



Mass Flow Meter / Controller

Differential pressure-based measurement and control of gas flows

*NIST-traceable accuracy
up to $\pm 0.5\%$ of reading*

*No warm-up
required*

*98+ pre-loaded gas
calibrations*

*5 millisecond
response times*



Mass Flow Meter 0.5 SCCM full scale to 5 SCCM full scale
Mass Flow Meter 10 SCCM full scale to 20 SLPM full scale
Mass Flow Meter 50 SLPM full scale to 10 000 SLPM full scale
Mass Flow Controller 0.5 SCCM full scale to 5 SCCM full scale
Mass Flow Controller 10 SCCM full scale to 20 SLPM full scale
Mass Flow Controller 50 SLPM full scale to 10 000 SLPM full scale

Page 3-4
Page 5-6
Page 7-9
Page 10-11
Page 12-13
Page 14-16

Quick Specifications:

Mass Flow Ranges:

0.5 SCCM–5000 SLPM

Accuracy:

Standard: $\pm 0.6\%$ of reading

High: $\pm 0.5\%$ of reading

Measurement Range:

0.01–100% of full scale

Response Time:

10 ms measurement response;

30 ms control response

Multi-gas Calibration:

98+ pre-loaded gases

Repeatability:

Greater of $\pm 0.1\%$ of reading or

$\pm 0.02\%$ of full scale

Communications:

Analog, RS–232, RS–485,

DeviceNet, EtherCAT, EtherNet/IP,

TCP/IP, Modbus RTU, PROFIBUS,

PROFINET



M/MC Meter or Controller

High-accuracy, multivariate flow measurement or control in real time.



MW/MCW Low Pressure Drop

Measure flow readings near atmospheric pressure with pressure drops as low as 0.07 PSID (4.8 mbarD).



MB Portable Meter

Easily verify flow anywhere with an 18 hour rechargeable battery and an intuitive interface.

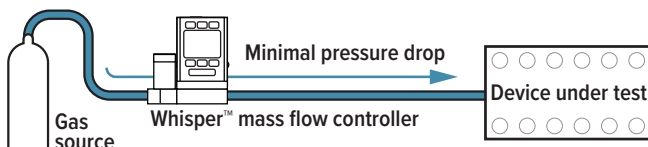


MCV Vacuum Control

Protect your vacuum process with a pneumatic shutoff valve on a controller built for flow or pressure control.

Fast and Accurate Leak Testing

A single Whisper multivariate controller is able to maintain a constant pressure in the device under test (DUT) while providing accurate, real-time mass and volumetric flow readings. When the DUT is subjected to a constant pressure within the closed system, any resulting flow is a direct measure of the DUT's leakage.



Easy Verification and Calibration

Quickly integrate an Alicat into test stands for fast and accurate verification without any warm-up time. For in-field calibrations, a portable, battery-powered flow meter can be easily added into a flow line at any point for rapid system verification.



Technical Data for M/MB-Series Mass Flow Meters

0.5 SCCM full scale through 5 SCCM full scale

Standard specifications. Consult Alicat for available options.

SENSOR PERFORMANCE

| | |
|----------------------------------|---|
| Mass flow accuracy ¹ | Standard accuracy: $\pm(0.8\%$ of reading + 0.2% of full scale) High-accuracy option (5 SCCM models): $\pm(0.4\%$ of reading + 0.2% of full scale) |
| Repeatability (2 σ) | $\pm(0.2\%$ of reading + 0.02% of full scale) |
| Pressure accuracy ¹ | Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: ± 0.07 PSIA |
| Flow measurement range | 0.01–100% of full scale (10,000:1 turndown ratio) |
| Operating pressure | 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: 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 additional uncertainty |
| Sensor response time | <1 ms |
| Typical indication response time | <10 ms, flow rate dependent |
| Typical warm-up time | <1 s |

MECHANICAL

| | |
|----------------------------------|--|
| Process connections ² | M5 female (10-32 compatible), shipped with Buna-N O-ring face seal to 1/8" NPT female fittings |
| Wetted materials | 302, 303, 304, and 316L stainless steel; FKM, alumina ceramic, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon |
| 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 | 2× 8-32 UNC threaded $\downarrow 0.175"$ [4.45 mm] |

POWER AND COMMUNICATION

| | |
|--|--|
| Digital 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 | 40 Hz at 19200 baud |
| Analog output options ³ | 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 | 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, 40 mA |

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

² Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).

³ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

Technical Data for M/MB-Series Mass Flow Meters

0.5 SCCM full scale through 5 SCCM full scale

Standard specifications. Consult Alicat for available options.

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. |

FLOW AND PROCESS DATA

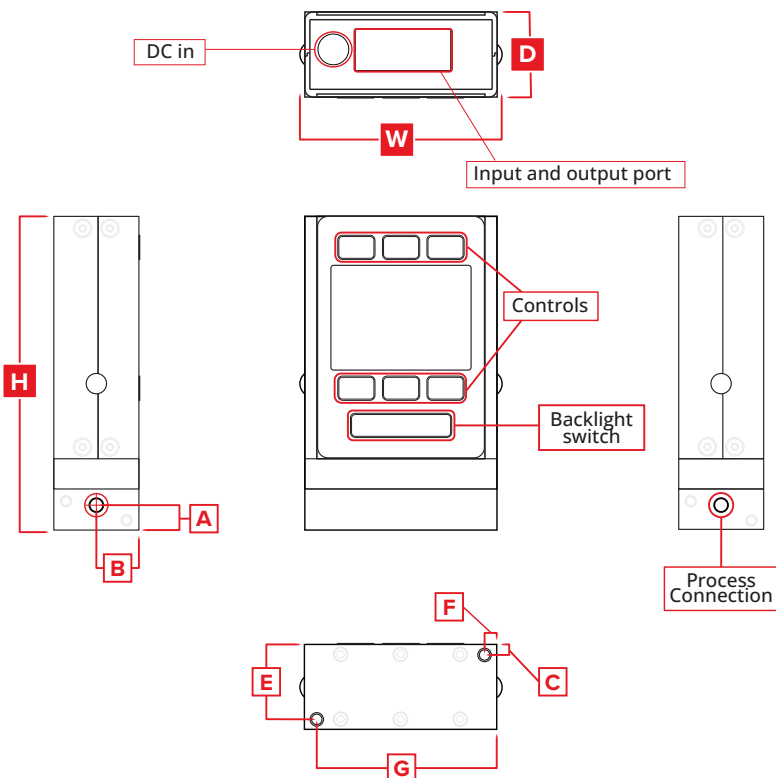
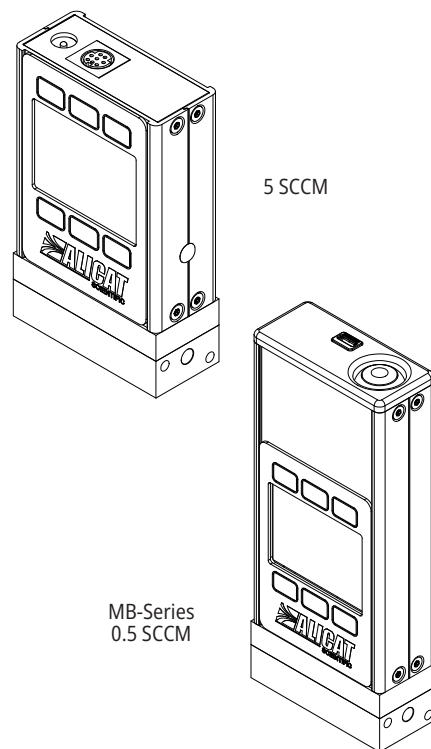
| | |
|-----------------|---|
| Full scale flow | Pressure drop at full scale flow venting to atmosphere ⁴ |
| 0.5 – 5 SCCM | 1.0 PSID |

