Mass Flow Controllers

- Ultra fast gas flow control
- Excellent flow repeatability
- Wide dynamic range
- Long term stability and reliability
- Customizable control solutions

CMOSens® TECHNOLOGY

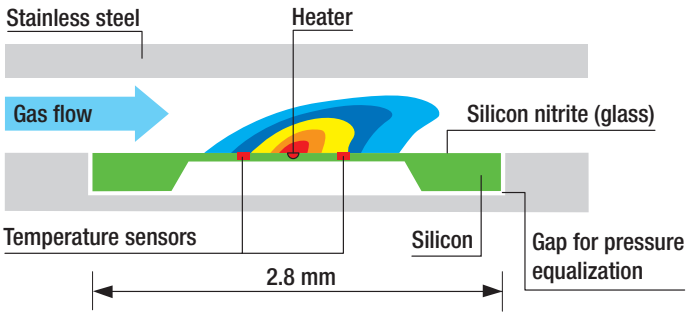
SENSIRION THE SENSOR COMPANY

Mass Flow Controllers for Gases

High Performance Gas Flow Control

Sensirion's mass flow controllers are characterized by fast and accurate control of gas flow over a wide dynamic range. Based on the innovative CMOSens® Technology, the heart of these mass flow controllers is a calorimetric microsensor (MEMS), which is integrated with the complete signal conditioning electronics on one single chip. While the flow is measured using the thermal measurement principle (see illustration below), efficient control is provided by an analog controlling circuit. This unique integrated technological approach results in excellent performance and reliability – at a very attractive cost.

SFC4000



Thermal measurement principle for CMOSens® flow sensors

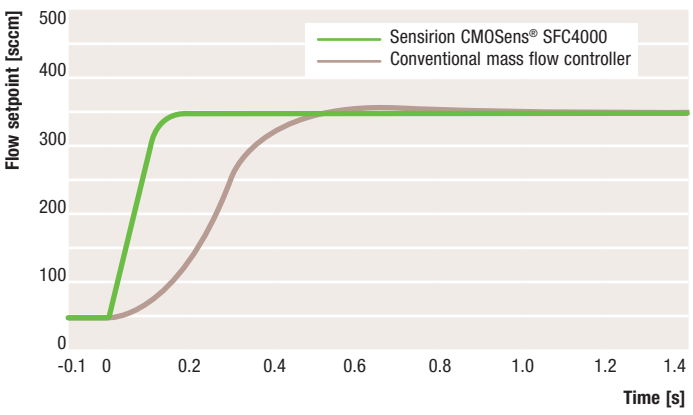
Extremely Stable SFC4000

The high performance SFC4000 provides stable and accurate control of gas flows over a wide dynamic control range of more than 1:1 000. The calibrated and temperature-compensated digital sensor signal is converted directly on the CMOSens® chip into a PWM signal, which is used by a fast analog controlling circuit to operate the valve. The technology accounts for a reading accuracy of within 0.8 % and exceptional repeatability to within 0.1 %. Thanks to the digital signal processing at chip level and the non-ratiometric output, the mass flow controllers are insusceptible to electromagnetic interferences from nearby power sources for other devices.

Model	SFC3000		SFC4000	
Version	SFC3100	SFC3200	SFC4100	SFC4200
Flow range[1]	0…200 mln/min	0…10 ln/min	0…50 sccm/0…500 sccm	0…5 slm/0…20 slm
Repeatabilitiy, % of reading	0.1 %	0.1 %	0.1 %	0.1 %
Accuracy, % of reading	2.0 %	2.0 %	0.8 %	1.0 %
Pressure drop at full flow	< 2 bar	< 2 bar	< 0.5 bar/< 2 bar	< 2 bar/< 3 bar
Interface (Input, Output)	digital, RS485		analog, 0..5.0 Vdc	
Settling time	< 300 ms	< 500 ms	< 100 ms	< 100 ms/< 250 ms
Available calibrations	Air, N2, Ar, He, H2 and others on request		Air, N2, Ar, He, H2, SF6, C4F8 and others on request	
Gastype switchable by software	x	x		
Power supply nominal	15 Vdc		15..24 Vdc	
Power supply max.	14.25..15.75 Vdc		14...26Vdc	
Electric connector	9pin Sub-D		9pin Sub-D	
Mounting, gas connection	Downmount		Downmount, Swagelok, VCR, VCO	
Max. working pressure	10 bar		10 bar	
Min. order quantity	100	>200	5	5
Recommended for:				
Analytical Instruments	x	x		
Process Automation			x	x
OEM integration	x	x	x	x

[1] mln = milliliter norm; ln = liter norm; slm = standard liters per minute; sccm = standard cubic centimeter per minute

The SFC4000 uses the patented CMOSens® Technology that permits an extremely fast response time, compared to conventional mass flow controllers, of less than 100 ms (see diagram below). This extraordinary speed is achieved through the small thermal mass of the CMOS sensor combined with its fast integrated electronics. This particular characteristic makes it an especially valuable device for general process automation applications. That is why leading system manufacturers for dry etching and surface coating prefer Sensirion's SFC4000.



