



## Product Specifications

### Apex Low Pressure Drop Mass Flow Controllers 10 SCCM to 100 SLPM Full Scale

#### SENSOR AND CONTROL PERFORMANCE

Mass Flow Accuracy at calibration conditions <sup>1</sup>	±0.75% of reading or ±0.1% of full scale, whichever is greater
High Accuracy Option <sup>1</sup>	±0.6% of reading or ±0.1% of full scale, whichever is greater
Repeatability (2σ)	±(0.2% of reading + 0.02% of full scale)
Steady State Control Range <sup>2</sup>	0.5–100% of full scale
Typical Control Response Time	MCW: 30 ms to 63% of step change (T63), user adjustable MCRW: 150 ms to 63% of step change (T63), user adjustable
Valve Function	Normally Closed
Temperature Sensitivity	Mass flow zero shift: ±0.03% 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 atmosphere from calibration conditions
Operating Temperature Range	–10–60°C (expanded range available)
Temperature Accuracy	±0.75°C
Operating Pressure Full Scale	60 PSIA
Pressure Accuracy above 1 ATM	±0.75% of reading
Pressure Accuracy below 1 ATM	±0.1 PSIA
Totalizer Volume Uncertainty	±0.5% of reading additional uncertainty
Sensor Response Time	<1 ms
Typical Indication Response Time <sup>3</sup>	127 ms (user adjustable)
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

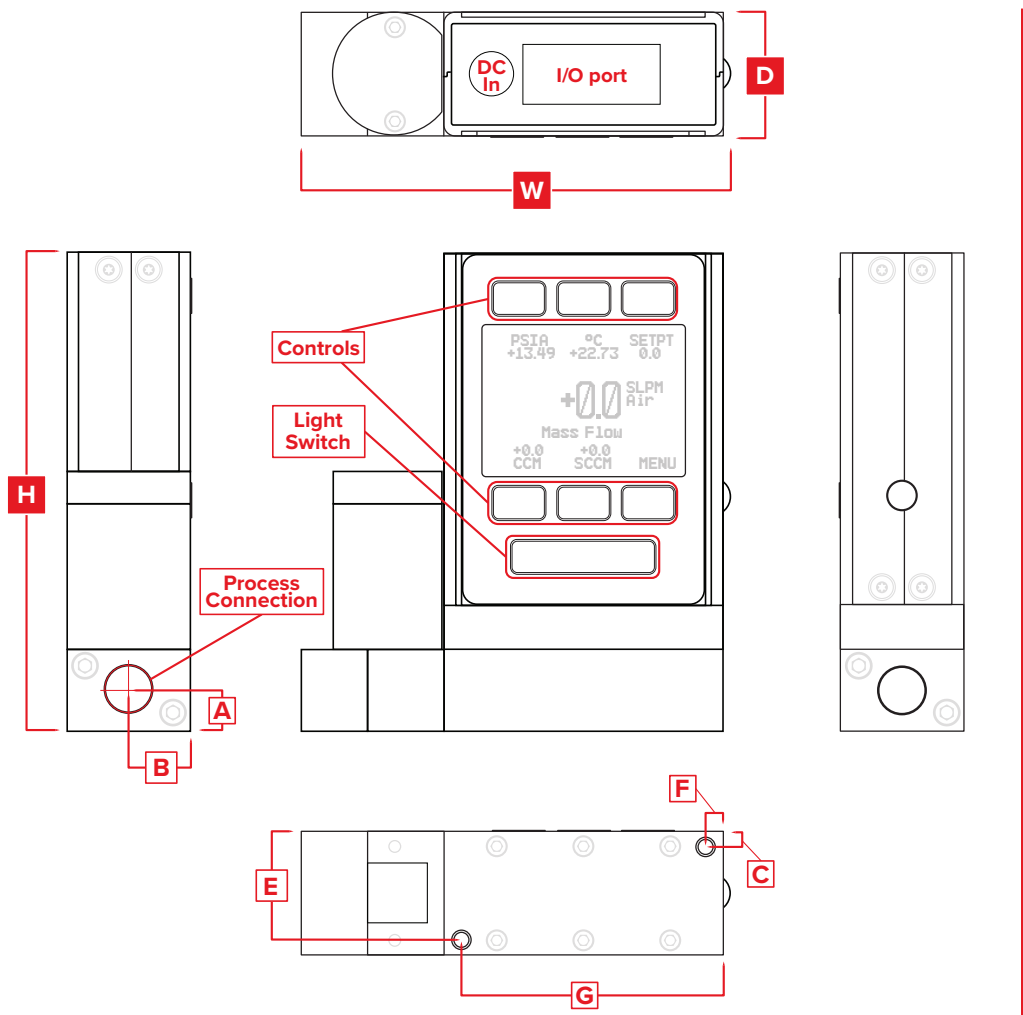
Minimum Operating Pressure	11.5 PSIA common mode pressure (lower operating pressures available) Differential pressure must exceed model pressure drop, see below for details
Maximum Operating Pressure	Damage possible above 80 PSIA common mode pressure Damage possible above 15 PSID differential pressure
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 polyphenylene sulfide, heat-cured epoxy, alumina, gold, silicon, glass MCW: Add brass and 430FR stainless steel. MCRW: Add 410 stainless steel.

