

Technical Data for Alicat **MC-Series** Mass Flow Controllers

0.5 SCCM full scale through 5 SCCM full scale

Standard Specifications (Consult Alicat for available options.)



Tel: 888-290-6060

www.alicat.com/mc

| SENSOR 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 Only available for ≥5 SCCM models |
| Repeatability (2σ) | ±(0.2% of reading + 0.02% of full scale) |
| Steady State Control Range ² | 0.01%–100% of full scale |
| Temperature Sensitivity | Mass flow zero and span shift: 0.02% of full scale per °C from 25°C |
| Pressure Sensitivity | Mass flow zero and span shift: ±(0.08% of reading + 0.02% of full scale) per atm 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 above 1 atm | ±0.5% of reading |
| Pressure Accuracy below 1 atm | ±0.07 PSIA |
| Totalizer Volume Uncertainty | ±0.5% of reading in addition to base accuracy (above) |
| Sensor Response Time | <1 ms |
| Typical Indication Response Time ³ | 100–1000 ms (flow rate dependent) |
| 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 | 0–95%, non-condensing |
| Wetted Materials | 302 / 303 / 304 / 430FR stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyamide, heat-cured epoxy, aluminum, gold, brass, silicon, glass |

| 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 ⁴ | 12–24 VDC, 250 mA (290 mA if equipped with 4–20 mA output) |
| Data Update Rate Serial ⁴ | 40 Hz at 19200 baud |
| Data Update Rate Analog ⁴ | 1 kHz |
| Display Update Rate | 10 Hz |
| Analog Signal Accuracy | ±0.1% of full scale additional uncertainty |
| Typical Control Response Time | 100–4000 ms to 63% of step change (T63), user adjustable |
| Valve Function | Normally Closed |

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

Technical Data for Alicat MC-Series Mass Flow Controllers

0.5 SCCM full scale through 5 SCCM full scale



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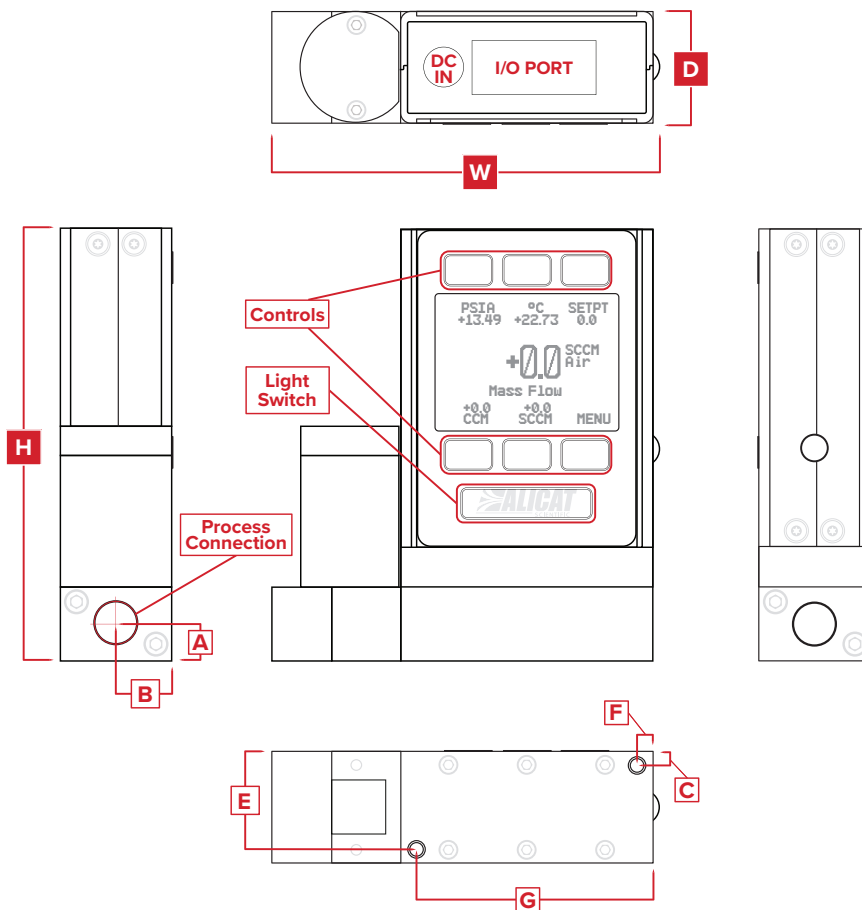
| FEATURES | |
|--|--|
| STP Reference Conditions | 25°C and 1 atm (default), user configurable |
| NTP Reference Conditions | 0°C and 1 atm (default), user configurable |
| Monochrome LCD or Color TFT Display with integrated touchpad | Simultaneously displays mass flow, volumetric flow, pressure, temperature, and setpoint |
| 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% precision. |

