

Technical Data for **Whisper Series** Mass Flow Controllers

0.5 sccm full scale through 5 sccm full scale

Standard specifications. Consult Alicat for available options.



+1 (888) 290-6060
alicat.com/mcw

SENSOR AND CONTROL 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
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Steady State Control Range ²	0.5–100% of full scale
Typical Control Response Time	30 ms to 63% of step change (T63), user adjustable
Valve Function	Normally Closed
Temperature Sensitivity	Mass flow zero shift and span shift: 0.03% 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	60 PSIA
Pressure Accuracy above 1 ATM	±0.75% of reading
Pressure Accuracy below 1 ATM	±0.1 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time ³	127 ms (user adjustable)
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 Achievable steady state control may be limited by user-configurable PID tuning and process conditions.
Dynamic control performance is also limited by control response time, which may vary with the flow rate.
- 3 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 80 PSIA common mode pressure Damage possible above 15 PSID differential pressure
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–95%, non-condensing
Wetted Materials	302 / 303 / 304 / 430FR stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyphenylene sulfide, heat-cured epoxy, alumina, gold, brass, silicon, glass

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 ⁴	12–24 VDC, 250 mA (290 mA if equipped with 4–20 mA output)
Digital Data Update Rate ⁴	40 Hz at 19200 baud
Analog Data Update Rate	1 kHz
Display Update Rate	10 Hz
Analog Signal Accuracy	±0.1% of full scale additional uncertainty

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

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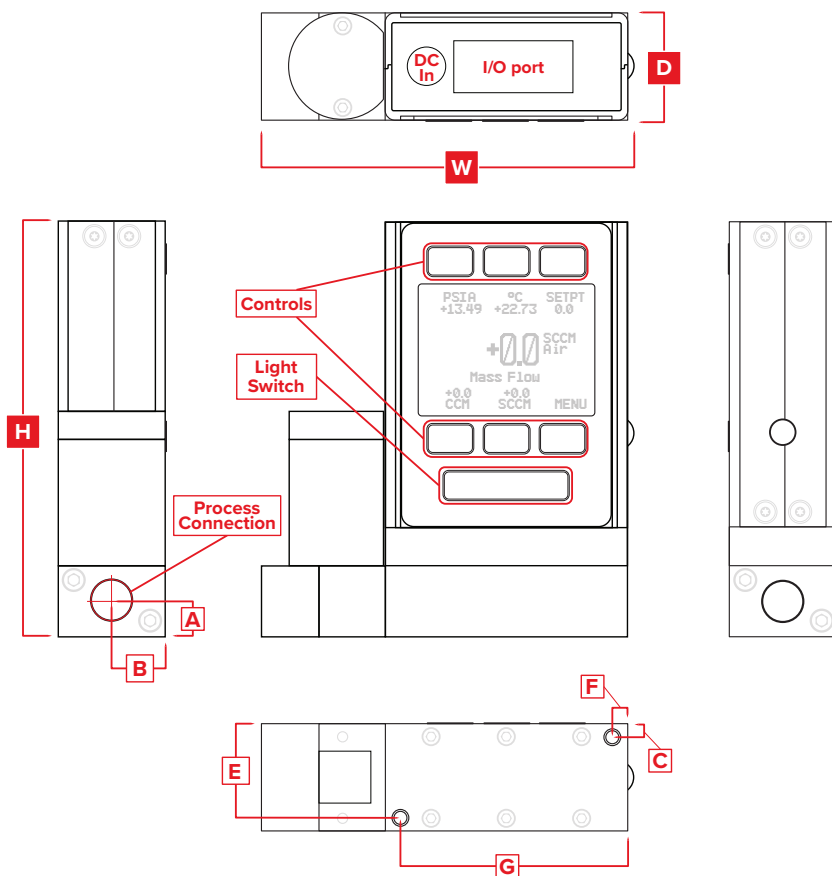
FEATURES	
STP Reference Conditions	25°C and 1 atm (default), user configurable
NTP Reference Conditions	0°C and 1 atm (default), user configurable
Monochrome LCD or Color TFT Display with integrated touchpad	Simultaneously displays mass flow, volumetric flow, temperature, and pressure
Gas Select™	98 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 SPECIFICATIONS			
Full scale flow	Pressure drop at full scale flow venting to atmosphere ⁵	Process connections ⁶	Mount tap size
0.5 sccm–5 sccm	0.07 PSID	M5 female thread (10-32 compatible) ⁷	2× 8-32 UNC 0.175 in [4.45 mm]

