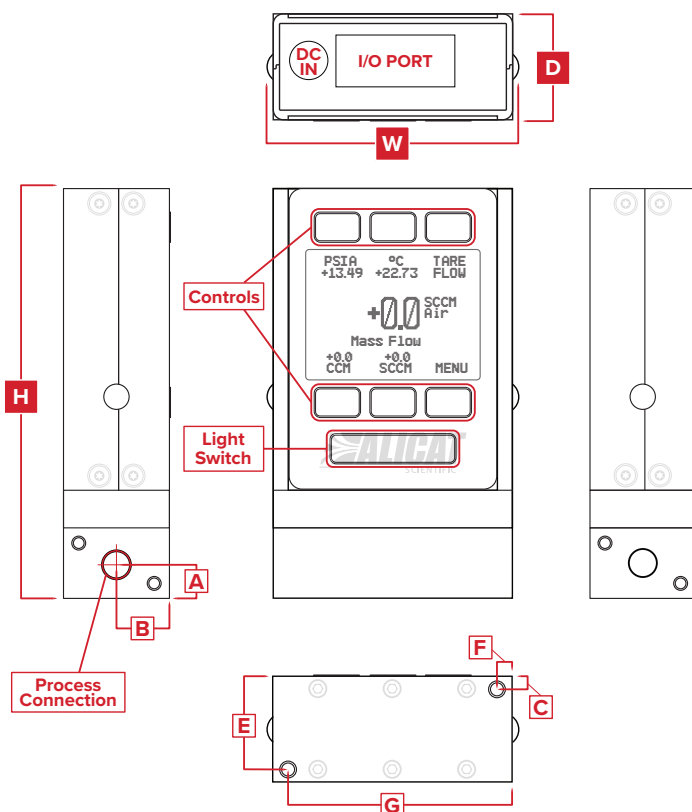
RANGE-SPECIFIC TECHNICAL DATA			
Meter's full scale flow	Pressure drop at full scale flow venting to atmosphere ⁴	Process connections ⁵	Mount tap size
0.5–5 sccm	1.0 PSID	M5 female thread (10-32 compatible) ⁶	2× 8-32 UNC 0.175 in [4.45 mm]

⁴ Lower pressure drops available, please see our WHISPER-Series mass flow controllers at www.alicat.com/whisper.

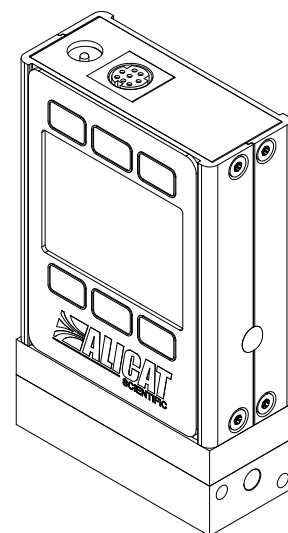
⁵ Consult Alicat for available process connection options, such as: compression, face seal, push-to-connect, BSPP, SAE, or Swagelok (including tube, VCO, and VCR).

⁶ Shipped with Buna-N O-Ring face seal to 1/8" female NPT fittings.

Range-Specific Technical Data & Dimensions



Representative Example



0.5 sccm

DIMENSIONS										
Meter's full scale flow	Weight	Height	Width	Depth	A	B	C	E	F	G
0.5–5 sccm	≈ 0.8 lb	3.897 in	2.375 in	1.050 in	0.336 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
	≈ 0.4 kg	98.98 mm	60.33 mm	26.67 mm	8.53 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm

Technical Data for Alicat M-Series Mass Flow Meters

10 sccm full scale through 20 slpm of full scale

Standard Specifications (Consult Alicat for available options.)



