Technical Data for MC-Series Mass Flow Controllers

0.5 SCCM full scale through **5 SCCM** full scale

Standard specifications. Consult Alicat for available options.

ALICAT SCIENTIFIC
+1 (888) 290-6060
alicat.com/mc

SENSOR AND CONTROL PERFORMANCE	
Mass flow accuracy[1]	**Standard accuracy:** ±0.8% of reading and ±0.2% of full scale **High accuracy (5 SCCM models):** ±0.4% of reading and ±0.2% of full scale
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Pressure accuracy[1]	**Above 1 atm:** ±0.5% of reading **Below 1 atm:** ±0.07 PSIA
Steady state control range	0.01–100% of full scale (10,000:1 turndown ratio)
Operating pressure full scale	11.5–160 PSIA
Pressure sensitivity	**Mass flow zero and span shift:** ±(0.08% of reading + 0.02% of full scale) per atm from calibration conditions
Temperature sensitivity	**Mass flow zero and span shift:** 0.02% of full scale per °C from 25°C
Temperature accuracy	±0.75°C
Operating temperature range	−10–60°C (ambient and gas)
Valve function	Normally closed
Totalizer volume uncertainty	±0.1% of reading in additional uncertainty
Sensor response time	<1 ms
Typical control response time	As fast as 100 ms (T63), flow rate dependent, user-adjustable
Typical indication response time	<10 ms, flow rate dependent
Typical warm-up time	<1 s

MECHANICAL	
Wetted materials	302, 303, 304, 316L, and 430FR stainless steel; FKM, alumina ceramic, brass, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon
Maximum pressure	Damage possible above 200 PSIA common mode pressure. Damage possible by rapid pressure change above 75 PSI differential pressure.
Relative humidity range	0–95%, non-condensing
Ingress protection	IP40 (consult Alicat for weatherproofing options)
Mounting orientation sensitivity	None
Mounting holes	2× 8-32 UNC threaded ↧ 0.175″ [4.45 mm]
Process connections[2]	M5 female (10-32 compatible), shipped with Buna O-ring face seal to ⅛ NPT female fittings

POWER AND COMMUNICATIONS	
Digital input and output options	RS-232 Serial and Modbus RTU (default) RS-485 Serial and Modbus RTU, Modbus TCP/IP, DeviceNet, EtherCAT, Ethernet/IP, PROFINET, PROFIBUS
Digital data update rate[3]	40 Hz at 19200 baud
Analog input and output options	4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc
Analog data update rate[3]	1 kHz
Analog signal accuracy	±0.1% of full scale additional uncertainty
Interactive display	Monochrome LCD or color TFT display with integrated touchpad; simultaneously displays mass flow, volumetric flow, temperature, setpoint, and pressure
Display update rate	10 Hz
Electrical connection options	6-pin locking, 8-pin mini-DIN, 8-pin M12, DB-9, DB-15
Power requirements[2]	12–24 Vdc, 250 mA (290 mA if equipped with 4–20 mA output)

Technical Data for MC-Series Mass Flow Controllers

0.5 SCCM full scale through **5 SCCM** full scale

Standard specifications. Consult Alicat for available options.

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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
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% composition resolution.

