

## Mass Airflow Sensors

### Description

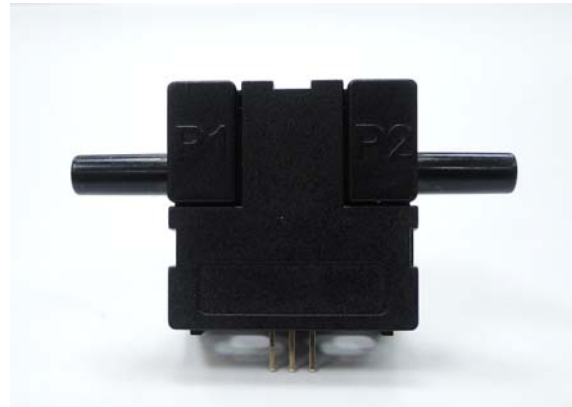
S'mate designed the FLA series of mass airflow sensors incorporate the latest MEMS and microelectronics innovations. The sensor die uses a pair of thermopiles to detect changes in temperature gradient caused by mass flow, delivering ultra-low noise-to-signal, and unsurpassed repeatability. The "solid state" thermal isolation on the sensor die eliminates the need for surface cavities or fragile membranes, used in competing solutions, making the sensor resistant to clogging and pressure shock. The sensor's internal signal conditioning circuitry leverages an off-the-shelf microcontroller, providing proven reliability and low cost.

The FLA series of mass airflow sensors covers the ranges from 10 sccm to 10000 sccm. The sensors are fully calibrated and compensated over the temperature range of 0 to 50 °C (32 to 122 °F). The linearized analog output (1 to 5 V) provides customers with maximum flexibility and ease-of-use.

Bidirectional air flow versions are available upon request. Consult Factory

### Applications

- Medical respirators and ventilators
- Patient monitoring systems
- Anesthesia delivery machines
- Nebulizers
- Oxygen concentrators
- Sleep apnea machines
- Ventricular assistance devices
- Environmental monitoring
- Analytical instrumentation
- Gas leak detection
- Filter monitoring and VAV systems in HVAC
- Process Control



### Features

- Unsurpassed performance in a robust and cost effective package
- High accuracy and repeatability (2% F.S. Max)
- Linear output and temperature compensation
- Long-term stability with minimal null drift
- "Solid state" sensing core (no surface cavity or fragile membrane), resistant to clogging and pressure shock
- Analog output (1 to 5 V)
- High sensitivity at very low flows
- Fast response time (1 ms)

### Absolute Maximum Ratings

- Operating Temperature: -25 °C to 85 °C
- Storage Temperature: -40 °C to 90 °C
- Humidity: 0 to 100% RH\*
- Shock 100 g peak (5 drops, 6 axis)
- Common Mode Pressure 25 psi\*\*

\*Sensor is resistant to water condensation

\*\*Packaging with higher common model pressure rating is available

## ELECTRICAL CHARACTERISTICS

Test Conditions:  $V_{in}=10\pm 0.01VDC$ ,  $T_a=25^{\circ}C$ . Relative Humidity:  $40\%<RH<60\%$

Maximum Operating Temperature Range  $-25^{\circ}C$  to  $+85^{\circ}C$

	Flow Range				
FLA101U-2210	0 .. 10			SCCM	
FLA301U-2210	0 .. 30			SCCM	
FLA202U-2210	0 .. 200			SCCM	
FLA103U-2210	0 .. 1000			SCCM	
FLA203U-2210	0 .. 2000			SCCM	
FLA303U-2210	0 .. 3000			SCCM	
FLA104U-2210	0 .. 10000			SCCM	
PARAMETERS	MIN	TYP	MAX	UNIT	CONDITIONS
	0		2000	SCCM	
Analog Voltage Output <sup>2</sup>	1		5	VDC	
Null Voltage <sup>3</sup>	.95	1	1.05	VDC	
Null Drift		0.2		% / Year	Full Scale
Full Scale Voltage	4.94	5.00	5.02	VDC	
Temperature Drift			4	%	0°C to +50°C
Repeatability		0.1		%	Full Scale
Load		100		KΩ	
Accuracy <sup>4</sup> (Full Scale)		1.5	2	%	
Response Time		1	3	mSec	
Supply Voltage	8	10	14	VDC	
Supply Current	21		25	mA	
Inrush Current <sup>5</sup>		550		mA	Duration: 3 ms
Wetted Materials	Silicon carbide, Epoxy, PPS, FR4, Silicone as static seal				

