

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

10 sccm full scale through **20 SLPM** full scale

Standard specifications. Consult Alicat for available options.



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

CONTROL AND SENSOR PERFORMANCE	
Mass Flow Accuracy at Calibration Conditions ¹	±0.6% of reading or ±0.1% of full scale, whichever is greater
Repeatability	±0.1% of full scale
Steady State Control Range	0.5–100% of full scale
Valve Function	Normally Closed
Temperature Sensitivity	Mass flow zero shift: ±0.01% of full scale per °C from tare temperature, per atm Mass flow span shift: ±0.01% of reading per °C from 25°C, per atm
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
Temperature Accuracy	±0.75°C
Operating Pressure Full Scale	320 PSIA
Pressure Accuracy above 1 atm	±0.5% of reading
Pressure Accuracy below 1 atm	±0.07 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time	<10 ms, flow rate dependent
Typical Control Response Time	As fast as 100 ms (T ₆₃), flow rate dependent, user adjustable
Typical Warm-Up Time	<1 s

¹ Stated accuracy is after tare under equilibrium conditions, includes repeatability and linearity.

MECHANICAL	
Minimum Operating Pressure	11.5 PSIA common mode pressure (consult Alicat for lower operating pressures) Differential pressure must exceed model pressure drop, see below for details
Maximum Operating Pressure	Damage possible above 400 PSIA common mode pressure Damage possible above 75 PSI differential pressure
Ingress Protection	IP40 (consult Alicat for weatherproofing options)
Humidity Range	0–95%, non-condensing
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

CONTROL AND 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 ²	12–24 VDC, 250 mA Add 40 mA if equipped with 4–20 mA output
Serial Data Update Rate ²	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

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
Monochrome LCD or Color TFT Display with Integrated Touchpad	Simultaneously displays mass flow, volumetric flow, temperature, setpoint, 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% composition precision.

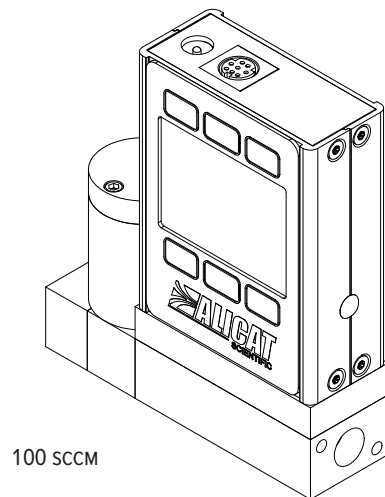
RANGE-SPECIFIC TECHNICAL DATA			
Full scale flow	Pressure drop at full scale flow ³	Process connections ⁴	Mount tap size
10 SCCM	2.8 PSID	M5 female (10-32 compatible) ⁵	2× 8-32 UNC 0.175 in [4.45 mm]
50 SCCM	1.0 PSID	M5 female (10-32 compatible) ⁵	2× 8-32 UNC 0.175 in [4.45 mm]
100–500 SCCM	1.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
1 SLPM	1.5 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
2 SLPM	3.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
5 SLPM	2.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
10 SLPM	5.5 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]
20 SLPM	20.0 PSID	1/8" NPT female	2× 8-32 UNC 0.175 in [4.45 mm]

3 Default valve venting air to atmosphere.

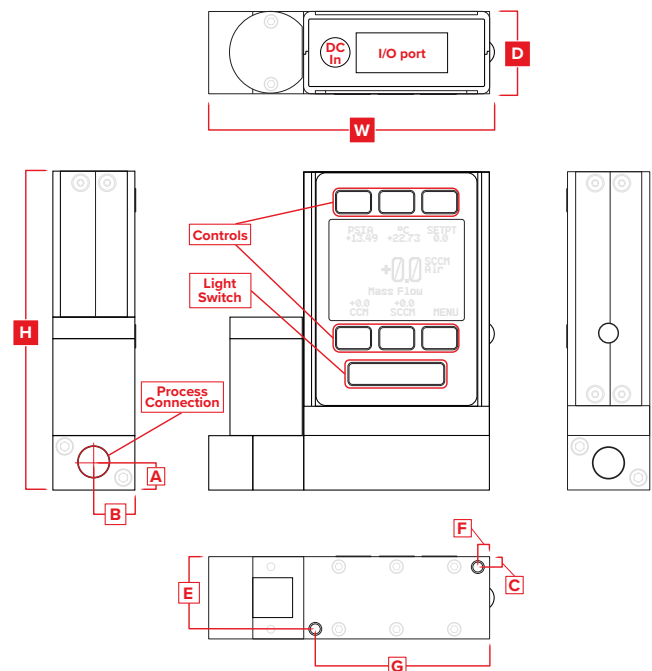
4 Consult Alicat for available process connection options, such as: compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).

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

Representative Example



100 SCCM



DIMENSIONS											WEIGHT
Full scale	Type	Height	Width	Depth	A	B	C	E	F	G	
10 SCCM–50 SCCM	MCQ	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	≈ 1.1 lb
		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	≈ 0.5 kg
100 SCCM–20 SLPM	MCQ	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	≈ 1.2 lb
		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	≈ 0.5 kg

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50 SLPM full scale through 12,000 SLPM full scale

Standard specifications. Consult Alicat for available options.