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 <sup>4</sup>	MCW: 12–24 VDC, 250 mA MCRW: 24 VDC, 1 A Add 40 mA if equipped with 4–20 mA output
Digital Data Update Rate <sup>4</sup>	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

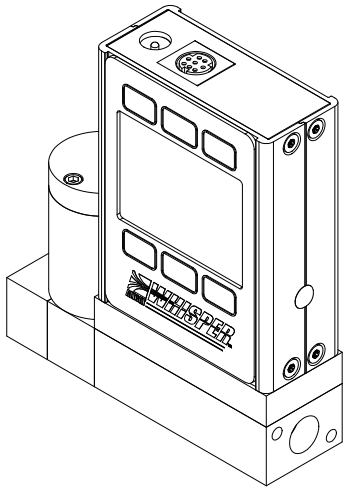
**4** Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.

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, temperature, 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% precision.

RANGE SPECIFIC SPECIFICATIONS				
Full scale flow	Type	Pressure drop at full scale flow venting to atmosphere <sup>5</sup>	Process connections <sup>6</sup>	Mount tap size
10–20 sccm	MCW	0.07 PSID	M5 female thread (10-32 compatible) <sup>7</sup>	2× 8-32 UNC 0.175 in [4.45mm]
50–500 sccm	MCW	0.07 PSID	⅛" NPT Female	2× 8-32 UNC 0.300 in [7.62mm]
1 SLPM	MCW	0.10 PSID	⅛" NPT Female	2× 8-32 UNC 0.300 in [7.62mm]
2 SLPM	MCW	0.18 PSID	⅛" NPT Female	2× 8-32 UNC 0.300 in [7.62mm]



