Technical Data for MCS-Series Mass Flow Controllers

0.5 SCCM full scale through 10,000 SLPM full scale

Controllers for flow rates over 6000 SLPM are compatible with hydrogen only.
Standard specifications. Consult Alicat for available options.

ALICAT SCIENTIFIC
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SENSOR AND CONTROL PERFORMANCE	
Mass flow accuracy[1]	**Standard accuracy:** ± 0.8% of reading and ± 0.2% of full scale **High accuracy (≥ 5 SCCM and ≤ 500 SLPM):** ± 0.4% of reading and ± 0.2% of full scale
Flow repeatability (2σ)	± 0.2% of full scale
Pressure accuracy[1]	± 0.5% of full scale
Steady state control range	1 – 100% of full scale (100:1 turndown ratio)
Operating pressure range	11.5 – 160 PSIA
Pressure sensitivity	**Mass flow zero shift and span shift:** ± (0.08% of reading + 0.02% of full scale) per atm from tare pressure
Temperature sensitivity	**Mass flow zero shift 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	**Flow rate dependent and user-adjustable. As fast as (T63):** **0.5 – 5 SCCM:** 100 – 4000 ms **10 SCCM – 20 SLPM:** 30 – 4000 ms **50 – 5000 SLPM:** 30 – 150 ms
Typical indication response time	**0.5 – 5 SCCM:** 100 – 4000 ms **10 SCCM – 20 SLPM:** < 10 ms **50 – 10,000 SLPM:** 65 – 255 ms
Typical warm-up time	< 1 s

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

MECHANICAL	
Wetted materials	316L, 303, 430FR stainless steel, FFKM standard, FKM or EPDM as needed for some gases. **MCRS and MCRHS:** Add 410 stainless steel
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	**MCS:** None **MCRS and MCRHS:** Rolamite valves must be upright.
Mounting holes	**0.5 – 50 SCCM:** 2× 8-32 UNC 0.175″ [4.45 mm] **100 SCCM – 20 SLPM:** 2× 8-32 UNC 0.350″ [8.89 mm] **50 – 1000 SLPM:** 4× 8-32 UNC 0.375″ [9.53 mm] **2000 – 3000 SLPM:** 4× 8-32 UNC 0.330″ [8.38 mm] **5000 – 10,000 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[2]	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	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 (contact Alicat for custom pinouts)
Power requirements[2]	**MCS:** 12 – 30 Vdc, 250 mA **MCRS:** 24 Vdc, 1 A **MCRHS:** 24 – 30 Vdc, 2 A Add 40 mA if equipped with 4 – 20 mA output

2 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
Gas Select™ [3]	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™ [3]	20 user definable gas mixes. Each mix may have up to 5 gases with 0.01% composition resolution.

3 Devices with a range of 6000 SLPM or greater are not equipped with Gas Select™ or COMPOSER™ and are only compatible with hydrogen.

RANGE-SPECIFIC TECHNICAL DATA			
Full scale flow	Type	Pressure drop at full scale when venting air to atmosphere	Default process connections[5]
0.5 SCCM	MCS	1.0 PSID	M5 female (10-32 compatible)[6]
1 – 5 SCCM	MCS	2.0 PSID	M5 female (10-32 compatible)[6]
10 SCCM	MCS	2.8 PSID	M5 female (10-32 compatible)[6]
50 SCCM	MCS	1.0 PSID	M5 female (10-32 compatible)[6]
100 – 500 SCCM	MCS	1.0 PSID	⅛″ NPT female
1 SLPM	MCS	1.5 PSID	⅛″ NPT female
2 SLPM	MCS	3.0 PSID	⅛″ NPT female
5 SLPM	MCS	2.0 PSID	⅛″ NPT female
10 SLPM	MCS	5.5 PSID	⅛″ NPT female
20 SLPM	MCS	20.0 PSID	⅛″ NPT female
50 – 100 SLPM	MCRS	2.5 PSID	¼″ NPT female
250 SLPM	MCRS	2.4 PSID	½″ NPT female
500 SLPM	MCRS	6.5 PSID	¾″ NPT female
1000 SLPM	MCRS	14.0 PSID	¾″ NPT female
2000 SLPM	MCRS	28.6 PSID	¾″ NPT female
3000 SLPM	MCRS	16.8 PSID	1¼″ NPT female
5000 SLPM	MCRHS	14.1 PSID	1½″ NPT female
10,000 SLPM (H_2 only)	MCRS	12.0 PSID[7]	1½″ NPT female