| RANGE-SPECIFIC TECHNICAL DATA | | | |
|-------------------------------|---|---|--------------------------------|
| Full scale flow | Pressure drop at full scale flow ⁵ | Process connections ⁶ | Mount tap size |
| 0.5 SCCM | 1.0 PSID | M5 female (10-32 compatible) ⁷ | 2× 8-32 UNC 0.175 in [4.45 mm] |
| 1 SCCM–5 SCCM | 2.0 PSID | M5 female (10-32 compatible) ⁷ | 2× 8-32 UNC 0.175 in [4.45 mm] |

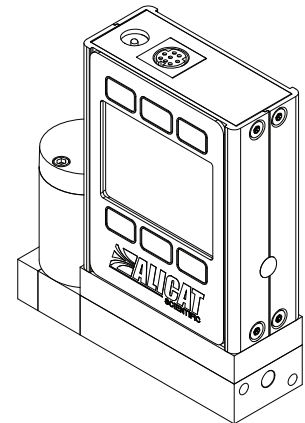
5 Default valve venting air to atmosphere. Lower pressure drops and other valves available, including our WHISPER-Series mass flow controllers at www.alicat.com/mcw.

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 Buna-N O-Ring face seal to 1/8" female NPT fittings.



Representative Example



0.5 SCCM

| DIMENSIONS | | | | | | | | | | |
|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Full scale flow | Weight | Height | Width | Depth | A | B | C | E | F | G |
| 0.5–5 SCCM | ≈ 1.1 lb | 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 |
| | ≈ 0.5 kg | 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 |

Technical Data for Alicat MC-Series Mass Flow Controllers

10 SCCM full scale through 20 SLPM full scale

Standard Specifications (Consult Alicat for available options.)



Tel: 888-290-6060

www.alicat.com/mc

| SENSOR PERFORMANCE | |
|---|---|
| Mass Flow Accuracy at calibration conditions ¹ | ±0.6% of reading or ±0.1% of full scale, whichever is greater |
| High Accuracy Option ¹ | ±0.5% of reading or ±0.1% of full scale, whichever is greater |
| Repeatability (2σ) | ±(0.1% of reading + 0.02% of full scale) |
| Steady State Control Range ² | 0.01%–100% of full scale |
| 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 |
| 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 |
| 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 above 1 atm | ±0.5% of reading |
| Pressure Accuracy below 1 atm | ±0.07 PSIA |
| Totalizer Volume Uncertainty | ±0.5% of reading in addition to base accuracy (above) |
| Sensor Response Time | <1 ms |
| Typical Indication Response Time ³ | < 10 ms (flow rate dependent) |
| 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 (consult Alicat for lower operating pressures). 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 | 0–95%, non-condensing |
| Wetted Materials | 302 / 303 / 304 / 430FR stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyamide, heat-cured epoxy, aluminum, gold, brass, silicon, glass |

| 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 ⁴ | 12–24 VDC, 250 mA (290 mA if equipped with 4–20 mA output) |
| Data Update Rate Serial ⁴ | 40 Hz at 19200 baud |
| Data Update Rate Analog ⁴ | 1 kHz |
| Display Update Rate | 10 Hz |
| Analog Signal Accuracy | ±0.1% of full scale additional uncertainty |
| Typical Control Response Time | 30 ms to 63% of step change (T63), user adjustable |
| Valve Function | Normally Closed |

