358 Series MCQ mass flow controllers

Laminar mass flow controllers for line pressures to 22.1 bar a, 50 to 12 000 sL/min full scale

The MCQ controller sets and measures gas mass flow and also reports volumetric flow, pressure and temperature on its display. It operates at line pressures up to 22.1 bar a. It stores 98 gases and 20 user mixes. RS-232 and Modbus RTU are standard; analogue I/O and fieldbus interfaces are options.



12 000	0.5–100 %	from 100 ms	98	22.1 bar a
Largest full scale in sL/min; smallest 50 sL/min	Steady-state control range of full scale	Typical control response (T63)	Stored gases, plus 20 user-defined mixes	Maximum operating pressure (320 psia)

Performance

Reference conditions	Standard 21.11 °C, normal 0 °C, at 1013.25 mbar; configurable
Accuracy [1]	±2 % FS
Repeatability (2σ)	±(0.1 % rd + 0.02 % FS)
Control range	0.5–100 % FS, steady state
Turndown ratio	200:1
Control response (T63), adjustable, flow dependent	As fast as 100 ms
Indication response	Typically < 10 ms, flow rate dependent
Sensor response	< 1 ms
Warm-up time	Typically < 1 s
Temperature sensitivity	Zero and span ±0.01 % FS/°C from 25 °C
Pressure sensitivity	Zero: ±0.01 % FS/atm from tare pressure Span: ±0.1 % rd/atm from calibration conditions
Pressure accuracy [1]	Above 1 atm: ±0.5 % rd Below 1 atm: ±4.8 mbar (±0.07 psia)
Temperature accuracy	±0.75 °C

Operating conditions

Operating pressure	0.79–22.1 bar a (11.5–320 psia)
Damage limit	Line: above 27.6 bar a (400 psia)
Temperature	−10 to 60 °C, ambient and gas
Humidity	0–95 % non-condensing

Mechanical

Wetted materials	Stainless steel 302, 303, 304, 316L, 410; FKM, alumina ceramic, acetal, nylon Glass, gold, silicon, polyamide, heat-cured epoxy and silicone rubber
Ingress protection	IP40
Orientation sensitivity	Valves must be upright
Valve	Normally closed
Mounting holes	4–8× 8-32 UNC, 8.38 mm deep

Electrical and communication

Analogue I/O	4–20 mA, 0–5 V DC, 1–5 V DC or 0–10 V DC; adds ±0.1 % FS uncertainty
Digital I/O	Standard: RS-232 and Modbus RTU Options: RS-485, Modbus TCP/IP, DeviceNet, EtherCAT, EtherNet/IP, PROFIBUS, PROFINET, IO-Link
Connector	6-pin locking, 8-pin mini-DIN, 8-pin M12, DB-9 or DB-15
Supply [2]	50–3000 sL/min: 24 V DC, 1 A 5000 sL/min, two valves: 24 V DC, 2 A 10 000–12 000 sL/min: 24 V DC, 2.1 A 4–20 mA output: add 40 mA
Update rates [2]	Digital: 40 Hz at 19 200 baud Analogue: 1 kHz; display: 10 Hz

Display and gases

Display	Monochrome LCD or colour TFT, touchpad; shows mass and volumetric flow, pressure, temperature, set point
Gas library	98 gases, properties matched to NIST REFPROP 10 across the operating range
Gas mixes	20 user mixes of up to 5 gases, 0.01 % resolution
Totaliser	±0.1 % rd additional uncertainty

Ranges, pressure drop, connections (21.11 °C, 1013.25 mbar)