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

6 Shipped with 316SS M-5 (10-32) male FFKM O-ring face seal to ⅛″ NPT female fittings.

7 Pressure drop of 12.0 PSID is at full scale when venting hydrogen to atmosphere.

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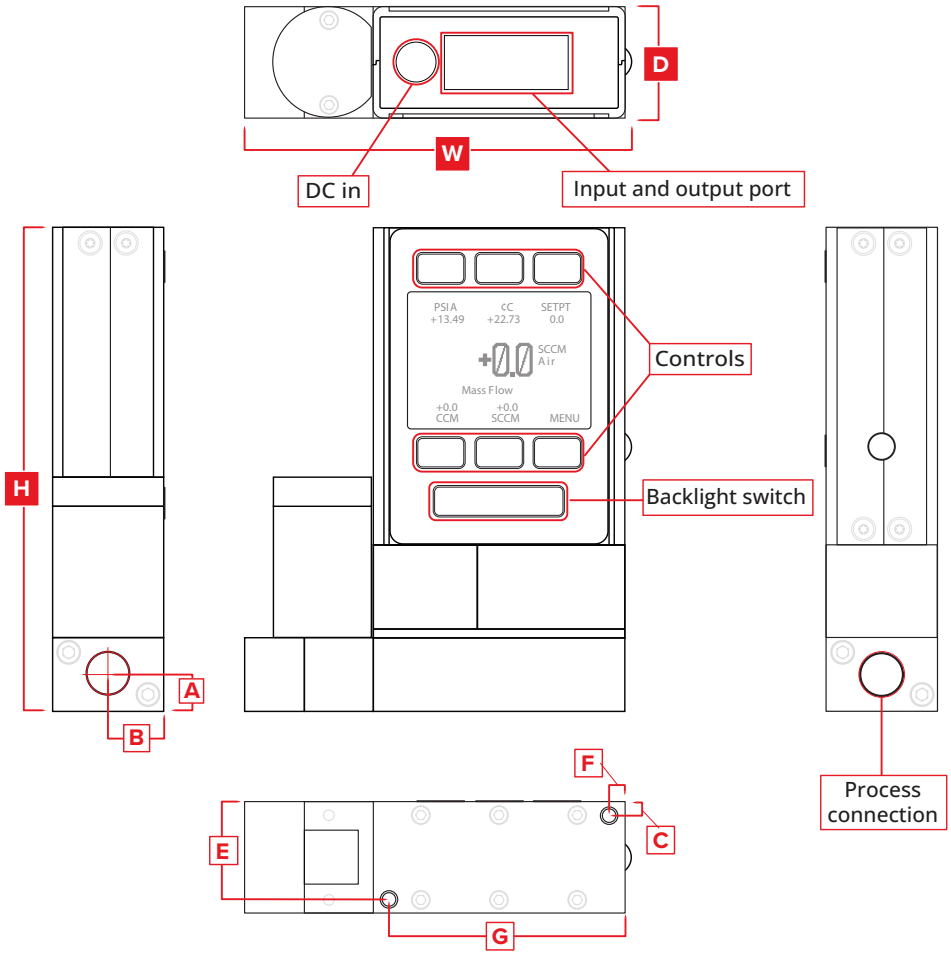
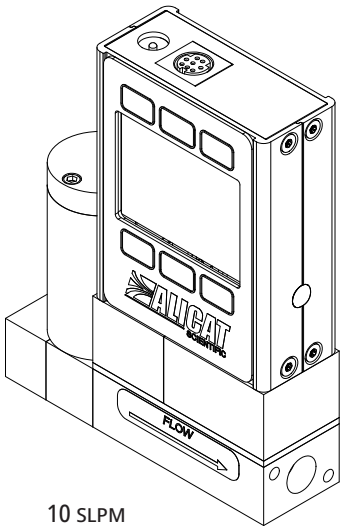


