

Datasheet SFM3400-AW
Preliminary Datasheet SFM3400-D
Digital Flow Meter for Neonatal/Pediatric Medical Applications



- Flow range: $\pm 33\text{slm}$ (bidirectional)
- Small dead space < 1ml
- Re-use (-AW) version
- Preliminary single-use (-D) version
- Very fast update time (0.5ms)

Product Summary

The SFM3400 sensor series is Sensirion's digital flow meter designed for neonatal/pediatric medical applications. It measures the flow rate of **air, oxygen and other non-aggressive gases** with superb accuracy. The special design of the flow channel results in a **very small dead space**.

The SFM3400-AW is designed for multiple use with the **ability to withstand autoclave procedures**. The single-use version SFM3400-D is in development stage with preliminary specifications identical to SFM3400-AW. Therefore, the SFM3400 series is extremely well suited for proximal flow measurements in neonatal/pediatric medical ventilation and other respiratory applications.

The SFM3400 series has been designed with the use by medical professionals in mind. It features **medical cones** for pneumatic connection to standard breathing circuits and a mechanical interface for **easy and reliable electrical reconnection**. The sensor element, signal processing and digital calibration are on a single microchip assuring **very fast signal processing time, best-in-class accuracy** and **superior robustness** to rough handling and adverse conditions.

The well-proven and patented **CMOSens® sensor technology** is perfectly suited for high-quality mass production and is the ideal choice for demanding and cost-sensitive OEM applications.

Applications

- Proximal flow measurement for infants / neonates
- Expiratory flow measurement for infants / neonates
- Ventilation & Anesthesia for infants / neonates
- Respiratory measurements for infants / neonates
- Metabolic Measurements for infants / neonates

OEM options

A variety of custom options can be implemented for high-volume OEM applications (custom flow rates, calibration for other gases, different body form factor, disposable option etc.). Contact us for more information.

Sensor chip

The SFM3400 flow meter features a fifth-generation silicon sensor chip. In addition to a thermal mass flow sensor element, the chip contains an amplifier, A/D converter, EEPROM memory, digital signal processing circuitry, and interface. Due to seamless integration of signal acquisition and processing on the single silicon die significant performance and cost benefits are achieved.

1.1 Physical Specifications ¹

Parameter	Condition	Value		Unit
Flow Range		-33 ... +33		slm ²
		Typical	Max ³	
Accuracy ⁴	span <33 slm offset	± 3 ⁵ ± 0.02 ⁵	± 10 ⁶ ± 0.05	% m.v. ⁷ slm ²
Noise Level ^{4,8}	span <33slm offset	0.5% ⁹ 0.005 ⁹	3.5% 0.025	% m.v. ⁷ slm ²
Accuracy shift for deviation from reference temperature 25°C	span offset		1% 0.01	% m.v./ 10°C slm / 10°C
Resolution (14bit)	span offset	0.06 ⁹ 0.005 ⁹	0.2 0.01	% m.v. ⁷ slm ²
Pressure Drop	@ 5 slm @ 10 slm @ 25 slm	100 / 0.4 ⁹ 250 / 1.0 ⁹ 900 / 3.6 ⁹	150 / 0.6 300 / 1.2 1500 / 6.0	Pa / inH ₂ O Pa / inH ₂ O Pa / inH ₂ O

1.2 Ambient conditions

Parameter	Condition	Value	Unit
Calibrated Temperature Range	dry gas	+10 ... +50	°C
Operating Temperature Range	10-95% rel. hum. (non cond.)	+5 ... +50	°C
Storage Temperature	10-95% rel. hum. (non cond.)	-40 ... +70	°C
Shelf Life for SFM3400-D	15°C - 35°C; 30 - 70 % rel. hum. storage in original packaging	3	years
Operating Pressure Range	absolute	0.54 – 1.1	bar
Burst Overpressure	gauge	0.3	bar

1.3 Media compatibility

Parameter	Value
Calibration ¹⁰	Air
Media Compatibility	Air (non-condensing), N ₂ , O ₂ , other non- aggressive gases
Wetted Materials -AW	Si, Si ₃ N ₄ , SiO _x , gold, PPSU, silicone
Wetted Materials -D	Si, Si ₃ N ₄ , SiO _x , gold, MABS, silicone, epoxy
RoHS, REACH	RoHS and REACH compliant

¹ Reference conditions are temperature = 25°C, absolute pressure = 966 mbar, horizontal flow and Vdd = 5V

² slm: mass flow measured in liters per minute at standard conditions (T = 20 °C, p = 1013.25 mbar)

³ For "Max" no sensor measured outside of this limit will be shipped and a CpK of 1.33 is targeted

⁴ For accuracy, noise level or resolution the total value is the sum of the offset and span values

⁵ This value corresponds to a CpK of 0.67 (95% of sensors within the "Typical" limit)

⁶ Dependent on tracheal tube diameter

⁷ % m.v. = % measured value = % of reading

⁸ Noise level defined as standard deviation of individual sensor readings, measured at full sampling rate

⁹ Average value

¹⁰ Contact Sensirion for information about other gases, wider calibrated temperature ranges and higher storage temperatures