

Technical Data for **MCS-Series** Mass Flow Controllers

0.5 sccm full scale through **5000 SLPM** full scale

Standard specifications. Consult Alicat for available options.

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 ranges ≥5 sccm and ≤ 500 SLPM
Repeatability	±0.2% of full scale
Steady State Control Range ²	1–100% of full scale
Typical Control Response Time	For 63% of step change (T63), user adjustable: 0.5 sccm–5 sccm: 100–4000 ms 10 sccm–20 SLPM: 30–4000 ms 50 SLPM–5000 SLPM: 30–150 ms
Valve Function	Normally Closed
Zero Shift and Span Shift	0.02% full scale per °C per atm
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	±0.5% of full scale
Totalizer Volume Uncertainty	±0.5% of reading in additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time ³	0.5 sccm–5 sccm: 100–4000 ms 10 sccm–20 SLPM: <10 ms 50 SLPM–5000 SLPM: 65–255 ms
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 175 PSIA common mode pressure. Damage possible above 75 PSID differential pressure.
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–100%, non-condensing
Wetted Materials	316L / 303 / 430FR stainless steel, FFKM standard, FKM or EPDM as needed for some gases. MCRS/MCRHS: Add 410 stainless steel

Technical Data for **MCS-Series** Mass Flow Controllers

0.5 sccm full scale through **5000 SLPM** full scale

Standard specifications. Consult Alicat for available options.

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 (Contact Alicat for custom pinouts)
Power Requirements ⁴	MCS: 12–30 Vdc, 250 mA MCRS (Rolamite Valve): 24 Vdc, 1 A MCRHS (Dual Rolamite valve): 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.

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, setpoint, and pressure
Gas Select™	128 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.

Technical Data for MCS-Series Mass Flow Controllers

0.5 sccm full scale through 5000 SLPM full scale

Standard specifications. Consult Alicat for available options.

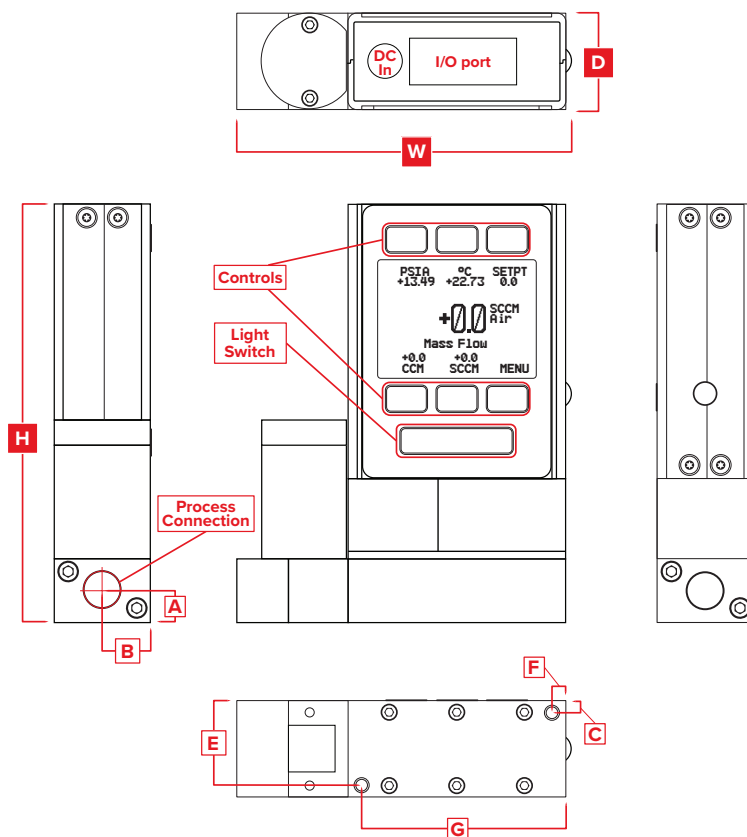
RANGE-SPECIFIC TECHNICAL DATA				
Full scale flow	Type	Pressure drop at full scale flow ⁵	Process connections ⁶	Mount tap size
0.5 sccm	MCS	1.0 PSID	M5 female (10-32 compatible) ⁸	2× 8-32 UNC 0.175 in [4.45 mm]
1 sccm–5 sccm	MCS	2.0 PSID	M5 female (10-32 compatible) ⁸	2× 8-32 UNC 0.175 in [4.45 mm]
10 sccm	MCS	2.8 PSID	M5 female (10-32 compatible) ⁸	2× 8-32 UNC 0.175 in [4.45 mm]
50 sccm	MCS	1.0 PSID	M5 female (10-32 compatible) ⁸	2× 8-32 UNC 0.175 in [4.45 mm]
100–500 sccm	MCS	1.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
1 SLPM	MCS	1.5 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
2 SLPM	MCS	3.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
5 SLPM	MCS	2.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
10 SLPM	MCS	5.5 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
20 SLPM	MCS	20.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]