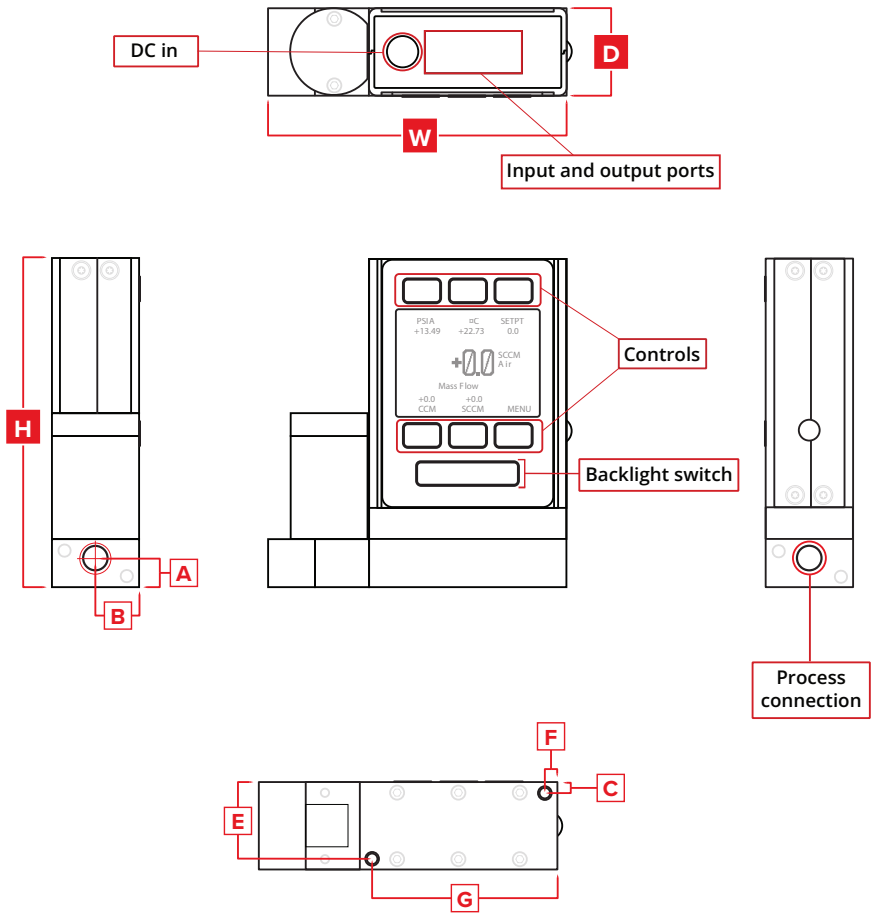
RANGE-SPECIFIC TECHNICAL DATA	
Full scale flow	**Pressure drop at full scale when venting air to atmosphere[4]**
0.5 SCCM	1.0 PSID
1–5 SCCM	2.0 PSID

1 Stated accuracy is after tare (for mass flow), under equilibrium conditions, includes repeatability and linearity.

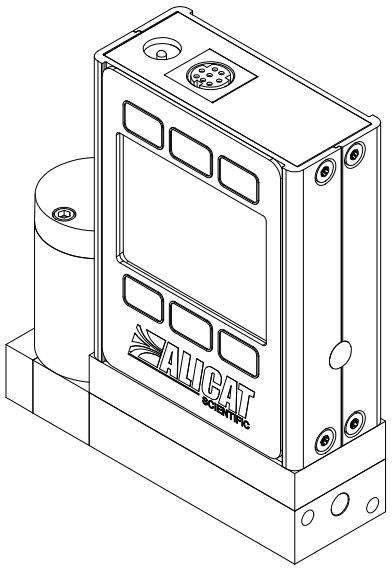
2 Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).

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

4 Lower pressure drops and other valves available, including our WHISPER™ series mass flow controllers at alicat.com/mcw.



Representative Example



0.5 SCCM

DIMENSIONS										WEIGHT
Full scale flow	**Width**	**Depth**	**Height**	**A**	**B**	**C**	**E**	**F**	**G**	
0.5–5 SCCM	3.34″	1.05″	3.90″	0.34″	0.53″	0.13″	0.93″	0.15″	2.23″	≈ 1.1 lb
	84.8 mm	26.7 mm	99.0 mm	8.5 mm	13.3 mm	3.2 mm	23.5 mm	3.8 mm	56.5 mm	≈ 0.5 kg

Technical Data for MC-Series Mass Flow Controllers

10 SCCM full scale through 20 SLPM full scale

Standard specifications. Consult Alicat for available options.

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SENSOR AND CONTROL PERFORMANCE	
Mass flow accuracy[1]	**Standard accuracy:** ±0.6% of reading or ±0.1% of full scale, whichever is greater **High accuracy**: ±0.5% of reading or ±0.1% of full scale, whichever is greater
Flow repeatability (2σ)	±(0.1% of reading + 0.02% of full scale)
Pressure accuracy[1]	**Above 1 atm:** ±0.5% of reading **Below 1 atm:** ±0.07 PSIA
Steady state control range	0.01–100% of full scale (10,000:1 turndown ratio)
Operating pressure full scale	11.5–160 PSIA
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 atm from calibration conditions
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
Temperature accuracy	±0.75°C
Operating temperature range	−10–60°C (ambient and gas)
Valve function	Normally closed
Totalizer volume uncertainty	±0.1% of reading in additional uncertainty
Sensor response time	<1 ms
Typical control response time	As fast as 30 ms (T63), flow rate dependent, user-adjustable
Typical indication response time	<10 ms, flow rate dependent
Typical warm-up time	<1 s

