

Technical Data for MS/MBS-Series Mass Flow Meters

0.5 sccm full scale through 10,000 SLPM full scale

Meters for flow rates over 6000 SLPM are compatible with hydrogen only.

Standard specifications. Consult Alicat for available options.



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SENSOR PERFORMANCE	
Mass flow accuracy ^{1,2}	Standard accuracy: $\pm 0.8\%$ of reading and $\pm 0.2\%$ of full scale High accuracy (≥ 5 sccm and ≤ 500 SLPM): $\pm 0.4\%$ of reading and $\pm 0.2\%$ of full scale
Flow repeatability (2σ)	$\pm 0.2\%$ of full scale
Pressure accuracy ¹	$\pm 0.5\%$ of full scale
Flow measurement 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: $\pm (0.08\%$ of reading + 0.02% of full scale) per atmosphere from calibration conditions
Temperature sensitivity	Mass flow zero shift and span shift: $\pm 0.02\%$ of full scale per °C from 25°C
Temperature accuracy	$\pm 0.75^\circ\text{C}$
Operating temperature range	-10 – 60°C (ambient and gas)
Totalizer volume uncertainty	$\pm 0.1\%$ of reading in additional uncertainty
Sensor response time	< 1 ms
Typical indication response time	Flow rate dependent and user-adjustable. As fast as (T63): 0.5 – 5 sccm: 100 – 4000 ms 10 sccm – 20 SLPM: < 10 ms 50 – 5000 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.

² When calculating accuracy for meters with bidirectional calibration, use total span (positive full scale to negative full scale) as full scale.

MECHANICAL	
Wetted materials	316L stainless steel, FFKM standard, FKM or EPDM as needed for some gases
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	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 output options ³	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 ⁴	40 Hz at 19200 baud
Analog output options	4 – 20 mA, 0 – 5 Vdc, 1 – 5 Vdc, 0 – 10 Vdc
Analog data update rate	1 kHz
Analog signal accuracy	$\pm 0.1\%$ of full scale additional uncertainty
Interactive display	Monochrome LCD or color TFT display with integrated touchpad; simultaneously displays mass flow, volumetric flow, temperature, and pressure
Display update rate	10 Hz
Electrical connection options ³	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 ^{3,4}	0 – 5 Vdc output: 9 – 24 Vdc, 40 mA 0 – 10 Vdc output: 12 – 28 Vdc, 40 mA 4 – 20 mA output: 12 – 28 Vdc, 80 mA

³ See Portable Devices table for MBS-Series specifications and options.

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
Gas Select™ 5	130 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™ 5	20 user definable gas mixes. Each mix may have up to 5 gases with 0.01% composition resolution.

5 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	Pressure drop at full scale when venting air to atmosphere	Default process connections ⁶
0.5 – 50 sccm	1.0 PSID	M5 female thread (10-32 compatible) ⁷
100 sccm – 20 SLPM	1.0 PSID	1/8" NPT female
50 SLPM	2.0 PSID	1/4" NPT female
100 SLPM	2.5 PSID	1/4" NPT female
250 SLPM	2.1 PSID	1/2" NPT female
500 SLPM	4.0 PSID	3/4" NPT female
1000 SLPM	6.0 PSID	3/4" NPT female
2000 SLPM	5.0 PSID	3/4" NPT female
3000 SLPM	7.1 PSID	1 1/4" NPT female
5000 SLPM	3.4 PSID	1 1/2" NPT female
10,000 SLPM (H ₂ only)	3.5 PSID ⁸	1 1/2" NPT female

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" NPT female fittings.