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SENSOR PERFORMANCE	
Mass Flow Accuracy at calibration conditions ¹	±0.6% of reading or ±0.1% of full scale, whichever is greater
High Accuracy Option ¹	±0.5% of reading or ±0.1% of full scale, whichever is greater
Bidirectional option ¹	No additional uncertainties
Repeatability (2σ)	±(0.1% of reading + 0.02% of full scale)
Flow Measurement Range	0.01–100% of full scale
Temperature Sensitivity	Mass flow zero shift: ±0.01% of full scale per °C from tare temperature Mass flow span shift: ±0.01% of reading per °C from 25°C
Pressure Sensitivity	Mass flow zero shift: ±0.01% of full scale per ATM from tare pressure Mass flow span shift: ±0.1% of reading per atmosphere from calibration conditions
Operating Temperature Range	-10–60°C (expanded range available)
Temperature Accuracy	±0.75°C
Operating Pressure full scale	160 PSIA (additional options available)
Pressure Accuracy above 1 ATM	±0.5% of reading
Pressure Accuracy below 1 ATM	±0.07 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time ²	<10 ms (flow rate dependent)
Typical Warm-Up Time	<1 s

¹ Stated accuracy is after tare under equilibrium conditions. Extreme gas behavior (especially near state boundaries) can introduce additional flow uncertainties.

² Indication response time includes user adjustable averaging up to 255 ms.

MECHANICAL	
Minimum Operating Pressure	11.5 PSIA common mode pressure (lower operating pressures available) Differential pressure must exceed model pressure drop, see below for details
Maximum Operating Pressure	Damage possible above 175 PSIA common mode pressure Damage possible above 75 PSID differential pressure
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–95%, non-condensing
Wetted Materials	302 / 303 stainless steel, Viton®, polyamide, alumina, ceramic, glass, gold, silicon, heat-cured epoxy, heat-cured silicone rubber

COMMUNICATIONS	
Analog I/O Options	4–20 mA, 0–5 VDC, 1–5 VDC, 0–10 VDC
Digital I/O Options	RS-232 Serial by default RS-485 Serial, Modbus RTU (over RS-232 or RS-485), Modbus TCP/IP, DeviceNet, EtherCAT, EtherNet/IP, Profibus
Electrical Connection Options	6 pin locking, 8 pin mini-DIN, 8 pin M12, DB-9, DB-15
Power Requirements ³	9–24 VDC, 40 mA (12–24 VDC, 80 mA if equipped with 4–20 mA or 0–10 VDC output)
Digital Data Update Rate ³	40 Hz at 19200 baud
Data Update Rate Analog	1 kHz
Display Update Rate	10 Hz
Analog Signal Accuracy	±0.1% of full scale additional uncertainty

³ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

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0.5 sccm full scale through 5 sccm of full scale



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FEATURES	
STP Reference Conditions	25°C and 1 ATM (default), user configurable
NTP Reference Conditions	0°C and 1 ATM (default), user configurable
Monochrome LCD or Color TFT Display with integrated touchpad	Simultaneously displays mass flow, volumetric flow, pressure and temperature
Gas Select™	98 user selectable gases stored internally. Each gas optimized to match NIST's REFPROP 10 gas property calculations across the operating temperature and pressure ranges for highest accuracy.
COMPOSER™	20 user definable gas mixes. Each mix may have up to 5 gases with 0.01% precision.