MECHANICAL	
Wetted materials	302, 303, 304, 316L, and 430FR stainless steel; FKM, alumina ceramic, brass, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon
Maximum pressure	Damage possible above 200 PSIA common mode pressure. Damage possible by rapid pressure change above 75 PSI differential pressure.
Relative humidity range	0–95%, non-condensing
Ingress protection	IP40 (consult Alicat for weatherproofing options)
Mounting orientation sensitivity	None
Mounting holes	**10–50 SCCM:** 2× 8-32 UNC threaded ↧ 0.175″ [4.45 mm] **100 SCCM–20 SLPM:** 2× 8-32 UNC threaded ↧ 0.350″ [8.89 mm]
Process connections[2]	**10–50 SCCM:** M5 female (10-32 compatible), shipped with Buna-N O-ring face seal **100 SCCM–20 SLPM:** ⅛" NPT female

POWER AND COMMUNICATIONS	
Digital input and output options	RS-232 Serial and Modbus RTU (default) RS-485 Serial and Modbus RTU, Modbus TCP/IP, DeviceNet, EtherCAT, Ethernet/IP, PROFINET, PROFIBUS
Digital data update rate[3]	40 Hz at 19200 baud
Analog input and output options	4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc
Analog data update rate[3]	1 kHz
Analog signal accuracy	±0.1% of full scale additional uncertainty
Interactive display	Monochrome LCD or color TFT display with integrated touchpad; simultaneously displays mass flow, volumetric flow, temperature, setpoint, and pressure
Display update rate	10 Hz
Electrical connection options	6-pin locking, 8-pin mini-DIN, 8-pin M12, DB-9, DB-15
Power requirements[3]	12–24 Vdc, 250 mA (290 mA if equipped with 4–20 mA output)

Technical Data for MC-Series Mass Flow Controllers

10 SCCM full scale through 20 SLPM full scale

Standard specifications. Consult Alicat for available options.

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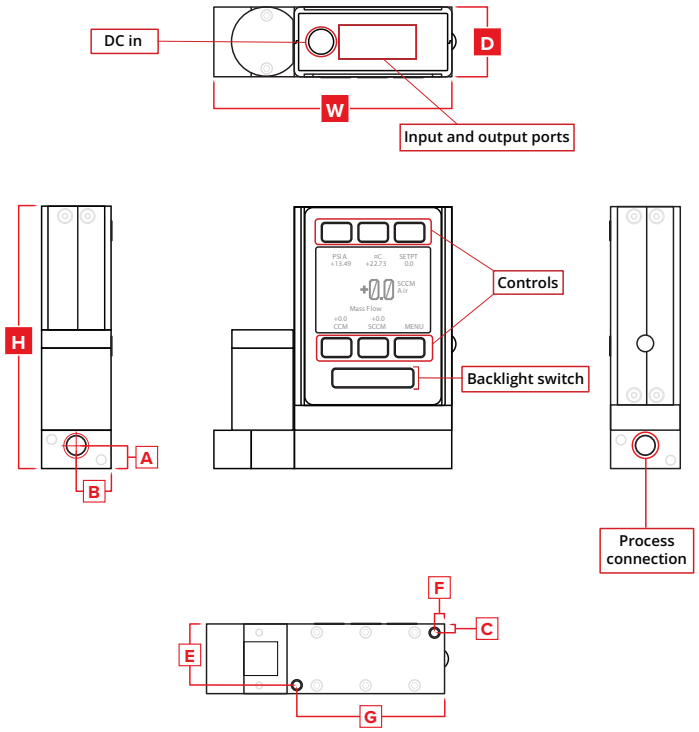
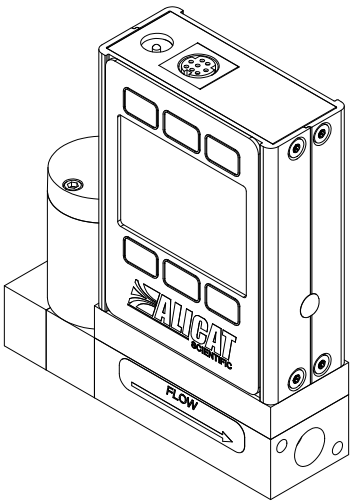
FEATURES	
STP reference conditions	25°C and 1 atm (default), user-configurable
NTP reference conditions	0°C and 1 atm (default), user-configurable
Gas Select™	98 user-selectable gases stored internally. Each gas optimized to match NIST's REFPROP 10 gas property calculations across the operating temperature and pressure ranges for highest accuracy.
COMPOSER™	20 user-definable gas mixes. Each mix may have up to 5 gases with 0.01% composition resolution.