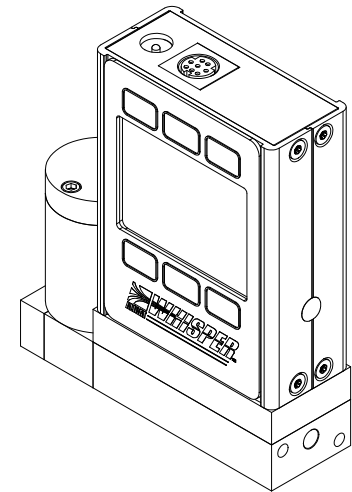
5 Default valve venting to atmosphere.

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

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



Representative Example



0.5 sccm

DIMENSIONS										
Full scale flow	Weight	Height	Width	Depth	A	B	C	E	F	G
0.5 sccm–5 sccm	≈ 1.1 lb	3.897 in	3.338 in	1.050 in	0.336 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
	≈ 0.5 kg	98.98 mm	84.79 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 **Whisper Series** Mass Flow Controllers

10 sccm full scale through **100 SLPM** full scale

Standard specifications. Consult Alicat for available options.



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SENSOR AND CONTROL PERFORMANCE	
Mass Flow Accuracy at calibration conditions ¹	±0.75% of reading or ±0.1% of full scale, whichever is greater
High Accuracy Option ¹	±0.6% of reading or ±0.1% of full scale, whichever is greater
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Steady State Control Range ²	0.5–100% of full scale
Typical Control Response Time	MCW: 30 ms to 63% of step change (T63), user adjustable MCRW: 150 ms to 63% of step change (T63), user adjustable
Valve Function	Normally Closed
Temperature Sensitivity	Mass flow zero shift: ±0.03% 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	60 PSIA
Pressure Accuracy above 1 ATM	±0.75% of reading
Pressure Accuracy below 1 ATM	±0.1 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time ³	127 ms (user adjustable)
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 Achievable steady state control may be limited by user-configurable PID tuning and process conditions. Dynamic control performance is also limited by control response time, which may vary with the flow rate.
- 3 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 80 PSIA common mode pressure Damage possible above 15 PSID differential pressure
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–95%, non-condensing
Wetted Materials	302 / 303 / 304 stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyphenylene sulfide, heat-cured epoxy, alumina, gold, silicon, glass MCW: Add brass and 430FR stainless steel. MCRW: Add 410 stainless steel.

Technical Data for **Whisper Series** Mass Flow Controllers

10 sccm full scale through **100 SLPM** 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
Electrical Connection Options	6 pin locking, 8 pin mini-DIN, 8 pin M12, DB-9, DB-15
Power Requirements ⁴	MCW: 12–24 VDC, 250 mA MCRW: 24 VDC, 1 A Add 40 mA if equipped with 4–20 mA output
Digital Data Update Rate ⁴	40 Hz at 19200 baud
Analog Data Update Rate	1 kHz
Display Update Rate	10 Hz
Analog Signal Accuracy	±0.1% of full scale additional uncertainty

⁴ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

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, temperature, and pressure
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.