Representative Example



10 SLPM

DIMENSIONS											WEIGHT
Full scale flow	Type	Width	Depth	Height	A	B	C	E	F	G	
0.5 – 50 SCCM	MCS	3.34″	1.05″	4.40″	0.34″	0.53″	0.13″	0.93″	0.15″	2.23″	≈ 1.1 lb
		84.8 mm	26.7 mm	111.7 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	MCS	3.59″	1.05″	4.57″	0.35″	0.53″	0.13″	0.93″	0.15″	2.23″	≈ 1.2 lb
		91.1 mm	26.7 mm	116.0 mm	8.9 mm	13.3 mm	3.2 mm	23.5 mm	3.8 mm	56.5 mm	≈ 0.5 kg

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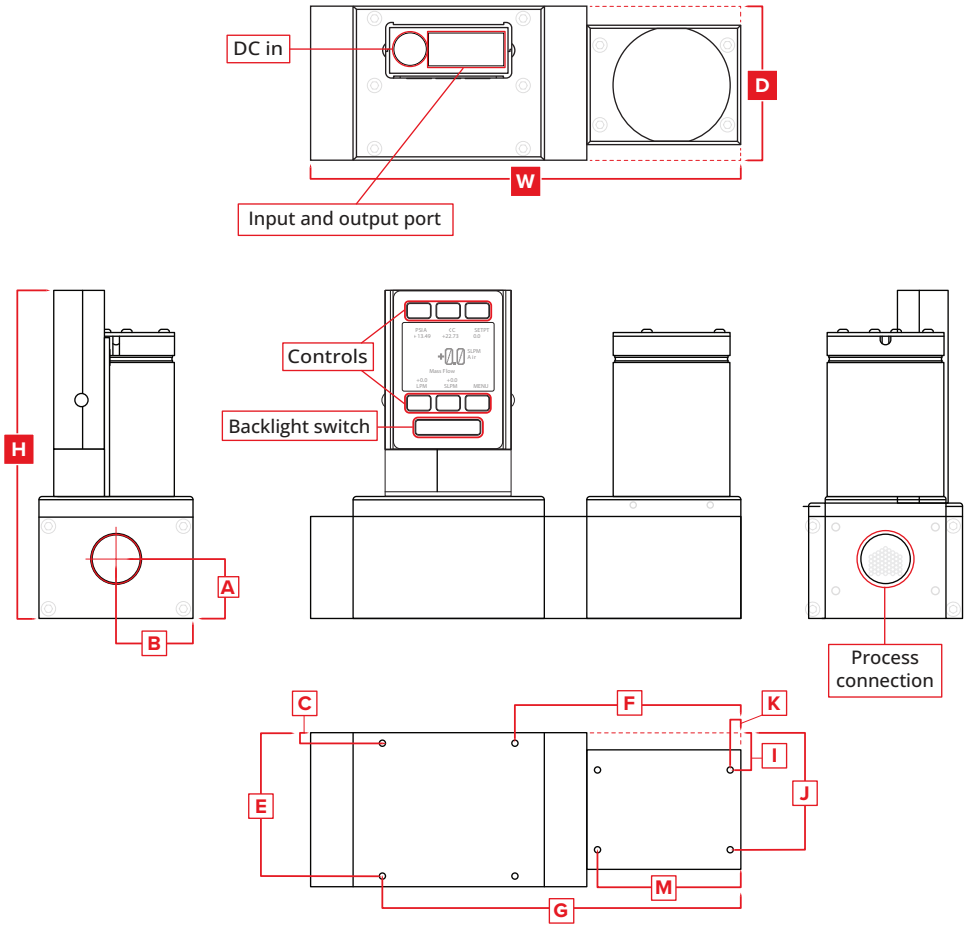
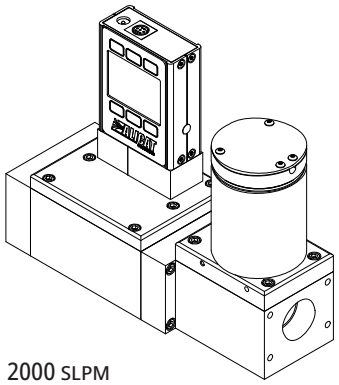
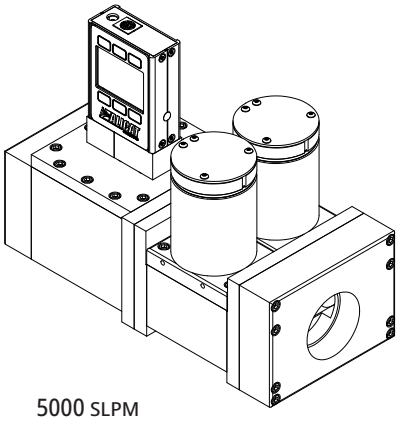