1. Custom ranges available between 10 and 10000 sccm

2. See Linear Output Flow Rate Calculation on Page 3

3. Null tolerance for FLA10U-2210 is  $\pm 0.1V$

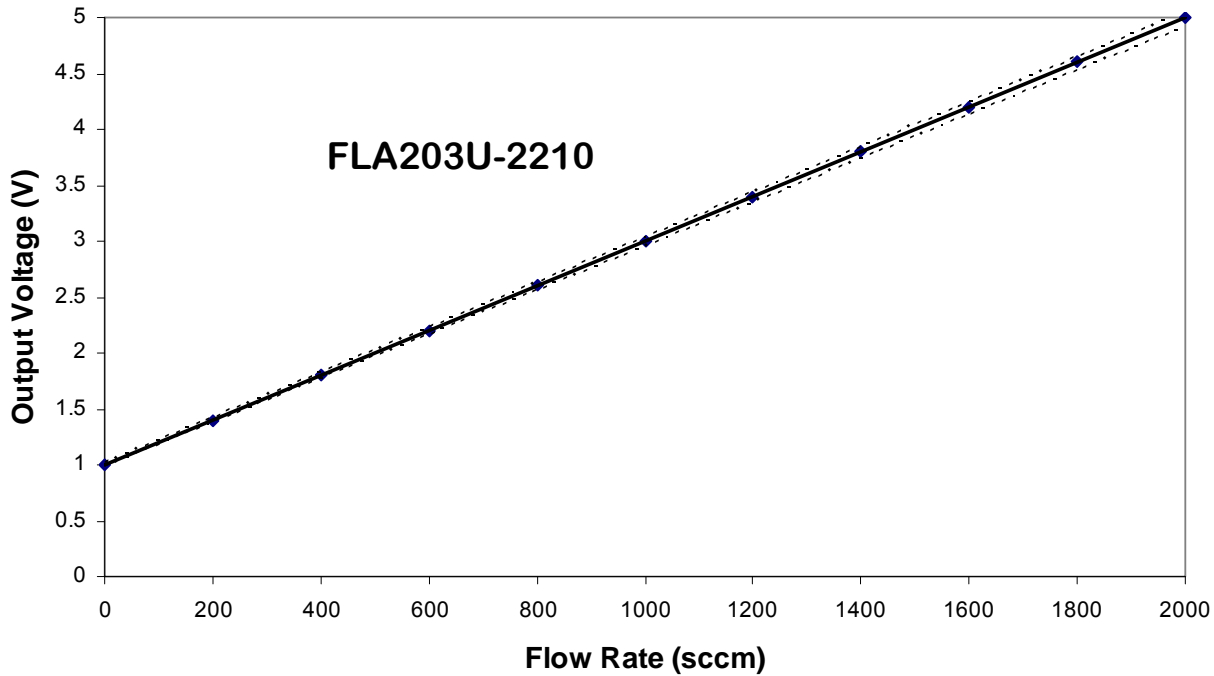
4. Accuracy for FLA10U-2210 and FLA10U-2210 is 2.5% F.S. Max

