

Liquid flow sensors

Precise measurements, even
at lowest flow rates



SENSIRION

Inspiring technology

Sensirion's liquid flow meters establish new standards wherever monitoring of low liquid flow rates, liquid handling and liquid dispensing is important. Our unique CMOS® Technology allows bidirectional liquid flow measurement through the wall of the sensor's flow channel from hundreds of milliliters per minute down to single-digit nanoliters per minute. Applications in fields like medical devices, diagnostics and process and automation technology benefit daily from our safe and reliable sensor solutions.

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

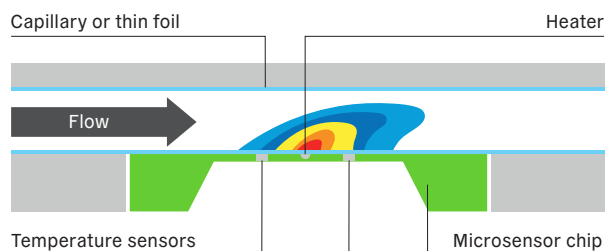
Patented technology

Sensirion's CMOS® flow sensor technology is based on a thermal microsensor, and is most effective at flow rates up to 1 l/min. The key element in our products is an integrated digital CMOS® microchip bonded to the outside of the sensor's flow channel for precise measurement through the wall of the flow channel. Our liquid flow meters offer completely media-isolated flow sensing with no moving parts or obstacles in the flow path. We offer our customers the world's smallest and most precise liquid flow meters, and inspire new designs and applications throughout all industries. High reliability and perfect media compatibility make our sensors ideal for use in medical and life sciences, diagnostics, semiconductor, factory automation and energy management applications.

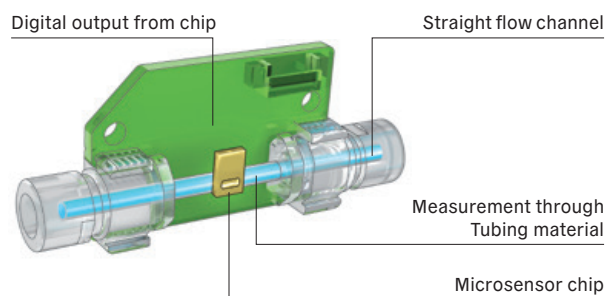
Fast, small, reliable

Sensirion's standard liquid flow meters provide exceptional value for money and eliminate the need for investment in application-specific OEM sensor development. Inert wetted materials ensure excellent process compatibility, industry-standard fluidic fittings enable quick assembly on the fluidic line and downmount fittings allow compact installation in manifold systems. Through the use of capillaries with different diameters, Sensirion's liquid flow meters cover flow rates over six orders of magnitude, from single-digit nanoliters up to a liter per minute.

In addition to the sensor element, the CMOS® chip integrates the complete digital intelligence and memory for signal linearization, temperature compensation and self-test algorithms. Various digital (I²C, RS485, USB) or analog output options are available for easy testing and seamless integration. Please contact our experts to discuss possible options for customized solutions: info@sensirion.com



Flow measurement principle



Schematic layout of a liquid flow meter



Mosquito drinking
ca. 10 µl/min



Drug injection
ca. 5 ml/min



Espresso machine
ca. 250 ml/min



Sensirion is able to measure flow rates from single-digit nl/min up to several hundred l/min.
Contact us if you require higher flow rates: info@sensirion.com

Liquid flow sensors



SLF3x series: The SLF3x series takes its well-established functionality to the next level in the price-performance ratio. In addition to an unprecedented turndown ratio reaching up to 1l/min, the series maximizes safety, stability and long-term reliability in a vast range of high-volume OEM applications. Tube and downmount fluidic interfaces are available.



LD20 series: The LD20 sensors measure liquid flow rates of up to 1,000 ml/h at the point of interest, enabling a more direct and effective patient treatment. It combines Sensirion's proven sensing technology with a single-use design for high-volume applications in the biomedical, life sciences and food industry sectors.