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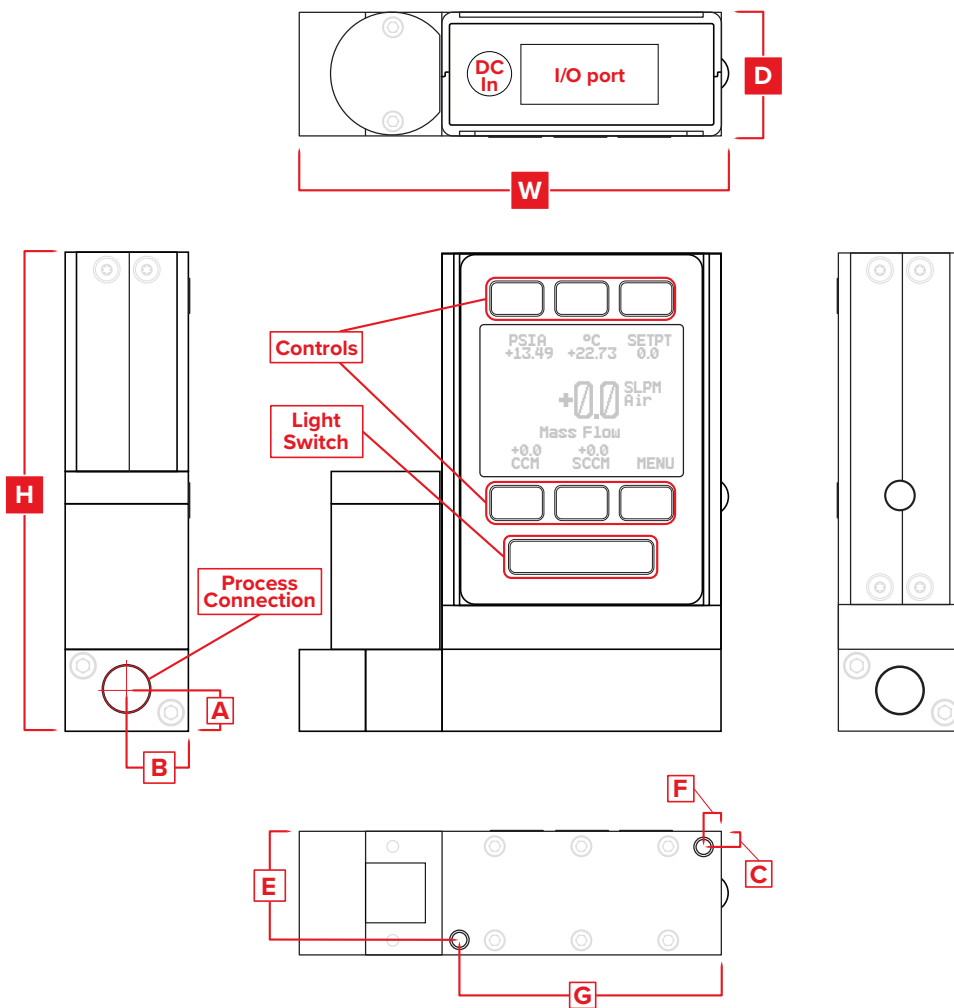
RANGE SPECIFIC SPECIFICATIONS				
Full scale flow	Type	Pressure drop at full scale flow venting to atmosphere ⁵	Process connections ⁶	Mount tap size
10–20 sccm	MCW	0.07 PSID	M5 female thread (10-32 compatible) ⁷	2× 8-32 UNC 0.175 in [4.45mm]
50–500 sccm	MCW	0.07 PSID	1/8" NPT Female	2× 8-32 UNC 0.300 in [7.62mm]
1 SLPM	MCW	0.10 PSID	1/8" NPT Female	2× 8-32 UNC 0.300 in [7.62mm]
2 SLPM	MCW	0.18 PSID	1/8" NPT Female	2× 8-32 UNC 0.300 in [7.62mm]

5 Default valve venting to atmosphere.

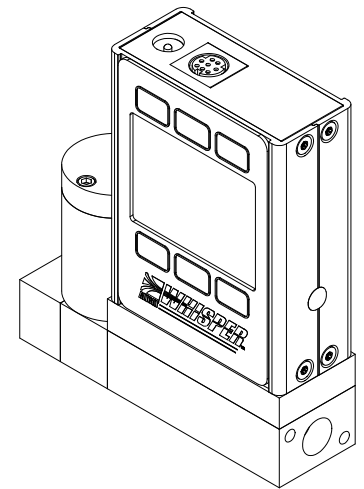
6 Consult Alicat for available process connection options, such as:

Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO, and VCR).

