# Technical Data for MCES-Series Mass Flow Controllers

**0.5 SCCM** full scale through **20 SLPM** full scale

Integrated ¼" VCR®-compatible male fittings

| SENSOR AND CONTROL 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<br>Available for ranges ≥5 SCCM models |
| Repeatability | ±0.2% of full scale |
| Steady State Control Range | 1–100% of full scale |
| Typical Control Response Time | **0.5 SCCM–5 SCCM**: As fast as 100 ms, flow rate dependent, user adjustable<br>**10 SCCM–20 SLPM**: As fast as 30 ms, flow rate dependent, user adjustable |
| Valve Function | Normally Closed |
| Temperature Sensitivity | **Mass flow zero shift:** ±0.02% of full scale per °C from tare temperature<br>**Mass flow span shift:** ±0.02% of reading per °C from 25°C |
| Pressure Sensitivity | **Mass flow zero shift:** ±0.02% of full scale per atm from tare pressure<br>**Mass flow span shift:** ±(0.08% of reading + 0.02% of full scale) per atm from calibration conditions |
| Operating Temperature Range | –10–60°C |
| Temperature Accuracy | ±0.75°C |
| Operating Pressure Full Scale | 160 PSIA |
| Pressure Accuracy | ±0.5% of full scale |
| Totalizer Volume Uncertainty | ±0.5% 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 under equilibrium conditions, includes repeatability and linearity.

| MECHANICAL | |
|---|---|
| Minimum Operating Pressure | 11.5 PSIA common mode pressure (consult Alicat for lower operating pressures).<br>Differential pressure must exceed model pressure drop, see below for details. |
| Maximum Operating Pressure | Damage possible above 200 PSIA common mode pressure.<br>Damage possible above 75 PSI differential pressure. |
| Ingress Protection | IP40 |
| Humidity Range | 0–95%, non-condensing |
| Leak Integrity, External | $1\times10^{-8}$ atm-cc/sec of Helium |
| Leak Integrity, Through Closed Valve | $1\times10^{-5}$ atm-cc/sec of Helium |
| Wetted Materials | 303, 316L, and 430FR stainless steel; FFKM |

| FEATURES | |
|---|---|
| SEMI Standard Length | Matches 124 mm end-to-end length of SEMI standard MFCs |
| 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™ | 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™ | 20 user-definable gas mixes. Each mix may have up to 5 gases with 0.01% composition precision. |

# Technical Data for MCES-Series Mass Flow Controllers

**0.5 SCCM** full scale through **20 SLPM** full scale

Integrated ¼" VCR®-compatible male fittings

| 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<br>RS-485 serial, Modbus RTU (over RS-232 or RS-485 serial),<br>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 (Contact Alicat for custom pinouts) |
| **Power Requirements[2]** | 12–24 Vdc, 250 mA (290 mA if equipped with 4–20 mA output) |
| **Digital Data Update Rate[2]** | 40 Hz at 19200 baud |
| **Analog Data Update Rate[2]** | 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.

This area intentionally left blank

# Technical Data for MCES-Series Mass Flow Controllers

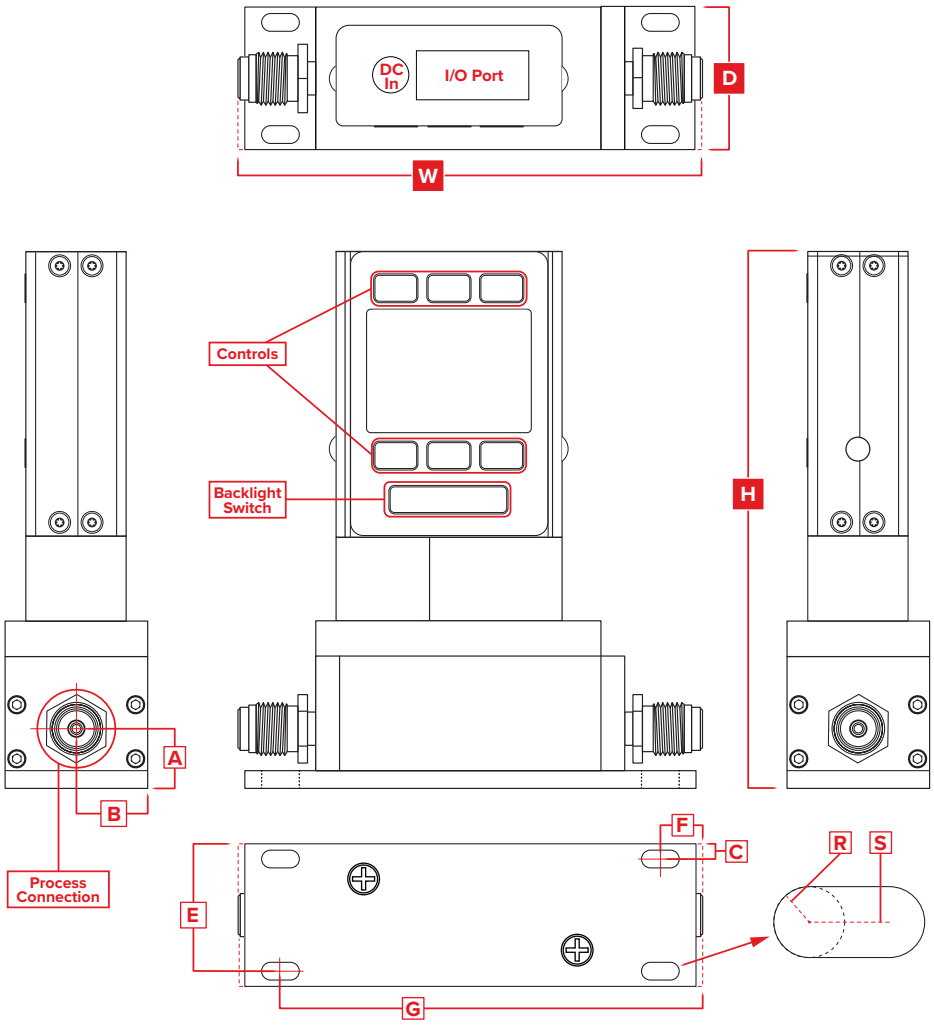
**0.5 SCCM** full scale through **20 SLPM** full scale