⁴ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

Technical Data for Alicat **MC-Series** Mass Flow Controllers

10 SCCM full scale through 20 SLPM full scale



Tel: 888-290-6060
www.alicat.com/mc

| 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, pressure, temperature, and setpoint |
| 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% precision. |

| RANGE-SPECIFIC TECHNICAL DATA | | | |
|-------------------------------|---|---|--------------------------------|
| Full scale flow | Pressure drop at full scale flow ⁵ | Process connections ⁶ | Mount tap size |
| 10 SCCM | 2.8 PSID | M5 female (10-32 compatible) ⁷ | 2× 8-32 UNC 0.175 in [4.45 mm] |
| 50 SCCM | 1.0 PSID | M5 female (10-32 compatible) ⁷ | 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] |

5 Default valve venting air to atmosphere. Lower pressure drops and other valves available, including our WHISPER-Series mass flow controllers at www.alicat.com/mcw.

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).

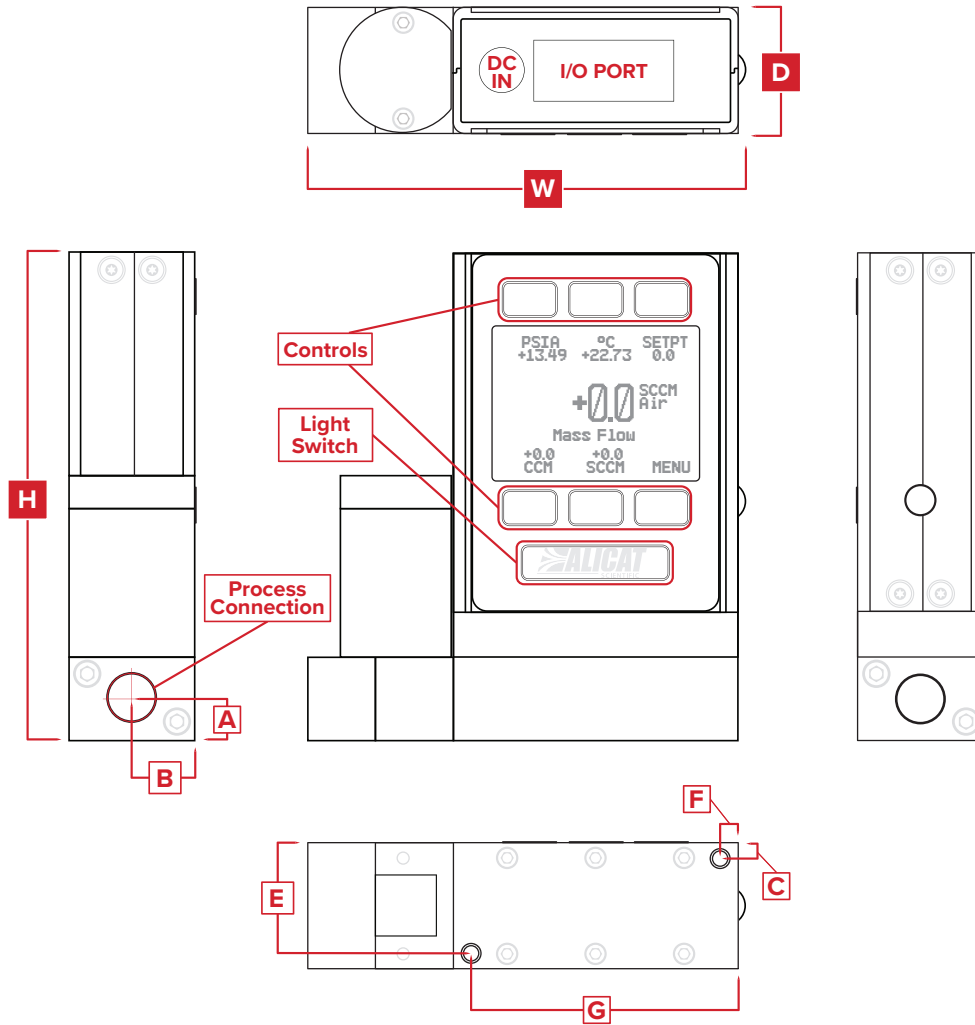
7 Shipped with Buna-N O-Ring face seal to 1/8" female NPT fittings.