SLG series: SLG liquid flow meters for ultra-low flow rates (down to single-digit nanoliters per minute) are the perfect solution for dynamic liquid flow monitoring at high pressures and/or low flow rates, such as cutting-edge UHPLC applications. The fused silica flow channel withstands pressures of up to 1,200 bar.



SLI/SLS series: With Sensirion's flow meter technology in a protective housing, SLI/SLS liquid flow meters are ideal for laboratory work and for use in the automation industry. In combination with the SCC1 sensor cables, they provide RS485, analog or USB output for reliable communication in harsh environments.



LG16 series/LG01: Inert wetted materials and ultra-low flow capabilities make the LG16 series a versatile addition to demanding OEM applications. The LG01 liquid flow switch enables straightforward event detection of flow, bubbles and leakages.



LS32-1500: The LS32-1500 comes in a compact housing with high mechanical robustness. The wetted materials provide exceptional chemical resistance. In addition to its suitability for the biomedical market, it is a compact and reliable solution for many applications with flow rates up to 40 ml/min.

Model	Full Scale Flow Rates	Typ. Accuracy of Measured Value (H ₂ O)	Bidirectional Operation	Output			Maximum Cable Length	Fluidic Connector Ports	Maximum Pressure	Model	nl/min		µl/min		ml/min		l/min				
				Analog	RS485	I ² C					10	100	1	10	100	1					
SLF3S-0600F	2000 µl/min H ₂ O 2000 µl/min HC	5% 10%	Yes			30 cm for I ² C	1/4"-28 flat-bottom port for 1/16" or 1/8" OD tubing	12 bar	SLF3S-0600F												
SLF3S-1300F	40 ml/min H ₂ O 40 ml/min HC								SLF3S-1300F												
SLF3S-4000B	600 ml/min H ₂ O 600 ml/min HC	10%					6 mm OD Barb	3 bar	SLF3S-4000B												
SLF3S-0600D	2000 µl/min H ₂ O 2000 µl/min HC	5% 10%					Downmount	10 bar	SLF3S-0600D												
SLF3S-1300D	40 ml/min H ₂ O 40 ml/min HC						SLF3S-1300D														
LD20-2600B	1,000 ml/h H ₂ O	5%	Yes		30 cm for I ² C	Barbed fittings	3 bar	LD20-2600B													
LD20-0600L	20 ml/h H ₂ O					Luer lock		LD20-0600L													
SLG-0025	1.5 µl/min H ₂ O	10%	Yes	0 to 10 V 4 to 20 mA	✓	✓	> 100 m for RS485, 30 cm for I ² C	Stainless steel 0-32 coned port for 1/16" OD tubing	1200 bar	SLG-0025											
SLG-0075	5 µl/min H ₂ O								500 bar	SLG-0075											
SLG-0150	8 µl/min H ₂ O	5%							SLG-0150												
SLI-0430	80 µl/min H ₂ O 500 µl/min HC	5%	Yes	0 to 10 V 4 to 20 mA	✓	✓	> 100 m for RS485, 30 cm for I ² C	1/4"-28 flat-bottom port for 1/16" or 1/8" OD tubing	50 bar	SLI-0430											
SLI-1000	1000 µl/min H ₂ O 10 ml/min HC								12 bar	SLI-1000											
SLI-2000	5 ml/min H ₂ O 80 ml/min HC								SLI-2000												
LG16-0025	1.5 µl/min H ₂ O	10%	Yes			30 cm for I ² C	UNF 6-40 coned port for 1/32" OD tubing	200 bar	LG16-0025												
LG16-0150	7 µl/min H ₂ O 70 µl/min HC							100 bar	LG16-0150												
LG16-0430	80 µl/min H ₂ O 500 µl/min HC	5%					15 bar	LG16-0430													
LG16-1000	1 ml/min H ₂ O 10 ml/min HC						3 bar	LG16-1000													
LG16-2000	5 ml/min H ₂ O						3 bar	LG16-2000													
LG01-2000	Switch level: 0.25 ml/min or 4.5 ml/min	10%	No	0V: no flow or bubble 5V: flow above switch level			3m		3 bar	LG01-2000											
SLS-1500	40 ml/min H ₂ O	5%	Yes	0 to 10 V 4 to 20 mA	✓	✓	> 100 m for RS485, 30 cm for I ² C	1/4"-28 flat-bottom port for 1/8" OD tubing	12 bar	SLS-1500											
LS32-1500	40 ml/min H ₂ O	5%	Yes	0 to 10 V 4 to 20 mA	✓	✓	30 cm for I ² C	1/4"-28 flat-bottom port for 1/8" OD tubing	12 bar	LS32-1500											
SLQ-QT105	120 ml/min HC	10%	Yes	0 to 10 V 4 to 20 mA	✓	✓	> 100 m for RS485, 30 cm for I ² C	Super 300 type pillar fitting 4 x 3 mm	12 bar	SLQ-QT105											
SLQ-QT500	120 ml/min H ₂ O 120 ml/min HC	5%						PFA tube with 6.35 mm (1/4") OD, 4.35 mm ID		SLQ-QT500											
LPG10-1000	1 ml/min H ₂ O	5%	Yes	0 to 10 V 4 to 20 mA	✓	✓	30 cm for I ² C	Downmount	3 bar	LPG10-1000											

