Mass Flow Controllers for Gases

Experts for Smart Sensor Solutions

SENSIRION
THE SENSOR COMPANY

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.

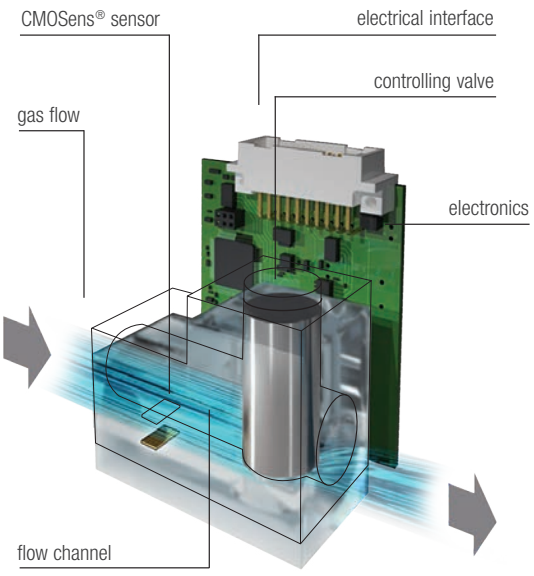
HIGH SPEED FLOW CONTROL

The MEMS sensor integrated on a CMOS chip permits ultra-fast response times due to its small thermal mass. Sensirion can realize settling times of better than 50 ms, which remains unrivalled on the mass flow controller market.

FLEXIBILITY AND COST EFFICIENCY

With our 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. In specific applications, emphasis can be made on performance or on price-efficiency.

Medical



Diffusion Furnaces

Analytical Instruments
Fuel Cells
Deep Reactive Ion Etching

Selection of Sensirion Mass Flow Controllers

VERSATILE SFC5400

The SFC5400 is a standardized series of Sensirion's digital mass flow controllers. It enables extremely precise and long-term stable measurement and control of mass flow over a wide control range of 1000:1. Based on the innovative CMOSens® Technology, it has an extremely fast response time. Best-in-class settling time of about 50 ms makes it the first choice for the most demanding applications. In addition, the SFC5400 mass flow controller features a multi-gas option with gas recognition and self-test capability. It is available with various communication interfaces (digital and analog) and mechanical fittings. The SFC5400 mass flow controller is the ideal solution for controlling and monitoring mass flow in diverse applications in the industrial and medical markets. The SFM5400 is a mass flow meter series based on Sensirion's mass flow controller platform with similar performance characteristics.

SFC5300 FOR HIGH VOLUME APPLICATIONS

The SFC5300 is a customizable version of Sensirion's mass flow controller and therefore ideally suited for OEMs. The compact product is characterized by a very attractive price. It is available in large quantities only. Various flow ranges from 1 sccm[1] up to 10 slm[1] as well as calibration for various gases are available. The specifications listed below represent an example of a possible product; customized solutions are available on request.

EK-F5X FOR EASY AND FAST TESTING

The EK-F5X evaluation kit is a simple test set for the evaluation and qualification of Sensirion's SFC5X00 mass flow controller series and SFM5X00 mass flow meter series. Precise measurements for test purposes can be made quickly and inexpensively with this easy-to-use kit. The evaluation kit consists of a RS485-to-USB adapter cable, a 100/240V AC adapter, a USB memory stick with PC software, and is designed for RS485 based mass flow controllers.