Technical Data for Alicat **MC-Series** Mass Flow Controllers

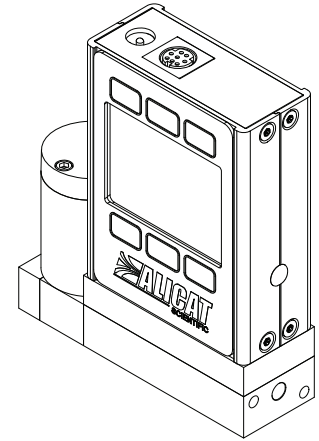
10 SCCM full scale through 20 SLPM full scale



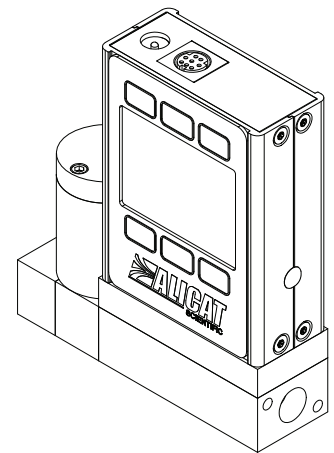
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www.alicat.com/mc



Representative Example



10 SCCM



20 SLPM

| DIMENSIONS | | | | | | | | | | |
|------------------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Full scale flow | Weight | Height | Width | Depth | A | B | C | E | F | G |
| 10–50 SCCM | ≈ 1.1 lb | 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 |
| | ≈ 0.5 kg | 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 |
| 100 SCCM–20 SLPM | ≈ 1.2 lb | 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 |
| | ≈ 0.5 kg | 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 |

Technical Data for Alicat **MC-Series** Mass Flow Controllers

50 SLPM full scale through 5000 SLPM full scale

Standard Specifications (Consult Alicat for available options.)



Tel: 888-290-6060

www.alicat.com/mc

| SENSOR 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 High accuracy option available for ≤500 SLPM models |
| Repeatability (2σ) | ±(0.2% of reading + 0.02% of full scale) |
| Steady State Control Range ² | 0.01%–100% of full scale |
| Temperature Sensitivity | Mass flow zero and span shift: 0.02% of full scale per °C from 25°C |
| Pressure Sensitivity | Mass flow zero and span shift: ±(0.08% of reading + 0.02% of full scale) per atm 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 above 1 atm | ±0.5% of reading |
| Pressure Accuracy below 1 atm | ±0.07 PSIA |
| Totalizer Volume Uncertainty | ±0.5% of reading in addition to base accuracy (above) |
| Sensor Response Time | <1 ms |
| Typical Indication Response Time ³ | 65–255 ms (flow rate dependent) |
| 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 (consult Alicat for lower operating pressures). 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 | 0–95%, non-condensing |
| Wetted Materials | 302 / 303 / 304 stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyamide, heat-cured epoxy, aluminum, gold, brass, silicon, glass. MCP: Add 430FR stainless steel. MCR/MCRH: Add 410 stainless steel. |

Technical Data for Alicat **MC-Series** Mass Flow Controllers

50 SLPM full scale through 5000 SLPM full scale



Tel: 888-290-6060
www.alicat.com/mc

| 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 ⁴ | MCP (miniature valve): 12–24 VDC, 250 mA MCR (Rolamite valve): 24 VDC, 1 A MCRH (dual Rolamite valves): 24–30 VDC, 2 A Add 40 mA if equipped with 4–20 mA output |
| Data Update Rate Serial ⁴ | 40 Hz at 19200 baud |
| Data Update Rate Analog ⁴ | 1 kHz |
| Display Update Rate | 10 Hz |
| Analog Signal Accuracy | ±0.1% of full scale additional uncertainty |
| Typical Control Response Time | 150 ms to 63% of step change (T63), user adjustable |
| Valve Function | Normally Closed |