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



Representative Example



2 SLPM

DIMENSIONS											
Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G
10–20 sccm	MCW	≈ 1.1 lb	3.897 in	3.338 in	1.050 in	0.336 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
		≈ 0.5 kg	98.98 mm	84.79 mm	26.67 mm	8.53 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm
50 sccm–2 SLPM	MCW	≈ 1.2 lb	4.067 in	3.588 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	91.14 mm	26.67 mm	8.89 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm

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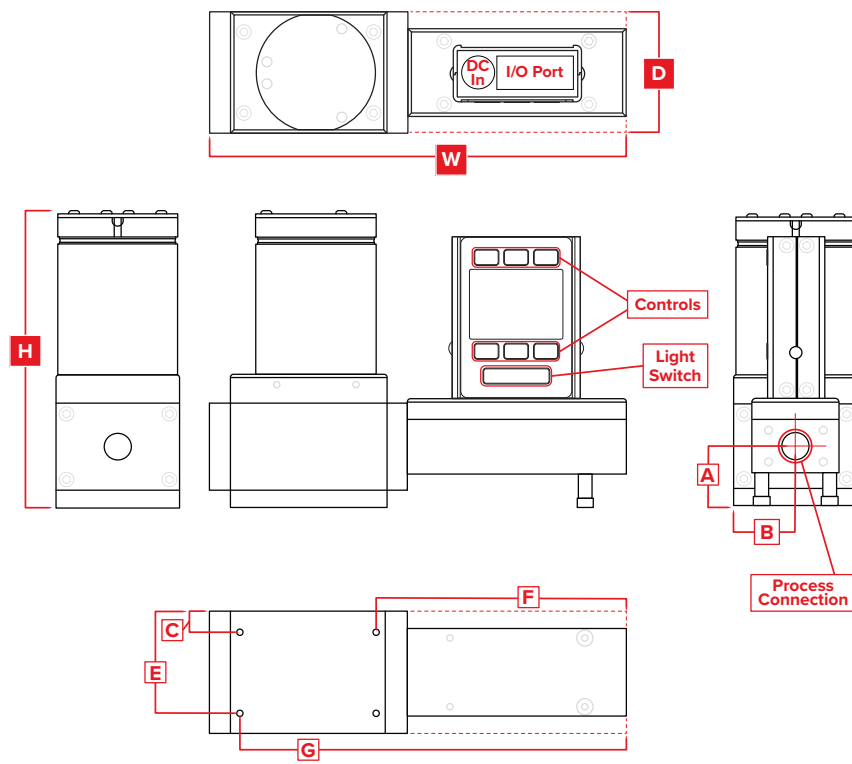
RANGE SPECIFIC SPECIFICATIONS				
Full scale flow	Type	Pressure drop at full scale flow venting to atmosphere ⁵	Process connections ⁶	Mount tap size
5 SLPM	MCRW	0.10 PSID	¼" NPT Female	4× 8-32 UNC 0.375 in [9.53 mm]
10 SLPM	MCRW	0.12 PSID	¼" NPT Female	4× 8-32 UNC 0.375 in [9.53 mm]
20 SLPM	MCRW	0.26 PSID	¼" NPT Female	4× 8-32 UNC 0.375 in [9.53 mm]
40 SLPM	MCRW	0.14 PSID	½" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]
50 SLPM	MCRW	0.17 PSID	¾" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]
100 SLPM	MCRW	0.30 PSID	¾" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]

⁵ Default valve venting to atmosphere.

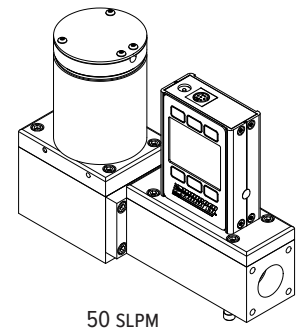
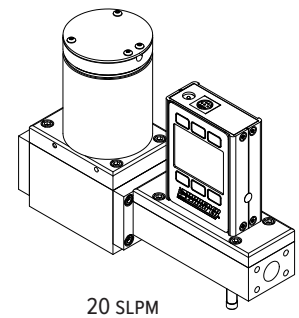
⁶ Consult Alicat for available process connection options, such as:

Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO, and VCR).

⁷ Shipped with Buna-N O-Ring face seal to ½" female NPT fittings.