Comparison between a conventional mass flow controller and the SFC4000 with CMOSens® Technology

Compact Size Digital SFC3000

The fully digital CMOSens® mass flow controllers of the SFC3000 family feature a digital RS485 interface. The analog sensor signal is converted into a digital calibrated and temperature-compensated signal directly on the chip. It requires a standard supply voltage of +15V and can be operated at gas pressures of up to 10 bar. Different gas types and control ranges can be switched even during operation. Its flexibility, compact size and high dynamic range together with its outstanding low flow capabilities makes it a perfect fit for analytical instruments and other applications with similar requirements.

SFC3000

Customized Solutions

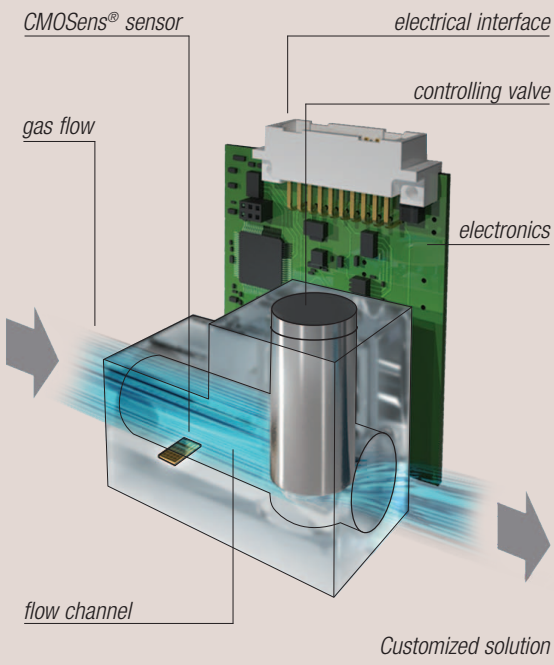
Our cutting-edge sensor technology combined with our wealth of experience as a solution provider enables us to support high performance gas flow control systems with customized sensors and controllers.

Our goal in doing so is to develop a deep understanding of the requirements of our customers, which can then form the basis for a tailor-made solution. Thanks to our outstanding technology, our customers benefit from several advantages:

Low flow capabilities
Our experience and expertise in fluid dynamics and flow channel design enable our mass flow controllers to control gas flows in extremely low ranges, down to fractions of milliliters per minute.

High speed flow control
The MEMS sensor integrated on a CMOS chip permits ultra fast response times because of its small thermal mass. Sensirion can realize settling times of around 100 ms, which remains unrivalled on the mass flow controller market.

Flexibility and cost efficiency
With our advanced technology, we have the flexibility to address the customer's requirements in a way that ensures a customized sensor solution that is both high performance and cost efficient.



About Sensirion

Sensirion AG, with headquarters in Staefa, Switzerland, is a leading manufacturer of CMOS sensor components and systems for a wide variety of OEM applications (e.g. in the medical, automotive, HVAC and consumer industries). Our current four business units focus on the following categories of high-quality products:

- **Humidity and temperature sensors**
- **Liquid flow sensors**
- **Gas flow sensor solutions (mass flow meters and controllers)**
- **Differential pressure sensors**

With a growing, highly qualified staff of more than 200 employees, Sensirion stands for continuous product innovation and excellent technical support. To provide international service with guaranteed high quality, we rely on a global sales and support network consisting of subsidiaries in the USA, China, Japan and Korea as well as about 10 independent distributors.

Our products are distinguished by their use of patented CMOSens® Technology, which integrates the sensor element and signal processing on a single chip. In the highly competitive global market, this system integration offers unbeatable customer benefits – in particular high reliability and precision at low cost.

Sensirion's competence as a reliable OEM partner is underlined by a distinct quality approach and a professional quality management system, which is certified in accordance with the ISO 9001 and ISO/TS 16949 standards.

CMOSens®
TECHNOLOGY

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