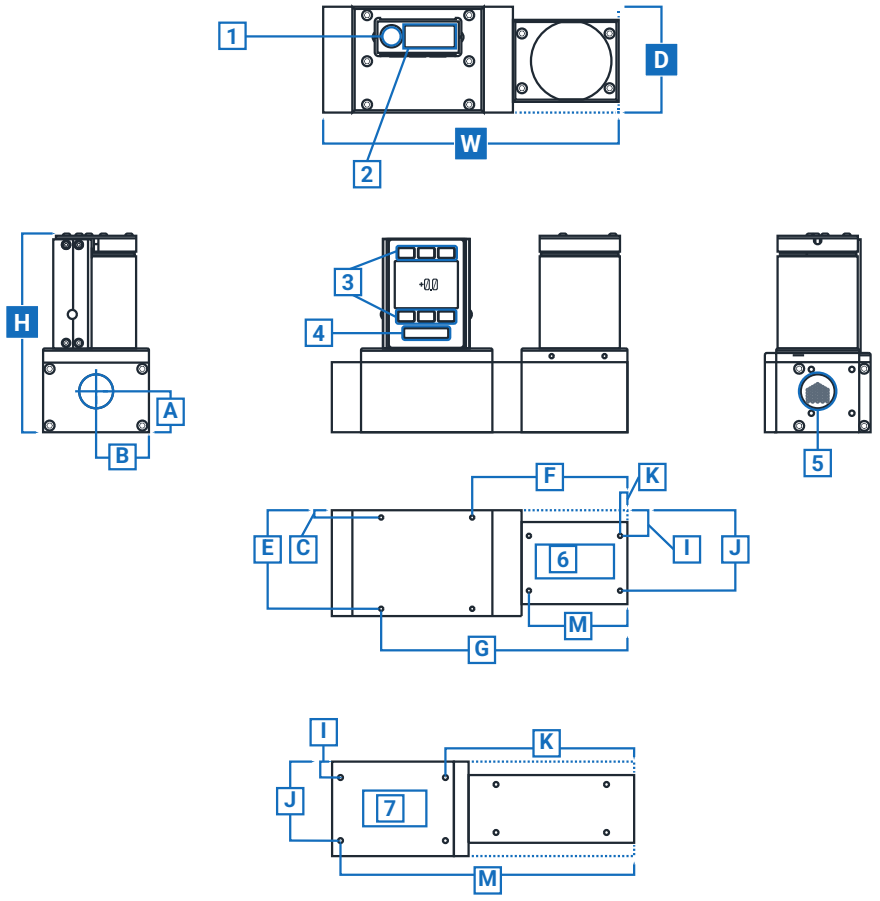
Full scale	Δp, mbar	psid	Process connection
50 sL/min	138	2.0	1/4" NPT female
100 sL/min	221	3.2	1/4" NPT female
250 sL/min	165	2.4	1/2" NPT female
500 sL/min	448	6.5	3/4" NPT female
1000 sL/min	965	14.0	3/4" NPT female

Full scale	Δp, mbar	psid	Process connection
2000 sL/min	593	8.6	3/4" NPT female
3000 sL/min	1158	16.8	1 1/4" NPT female
5000 sL/min	972	14.1	1 1/2" NPT female
10 000 sL/min	3930	57.0	2" NPT female
12 000 sL/min	4964	72.0	2" NPT female

Δp at full scale, venting air to atmosphere. The 5000 sL/min controller has two valves.

Weight (21.11 °C, 1013.25 mbar)

Full scale	Weight, kg
50–100 sL/min	≈ 4.1
250 sL/min	≈ 4.1
500–1000 sL/min	≈ 4.1
2000 sL/min	≈ 5.4
3000 sL/min	≈ 5.4
5000 sL/min	≈ 12.7
10 000–12 000 sL/min	≈ 14.5



1 DC power input
2 Input and output port
3 Controls
4 Backlight switch
5 Process connection
6 Downstream valve
7 Upstream valve, 50–100 sL/min

Top, front, side and bottom views. The lower bottom view shows the 50–100 sL/min controller, whose valve sits upstream. The table gives the dimensions per full scale.

Dimensions in mm (21.11 °C, 1013.25 mbar)

Full scale	W	D	H	A	B	C	E	F	G	I	J	K	M
50–100 sL/min	204.0	57.2	139.7	28.4	28.6	–	–	–	–	9.5	47.6	125.7	189.2
250 sL/min	194.3	57.2	139.6	28.4	28.6	4.4	36.2	111.8	175.3	9.5	47.6	14.6	78.1
500–1000 sL/min	184.8	57.2	139.6	28.4	28.6	4.4	36.2	102.2	165.7	9.5	47.6	5.1	68.6
2000 sL/min	205.7	73.7	139.6	28.4	36.8	5.1	68.6	108.0	171.5	17.8	55.9	5.1	68.6
3000 sL/min	226.1	73.7	139.6	24.4	36.8	5.1	68.6	128.3	191.8	17.8	55.9	25.4	88.9
5000 sL/min	254.0	114.3	160.8	36.8	57.2	16.0	98.6	151.3	214.8	–	–	–	–
10 000–12 000 sL/min	304.8	97.5	202.3	43.2	48.8	7.5	90.0	163.8	227.3	13.2	84.3	40.6	91.4

Standard versions, air (21.11 °C, 1013.25 mbar)

Full scale	Order code
50 sL/min	35835Q
100 sL/min	35836Q
250 sL/min	Ask Analyt-MTC
500 sL/min	Ask Analyt-MTC
1000 sL/min	Ask Analyt-MTC

Full scale	Order code
2000 sL/min	Ask Analyt-MTC
3000 sL/min	Ask Analyt-MTC
5000 sL/min	Ask Analyt-MTC
10 000 sL/min	Ask Analyt-MTC
12 000 sL/min	Ask Analyt-MTC

Order from Analyt-MTC with the order codes. Calibrated for air; another gas or a gas mix is selected on the controller. For any other version, contact Analyt-MTC.

Options

Weatherproof housing
Compression, face-seal, push-to-connect, BSPP or SAE connections
Swagelok®-compatible tube, VCO® or VCR® connections

Notes

1. rd = of reading, FS = of full scale. Accuracy holds after tare at equilibrium and includes repeatability and linearity. sL/min and smL/min at 21.11 °C, 1013.25 mbar.
2. Fieldbus versions differ in supply and data rates; ask Analyt-MTC for their documentation.

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