Representative Examples



DIMENSIONS											
Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G
5 SLPM	MCRW	≈ 9.0 lb	4.367 in	5.408 in	1.600 in	0.500 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
		≈ 4.1 kg	110.92 mm	137.36 mm	40.64 mm	12.70 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
10 SLPM	MCRW	≈ 9.0 lb	4.367 in	5.408 in	1.600 in	0.500 in	0.800 in	0.175 in	1.425 in	0.750 in	3.250 in
		≈ 4.1 kg	110.92 mm	137.36 mm	40.64 mm	12.70 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
20 SLPM	MCRW	≈ 9.0 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
		≈ 4.1 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
40 SLPM	MCRW	≈ 9.0 lb	5.495 in	7.650 in	2.250 in	1.120 in	1.125 in	0.175 in	1.425 in	4.400 in	6.900 in
		≈ 4.1 kg	139.57 mm	194.31 mm	57.15 mm	28.45 mm	28.58 mm	4.45 mm	36.20 mm	111.76 mm	175.26 mm
50 SLPM–100 SLPM	MCRW	≈ 9.0 lb	5.495 in	7.275 in	2.250 in	1.120 in	1.125 in	0.175 in	1.425 in	4.025 in	6.525 in
		≈ 4.1 kg	139.57 mm	184.79 mm	57.15 mm	28.45 mm	28.58 mm	4.45 mm	36.20 mm	102.24 mm	165.74 mm

Technical Data for **Whisper Series** Mass Flow Controllers

250 SLPM full scale through **1000 SLPM** full scale

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SENSOR AND CONTROL 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 ≤500 SLPM models
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Steady State Control Range ²	0.5–100% of full scale
Typical Control Response Time	150 ms to 63% of step change (T63), user adjustable
Valve Function	Normally Closed
Temperature Sensitivity	Mass flow zero shift and span shift: 0.03% 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	60 PSIA
Pressure Accuracy above 1 ATM	±0.75% of reading
Pressure Accuracy below 1 ATM	±0.1 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time ³	127 ms (user adjustable)
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 Achievable steady state control may be limited by user-configurable PID tuning and process conditions.

Dynamic control performance is also limited by control response time, which may vary with the flow rate.

3 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 80 PSIA common mode pressure Damage possible above 15 PSID differential pressure
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–95%, non-condensing
Wetted Materials	302 / 303 / 304 / 410 stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyphenylene sulfide, heat-cured epoxy, alumina, gold, silicon, glass

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 ⁴	MCRW: 24 VDC, 1 A MCRWH: 24–30 VDC, 2 A Add 40 mA if equipped with 4–20 mA output
Digital Data Update Rate ⁴	40 Hz at 19200 baud
Analog Data Update Rate	1 kHz
Display Update Rate	10 Hz
Analog Signal Accuracy	±0.1% of full scale additional uncertainty