SENSOR AND CONTROL PERFORMANCE	
Mass flow accuracy ¹	± 2% of full scale
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	0.5 – 100% of full scale (200:1 turndown ratio)
Operating pressure	11.5 – 320 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 atmosphere from calibration conditions
Temperature sensitivity	Mass flow zero and span shift: ± 0.01% 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 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

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

MECHANICAL	
Wetted materials	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 400 PSIA common mode pressure.
Relative humidity range	0 – 95%, non-condensing
Ingress protection	IP40 (consult Alicat for weatherproofing options)
Mounting orientation sensitivity	Valves must be upright
Mounting holes	4-8× 8-32 UNC threaded ⌀ 0.330" [8.38 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, IO-Link
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
Power requirements ²	MCR (≤ 3000 SLPM): 24 Vdc, 1 A MCRH (dual Rolamite valves): 24 Vdc, 2 A MCR (> 5000 SLPM): 24 Vdc, 2.1 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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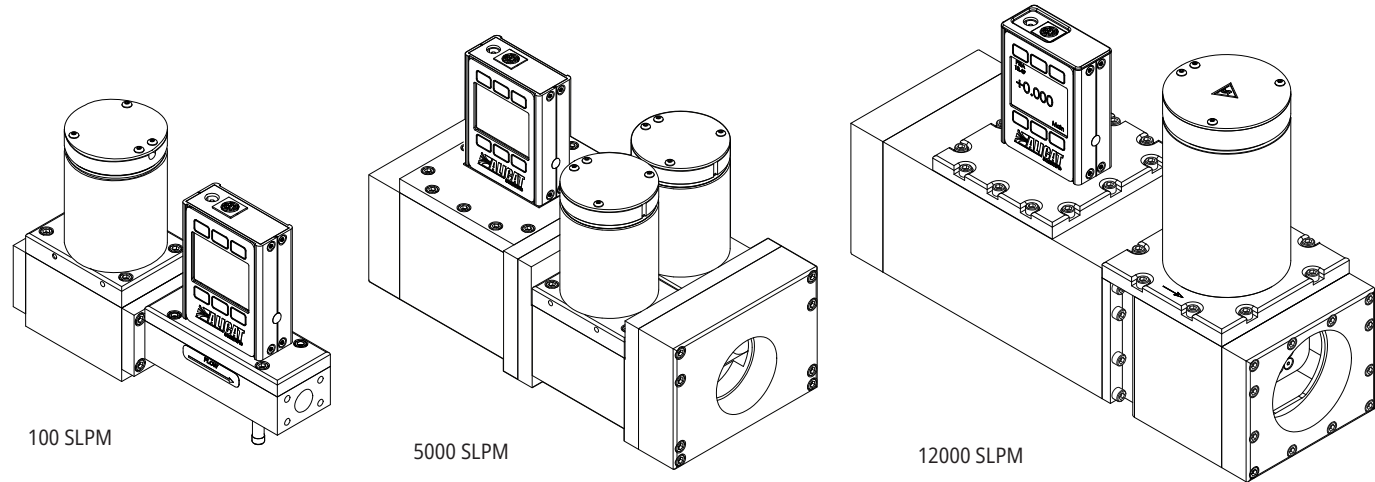
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FEATURES	
STP reference conditions	25°C and 1 atm (default), user-configurable
NTP reference conditions	0°C and 1 atm (default), user-configurable
Gas Select™	98 user-selectable gases stored internally. Each gas optimized to match NIST's REFPROP 10 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	Type	Pressure drop at full scale when venting air to atmosphere	Default process connections ³
50 SLPM	MCRQ	2.0 PSID	¼" NPT female
100 SLPM	MCRQ	3.2 PSID	¼" NPT female
250 SLPM	MCRQ	2.4 PSID	½" NPT female
500 SLPM	MCRQ	6.5 PSID	¾" NPT female
1000 SLPM	MCRQ	14.0 PSID	¾" NPT female
2000 SLPM	MCRQ	8.6 PSID	¾" NPT female
3000 SLPM	MCRQ	16.8 PSID	1¼" NPT female
5000 SLPM	MCRHQ	14.1 PSID	1½" NPT female
10,000 SLPM	MCRQ	57.0 PSID	2" NPT female
12,000 SLPM	MCRQ	72.0 PSID	2" NPT female

³ 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®).