5 Default valve venting air to atmosphere.

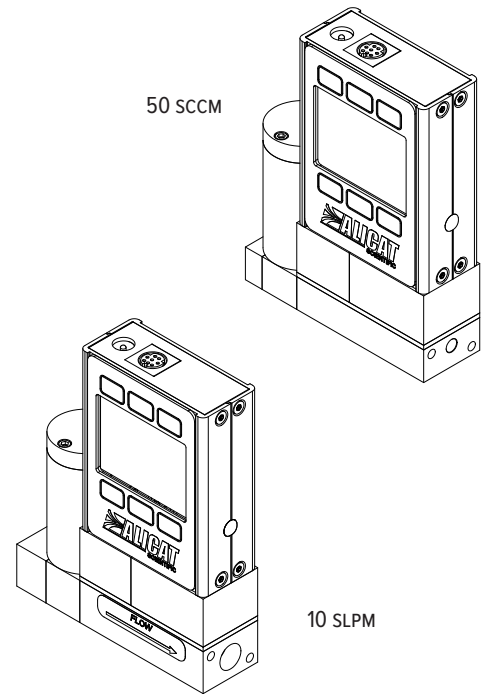
6 Consult Alicat for available process connection options, such as:

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

7 Shipped with 316SS M-5 (10-32) Male FFKM O-ring face seal to 1/8" Female NPT fittings



Representative Examples



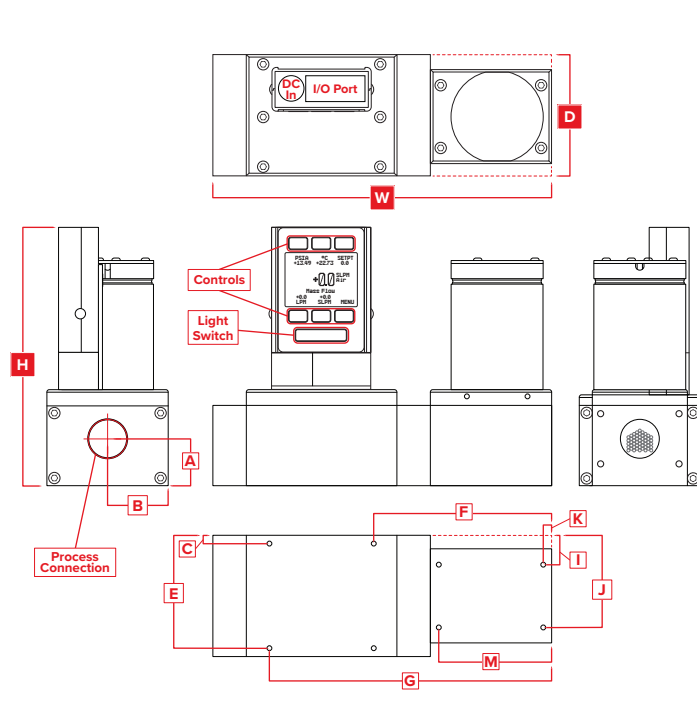
DIMENSIONS											
Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G
0.5–50 sccm	MCS	≈ 1.1 lb	4.397 in	3.338 in	1.050 in	0.336 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
		≈ 0.5 kg	111.68 mm	84.79 mm	26.67 mm	8.53 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm
100 sccm–20 SLPM	MCS	≈ 1.2 lb	4.567 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	116.00 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