PORTABLE DEVICES (MB SERIES)

| | |
|------------------------|--|
| 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 connections | Serial communication and power over Micro-USB Bluetooth® Low Energy (requires the Alicat Connect app and a compatible Android or iOS mobile device) |
| Charging temperature | 0–45°C |
| Dimensions | Add 1.646" [41.81 mm] to height, and 0.2 lb. [90.72 g] to weight |

⁴ Lower pressure drops available, including the WHISPER™ series mass flow meters at alicat.com/mw.

Representative Examples



DIMENSIONS

| Full scale flow | Height | Width | Depth | A | B | C | E | F | G | WEIGHT |
|-----------------|---------|---------|---------|--------|---------|--------|---------|--------|---------|----------|
| 0.5–5 SCCM | 3.90" | 2.38" | 1.05" | 0.34" | 0.53" | 0.13" | 0.93" | 0.15" | 2.23" | ≈ 0.8 lb |
| | 99.0 mm | 60.3 mm | 26.7 mm | 8.5 mm | 13.3 mm | 3.2 mm | 23.5 mm | 3.8 mm | 56.5 mm | ≈ 0.4 kg |

Technical Data for M/MB-Series Mass Flow Meters

10 SCCM full scale through 20 SLPM full scale

Standard specifications. Consult Alicat for available options.

| SENSOR PERFORMANCE | |
|----------------------------------|---|
| Mass flow accuracy ¹ | Standard accuracy: $\pm 0.6\%$ of reading or $\pm 0.1\%$ of full scale, whichever is greater High-accuracy option: $\pm 0.5\%$ of reading or $\pm 0.1\%$ of full scale, whichever is greater |
| Repeatability (2 σ) | $\pm (0.1\% \text{ of reading} + 0.02\% \text{ of full scale})$ |
| Pressure accuracy ¹ | Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: ± 0.07 PSIA |
| Flow measurement range | 0.01–100% of full scale (10,000:1 turndown ratio) |
| Operating pressure | 11.5–160 PSIA |
| Pressure sensitivity | Mass flow zero shift: $\pm 0.01\%$ of full scale per atm from tare pressure Mass flow span shift: $\pm 0.1\%$ of reading per atmosphere from calibration conditions |
| Temperature sensitivity | Mass flow zero shift: $\pm 0.01\%$ of full scale per °C from tare temperature Mass flow span shift: $\pm 0.01\%$ of reading 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 additional uncertainty |
| Sensor response time | <1 ms |
| Typical indication response time | <10 ms, flow rate dependent |
| Typical warm-up time | <1 s |

| MECHANICAL | |
|----------------------------------|--|
| Process connections ² | 10 – 50 SCCM: M5 female (10-32 compatible), shipped with Buna-N O-ring face seal to 1/8" NPT female fittings 100SCCM – 20 SLPM: 1/8" NPT female |
| Wetted materials | 302, 303, 304, and 316L stainless steel; FKM, alumina ceramic, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon |
| 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 | 10 – 50 SCCM: 2× 8-32 UNC threaded $\nabla 0.175''$ [4.45 mm] 100 SCCM – 20 SLPM: 2× 8-32 UNC threaded $\nabla 0.350''$ [8.89 mm] |

| POWER AND COMMUNICATION | |
|------------------------------------|--|
| Digital 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 | 40 Hz at 19200 baud |
| Analog output options ³ | 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 | 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 | 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, 40 mA |

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

² Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).

³ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

Technical Data for M/MB-Series Mass Flow Meters

10 SCCM full scale through 20 SLPM full scale

Standard specifications. Consult Alicat for available options.

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. |

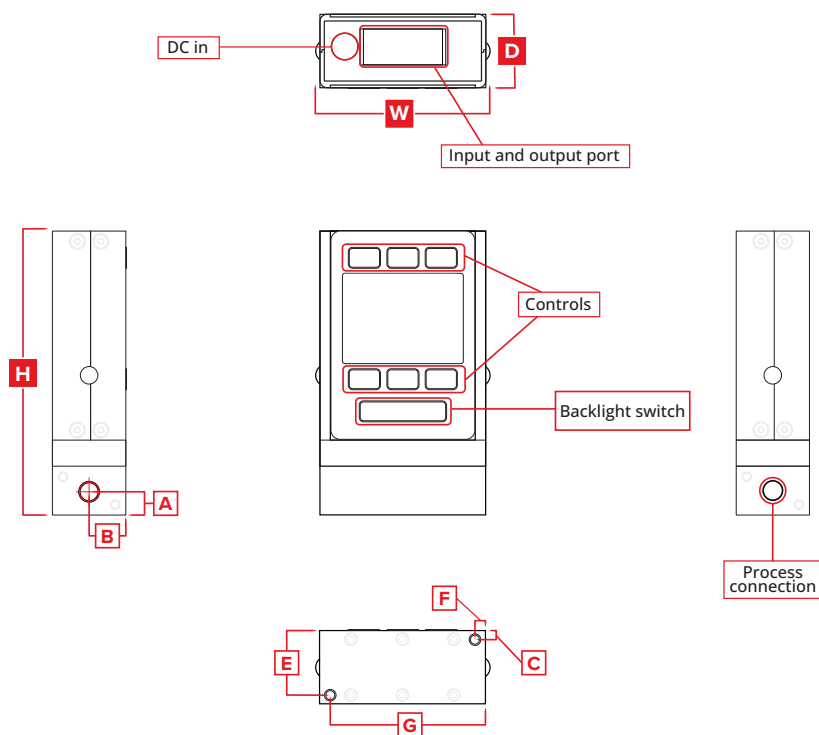
RANGE-SPECIFIC TECHNICAL DATA

| | |
|-------------------|---|
| Full scale flow | Pressure drop at full scale flow venting to atmosphere ⁴ |
| 10 SCCM – 20 SLPM | 1.0 PSID |