Model	SFC5400		SFM5400		SFC5300	SFM5300
Flow range[1,4]	50, 100, 200, 500 sccm; 1, 2, 5, 10 slm	20, 50, 100, 200 slm	50, 100, 200, 500 sccm; 1, 2, 5, 10 slm	20, 50, 100, 200 slm	50, 100, 200, 500 sccm; 1, 2, 5, 10 slm	
Repeatability, % of reading[2]	0.1% s.p.	0.2% s.p.	0.1% s.p.	0.2% s.p.	0.2% s.p.	
Repeatability, % of full scale[2]	0.01% FS	0.02% FS	0.01% FS	0.02% FS	0.02% FS	
Accuracy, % of reading[3]	0.8% s.p.	1% s.p.	0.8% s.p.	1% s.p.	2% s.p.	
Accuracy, % of full scale[3]	0.08% FS	0.1% FS	0.08% FS	0.1% FS	0.2% FS	
External leak rate	9×10^{-9} mbar l/s (He)	10×10^{-6} mbar l/s (He)	9×10^{-9} mbar l/s (He)	10×10^{-6} mbar l/s (He)	1×10^{-6} mbar l/s (He)	
Leak rate through closed valve	1×10^{-6} mbar l/s (He)	1×10^{-6} mbar l/s (He)	not applicable for SFM	not applicable for SFM	1×10^{-6} mbar l/s (He)	not applicable for SFM
Pressure drop at max full scale	< 2 bar	< 3 bar	< 0.1 bar	< 1 bar	< 2 bar	< 0.1 bar
Settling time for OEM	50 ms		not applicable for SFM flow meter version		50 ms	not applicable for SFM flow meter version
Settling time, typ.	100 ms		not applicable for SFM flow meter version		100 ms	not applicable for SFM flow meter version
Control range	1000:1 (digital interface)		not applicable for SFM		1000:1	not applicable for SFM
Communication interface	digital (RS485, IO-Link, DeviceNet) and analog (0 to 5 VDC, 0 to 10 VDC or 4 to 20 mA)		digital (RS485, IO-Link, DeviceNet) and analog (0 to 5 VDC, 0 to 10 VDC or 4 to 20 mA)		digital (RS485 & IO-Link)	
Real gas calibration	Air/N_2, H_2, O_2, He, Ar, CO_2		Air/N_2, H_2, O_2, He, Ar, CO_2		Air/N_2, H_2, O_2, He, Ar, CO_2	
Gas conversion	SF_6, CF_4, C_4F_8, NH_3, N_2O, CO, CH_4, CH_3F, Xe, Ne, Kr, and other gases on request		SF_6, CF_4, C_4F_8, NH_3, N_2O, CO, CH_4, CH_3F, Xe, Ne, Kr, and other gases on request		SF_6, CF_4, C_4F_8, NH_3, N_2O, CO, CH_4, CH_3F, Xe, Ne, Kr, and other gases on request	
Nominal power supply	14.0 to 26.0 VDC		14.0 to 26.0 VDC		14.0 to 26.0 VDC	
Electric connector	D-Sub, 9 Pin		D-Sub, 9 Pin		D-Sub, 9 Pin	
Mounting, gas connection	Downmount, Swagelok, VCR, VCO, Legris, UNF Thread		Downmount, Swagelok, VCR, VCO, Legris, UNF Thread		Downmount	
Max working pressure	10 bar		10 bar		10 bar	
Operation temperature	0 to 50 °C / 32 to 122 °F		0 to 50 °C / 32 to 122 °F		0 to 50 °C / 32 to 122 °F	
Gas type switchable by software	on request		on request		on request	
Gas recognition	on request		on request		on request	

[1] slm= standard liters per minute, sccm= standard cubic centimeters per minute, [2,3] whichever is bigger, s.p.= in % of setpoint (s.p.) = measured value (m.v.) = of rate = of reading, [4] lower ranges on request

High Performance Gas Flow Control

Our many years of experience in industrial automation and medical technology support your devices, machines and processes with optimal solutions. Sensirion's mass flow controllers are suitable for diverse applications and provide the following key features:

- Ultra-fast settling time (50 ms)
- Excellent accuracy and repeatability
- Wide control range (1000:1)
- Long-term stability and reliability
- Optional multi-gas/multi-range and gas recognition
- Customized solutions

For more information, please visit: www.sensirion.com/massflowcontroller

UNIQUE MEASUREMENT PROPERTIES

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 the mass flow controllers is a calorimetric microsensor (MEMS) that is integrated with the complete signal conditioning electronics on a single chip. Flow is measured using the thermal measurement principle (see figure 1) and efficient control is provided by a digital controlling circuit. This unique integrated technological approach results in excellent performance and reliability – at a very attractive cost.

The mass flow controllers have an ultra-fast settling time of approximately 50 ms (see figure 2). The extensive control range of Sensirion's mass flow controllers is highly beneficial for applications with a wide control range. Instead of employing two devices for the respective high and low flow ranges, a single SFC5400 device can efficiently cover a flow range of three orders of magnitude.

Sensirion's mass flow controllers can be equipped with a multi-gas feature, which enables the user to switch between a set of gas calibrations stored in the device memory. Another feature is gas recognition, which analyzes whether the activated gas calibration matches the media in the gas line (safety feature).

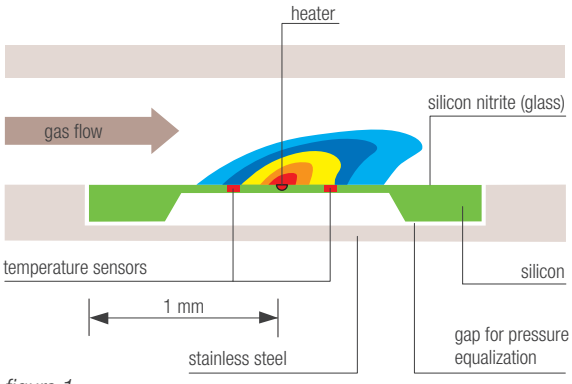


figure 1

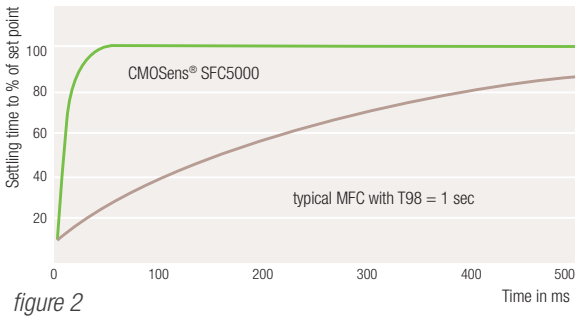


figure 2

Sensing. Anytime. Anywhere.

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