RANGE-SPECIFIC TECHNICAL DATA	
Full scale flow	Pressure drop at full scale when venting air to atmosphere[4]
10 SCCM	2.8 PSID
20–500 SCCM	1.0 PSID
1 SLPM	1.5 PSID
2 SLPM	3.0 PSID
5 SLPM	2.0 PSID
10 SLPM	5.5 PSID
20 SLPM	12.0 PSID

1 Stated accuracy is after tare (for mass flow), under equilibrium conditions, includes repeatability and linearity.
2 Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).
3 Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.
4 Lower pressure drops and other valves available, including our WHISPER™ series mass flow controllers at alicat.com/mcw.



Representative Example



10 SLPM

DIMENSIONS										WEIGHT
Full scale flow	Width	Depth	Height	A	B	C	E	F	G	
10–50 SCCM	3.34″	1.05″	3.90″	0.34″	0.53″	0.13″	0.93″	0.15″	2.23″	≈ 1.1 lb
	84.8 mm	26.7 mm	99.0 mm	8.5 mm	13.3 mm	3.2 mm	23.5 mm	3.8 mm	56.5 mm	≈ 0.5 kg
100 SCCM–20 SLPM	3.59″	1.05″	4.07″	0.35″	0.53″	0.13″	0.93″	0.15″	2.23″	≈ 1.2 lb
	91.1 mm	26.7 mm	103.3 mm	8.9 mm	13.3 mm	3.2 mm	23.5 mm	3.8 mm	56.5 mm	≈ 0.5 kg

Technical Data for MC-Series Mass Flow Controllers

50 SLPM full scale through **5000 SLPM** full scale

Standard specifications. Consult Alicat for available options.

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SENSOR AND CONTROL PERFORMANCE	
Mass flow accuracy	**Standard accuracy:** ±0.8% of reading and ±0.2% of full scale **High accuracy (≤1000 SLPM models):** ±0.4% of reading and ±0.2% of full scale
Flow repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Pressure accuracy[1]	**Above 1 atm:** ±0.5% of reading **Below 1 atm:** ±0.07 PSIA
Steady state control range	**MCP:** 0.01–100% of full scale (10,000:1 turndown ratio) **MCR (Rolamite valve):** 0.2–100% of full scale (250:1 turndown ratio)
Operating pressure full scale	11.5 – 160 PSIA
Pressure sensitivity	**Mass flow zero and span shift:** ±(0.08% of reading + 0.02% of full scale) per atm from calibration conditions
Temperature sensitivity	**Mass flow zero and span shift:** 0.02% of full scale per °C from 25°C
Temperature accuracy	±0.75°C
Operating temperature range	−10–60°C (ambient and gas)
Valve function	Normally closed
Totalizer volume uncertainty	±0.1% of reading in additional uncertainty
Sensor response time	<1 ms
Typical control response time	As fast as 30 ms (T63), flow rate dependent, user-adjustable
Typical indication response time	<10 ms, flow rate dependent
Typical warm-up time	<1 s