8 Pressure drop of 3.5 PSID is at full scale when venting hydrogen to atmosphere.

PORTABLE DEVICES (MBS-SERIES) ⁹	
Power requirements	5 Vdc, 1 A recommended via an outlet adapter to USB
Battery life	Monochrome screen: 18 hours, user-configurable, contrast dependent Color TFT screen: 8 hours, user-configurable, contrast dependent
Electrical connection and communication	Serial over Micro-USB Type B Optional: Bluetooth® Low Energy (requires the Alicat Connect app and a compatible Android or iOS mobile device)
Charging temperature	0 – 45°C
Dimensions	Portable devices (MBS-Series) add 1.646" [41.81 mm] to height, and 0.2 lb [90.72 g] to weight

9 More information about our MBS-Series portable anti-corrosive mass flow meters at alicat.com/mbs.

Technical Data for MS/MBS-Series Mass Flow Meters

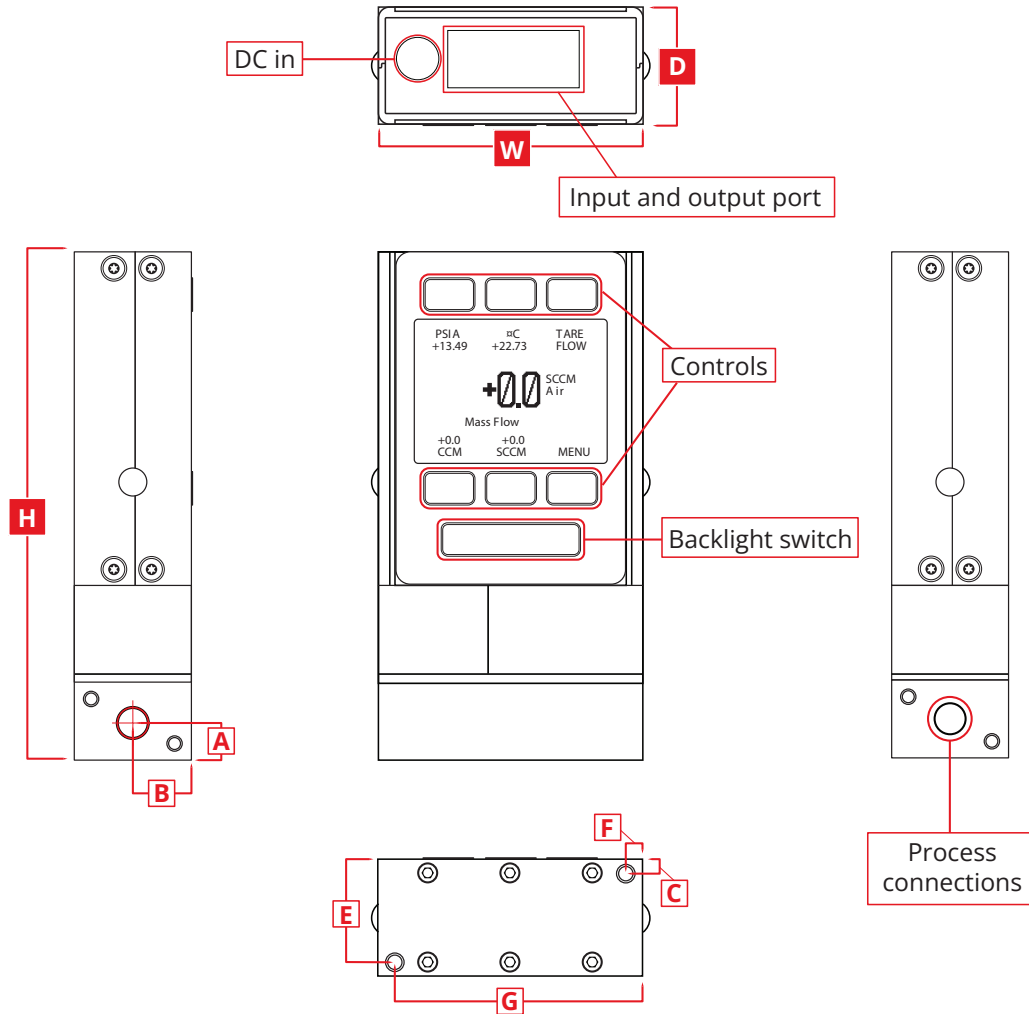
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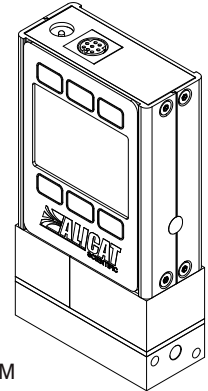
Standard specifications. Consult Alicat for available options.