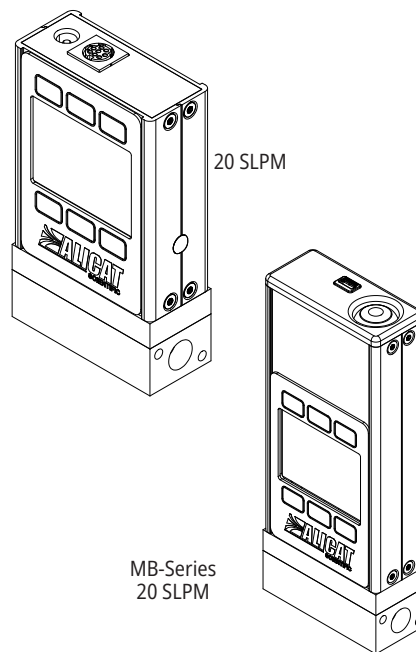
PORTABLE DEVICES (MB SERIES)

| | |
|-----------------------|--|
| 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 | Serial over Micro-USB Type B Bluetooth® Low Energy (requires the Alicat Connect app and a compatible Android or iOS mobile device) |
| Charging temperature | 0–45°C |
| Dimensions | Add 1.646" [41.81 mm] to height, and 0.2 lb. [90.72 g] to weight |

⁴ Lower pressure drops available, including the WHISPER™ series mass meters at alicat.com/mw.



Representative Examples



DIMENSIONS

| Full scale flow | DIMENSIONS | | | | | | | | | WEIGHT |
|------------------|------------|---------|---------|--------|---------|--------|---------|--------|---------|----------|
| | Height | Width | Depth | A | B | C | E | F | G | |
| 10–50 SCCM | 3.90" | 2.38" | 1.05" | 0.34" | 0.53" | 0.13" | 0.93" | 0.15" | 2.23" | ≈ 0.8 lb |
| | 99.0 mm | 60.3 mm | 26.7 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 | 4.07" | 2.38" | 1.05" | 0.35" | 0.53" | 0.13" | 0.93" | 0.15" | 2.23" | ≈ 1.0 lb |
| | 103.3 mm | 60.3 mm | 26.7 mm | 8.9 mm | 13.3 mm | 3.2 mm | 23.5 mm | 3.8 mm | 56.5 mm | ≈ 0.5 kg |

Technical Data for M/MB-Series Mass Flow Meters

50 SLPM 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.

| SENSOR PERFORMANCE | |
|----------------------------------|---|
| Mass flow accuracy ¹ | Standard accuracy: $\pm 0.8\%$ of reading and $\pm 0.2\%$ of full scale High-accuracy option (≤ 500 SLPM models): $\pm 0.4\%$ of reading and $\pm 0.2\%$ of full scale |
| Flow repeatability (2σ) | $\pm 0.2\%$ of reading and $\pm 0.02\%$ of full scale |
| Pressure accuracy ¹ | Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: ± 0.07 PSIA |
| Flow measurement range | 0.01 – 100% of full scale (10,000:1 turndown ratio) |
| Operating pressure range | 11.5 – 160 PSIA |
| Pressure sensitivity | Mass flow zero shift and span shift: $\pm (0.08\%$ of reading and $\pm 0.02\%$ of full scale) per atmosphere from calibration conditions |
| Temperature sensitivity | Mass flow zero shift and span shift: $\pm 0.02\%$ of full scale per $^{\circ}\text{C}$ 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 | < 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, and 316L stainless steel; FKM, alumina ceramic, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon |
| Maximum pressure | Damage possible above 200 PSIA common mode pressure. Damage possible by rapid pressure change above 75 PSI differential. |
| Relative humidity range | 0 – 95%, non-condensing |
| Ingress protection | IP40 (consult Alicat for weatherproofing options) |
| Mounting holes | 50 – 100 SLPM: $4 \times 8\text{-}32$ UNC threaded $\nabla 0.375''$ [9.53 mm] 250 – 1000 SLPM: $4 \times 8\text{-}32$ UNC threaded $\nabla 0.328''$ [8.33 mm] 2000 – 3000 SLPM: $4 \times 8\text{-}32$ UNC threaded $\nabla 0.330''$ [8.38 mm] 5000 – 10,000 SLPM: $4 \times 8\text{-}32$ UNC threaded $\nabla 0.300''$ [7.62 mm] |

| POWER AND COMMUNICATION | |
|--|--|
| Digital output options ² | 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 ³ | 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 ² | 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 ^{2,3} | 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 |

² See Portable Devices table for MB-Series specifications and options.

³ Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

Technical Data for M/MB-Series Mass Flow Meters

50 SLPM 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.

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™ 4 | 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™ 4 | 20 user-definable gas mixes. Each mix may have up to 5 gases with 0.01% composition resolution. |

4 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 flow when venting air to atmosphere ⁵ | Default process connection ⁶ |
|-----------------------------------|--|---|
| 50 SLPM | 2.0 PSID | ¼" NPT female |
| 100 SLPM | 2.5 PSID | ¼" NPT female |
| 250 SLPM | 2.1 PSID | ½" NPT female |
| 500 SLPM | 4.0 PSID | ¾" NPT female |
| 1000 SLPM | 6.0 PSID | ¾" NPT female |
| 2000 SLPM | 5.0 PSID | ¾" NPT female |
| 3000 SLPM | 7.1 PSID | 1¼" NPT female |
| 5000 SLPM | 3.4 PSID | 1½" NPT female |
| 10,000 SLPM (H ₂ only) | 3.5 PSID ⁷ | 1½" NPT female |

5 Lower pressure drops and other valves available, including our WHISPER™ series mass flow meters at alicat.com/mw.

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®).

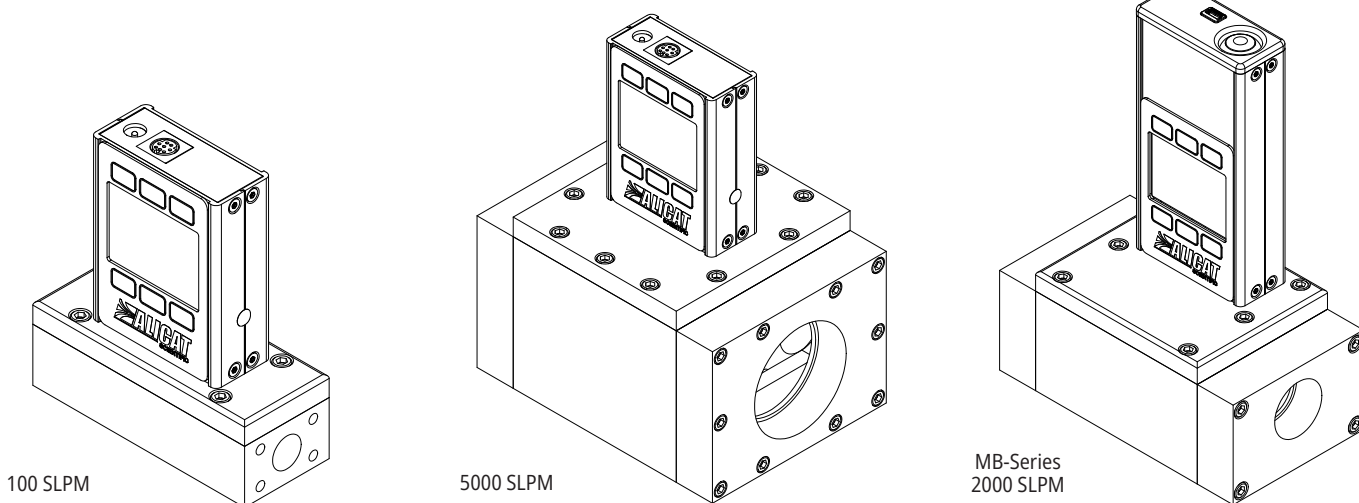
7 Pressure drop of 3.5 PSID is at full scale when venting hydrogen to atmosphere.