MECHANICAL	
Process connections[2]	**MCP:** ¼" NPT female **MCR:** ¼ – 1¼" NPT female **MCRH:** 1½" NPT female
Wetted materials	**MCP:** 302, 303, 304, 316L, and 430FR stainless steel; FKM, alumina ceramic, brass, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon **MCR and MCRH:** 302, 303, 304, 316L, and 410 stainless steel; FKM, alumina ceramic, Delrin®, glass, gold, heat-cured epoxy, heat-cured silicone rubber, nylon, polyamide, silicon
Maximum pressure	Damage possible above 200 PSIA common mode pressure. Damage possible by rapid pressure change above 75 PSI differential pressure
Relative humidity range	0–95%, non-condensing
Ingress protection	IP40 (consult Alicat for weatherproofing options)
Orientation sensitivity	**MC-Series:** None **MCR- and MCRH-Series:** Rolamite valves must be upright.
Mounting holes	**50–100 SLPM:** 4× 8-32 UNC threaded ↧ 0.375″ [9.53 mm] **250–1000 SLPM:** 4× 8-32 UNC threaded ↧ 0.328″ [8.33 mm] **2000–3000 SLPM:** 4× 8-32 UNC threaded ↧ 0.330″ [8.38 mm] **5000 SLPM:** 4× 8-32 UNC threaded ↧ 0.300″ [7.62 mm]

POWER AND COMMUNICATIONS	
Digital input and output options	RS-232 Serial and Modbus RTU (default), RS-485 Serial and Modbus RTU, Modbus TCP/IP, DeviceNet, EtherCAT, Ethernet/IP, PROFINET, PROFIBUS
Digital data update rate[3]	40 Hz at 19200 baud
Analog input and output options	4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc
Analog data update rate[3]	1 kHz
Analog signal accuracy	±0.1% of full scale additional uncertainty
Interactive display	Monochrome LCD or color TFT display with integrated touchpad; simultaneously displays mass flow, volumetric flow, temperature, setpoint, and pressure
Display update rate	10 Hz
Electrical connection options	6-pin locking, 8-pin mini-DIN, 8-pin M12, 9-pin DB-9, 15-pin DB-15
Power requirements[2]	12–24 Vdc, 250 mA (290 mA if equipped with 4–20 mA output)

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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% composition resolution.

RANGE-SPECIFIC TECHNICAL DATA		
Full scale flow	**Type**	**Pressure drop at full scale when venting air to atmosphere[4]**
50 SLPM	MCP	5.0 PSID
100 SLPM	MCP	15.5 PSID
250 SLPM	MCR	2.4 PSID
500 SLPM	MCR	6.5 PSID
1000 SLPM	MCR	14.0 PSID
2000 SLPM	MCR	28.6 PSID
3000 SLPM	MCR	16.8 PSID
5000 SLPM	MCRH	14.1 PSID

1 Stated accuracy is after tare (for mass flow), under equilibrium conditions, includes repeatability and linearity.

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

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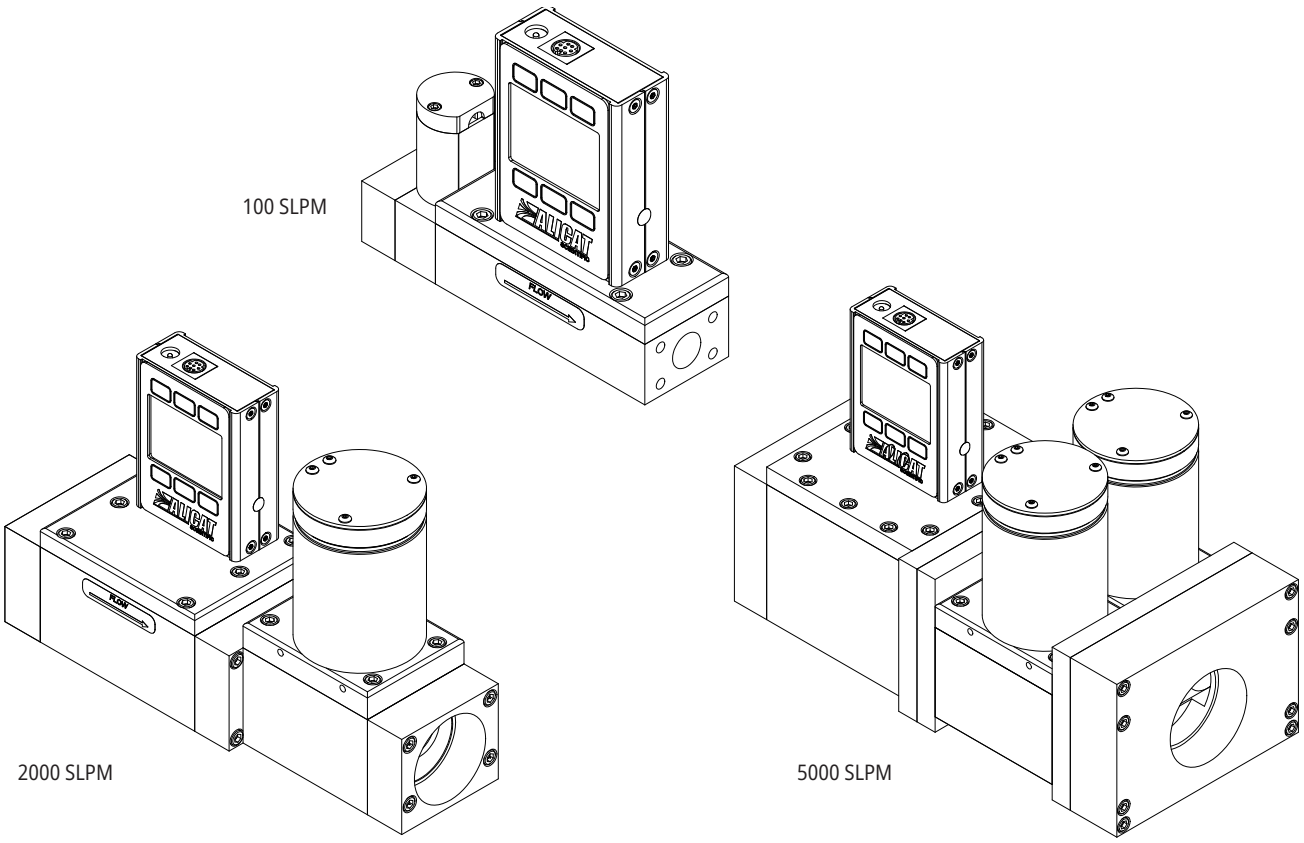
Representative Examples