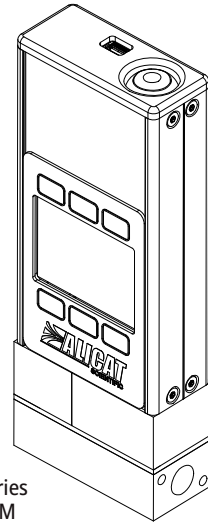
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Representative Examples



10 SCCM



MBS-Series
10 SLPM

DIMENSIONS ¹⁰										WEIGHT
Full scale flow	Width	Depth	Height	A	B	C	E	F	G	
0.5 – 50 sccm	2.38"	1.05"	4.40"	0.34"	0.53"	0.13"	0.93"	0.15"	2.23"	≈ 0.8 lb
	60.3 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	≈ 0.4 kg
100 SCCM – 20 SLPM	2.38"	1.05"	4.57"	0.35"	0.53"	0.13"	0.93"	0.15"	2.23"	≈ 1.0 lb
	60.3 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

¹⁰ Portable devices (MBS-Series) add 1.646" [41.81 mm] to height, and 0.2 lb. [90.72 g] to weight.

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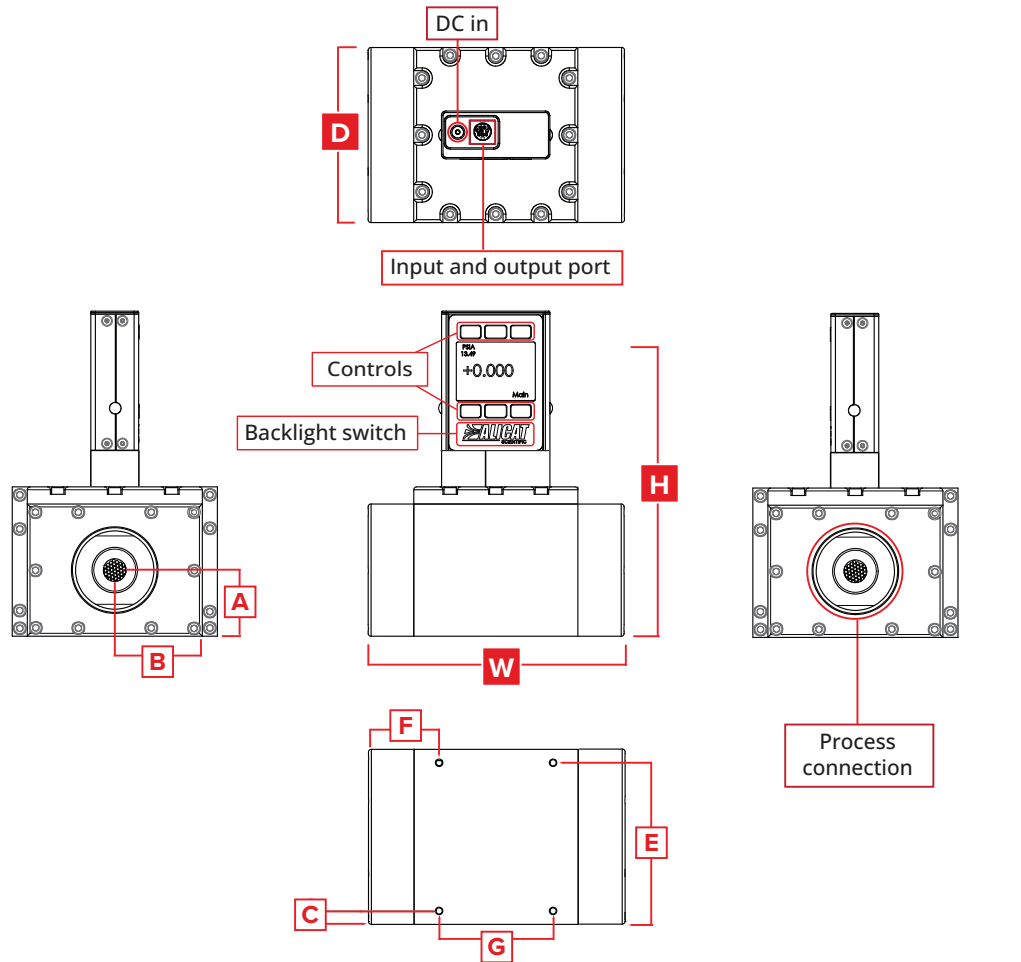
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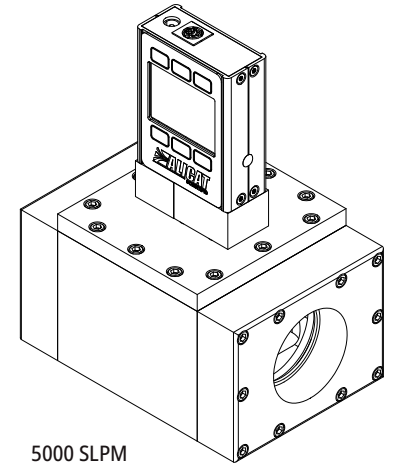
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Representative Example