PORTABLE DEVICES (MB-SERIES)⁸

| | |
|-----------------------|--|
| 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 | Serial over Micro-USB Type B Bluetooth® Low Energy (requires the Alicat Connect app and a compatible Android or iOS mobile device) |
| Charging temperature | 0 – 45°C |
| Dimensions | Add 1.646" [41.81 mm] to height, and 0.2 lb [90.72 g] to weight |

8 More information about our MB-Series portable mass flow meters at alicat.com/mb.

Representative Examples

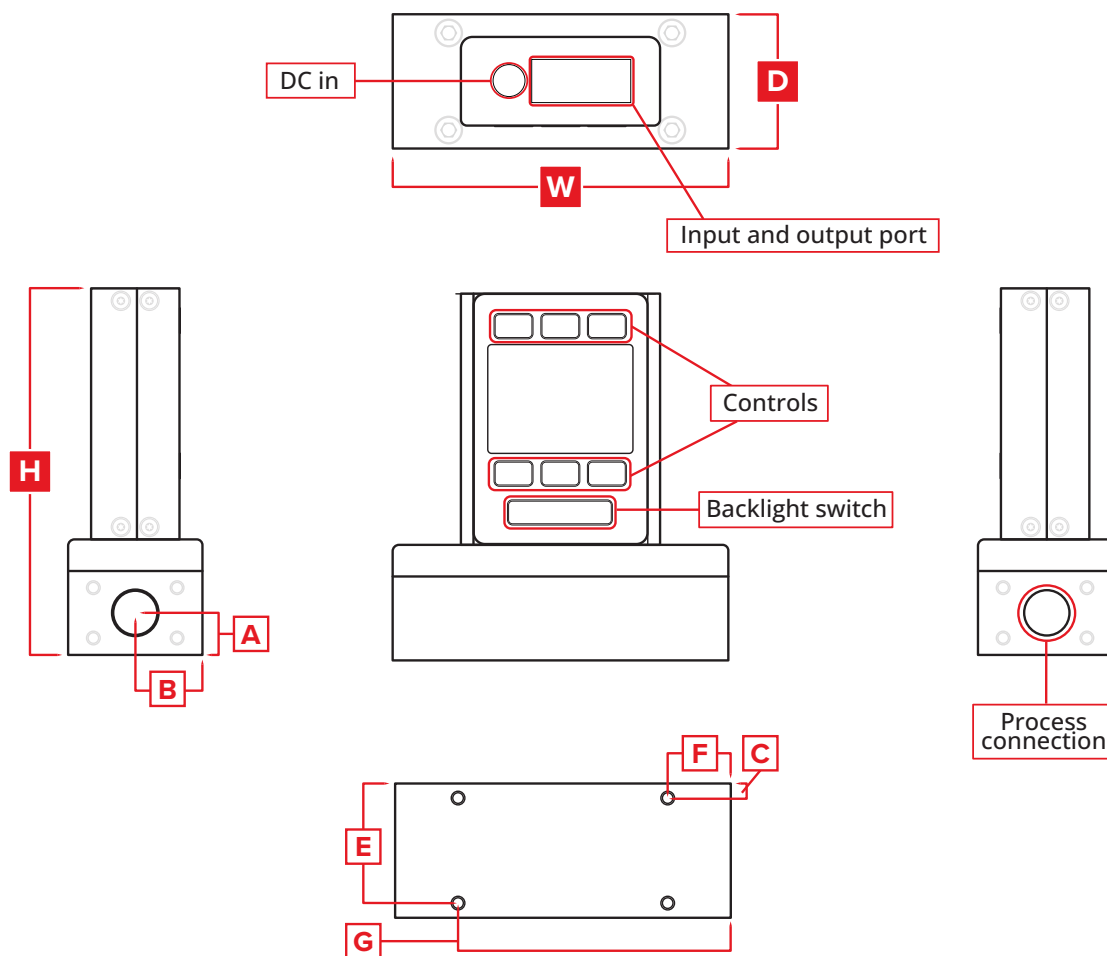


Technical Data for M/MB-Series Mass Flow Meters

50 SLPM 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.



| DIMENSIONS ⁹ | | | | | | | | | | WEIGHT |
|--------------------------------------|----------|---------|----------|---------|---------|--------|---------|---------|---------|-----------|
| Full scale flow | Width | Depth | Height | A | B | C | E | F | G | |
| 50 – 100 SLPM | 4.00" | 1.60" | 4.37" | 0.50" | 0.80" | 0.18" | 1.43" | 0.75" | 3.25" | ≈ 2.4 lb |
| | 101.6 mm | 40.6 mm | 110.9 mm | 12.7 mm | 20.3 mm | 4.4 mm | 36.2 mm | 19.1 mm | 82.6 mm | ≈ 1.1 kg |
| 250 SLPM | 4.00" | 1.60" | 4.97" | 0.80" | 0.80" | 0.18" | 1.43" | 0.75" | 3.25" | ≈ 2.4 lb |
| | 101.6 mm | 40.6 mm | 126.2 mm | 20.3 mm | 20.3 mm | 4.4 mm | 36.2 mm | 19.1 mm | 82.6 mm | ≈ 1.1 kg |
| 500 – 1000 SLPM | 4.00" | 1.60" | 4.97" | 0.80" | 0.80" | 0.18" | 1.43" | 0.75" | 3.25" | ≈ 3.5 lb |
| | 101.6 mm | 40.6 mm | 126.2 mm | 20.3 mm | 20.3 mm | 4.4 mm | 36.2 mm | 19.1 mm | 82.6 mm | ≈ 1.6 kg |
| 2000 SLPM | 5.20" | 2.90" | 5.29" | 1.12" | 1.45" | 0.20" | 2.70" | 1.35" | 3.85" | ≈ 4.5 lb |
| | 132.1 mm | 73.7 mm | 134.3 mm | 28.4 mm | 36.8 mm | 5.1 mm | 68.6 mm | 34.3 mm | 97.8 mm | ≈ 2.0 kg |
| 3000 SLPM | 5.20" | 2.90" | 5.29" | 0.96" | 1.45" | 0.20" | 2.70" | 1.35" | 3.85" | ≈ 4.5 lb |
| | 132.1 mm | 73.7 mm | 134.3 mm | 24.4 mm | 36.8 mm | 5.1 mm | 68.6 mm | 34.3 mm | 97.8 mm | ≈ 2.0 kg |
| 5000 SLPM | 5.20" | 3.84" | 6.27" | 1.45" | 1.92" | 0.30" | 3.55" | 1.35" | 3.85" | ≈ 14.0 lb |
| | 132.1 mm | 97.5 mm | 159.2 mm | 36.8 mm | 48.8 mm | 7.5 mm | 90.0 mm | 34.3 mm | 97.8 mm | ≈ 6.4 kg |
| 10,000 SLPM (H ₂ only) | 5.20" | 3.84" | 6.27" | 1.45" | 1.92" | 0.30" | 3.55" | 1.35" | 3.85" | ≈ 14.0 lb |
| | 132.1 mm | 97.5 mm | 159.2 mm | 36.8 mm | 48.8 mm | 7.5 mm | 90.0 mm | 34.3 mm | 97.8 mm | ≈ 6.4 kg |