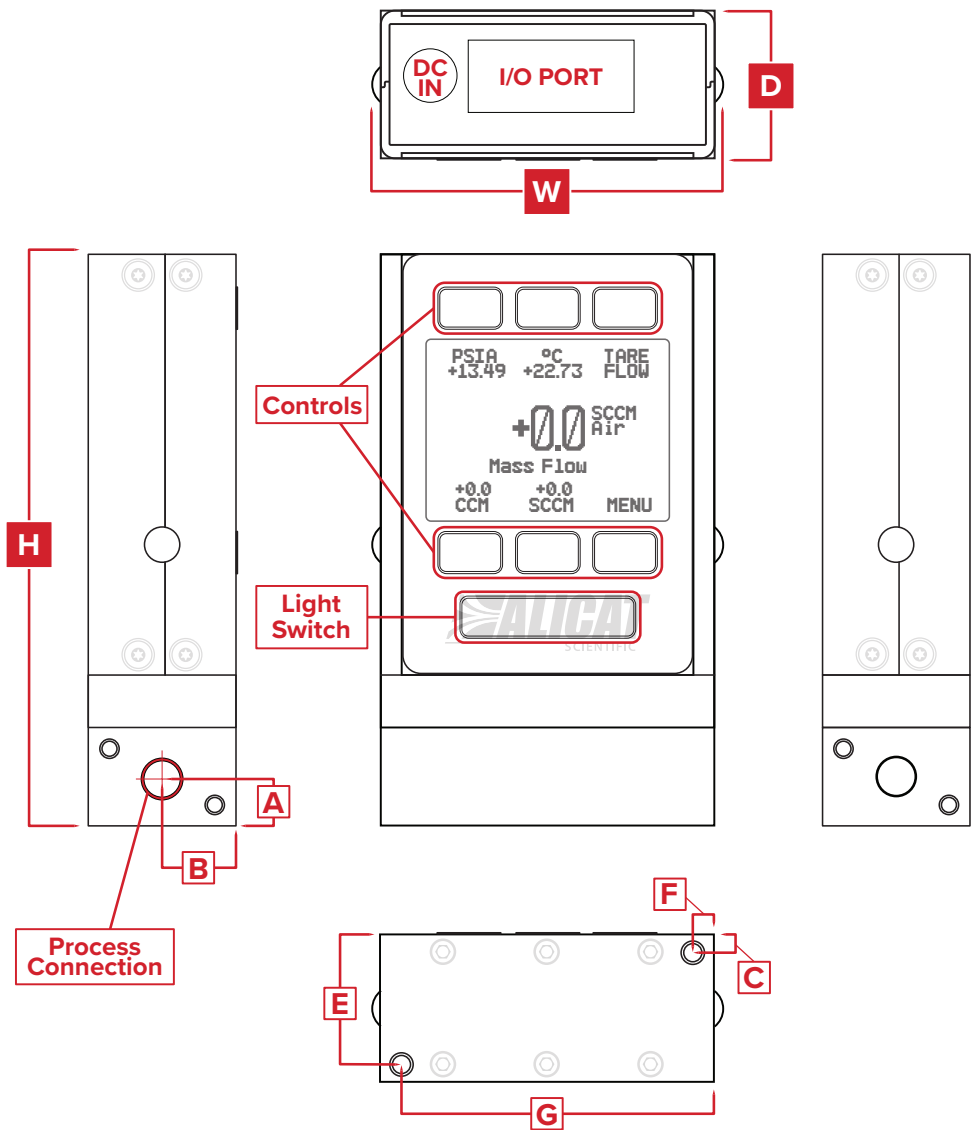
RANGE-SPECIFIC TECHNICAL DATA			
Meter's full scale flow	Pressure drop at full scale flow venting to atmosphere ⁴	Process connections ⁵	Mount tap size
10–50 sccm	1.0 PSID	M5 female thread (10-32 compatible) ⁶	2× 8-32 UNC 0.175 in [4.45 mm]
100 sccm–20 slpm	1.0 PSID	1/8" NPT female	2× 8-32 UNC 0.350 in [8.89 mm]

⁴ Lower pressure drops available, please see our WHISPER-Series mass flow controllers at www.alicat.com/whisper.

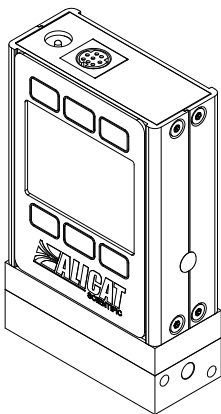
⁵ Consult Alicat for available process connection options, such as: compression, face seal, push-to-connect, BSPP, SAE, or Swagelok (including tube, VCO, and VCR).

⁶ Shipped with Buna-N O-Ring face seal to 1/8" female NPT fittings.

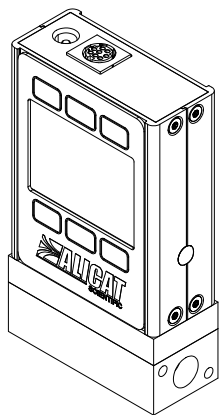
Range-Specific Technical Data & Dimensions



Representative Examples



10 sccm



20 slpm

DIMENSIONS										
Meter's full scale flow	Weight	Height	Width	Depth	A	B	C	E	F	G
10–50 sccm	≈ 0.8 lb	3.897 in	2.375 in	1.050 in	0.336 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
	≈ 0.4 kg	98.98 mm	60.33 mm	26.67 mm	8.53 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm
100 sccm–20 slpm	≈ 1.0 lb	4.067 in	2.375 in	1.050 in	0.350 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
	≈ 0.5 kg	103.30 mm	60.33 mm	26.67 mm	8.89 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm

Technical Data for Alicat M-Series Mass Flow Meters

50 slpm full scale through 5000 slpm of full scale

Standard Specifications (Consult Alicat for available options.)