Representative Example

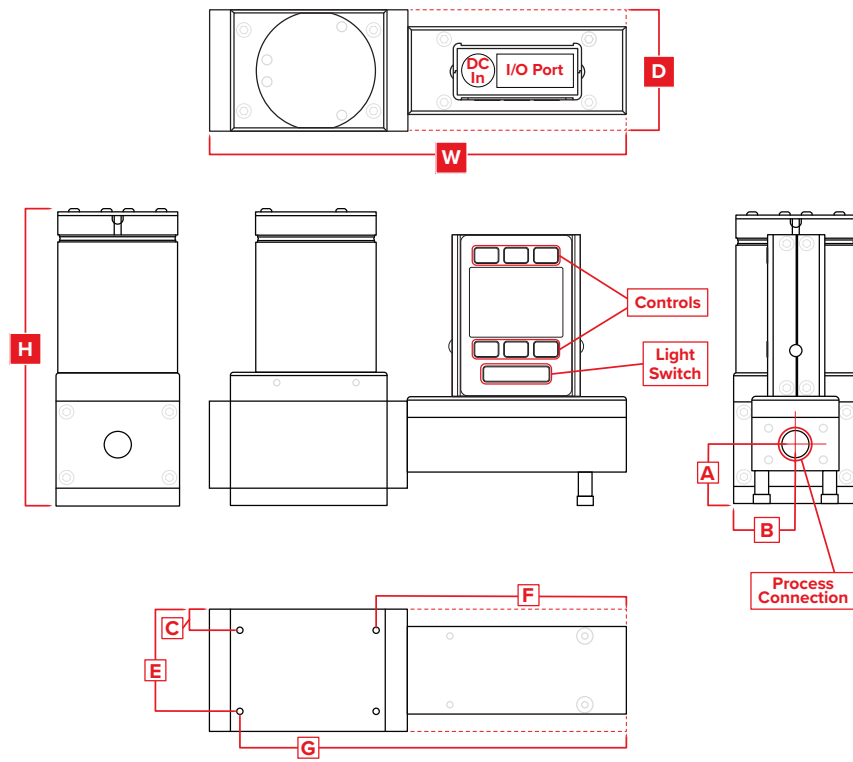


2 SLPM

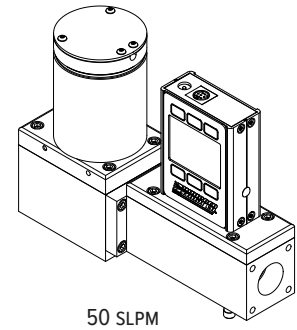
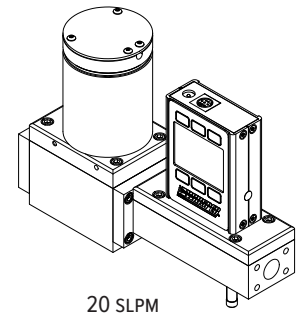
DIMENSIONS											
Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G
10–20 sccm	MCW	≈ 1.1 lb	3.897 in	3.338 in	1.050 in	0.336 in	0.525 in	0.125 in	0.925 in	0.150 in	2.225 in
		≈ 0.5 kg	98.98 mm	84.79 mm	26.67 mm	8.53 mm	13.34 mm	3.18 mm	23.50 mm	3.81 mm	56.52 mm
50 sccm–2 SLPM	MCW	≈ 1.2 lb	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

## RANGE SPECIFIC SPECIFICATIONS

Full scale flow	Type	Pressure drop at full scale flow venting to atmosphere <sup>5</sup>	Process connections <sup>6</sup>	Mount tap size
5 SLPM	MCRW	0.10 PSID	¼" NPT Female	4× 8-32 UNC 0.375 in [9.53 mm]
10 SLPM	MCRW	0.12 PSID	¼" NPT Female	4× 8-32 UNC 0.375 in [9.53 mm]
20 SLPM	MCRW	0.26 PSID	¼" NPT Female	4× 8-32 UNC 0.375 in [9.53 mm]
40 SLPM	MCRW	0.14 PSID	½" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]
50 SLPM	MCRW	0.17 PSID	¾" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]
100 SLPM	MCRW	0.30 PSID	¾" NPT Female	4× 8-32 UNC 0.328 in [8.33 mm]



## Representative Examples



## DIMENSIONS

Full scale flow	Type	Weight	Height	Width	Depth	A	B	C	E	F	G
5 SLPM	MCRW	≈ 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
10 SLPM	MCRW	≈ 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
20 SLPM	MCRW	≈ 9.0 lb	4.367 in	4.000 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	101.60 mm	40.64 mm	12.70 mm	20.32 mm	4.45 mm	36.20 mm	19.05 mm	82.55 mm
40 SLPM	MCRW	≈ 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
		≈ 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
50 SLPM–100 SLPM	MCRW	≈ 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
		≈ 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