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

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

0.5 SCCM full scale through 5 SCCM full scale

Standard specifications. Consult Alicat for available options.

| SENSOR AND CONTROL PERFORMANCE | |
|----------------------------------|--|
| Mass flow accuracy ¹ | Standard accuracy: $\pm 0.8\%$ of reading and $\pm 0.2\%$ of full scale High accuracy (5 SCCM models): $\pm 0.4\%$ of reading and $\pm 0.2\%$ of full scale |
| Repeatability (2σ) | $\pm(0.2\%$ of reading + 0.02% of full scale) |
| Pressure accuracy ¹ | Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: ± 0.07 PSIA |
| Steady state control range | 0.01–100% of full scale (10,000:1 turndown ratio) |
| Operating pressure full scale | 11.5–160 PSIA |
| Pressure sensitivity | Mass flow zero and span shift: $\pm(0.08\%$ of reading + 0.02% of full scale) per atm from calibration conditions |
| Temperature sensitivity | Mass flow zero and span shift: 0.02% of full scale per $^{\circ}\text{C}$ from 25°C |
| Temperature accuracy | $\pm 0.75^{\circ}\text{C}$ |
| Operating temperature range | -10 – 60°C (ambient and gas) |
| Valve function | Normally closed |
| Totalizer volume uncertainty | $\pm 0.1\%$ of reading in 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 |

| MECHANICAL | |
|----------------------------------|--|
| 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 |
| 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 | 2× 8-32 UNC threaded $\nabla 0.175''$ [4.45 mm] |
| Process connections ² | M5 female (10-32 compatible), shipped with Buna O-ring face seal to $\frac{1}{8}$ NPT female fittings |

| 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 ³ | 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 ³ | 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, setpoint, and pressure |
| Display update rate | 10 Hz |
| 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 (290 mA if equipped with 4–20 mA output) |

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

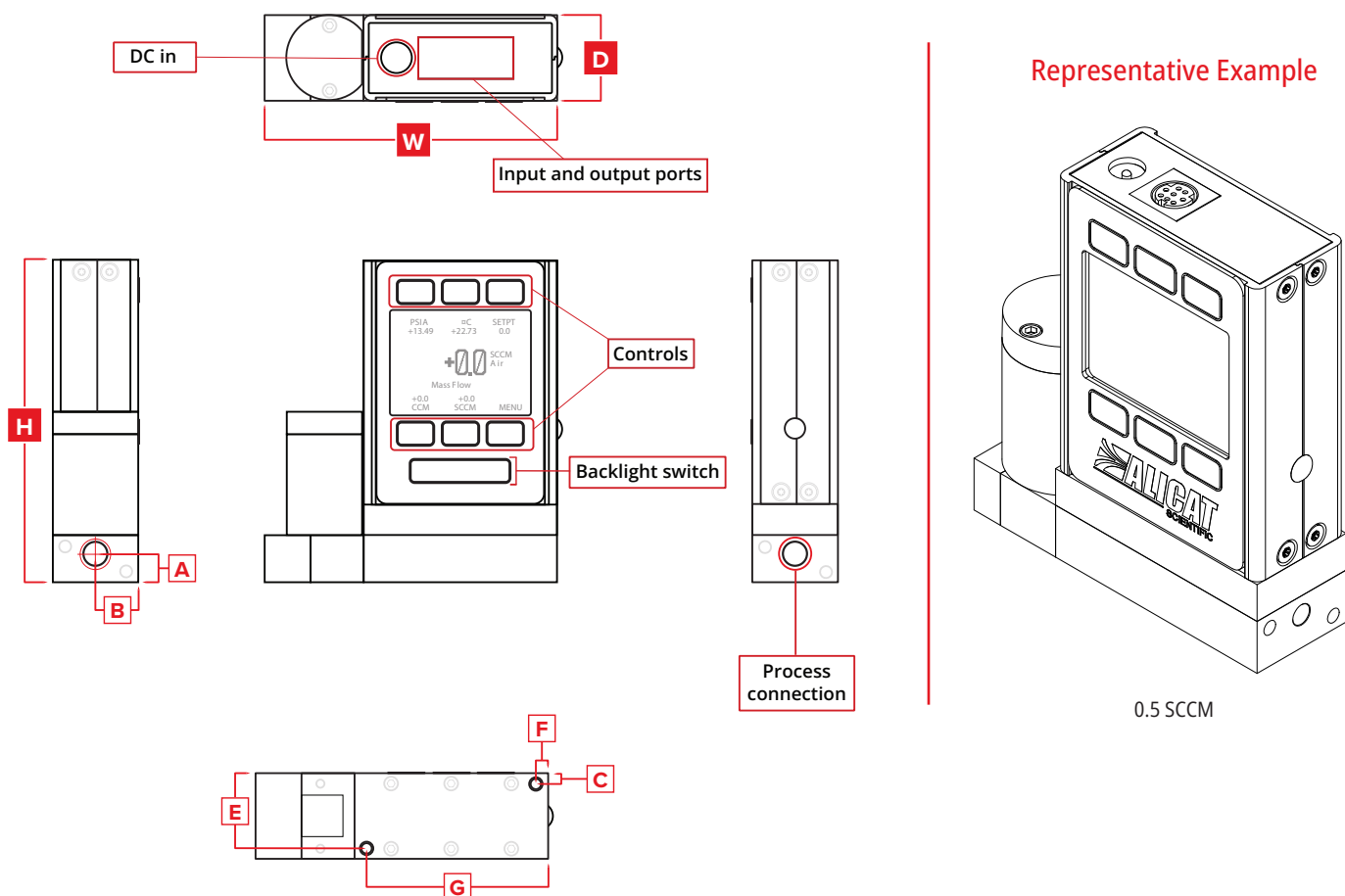
0.5 SCCM full scale through 5 SCCM full scale