Technical Data for MCS-Series Mass Flow Controllers

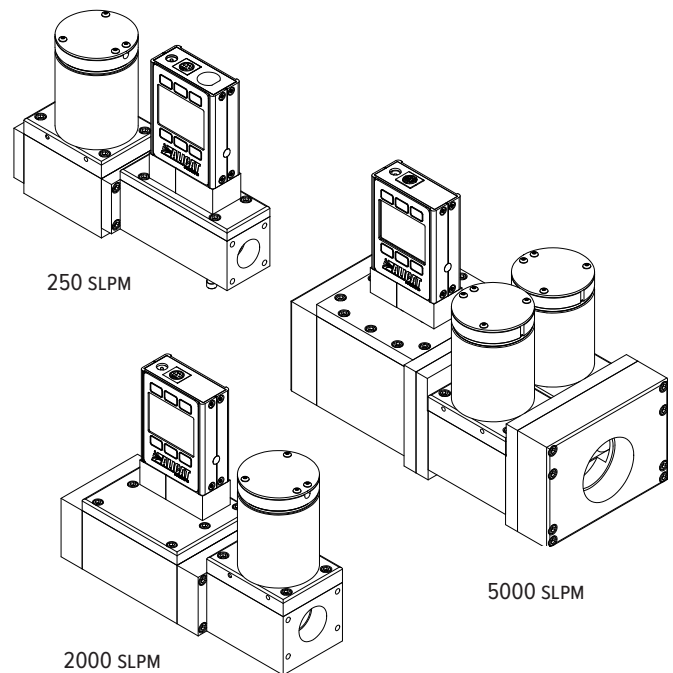
0.5 sccm full scale through 5000 SLPM full scale

Standard specifications. Consult Alicat for available options.

RANGE-SPECIFIC TECHNICAL DATA				
Full scale flow	Type	Pressure drop at full scale flow ⁵	Process connections ⁶	Mount tap size
50 SLPM	MCRS	2.5 PSID	¼" NPT female	4× 8-32 UNC 0.375 in [9.53 mm]
100 SLPM	MCRS	2.5 PSID	¼" NPT female	4× 8-32 UNC 0.375 in [9.53 mm]
250 SLPM	MCRS	2.4 PSID	½" NPT female	4× 8-32 UNC 0.328 in [8.33 mm]
500 SLPM	MCRS	6.5 PSID	¾" NPT female	4× 8-32 UNC 0.328 in [8.33 mm]
1000 SLPM	MCRS	14.0 PSID	¾" NPT female	4× 8-32 UNC 0.328 in [8.33 mm]
2000 SLPM	MCRS	28.6 PSID	¾" NPT female (1¼" NPT connection available)	8× 8-32 UNC 0.330 in [8.38 mm]
3000 SLPM	MCRS	16.8 PSID	1¼" NPT female	8× 8-32 UNC 0.330 in [8.38 mm]
5000 SLPM	MCRHS	14.1 PSID	1½" NPT female	4× 8-32 UNC 0.300 in [7.62 mm]



Representative Examples



DIMENSIONS															
Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G	I	J	K	M
50–100 SLPM	MCRS	≈ 9.0 lb	5.687 in	7.650 in	2.250 in	1.120 in	1.125 in	0.375 in	1.875 in	4.575 in	7.075 in	–	–	–	–
		≈ 4.1 kg	144.45 mm	194.31 mm	57.15 mm	28.45 mm	28.58 mm	9.53 mm	47.63 mm	116.21 mm	179.71 mm	–	–	–	–
250 SLPM	MCRS	≈ 9.0 lb	5.987 in	7.650 in	2.250 in	1.120 in	1.125 in	0.375 in	1.875 in	4.575 in	7.075 in	–	–	–	–
		≈ 4.1 kg	152.07 mm	194.31 mm	57.15 mm	28.45 mm	28.58 mm	9.53 mm	47.63 mm	116.21 mm	179.71 mm	–	–	–	–
500–1000 SLPM	MCRS	≈ 9.0 lb	5.987 in	7.275 in	2.250 in	1.120 in	1.125 in	0.375 in	1.875 in	4.575 in	7.075 in	–	–	–	–
		≈ 4.1 kg	152.07 mm	184.79 mm	57.15 mm	28.45 mm	28.58 mm	9.53 mm	47.63 mm	116.21 mm	179.71 mm	–	–	–	–
2000 SLPM	MCRS	≈ 12.0 lb	5.987 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	152.07 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
3000 SLPM	MCRS	≈ 12.0 lb	5.987 in	8.900 in	2.900 in	0.960 in	1.450 in	0.200 in	2.700 in	5.050 in	7.550 in	0.700 in	2.200 in	1.000 in	3.500 in
		≈ 5.4 kg	152.07 mm	226.06 mm	73.66 mm	24.38 mm	36.83 mm	5.08 mm	68.58 mm	128.27 mm	191.77 mm	17.78 mm	55.88 mm	25.40 mm	88.90 mm
5000 SLPM	MCRHS	≈ 28.0 lb	7.083 in	10.000 in	4.500 in	1.450 in	2.250 in	0.625 in	3.875 in	5.950 in	8.450 in	–	–	–	–
		≈ 12.7 kg	179.91 mm	254.00 mm	114.30 mm	36.83 mm	57.15 mm	15.88 mm	98.43 mm	151.13 mm	214.63 mm	–	–	–	–