Representative Examples



2000 SLPM



5000 SLPM

DIMENSIONS															WEIGHT
Full scale flow	Type	Width	Depth	Height	A	B	C	E	F	G	I	J	K	M	
50 – 100 SLPM	MCRS	7.65″	2.25″	5.69″	1.12″	1.13″	0.38″	1.88″	4.58″	7.08″	—	—	—	—	≈ 9.0 lb
		194.3 mm	57.2 mm	144.4 mm	28.4 mm	28.6 mm	9.5 mm	47.6 mm	116.2 mm	179.7 mm	—	—	—	—	≈ 4.1 kg
250 SLPM	MCRS	7.65″	2.25″	5.99″	1.12″	1.13″	0.38″	1.88″	4.58″	7.08″	—	—	—	—	≈ 9.0 lb
		194.3 mm	57.2 mm	152.1 mm	28.4 mm	28.6 mm	9.5 mm	47.6 mm	116.2 mm	179.7 mm	—	—	—	—	≈ 4.1 kg
500 – 1000 SLPM	MCRS	7.28″	2.25″	5.99″	1.12″	1.13″	0.38″	1.88″	4.58″	7.08″	—	—	—	—	≈ 9.0 lb
		184.8 mm	57.2 mm	152.1 mm	28.4 mm	28.6 mm	9.5 mm	47.6 mm	116.2 mm	179.7 mm	—	—	—	—	≈ 4.1 kg
2000 SLPM	MCRS	8.10″	2.90″	5.99″	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	152.1 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	MCRS	8.90″	2.90″	5.99″	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	152.1 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	MCRHS	10.00″	4.50″	7.08″	1.45″	2.25″	0.63″	3.88″	5.95″	8.45″	—	—	—	—	≈ 28.0 lb
		254.0 mm	114.3 mm	179.9 mm	36.8 mm	57.2 mm	15.9 mm	98.4 mm	151.1 mm	214.6 mm	—	—	—	—	≈ 12.7 kg
10,000 SLPM (H_2 only)	MCRS	9.66″	6.33″	9.66″	1.45″	1.92″	0.30″	3.25″	1.55″	2.55″	1.50″	5.72″	3.00″	—	≈ 28.0 lb
		245.4 mm	160.8 mm	245.4 mm	36.8 mm	48.8 mm	7.5 mm	82.6 mm	39.4 mm	64.8 mm	38.1 mm	145.2 mm	76.2 mm	—	≈ 12.7 kg