Standard specifications. Consult Alicat for available options.

| 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 | Pressure drop at full scale when venting air to atmosphere ⁴ |
| 0.5 SCCM | 1.0 PSID |
| 1–5 SCCM | 2.0 PSID |

- 1 Stated accuracy is after tare (for mass flow), under equilibrium conditions, includes repeatability and linearity.
- 2 Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).
- 3 Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.
- 4 Lower pressure drops and other valves available, including our WHISPER™ series mass flow controllers at alicat.com/mcw.



| Full scale flow | DIMENSIONS | | | | | | | | | WEIGHT |
|-----------------|------------|---------|---------|--------|---------|--------|---------|--------|---------|----------|
| | Width | Depth | Height | A | B | C | E | F | G | |
| 0.5–5 SCCM | 3.34" | 1.05" | 3.90" | 0.34" | 0.53" | 0.13" | 0.93" | 0.15" | 2.23" | ≈ 1.1 lb |
| | 84.8 mm | 26.7 mm | 99.0 mm | 8.5 mm | 13.3 mm | 3.2 mm | 23.5 mm | 3.8 mm | 56.5 mm | ≈ 0.5 kg |

Technical Data for MC-Series Mass Flow Controllers

10 SCCM full scale through 20 SLPM full scale

Standard specifications. Consult Alicat for available options.

| SENSOR AND CONTROL PERFORMANCE | |
|----------------------------------|--|
| Mass flow accuracy ¹ | Standard accuracy: $\pm 0.6\%$ of reading or $\pm 0.1\%$ of full scale, whichever is greater High accuracy: $\pm 0.5\%$ of reading or $\pm 0.1\%$ of full scale, whichever is greater |
| Flow repeatability (2 σ) | $\pm(0.1\%$ of reading + 0.02% of full scale) |
| Pressure accuracy ¹ | Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: ± 0.07 PSIA |
| Steady state control range | 0.01 – 100% of full scale (10,000:1 turndown ratio) |
| Operating pressure full scale | 11.5 – 160 PSIA |
| Pressure sensitivity | Mass flow zero shift: $\pm 0.01\%$ of full scale per atm from tare pressure Mass flow span shift: $\pm 0.1\%$ of reading per atm from calibration conditions |
| Temperature sensitivity | Mass flow zero shift: $\pm 0.01\%$ of full scale per °C from tare temperature Mass flow span shift: $\pm 0.01\%$ of reading per °C from 25°C |
| Temperature accuracy | $\pm 0.75^\circ\text{C}$ |
| Operating temperature range | -10 – 60°C (ambient and gas) |
| Valve function | Normally closed |
| Totalizer volume uncertainty | $\pm 0.1\%$ of reading in additional uncertainty |
| Sensor response time | <1 ms |
| Typical control response time | As fast as 30 ms (T63), flow rate dependent, user-adjustable |
| Typical indication response time | <10 ms, flow rate dependent |
| Typical warm-up time | <1 s |

| MECHANICAL | |
|----------------------------------|--|
| 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 |
| 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 | 10–50 SCCM: 2× 8-32 UNC threaded $\nabla 0.175''$ [4.45 mm] 100 SCCM–20 SLPM: 2× 8-32 UNC threaded $\nabla 0.350''$ [8.89 mm] |
| Process connections ² | 10–50 SCCM: M5 female (10-32 compatible), shipped with Buna-N O-ring face seal 100 SCCM–20 SLPM: $\frac{1}{8}''$ NPT female |

| 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 ³ | 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 ³ | 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, setpoint, and pressure |
| Display update rate | 10 Hz |
| Electrical connection options | 6-pin locking, 8-pin mini-DIN, 8-pin M12, DB-9, DB-15 |
| Power requirements ³ | 12–24 Vdc, 250 mA (290 mA if equipped with 4–20 mA output) |

Technical Data for MC-Series Mass Flow Controllers

10 SCCM full scale through 20 SLPM full scale

Standard specifications. Consult Alicat for available options.

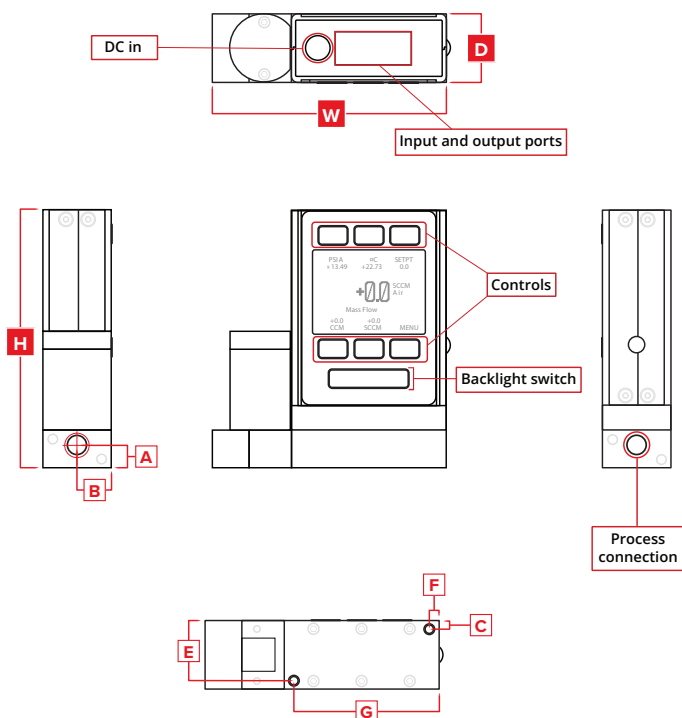
FEATURES

| | |
|--------------------------|--|
| 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. |

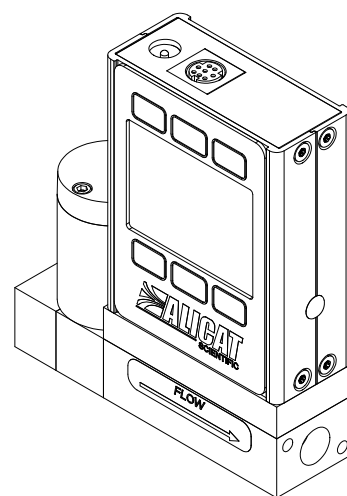
RANGE-SPECIFIC TECHNICAL DATA

| Full scale flow | Pressure drop at full scale when venting air to atmosphere ⁴ |
|-----------------|---|
| 10 SCCM | 2.8 PSID |
| 20–500 SCCM | 1.0 PSID |
| 1 SLPM | 1.5 PSID |
| 2 SLPM | 3.0 PSID |
| 5 SLPM | 2.0 PSID |
| 10 SLPM | 5.5 PSID |
| 20 SLPM | 12.0 PSID |

- 1 Stated accuracy is after tare (for mass flow), under equilibrium conditions, includes repeatability and linearity.
- 2 Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO®, and VCR®).
- 3 Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.
- 4 Lower pressure drops and other valves available, including our WHISPER™ series mass flow controllers at alicat.com/mcw.