Integrated ¼″ VCR®-compatible male fittings

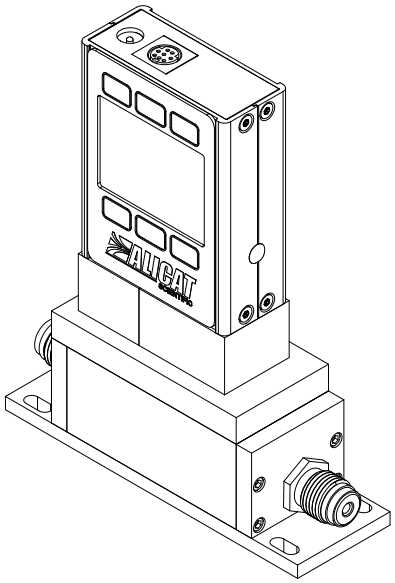
| RANGE-SPECIFIC TECHNICAL DATA | | | |
|---|---|---|---|
| Full scale flow | Pressure drop at full scale flow[3] | Process connections[4] | Mount hole size |
| 0.5 SCCM–500 SCCM | 1.0 PSID | ¼″ VCR®-compatible male | 4× obround pass-through slots, ø 0.188″ × 0.4″ [4.78 mm × 10.16 mm] |
| 1 SLPM | 1.5 PSID | ¼″ VCR®-compatible male | 4× obround pass-through slots, ø 0.188″ × 0.4″ [4.78 mm × 10.16 mm] |
| 2 SLPM | 3.0 PSID | ¼″ VCR®-compatible male | 4× obround pass-through slots, ø 0.188″ × 0.4″ [4.78 mm × 10.16 mm] |
| 5 SLPM | 2.0 PSID | ¼″ VCR®-compatible male | 4× obround pass-through slots, ø 0.188″ × 0.4″ [4.78 mm × 10.16 mm] |
| 10 SLPM | 5.5 PSID | ¼″ VCR®-compatible male | 4× obround pass-through slots, ø 0.188″ × 0.4″ [4.78 mm × 10.16 mm] |
| 20 SLPM | 20.0 PSID | ¼″ VCR®-compatible male | 4× obround pass-through slots, ø 0.188″ × 0.4″ [4.78 mm × 10.16 mm] |

**3** Default valve venting air to atmosphere. Other valves may be available.

**4** Swagelok® tube and VCO® process connections are also available.




Representative Example



2 SLPM

| DIMENSIONS | | | | | | | | | | | | WEIGHT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full scale flow | Height | Width | Depth | A | B | C | E | F | G | R | S | |
| 0.5 SCCM–20 SLPM | 5.555 in | 4.882 in | 1.500 in | 0.628 in | 0.750 in | 0.161 in | 1.339 in | 0.373 in | 4.373 in | 0.094 in | 0.212 in | ≈ 2.6 lb |
| | 141.10 mm | 124.00 mm | 38.10 mm | 15.95 mm | 19.05 mm | 4.09 mm | 34.01 mm | 9.47 mm | 111.07 mm | 2.39 mm | 5.38 mm | ≈ 1.2 kg |