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, pressure, temperature, and setpoint |
| 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% precision. |

| RANGE-SPECIFIC TECHNICAL DATA | | | | |
|-------------------------------|------|---|---|--------------------------------|
| Full scale flow | Type | Pressure drop at full scale flow ⁵ | Process connections ⁶ | Mount tap size |
| 50 SLPM | MCP | 5.0 PSID | ¼" NPT female | 4× 8-32 UNC 0.375 in [9.53 mm] |
| 100 SLPM | MCP | 15.5 PSID | ¼" NPT female | 4× 8-32 UNC 0.375 in [9.53 mm] |
| 250 SLPM | MCR | 2.4 PSID | ½" NPT female | 4× 8-32 UNC 0.328 in [8.33 mm] |
| 500 SLPM | MCR | 6.5 PSID | ¾" NPT female | 4× 8-32 UNC 0.328 in [8.33 mm] |
| 1000 SLPM | MCR | 14.0 PSID | ¾" NPT female | 4× 8-32 UNC 0.328 in [8.33 mm] |
| 1500 SLPM | MCR | 17.0 PSID | ¾" NPT female | 4× 8-32 UNC 0.328 in [8.33 mm] |
| 2000 SLPM | MCR | 28.6 PSID | ¾" NPT female (1¼" NPT connection available) | 4× 8-32 UNC 0.330 in [8.38 mm] |
| 3000 SLPM | MCR | 16.8 PSID | 1¼" NPT female | 4× 8-32 UNC 0.330 in [8.38 mm] |
| 5000 SLPM | MCRH | 14.1 PSID | 2" NPT female | 4× 8-32 UNC 0.300 in [7.62 mm] |

⁵ Default valve venting air to atmosphere. Lower pressure drops and other valves available, including our WHISPER-Series mass flow controllers at www.alicat.com/mcw.

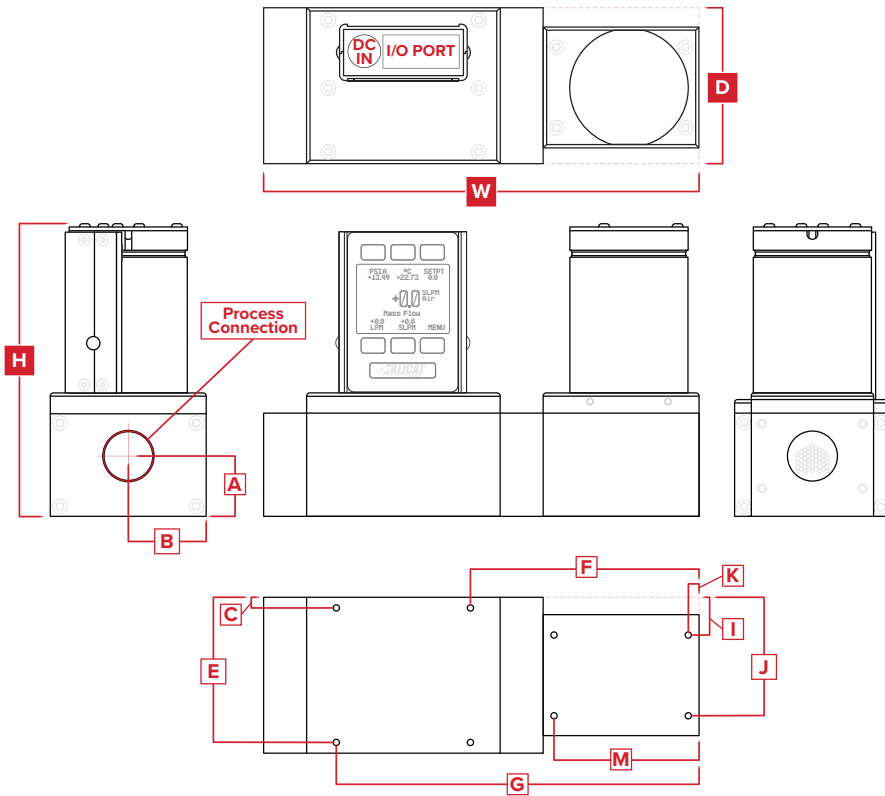
⁶ Consult Alicat for available process connection options, such as: compression, face seal, push-to-connect, BSPP, SAE, or Swagelok (including tube, VCO, and VCR).