Representative Example



10 SLPM

DIMENSIONS

| Full scale flow | Width | Depth | Height | A | B | C | E | F | G | WEIGHT |
|------------------|---------|---------|----------|--------|---------|--------|---------|--------|---------|----------|
| 10–50 SCCM | 3.34" | 1.05" | 3.90" | 0.34" | 0.53" | 0.13" | 0.93" | 0.15" | 2.23" | ≈ 1.1 lb |
| | 84.8 mm | 26.7 mm | 99.0 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 | 3.59" | 1.05" | 4.07" | 0.35" | 0.53" | 0.13" | 0.93" | 0.15" | 2.23" | ≈ 1.2 lb |
| | 91.1 mm | 26.7 mm | 103.3 mm | 8.9 mm | 13.3 mm | 3.2 mm | 23.5 mm | 3.8 mm | 56.5 mm | ≈ 0.5 kg |

Technical Data for MC-Series Mass Flow Controllers

50 SLPM 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.

| SENSOR AND CONTROL PERFORMANCE | |
|----------------------------------|--|
| Mass flow accuracy ¹ | Standard accuracy: $\pm 0.8\%$ of reading and $\pm 0.2\%$ of full scale High accuracy (≤ 500 SLPM models): $\pm 0.4\%$ of reading and $\pm 0.2\%$ of full scale |
| Flow repeatability (2σ) | $\pm 0.2\%$ of reading and $\pm 0.02\%$ of full scale |
| Pressure accuracy ¹ | Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: ± 0.07 PSIA |
| Steady state control range | MCP: 0.01 – 100% of full scale (10,000:1 turndown ratio) MCR and MCRH: 0.2 – 100% of full scale (500:1 turndown ratio) |
| Operating pressure range | 11.5 – 160 PSIA |
| Pressure sensitivity | Mass flow zero and span shift: $\pm (0.08\%$ of reading + 0.02%) of full scale per atm from tare pressure |
| Temperature sensitivity | Mass flow zero and span shift: $\pm 0.02\%$ of full scale per $^{\circ}\text{C}$ from 25°C |
| Temperature accuracy | $\pm 0.75^{\circ}\text{C}$ |
| Operating temperature range | -10 – 60°C (ambient and gas) |
| Valve function | Normally closed |
| Totalizer volume uncertainty | $\pm 0.1\%$ of reading in additional uncertainty |
| Sensor response time | < 1 ms |
| Typical control response time | MCP: As fast as 30 ms (T63), flow rate dependent, user-adjustable MCR and MCRH: 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 | MCP: 302, 303, 304, 316L, and 430FR stainless steel; FKM, alumina ceramic, brass, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon MCR and MCRH: 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 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 | MCP: None MCR and MCRH: Rolamite valves must be upright |
| Mounting holes | 50 – 100 SLPM: 4× 8-32 UNC threaded $\downarrow 0.375''$ [9.53 mm] 250 – 1000 SLPM: 4× 8-32 UNC threaded $\downarrow 0.328''$ [8.33 mm] 2000 – 3000 SLPM: 4× 8-32 UNC threaded $\downarrow 0.330''$ [8.38 mm] 5000 – 10000 SLPM: 4× 8-32 UNC threaded $\downarrow 0.300''$ [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 | $\pm 0.1\%$ of full scale additional uncertainty |
| Interactive display | Monochrome LCD or color TFT display with integrated touchpad; simultaneously displays mass flow, volumetric flow, temperature, 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 | MCP: 12 – 24 Vdc, 250 mA MCR (< 2000 SLPM): 24 Vdc, 0.5 A MCR (≥ 2000 SLPM): 24 Vdc, 1 A MCRH: 24 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.

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

50 SLPM 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.

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 | 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™ 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

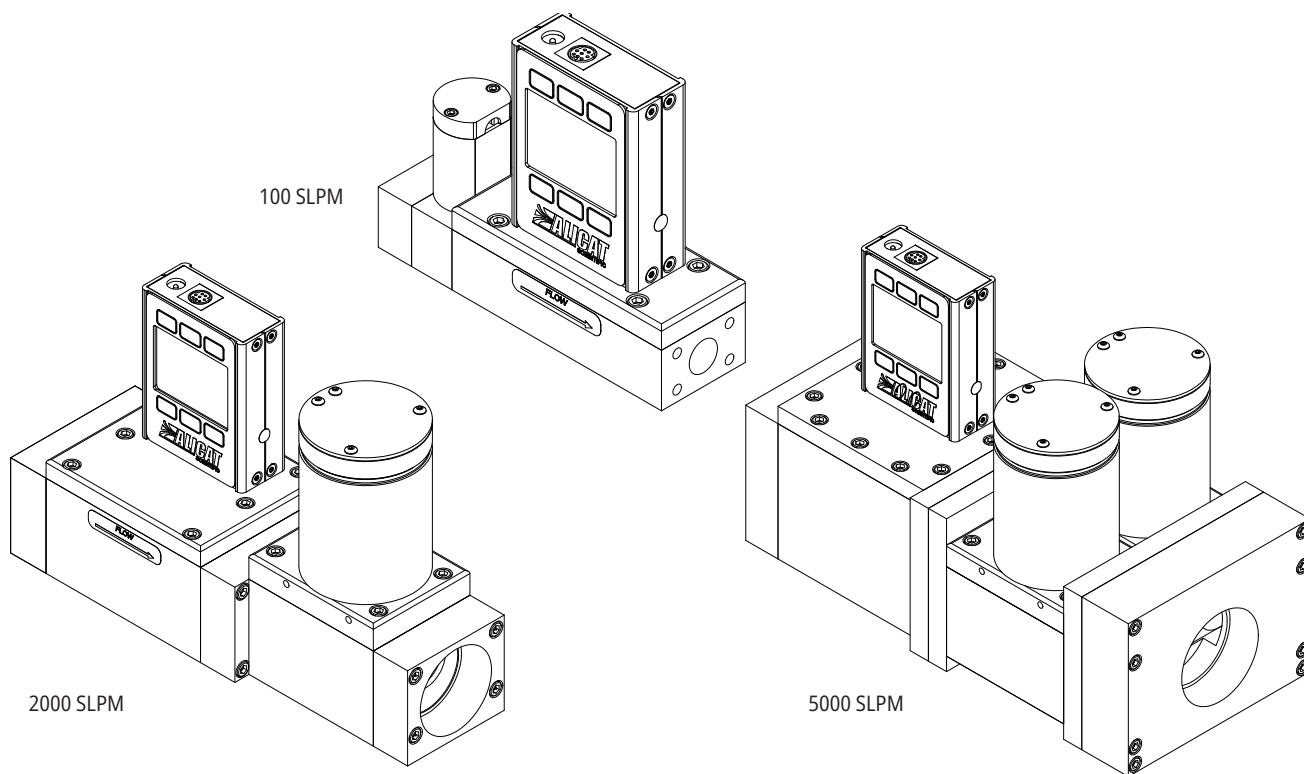
| Full scale flow | Type | Pressure drop at full scale when venting air to atmosphere ⁴ | Default process connections ⁵ |
|-----------------------------------|------|---|--|
| 50 SLPM | MCP | 5.0 PSID | ¼" NPT female |
| 100 SLPM | MCP | 15.5 PSID | ¼" NPT female |
| 250 SLPM | MCR | 2.4 PSID | ½" NPT female |
| 500 SLPM | MCR | 6.5 PSID | ¾" NPT female |
| 1000 SLPM | MCR | 14.0 PSID | ¾" NPT female |
| 2000 SLPM | MCR | 28.6 PSID | ¾" NPT female (1¼" NPT connection available) |
| 3000 SLPM | MCR | 16.8 PSID | 1¼" NPT female |
| 5000 SLPM | MCRH | 14.1 PSID | 1½" NPT female |
| 10,000 SLPM (H ₂ only) | MCR | 12.0 PSID ⁶ | 1½" NPT female |