DIMENSIONS ⁹										WEIGHT
Full scale flow	Width	Depth	Height	A	B	C	E	F	G	
50 – 100 SLPM	4.00"	1.60"	5.07"	0.50"	0.80"	0.18"	1.43"	0.75"	3.25"	≈ 2.8 lb
	101.6 mm	40.6 mm	128.7 mm	12.7 mm	20.3 mm	4.4 mm	36.2 mm	19.1 mm	82.6 mm	≈ 1.3 kg
250 SLPM	4.00"	1.60"	5.67"	0.80"	0.80"	0.18"	1.43"	0.75"	3.25"	≈ 3.5 lb
	101.6 mm	40.6 mm	143.9 mm	20.3 mm	20.3 mm	4.4 mm	36.2 mm	19.1 mm	82.6 mm	≈ 1.6 kg
500 – 1000 SLPM	4.00"	1.60"	5.67"	0.80"	0.80"	0.18"	1.43"	0.75"	3.25"	≈ 3.5 lb
	101.6 mm	40.6 mm	143.9 mm	20.3 mm	20.3 mm	4.4 mm	36.2 mm	19.1 mm	82.6 mm	≈ 1.6 kg
2000 – 3000 SLPM	5.20"	2.90"	5.99"	1.12"	1.45"	0.20"	2.70"	1.35"	3.85"	≈ 4.5 lb
	132.1 mm	73.7 mm	152.1 mm	28.4 mm	36.8 mm	5.1 mm	68.6 mm	34.3 mm	97.8 mm	≈ 2.0 kg
5000 SLPM	5.60"	3.84"	7.08"	1.45"	1.92"	0.30"	3.55"	1.55"	4.05"	≈ 14.0 lb
	142.2 mm	97.5 mm	179.9 mm	36.8 mm	48.8 mm	7.5 mm	90.0 mm	39.4 mm	102.9 mm	≈ 6.4 kg
10,000 SLPM (H ₂ only)	5.60"	3.84"	7.08"	1.45"	1.92"	0.30"	3.55"	1.55"	4.05"	≈ 14.0 lb
	142.2 mm	97.5 mm	179.9 mm	36.8 mm	48.8 mm	7.5 mm	90.0 mm	39.4 mm	102.9 mm	≈ 6.4 kg

⁹ Portable devices (MBS-Series) add 1.646" [41.81 mm] to height, and 0.2 lb. [90.72 g] to weight.