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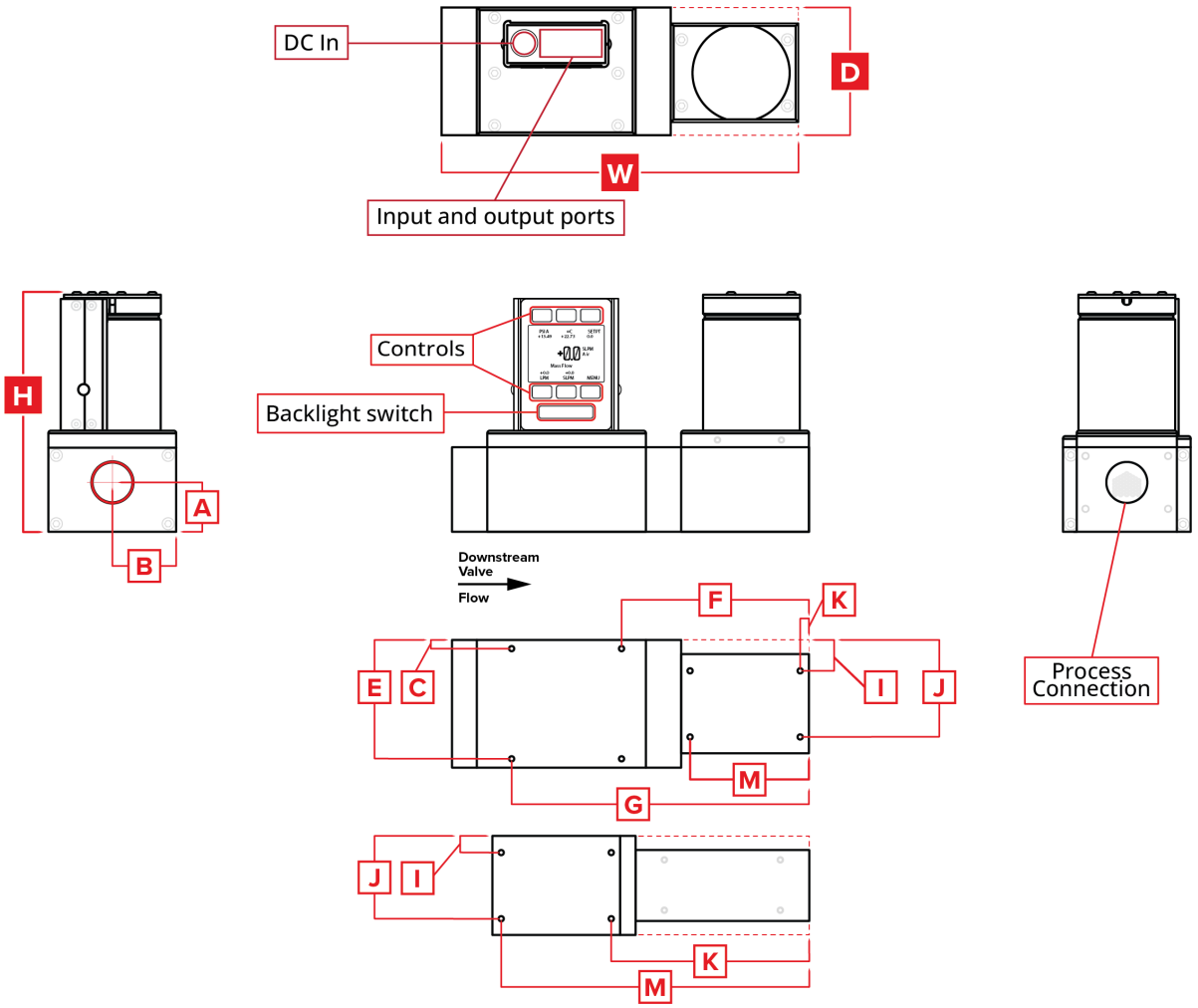