5. A series resistance of 5 ohms on the source supply will reduce inrush current to under 250 mA (duration: 8 ms)

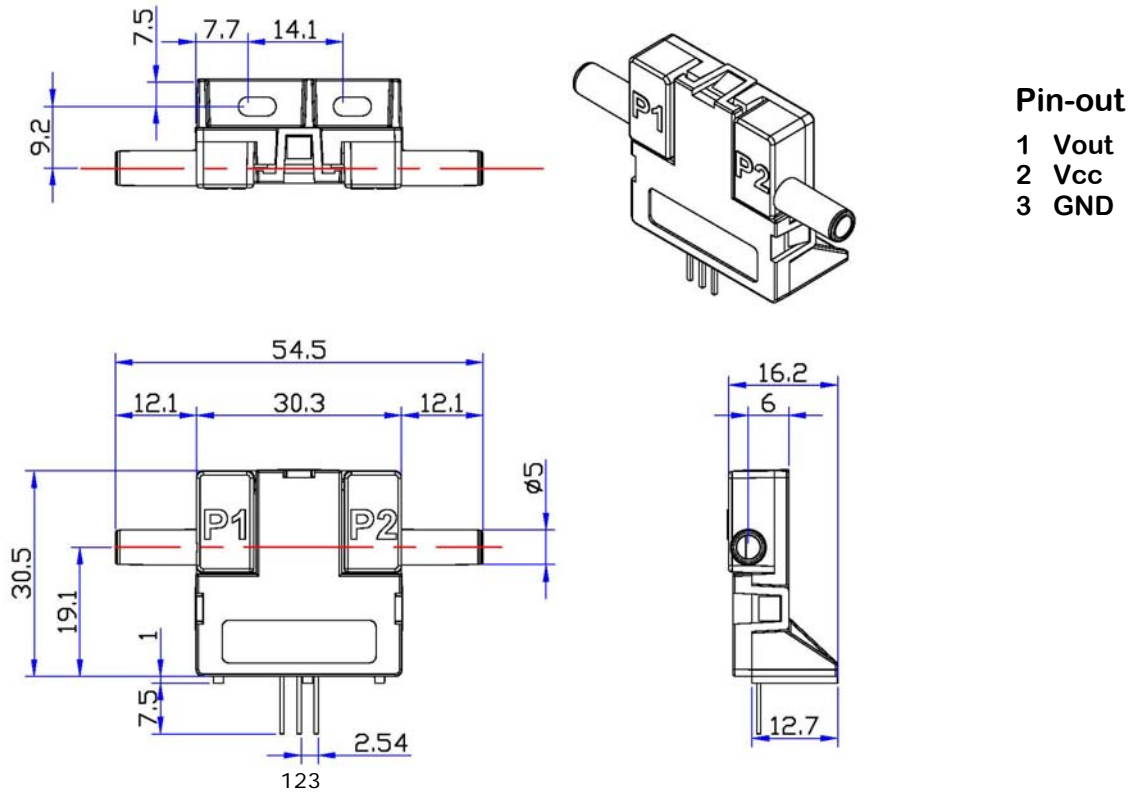
## Linear Output

$$\text{Flow Rate} = [(V_{\text{out}} - 1 \text{ V}) / 4 \text{ V}] \times \text{Full Scale Flow Rate}$$

For example, using the FLA203U-2210 below, the device has a Full Scale Flow Rate of 2000 sccm. When the Output Voltage reads 2.5V, the Flow Rate will be:  $[(2.5\text{V}-1\text{V})/4\text{V} \times 2000 \text{ sccm}] = 750 \text{ sccm}$



**Package Dimensions**



**Ordering Information**

Part Number	Specifications
FLA101U-2210	1 to 5 V, linear; 0 to 10 SCCM
FLA301U-2210	1 to 5 V, linear; 0 to 30 SCCM
FLA202U-2210	1 to 5 V, linear; 0 to 200 SCCM
FLA103U-2210	1 to 5 V, linear; 0 to 1000 SCCM
FLA203U-2210	1 to 5 V, linear; 0 to 2000 SCCM
FLA303U-2210	1 to 5 V, linear; 0 to 3000 SCCM
FLA104U-2210	1 to 5 V, linear; 0 to 10000 SCCM