Technical Data for Alicat MC-Series Mass Flow Controllers

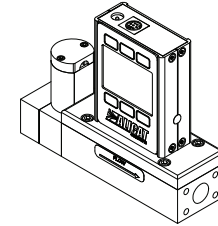
50 SLPM full scale through 5000 SLPM full scale



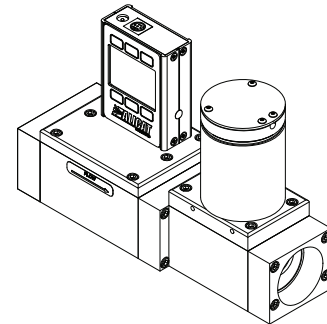
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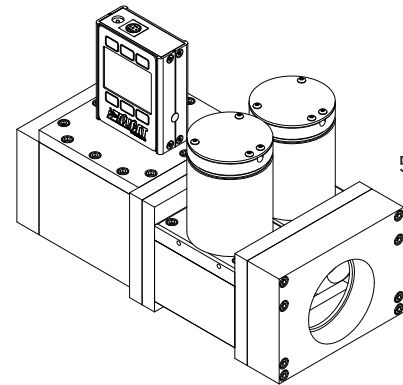
Representative Examples



100 SLPM



2000 SLPM



5000 SLPM

| DIMENSIONS | | | | | | | | | | | | | | | |
|------------------|------|-----------|-----------|-----------|----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|----------|
| Full scale | Type | Weight | Height | Width | Depth | A | B | C | E | F | G | I | J | K | M |
| 50–100 SLPM | MCP | ≈ 9.0 lb | 4.367 in | 5.408 in | 1.600 in | 0.500 in | 0.800 in | 0.175 in | 1.425 in | 0.750 in | 3.250 in | — | — | — | — |
| | | ≈ 4.1 kg | 110.92 mm | 137.36 mm | 40.64 mm | 12.70 mm | 20.32 mm | 4.45 mm | 36.20 mm | 19.05 mm | 82.55 mm | — | — | — | — |
| 250 SLPM | MCR | ≈ 9.0 lb | 5.495 in | 7.650 in | 2.250 in | 1.120 in | 1.125 in | 0.175 in | 1.425 in | 4.400 in | 6.900 in | 0.375 in | 1.875 in | 0.575 in | 3.075 in |
| | | ≈ 4.1 kg | 139.57 mm | 194.31 mm | 57.15 mm | 28.45 mm | 28.58 mm | 4.45 mm | 36.20 mm | 111.76 mm | 175.26 mm | 9.53 mm | 47.63 mm | 14.61 mm | 78.11 mm |
| 500–1000 SLPM | MCR | ≈ 9.0 lb | 5.495 in | 7.275 in | 2.250 in | 1.120 in | 1.125 in | 0.175 in | 1.425 in | 4.025 in | 6.525 in | 0.375 in | 1.875 in | 0.200 in | 2.700 in |
| | | ≈ 4.1 kg | 139.57 mm | 184.79 mm | 57.15 mm | 28.45 mm | 28.58 mm | 4.45 mm | 36.20 mm | 102.24 mm | 165.74 mm | 9.53 mm | 47.63 mm | 5.08 mm | 68.58 mm |
| 2000 SLPM | MCR | ≈ 12.0 lb | 5.495 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 | 139.57 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 | MCR | ≈ 12.0 lb | 5.495 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 | 139.57 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 | MCRH | ≈ 28.0 lb | 6.267 in | 9.800 in | 3.840 in | 1.450 in | 1.920 in | 0.295 in | 3.545 in | 5.958 in | 8.455 in | — | — | — | — |
| | | ≈ 12.7 kg | 159.18 mm | 248.92 mm | 97.54 mm | 36.83 mm | 48.77 mm | 7.49 mm | 90.04 mm | 151.32 mm | 214.76 mm | — | — | — | — |