DIMENSIONS															WEIGHT
Full scale flow	Type	Width	Depth	Height	A	B	C	E	F	G	I	J	K	M	
50–100 SLPM	MCP	5.41″	1.60″	4.37″	0.50″	0.80″	0.18″	1.43″	0.75″	3.25″	—	—	—	—	≈ 3.1 lb
		137.4 mm	40.6 mm	110.9 mm	12.7 mm	20.3 mm	4.4 mm	36.2 mm	19.1 mm	82.6 mm	—	—	—	—	≈ 1.4 kg
250 SLPM	MCR	7.65″	2.25″	5.50″	1.12″	1.13″	0.18″	1.43″	4.40″	6.90″	0.38″	1.88″	0.58″	3.08″	≈ 9.0 lb
		194.3 mm	57.2 mm	139.6 mm	28.4 mm	28.6 mm	4.4 mm	36.2 mm	111.8 mm	175.3 mm	9.5 mm	47.6 mm	14.6 mm	78.1 mm	≈ 4.1 kg
500–1000 SLPM	MCR	7.28″	2.25″	5.50″	1.12″	1.13″	0.18″	1.43″	4.03″	6.53″	0.38″	1.88″	0.20″	2.70″	≈ 9.0 lb
		184.8 mm	57.2 mm	139.6 mm	28.4 mm	28.6 mm	4.4 mm	36.2 mm	102.2 mm	165.7 mm	9.5 mm	47.6 mm	5.1 mm	68.6 mm	≈ 4.1 kg
2000 SLPM	MCR	8.10″	2.90″	5.50″	1.12″	1.45″	0.20″	2.70″	4.25″	6.75″	0.70″	2.20″	0.20″	2.70″	≈ 12.0 lb
		205.7 mm	73.7 mm	139.6 mm	28.4 mm	36.8 mm	5.1 mm	68.6 mm	108.0 mm	171.5 mm	17.8 mm	55.9 mm	5.1 mm	68.6 mm	≈ 5.4 kg
3000 SLPM	MCR	8.90″	2.90″	5.50″	0.96″	1.45″	0.20″	2.70″	5.05″	7.55″	0.70″	2.20″	1.00″	3.50″	≈ 12.0 lb
		226.1 mm	73.7 mm	139.6 mm	24.4 mm	36.8 mm	5.1 mm	68.6 mm	128.3 mm	191.8 mm	17.8 mm	55.9 mm	25.4 mm	88.9 mm	≈ 5.4 kg
5000 SLPM	MCRH	9.80″	3.84″	6.27″	1.45″	1.92″	0.30″	3.55″	5.96″	8.46″	—	—	—	—	≈ 28.0 lb
		248.9 mm	97.5 mm	159.2 mm	36.8 mm	48.8 mm	7.5 mm	90.0 mm	151.3 mm	214.8 mm	—	—	—	—	≈ 12.7 kg