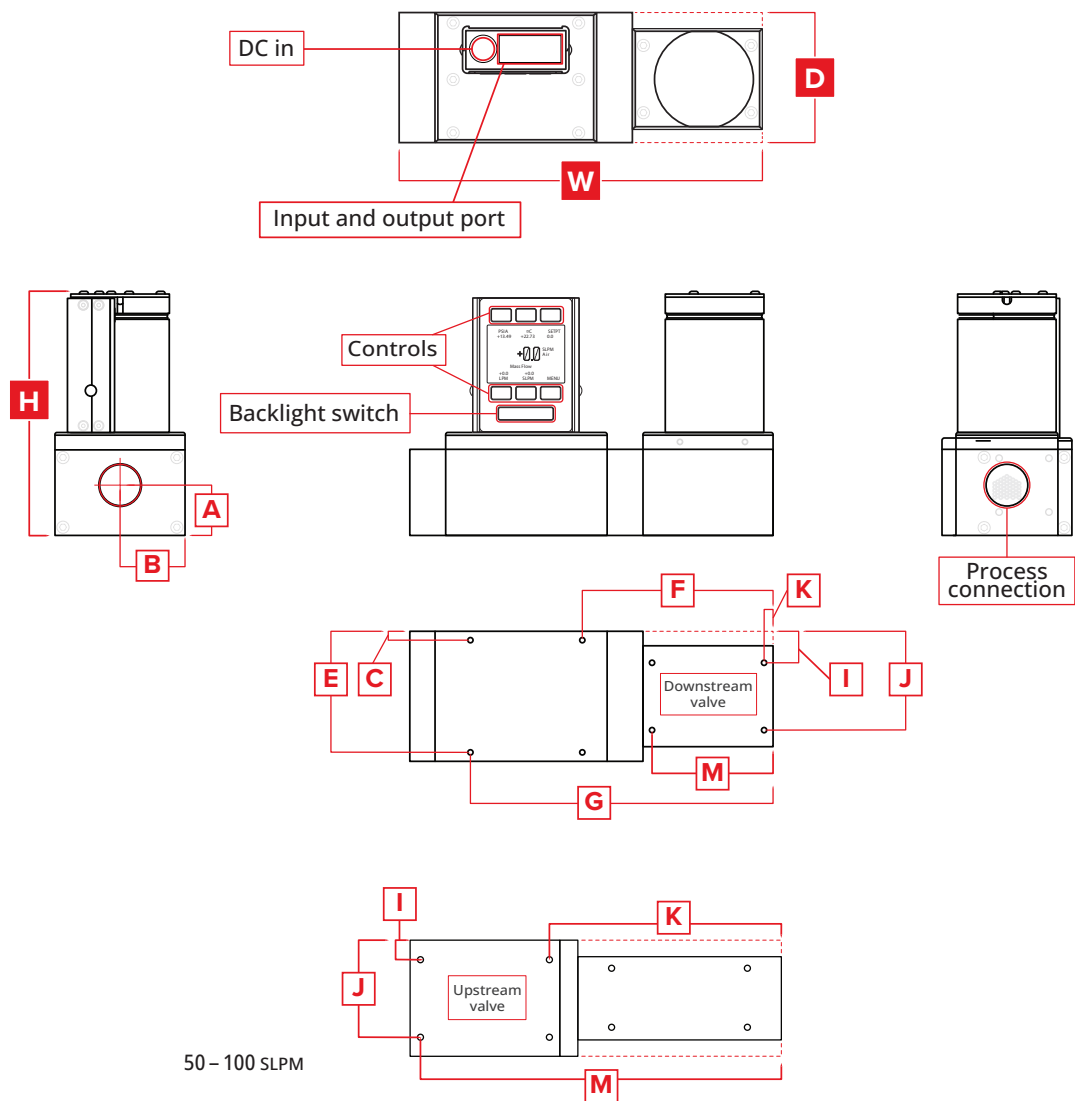
Representative Examples



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DIMENSIONS															WEIGHT
Full scale	Type	Width	Depth	Height	A	B	C	E	F	G	I	J	K	M	
50 – 100 SLPM	MCRQ	8.03"	2.25"	5.50"	1.12"	1.13"	—	—	—	—	0.38"	1.88"	4.95"	7.45"	≈ 9.0 lb
		204.0 mm	57.2 mm	139.7 mm	28.4 mm	28.6 mm	—	—	—	—	9.5 mm	47.6 mm	125.7 mm	189.2 mm	≈ 4.1 kg
250 SLPM	MCRQ	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	MCRQ	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	MCRQ	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	MCRQ	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	MCRHQ	10.00"	4.50"	6.33"	1.45"	2.25"	0.63"	3.88"	5.96"	8.46"	—	—	—	—	≈ 28.0 lb
		254.0 mm	114.3 mm	160.8 mm	36.8 mm	57.2 mm	16.0 mm	98.6 mm	151.3 mm	214.8 mm	—	—	—	—	≈ 12.7 kg
10,000 – 12,000 SLPM	MCRQ	12.00"	3.84"	7.96"	1.70"	1.92"	0.30"	3.55"	6.45"	8.95"	0.52"	3.32"	1.60"	3.60"	≈ 32.0 lb
		304.8 mm	97.5 mm	202.3 mm	43.2 mm	48.8 mm	7.5 mm	90.0 mm	163.8 mm	227.3 mm	13.2 mm	84.3 mm	40.6 mm	91.4 mm	≈ 14.5 kg