

1 CMOSens® EM1 Mass Flow Meter Performance

Table 1: Specifications of EM1 Mass Flow Meter – low flow ranges.

All data unless otherwise noted apply for calib. cond: 20°C, N₂, 1013 mbar absolute pressure, horizontal mounting position, straight inlet fitting (length min. 5 x ∅)

Specification	Condition	Value		Unit
Model Number		EM1_H...	EM1_L...	
Flow Range ¹		0-0.05	0 – 0.5	l _n /min
Performance				
Accuracy ^{2,3}	2.5 - 100% FS ⁴		3.0	% m.v. ⁵
	<2.5 % FS		0.075	% FS.
	10 - 100% FS	5.0		% m.v.
	<10 % FS	0.5		% FS
Repeatability	2.5 - 100% FS		0.3	% m.v.
	<2.5 % FS		0.02	% FS
	10 - 100% FS	0.5		% m.v.
	<10 % FS	0.05		% FS
Offset		<0.5	< 0.1	% FS
Standard Calibration Gas ⁶		N ₂		
Dynamic Range		>= 1:100		
Operating Temperature Ambient/Gas		0 – 50 / 32 – 122		°C / °F
Temp. Coeff. Zero		0.01		%FS / °C
Temp. Coeff. Span		0.1		% m.v. / °C
Position Sensitivity correction	<5% FS	0.1		% FS
Pressure Coefficient		0.15% / bar – 0.01 % / psi		
Pressure Drop at Full Flow ⁷	straight inlet	<2 / 0.029	2 / 0.029	mbar / psi

Table 2: Specifications of EM1 Mass Flow Meter – medium and high flow ranges.

All data unless otherwise noted apply for calib. cond.: 20°C, N₂, 1013 mbar absolute pressure, horizontal mounting position, straight inlet fitting (length min. 5 x ∅)

Specification	Condition	Value		Unit
Model Number		EM1_R...	EM1_V...	
Flow Range ⁸		0 – 20	0 – 200	l _n /min
Performance				
Accuracy ^{9,10}	1 - 100% FS ¹¹	3	5	% m.v. ¹²
	<1 % FS	0.03	0.05	% FS
Repeatability	10-100% FS	0.3	0.5	% m.v.
	<10% FS	0.02	0.02	% FS
Offset		< 0.03	< 0.03	% FS
Standard Calibration Gas ¹³		Air		
Dynamic Range		>= 1:100		
Operating Temperature Ambient/Gas		0 – 50 / 32 – 122		°C / °F
Temp. Coeff. Zero		0.01		%FS / °C
Temp. Coeff. Span		0.1		% m.v. / °C
Position Sensitivity correction	<5% FS	0.1		% FS
Pressure Coefficient		0.15% / bar – 0.01 % / psi		
Pressure Drop at Full Flow ¹⁴	straight inlet	20 / 0.29	100 / 1.45	mbar / psi

¹ Other ranges for volume applications on request² Including Offset, Non-Linearity, Hysteresis³ Better accuracy available on request⁴ In % of full scale (FS)⁵ In % of measured value (m.v.) = of rate = of reading⁶ Other gases for volume applications on request⁷ All data for 1'013 mbar, 1 bar = 100 000 Pa = 401.9 inch H₂O = 14.5 psi. Lower pressure drop available for volume applications on request.⁸ Other ranges for volume applications on request⁹ Including Offset, Non-Linearity, Hysteresis¹⁰ Better accuracy available on request¹¹ In % of full scale (FS)¹² In % of measured value (m.v.) = of rate = of reading¹³ Other gases for volume applications on request¹⁴ All data for 1'013 mbar, 1 bar = 100 000 Pa = 401.9 inch H₂O = 14.5 psi. Lower pressure drop available for volume applications on request.

Table 3: Additional Specifications of EM1 Mass Flow Meter – all flow ranges.

Specification	Condition	Value	Unit
Temperature Sensor (measured media)			
Dynamic Range		0 – 60 / 32 – 140	°C / °F
Resolution		0.1	K
Accuracy		2	K
Electrical			
Output		RS 232	
Supply Voltage		+ 7 – + 18	VDC
Electrical Connector		Molex	
Mechanical			
Length		13.6 / 5.35	cm / inch
Width		4.4 / 1.73	cm / inch
Height		8.18 / 3.2	cm / inch
Weight (straight / angle connector)		165 / 105	g
Mechanical Connector		G 3/8	inch
Maximum Operating Pressure ¹		8 / 116	bar / psi
Burst Pressure		40 / 580	bar / psi
Leak-Integrity		1 x 10 e-4	mbar l/s He
Material			
Wetted Materials		Si, Si ₃ N ₄ , SiOx, Gold, Viton®, Epoxy, Glob Top, Polycarbonate	
RoHS / WEEE compliance		Yes.	

Table 4: CMOSens® EM1 Mass Flow Meter Resolution (EM1_V) at different Flow Levels and integration time.

Flow Level	Readout Frequency 200 Hz	Readout Frequency 50 Hz	Readout Frequency 12.5 Hz	Readout Frequency 1.56 Hz
Flow Level				
200 l/min	13 l/min	3.5 l/min	0.9 l/min	0.11 l/min
50 l/min	4.0 l/min	1.0 l/min	0.3 l/min	0.03 l/min
< 5 l/min	1.0 l/min	0.25 l/min	0.06 l/min	0.0143 l/min
Mass Flow Integration Time				
	5 ms	20 ms	80 ms	640 ms

¹ 12.0 bar / 174 psi for short time operation, higher values for volume applications on request