4 Lower pressure drops and other valves available, including our WHISPER™ series mass flow controllers at alicat.com/mcw.

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

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

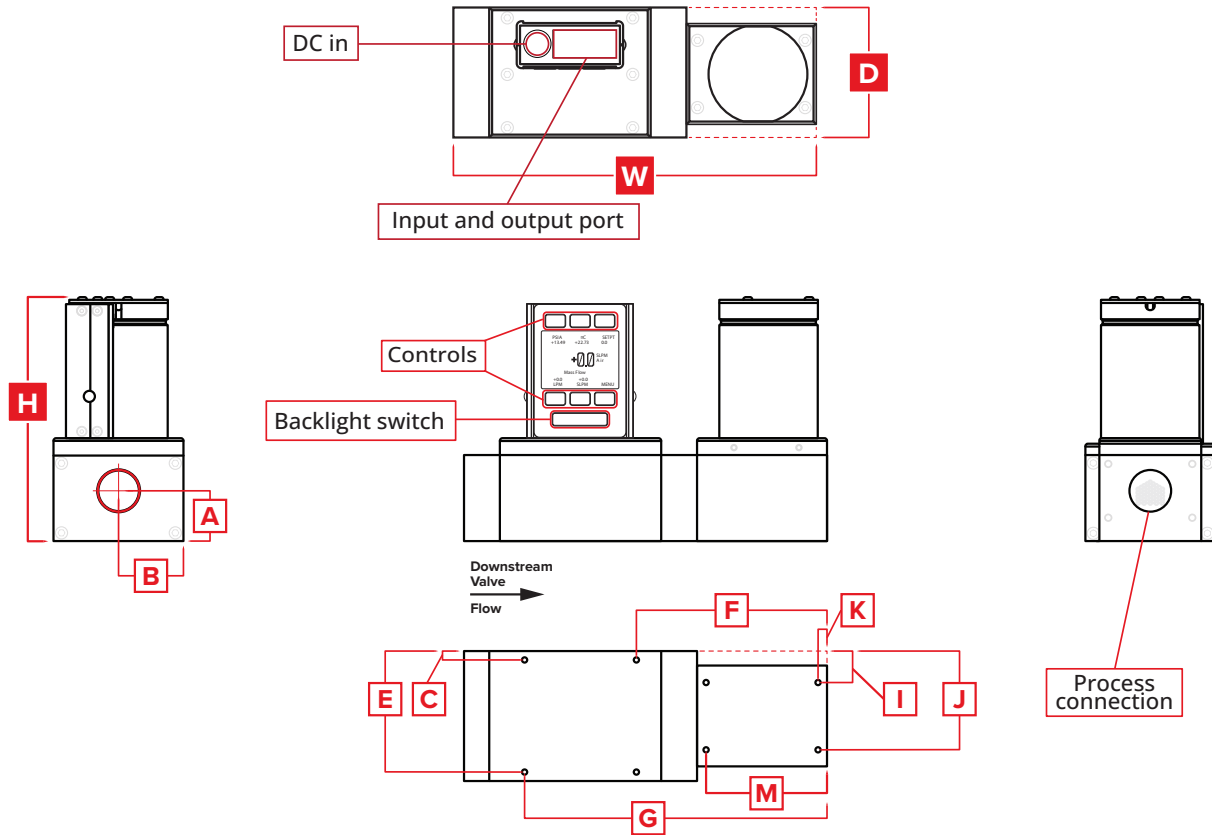
Representative Examples



Technical Data for MC-Series Mass Flow Controllers

50 SLPM 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.



| DIMENSIONS | | | | | | | | | | | | | | | WEIGHT |
|-----------------------------------|------|----------|---------|----------|---------|---------|--------|---------|----------|----------|---------|----------|---------|---------|-----------|
| Full scale flow | Type | Width | Depth | Height | A | B | C | E | F | G | I | J | K | M | |
| 50 – 100 SLPM | MCP | 5.41" | 1.60" | 4.37" | 0.50" | 0.80" | 0.18" | 1.43" | 0.75" | 3.25" | — | — | — | — | ≈ 3.1 lb |
| | | 137.4 mm | 40.6 mm | 110.9 mm | 12.7 mm | 20.3 mm | 4.4 mm | 36.2 mm | 19.1 mm | 82.6 mm | — | — | — | — | ≈ 1.4 kg |
| 250 SLPM | MCR | 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 | MCR | 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 |
| | | 184.9 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 | MCR | 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 | MCR | 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 | MCRH | 9.80" | 3.84" | 6.27" | 1.45" | 1.92" | 0.30" | 3.55" | 5.96" | 8.46" | — | — | — | — | ≈ 28.0 lb |
| | | 248.9 mm | 97.5 mm | 159.2 mm | 36.8 mm | 48.8 mm | 7.5 mm | 90.0 mm | 151.3 mm | 214.8 mm | — | — | — | — | ≈ 12.7 kg |
| 10,000 SLPM (H ₂ only) | MCR | 9.66" | 3.84" | 6.33" | 1.45" | 1.92" | 0.30" | 3.25" | 1.55" | 2.55" | 1.50" | 5.72" | 3.00" | — | ≈ 28.0 lb |
| | | 245.4 mm | 97.5 mm | 160.8 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 |