Calibrated flow rates for
■ water (H₂O)
■ hydrocarbons (HC)



SLQ-QT500: Calibrated for flow rates up to 120 ml/min with the exclusive use of high-purity wetted materials (quartz glass, PFA), this sensor is ideal for demanding dispensing processes in the semiconductor industry and for the measurement of liquids with high viscosity or containing particles.



LPG10 series: The LPG10 series enables outstanding performance and speed in a small form factor. Its innovative design enables flow measurement in a planar microfluidic glass substrate. Downmount fluidic ports allow compact integration into manifold systems.



SLD3P series: The SLD3P series is our new generation of digital liquid flow sensors for measurements up to 5 ml/min. It combines accuracy, miniature size, and compatibility with various therapies. These features make it the ideal solution for medical devices manufactured in large quantities, such as drug delivery patches and insulin pumps.

Liquid flow meter kits

In order to conduct initial measurements quickly and easily, all our SLI, SLS, SLG and SLQ liquid flow meters can be ordered as part of a Liquid Flow Meter Kit. In addition to the liquid flow meter of your choice, the kit also contains USB and analog interface cables for electrical connection, viewer and logging software, and a set of fluidic connectors.

For liquid flow sensors of the LPG10, the LD20 and the SLF3x series, we offer specific Evaluation Kits that contain additional accessories for mounting support and electrical connection.

For more information please visit: www.sensirion.com/liquidflowmeterkit



SLF3x Evaluation Kit

Customized solutions

Innovative ideas sometimes demand new solutions and Sensirion's sensor experts are always keen to finding ways to make interesting applications happen through our technology. Customized solutions can be designed for special requirements, such as flow rates, limited space constraints, resistance to aggressive chemicals, dedicated low-price and even disposable sensor designs for high-volume applications.

Our cutting-edge sensor technology and unique expertise in liquid flow sensing has led to many successful customer projects. The essential goal is to understand the requirements of our customers and to implement the key benefits of our technology skillfully to their advantage: modification of the packaging, the wetted materials, the fluidic or electrical interface and improvement of the dead volume or pressure resistance of the sensor.

Various flow rates

Years of experience and expertise, combined with the high sensitivity of our sensors, enable flow measurements at various flow ranges, from nanoliters to liters per minute.

Flexibility and cost efficiency

With our advanced technology, we have the flexibility to address customer requirements to ensure a customized sensor solution that is both high-performance and cost-effective.

High speed

The MEMS sensor integrated on a CMOS chip permits ultra-fast response times – as fast as 20 ms – due to its small thermal mass.



Technology at heart,
future in mind.