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

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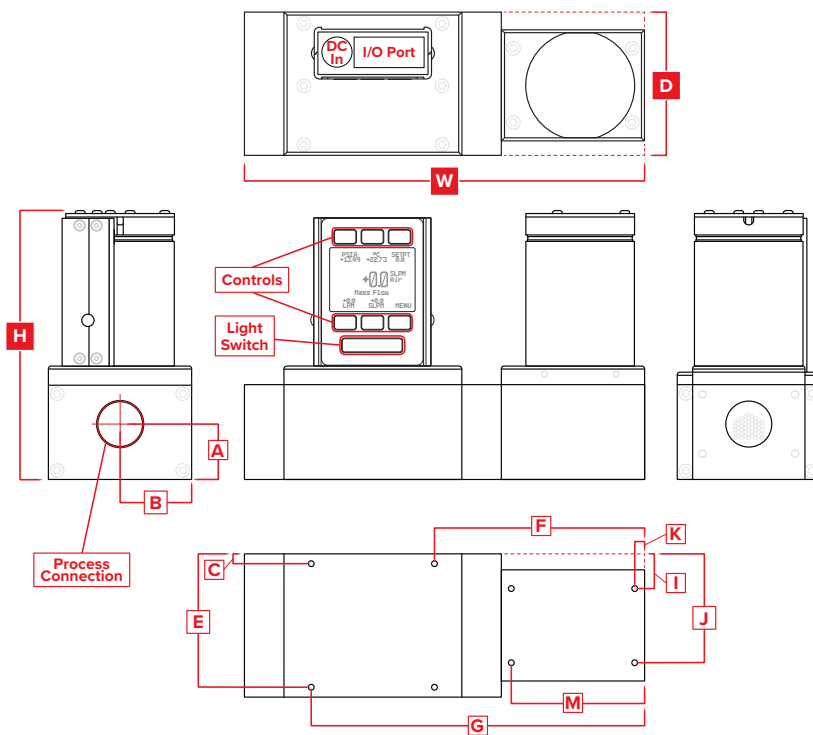
FEATURES	
STP Reference Conditions	25°C and 1 atm (default), user configurable
NTP Reference Conditions	0°C and 1 atm (default), user configurable
Monochrome LCD or Color TFT Display with integrated touchpad	Simultaneously displays mass flow, volumetric flow, temperature, and pressure
Gas Select™	98 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 SPECIFICATIONS				
Full scale flow	Type	Pressure drop at full scale flow venting to atmosphere ⁵	Process connections ⁶	Mount tap size
250 SLPM	MCRW	0.69 PSID	¾" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]
500 SLPM	MCRW	0.69 PSID	¾" NPT Female	4× 8-32 UNC 0.330 in [8.38 mm]
1000 SLPM	MCRWH	1.65 PSID	2" NPT Female	4× 8-32 UNC 0.300 in [7.62 mm]

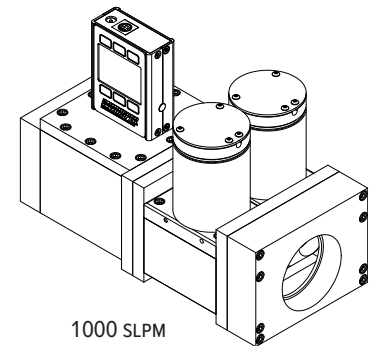
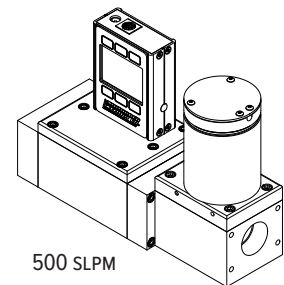
⁵ Default valve venting to atmosphere.

⁶ Consult Alicat for available process connection options, such as:

Compression, face seal, push-to-connect, BSP, SAE, or Swagelok® (including tube, VCO, and VCR).



Representative Examples



DIMENSIONS																
Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G	I	J	K	M	
250 SLPM	MCRW	≈ 9.0 lb	5.495 in	7.275 in	2.250 in	1.120 in	1.125 in	0.175 in	1.425 in	4.025 in	6.525 in	0.375 in	1.875 in	0.200 in	2.700 in	
		≈ 4.1 kg	139.57 mm	184.79 mm	57.15 mm	28.45 mm	28.58 mm	4.45 mm	36.20 mm	102.24 mm	165.74 mm	9.53 mm	47.63 mm	5.08 mm	68.58 mm	
500 SLPM	MCRW	≈ 12.0 lb	5.495 in	8.100 in	2.900 in	1.120 in	1.450 in	0.200 in	2.700 in	4.250 in	6.750 in	0.700 in	2.200 in	0.200 in	2.700 in	
		≈ 5.4 kg	139.57 mm	205.74 mm	73.66 mm	28.45 mm	36.83 mm	5.08 mm	68.58 mm	107.95 mm	171.45 mm	17.78 mm	55.88 mm	5.08 mm	68.58 mm	
1000 SLPM	MCRWH	≈ 28.0 lb	6.267 in	9.800 in	3.840 in	1.450 in	1.920 in	0.295 in	3.545 in	5.958 in	8.455 in	—	—	—	—	
		≈ 12.7 kg	159.18 mm	248.92 mm	97.54 mm	36.83 mm	48.77 mm	7.49 mm	90.04 mm	151.32 mm	214.76 mm	—	—	—	—	