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SENSOR PERFORMANCE	
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High Accuracy Option ¹	±0.4% of reading and ±0.2% of full scale Available for ≤500 slpm models
Bidirectional option ¹	±0.2% of full scale in addition to base accuracy (above)
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
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COMMUNICATIONS	
Analog I/O Options	4–20 mA, 0–5 VDC, 1–5 VDC, 0–10 VDC
Digital I/O Options	RS-232 Serial by default RS-485 Serial, Modbus RTU (over RS-232 or RS-485), Modbus TCP/IP, DeviceNet, EtherCAT, EtherNet/IP, Profibus
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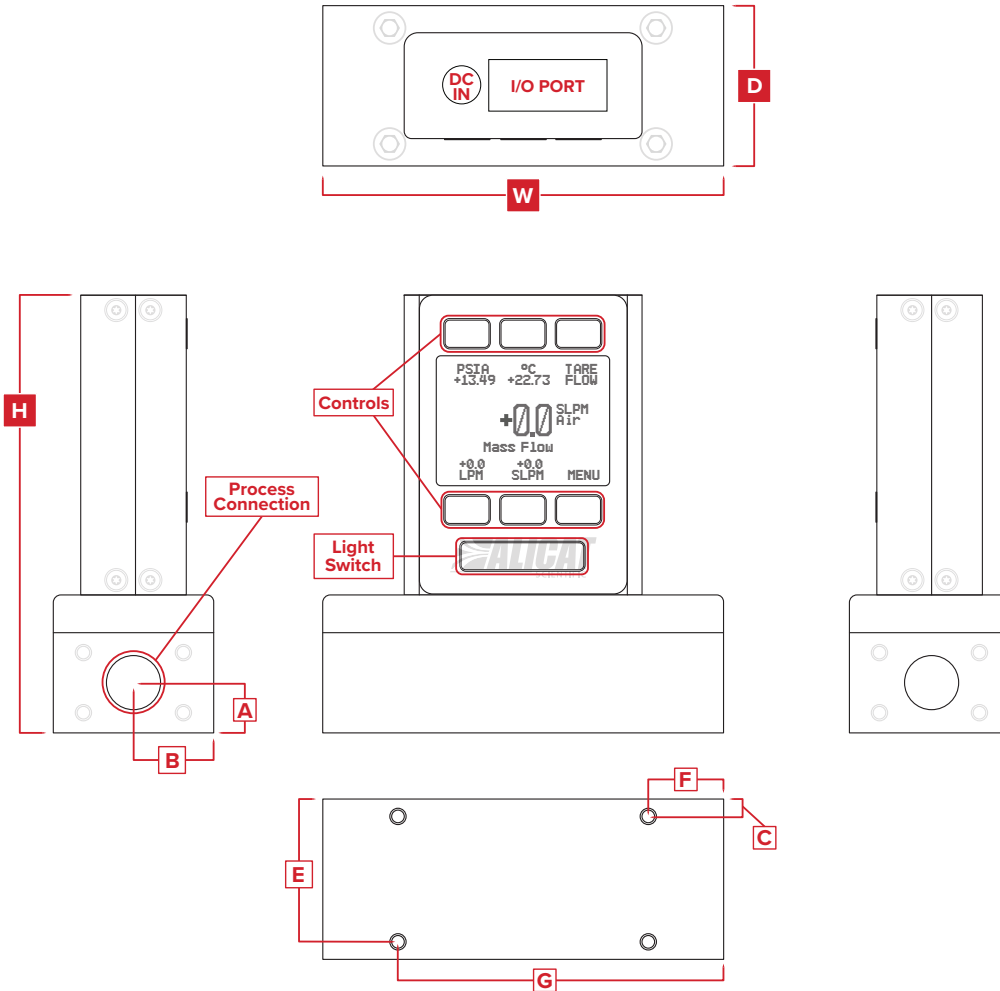
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COMPOSER™	20 user definable gas mixes. Each mix may have up to 5 gases with 0.01% precision.

RANGE-SPECIFIC TECHNICAL DATA			
Meter's full scale flow	Pressure drop at full scale flow venting to atmosphere ⁴	Process connections ⁵	Mount tap size
50 slpm	2.0 PSID	¼" NPT female	4× 8-32UNC 0.375 in [9.53 mm]
100 slpm	2.5 PSID	¼" NPT female	4× 8-32UNC 0.375 in [9.53 mm]
250 slpm	2.1 PSID	½" NPT female	4× 8-32UNC 0.375 in [9.53 mm]
500 slpm	4.0 PSID	¾" NPT female	4× 8-32UNC 0.375 in [9.53 mm]
1000 slpm	6.0 PSID	¾" NPT female	4× 8-32UNC 0.375 in [9.53 mm]
2000 slpm	5.0 PSID	¾" NPT female	4× 8-32UNC 0.330 in [8.38 mm]
3000 slpm	7.1 PSID	1¼" NPT female	4× 8-32UNC 0.330 in [8.38 mm]
5000 slpm	3.4 PSID	2" NPT female	4× 8-32UNC 0.330 in [8.38 mm]

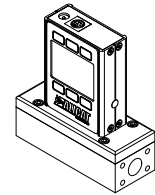
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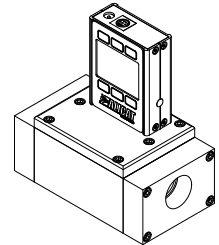
Range-Specific Technical Data & Dimensions



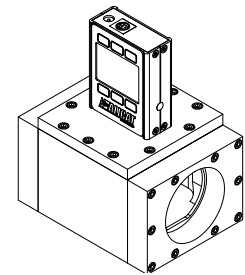
Representative Examples



100 slpm



2000 slpm



5000 slpm

DIMENSIONS										
Meter's full scale flow	Weight	Height	Width	Depth	A	B	C	E	F	G
50 slpm	≈ 2.4 lb	4.367 in	4.000 in	1.600 in	0.500 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
	≈ 1.1 kg	110.92 mm	101.60 mm	40.64 mm	12.70 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
100 slpm	≈ 2.4 lb	4.367 in	4.000 in	1.600 in	0.500 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
	≈ 1.1 kg	110.92 mm	101.60 mm	40.64 mm	12.70 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
250 slpm	≈ 2.4 lb	4.967 in	4.000 in	1.600 in	0.800 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
	≈ 1.1 kg	126.16 mm	101.60 mm	40.64 mm	20.32 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
500 slpm	≈ 3.5 lb	4.967 in	4.000 in	1.600 in	0.800 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
	≈ 1.6 kg	126.16 mm	101.60 mm	40.64 mm	20.32 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
1000 slpm	≈ 3.5 lb	4.967 in	4.000 in	1.600 in	0.800 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
	≈ 1.6 kg	126.16 mm	101.60 mm	40.64 mm	20.32 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
2000 slpm	≈ 4.5 lb	5.287 in	5.200 in	2.900 in	1.120 in	1.450 in	0.200 in	2.700 in	1.350 in	3.850 in
	≈ 2.0 kg	134.29 mm	132.08 mm	73.66 mm	28.45 mm	36.83 mm	5.08 mm	68.58 mm	34.29 mm	97.79 mm
3000 slpm	≈ 4.5 lb	5.287 in	5.200 in	2.900 in	0.960 in	1.450 in	0.200 in	2.700 in	1.350 in	3.850 in
	≈ 2.0 kg	134.29 mm	132.08 mm	73.66 mm	24.38 mm	36.83 mm	5.08 mm	68.58 mm	34.29 mm	97.79 mm
5000 slpm	≈ 14.0 lb	6.267 in	5.200 in	3.840 in	1.450 in	1.920 in	0.295 in	3.545 in	1.350 in	3.850 in
	≈ 6.4 kg	159.18 mm	132.08 mm	97.54 mm	36.83 mm	48.77 mm	7.49 mm	90.04 mm	34.29 mm	97.79 mm