



Selection Guide

Liquid Flow Sensors

While all of Sensirion’s liquid flow sensors are based on our unique CMOSens® technology, the broad product portfolio ranges from stand-alone flow sensors to highly integrable manifold mount components and even single-use sensors. This guide aims to assist you in selecting the best fit for your application.

	Model	Wetted materials	Electrical interface	Pressure	Flow range (H ₂ O) and full scale flow rate						Image
					nl/min 100	µl/min 1	10	100	ml/min 1	10	
Stand alone	SLG*	Fused silica, Titanium, PEEK		500-1200 bar		SLG-0075 (5 µl/min)					
	SLI*	Glass, PEEK, FEP	M8 connector for SCC1 sensor cables 0-10 V, 4-20 mA, RS485, USB	15-50 bar		SLI-0430 (80 µl/min) SLI-1000 (1 ml/min) SLI-2000 (5 ml/min)					
	SLS*	Stainless steel, PEEK, PTFE	IPxx Ingress Protection	12 bar		SLS-1500 (40 ml/min)					
	SLQ*	Quartz, PFA		12 bar		SLQ-105 (120 ml/min only for HC) SLQ-QT500 (120 ml/min only for HC)					
OEM	LG16	Glass, PEEK, FEP		15-200 bar		LG16-0150D (7 µl/min) LG16-0430D (80 µl/min) LG16-1000D (1 ml/min) LG16-2000D (5 ml/min)					
	LS32	Stainless steel, PEEK, PTFE	Standard connector I ² C	12 bar		LS32-1500 (40 ml/min)					
	SLF3S*	Stainless steel, PPS, Epoxy		3-12 bar		SLF3S-1300x (40 ml/min) SLF3S-0600x (2 ml/min) SLF3S-4000B (600 ml/min)					
Single use	LD20	PEI, LCP, Epoxy	Contact pads, I ² C	3 bar		LD20-2600B (16.7 ml/min)					

*Flow Sensor Kit or Evaluation Kit available on distribution.

Table 1. Summary table of Sensirion’s liquid flow sensors catalog. Only flow rates for H₂O calibration are included. For information on available IPA calibrations or any other specification, please consult the respective datasheet.

1 Selection Process

This document guides you through the necessary steps to identify the right sensor for your application and your current development stage. The relevant criteria are flow rates, electrical interface and form factor. Following the identification of the right sensor(s), compatibility checks regarding pressures and material compatibility have to be made.

1.1 Step 1: Flow Rates

Sensirion's liquid flow sensors are calibrated up to a certain full scale flow rate. Owing to the microthermal measurement principle, Sensirion's liquid flow sensors have excellent turn down ratios and offer exceptional performance below and up to the full scale flow rate. Due to the different thermal properties between water and hydrocarbons, the full scale of the sensors when using the IPA calibration is significantly higher.

*Example: Your application requires the measurement of aqueous solutions at 250-800 µl/min. Using **Table 1**, you identify the SLI-1000, LG16-1000D and the SLF3S-1300x as possible candidates. The following chapters will help in choosing the correct sensor.*

1.2 Step 2: Interface and Sensor Form Factor

Sensirion's liquid flow sensors can be grouped into several categories depending on their form factor, the electrical interface, and the resulting characteristics.

Stand-alone Sensors

Stand-alone flow sensors offer IPxx protection against dust and water ingress. They feature a standard circular M8 electrical connector and have been designed for use with the SCC1 sensor interface cables. By combining the flow sensor with the suitable SCC1 cable, a 0 - 10 V analog voltage, 4 - 20 mA current loop, RS485, or USB interface is available. With their rugged design, the stand-alone flow sensors are ideally suited for industrial applications, laboratory setups and testing.

OEM Sensors

OEM flow sensors are designed to be installed as an integral system component, inside an instrument. They offer reduced protection and a simpler electrical connection at the benefit of smaller size and reduced cost. Sensirion's OEM liquid flow sensors come with the digital I²C interface.

Single Use Sensors

Single use sensors are designed for high quantity applications with drastically reduced costs in mind. While still offering all the benefits and performance of CMOSens® technology but with a limited sensor lifetime, the simplified mechanical design and electrical connection enables cost-effective single use applications.

Example: You would like to integrate the sensor in a production line tool to monitor dispenses using analog readout. The SLI-1000 is therefore your sensor of choice. The IPxx protected housing means that minor spills are no issue and the solid M8-cable connection to our analog interface cable is ideally suited for this industrial use case.

1.3 Step 3: Pressures

Kits are available for sensors with maximum pressure ratings between 12 bar and 500 bar, with individual portfolio sensors reaching 1200 bar. Please make sure that the sensor capillary is never subjected to pressures beyond their maximum pressure rating, see the respective datasheets for details.

Example: In your application, the maximum pressure is 6 bar. You check the SLI-1000 sensor datasheet and notice that the maximum operating pressure is 15 bar. Therefore, the SLI-1000 fits for your application regarding the pressure resistance.

1.4 Step 4: Chemical Compatibility

While the sensing element is never in direct contact with the measured liquid, some chemical restrictions may arise from the wetted materials (fittings, seals and capillaries). Please see the datasheet of the sensor you have chosen for a list of the wetted materials and ensure their compatibility with your application.

Example: Again, in the SLI-1000 datasheet, you check the wetted materials: Borosilicate glass, PEEK, and FEP. None of the materials are expected to give issues with the aqueous solutions you intend to use in your application. So the SLI-1000 looks like the ideal candidate for your application.

2 Start Testing

To allow for straightforward testing and evaluation of our sensors, Flow Meter Kits or Evaluation Kits are available. The kits typically include a sensor, interface cable(s) and the software to get you started. Some kits include fitting materials as well. If your sensor of choice does not have a kit available, choosing the Flow Meter Kit for the corresponding stand-alone flow sensor enables you to test the performance of our sensor technology in your application.

Example: You have identified the SLI-1000 sensor as the ideal candidate for your application. In order to test it, you purchase an SLI-1000 Flow Meter Kit from one of our distribution partners.

3 Further information

3.1 Calibration

All our sensor families are available with calibrations for water. Some sensors are available with additional or alternative calibrations, typically for isopropyl alcohol (2-propanol, IPA). This calibration will yield more accurate results and better linearity if the main liquid components of your application are hydrocarbons such as oils, organic solvents or the like. Note that the flow ranges for water and IPA on a specific sensor may be different. See the sensor's datasheet for further details.

3.2 Customized Solutions

Many applications will be successful with our standard products and will benefit from the economies of scale of these. Some applications however require customized solutions, where the characteristics listed in **Table 1** give an indication of the possible degrees of freedom. Contact Sensirion for details.

Important Notices

Warning, Personal Injury

Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury (including death). Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.

If the Buyer purchases or uses SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION is allegedly negligent with respect to the design or the manufacture of the product.

ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product. See application note "ESD, Latchup and EMC" for more information.

Warranty

SENSIRION solely warrants to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product is of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall as sole and exclusive remedy, in SENSIRION's discretion, repair this product or send a replacement product, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;
- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty material or workmanship;
- the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

The Buyer shall at its own expense arrange for any dismantling and reassembly that is necessary to repair or replace the defective product. This warranty does not apply to any product which has not been installed or used within the specifications recommended by SENSIRION. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH HEREIN, SENSIRION MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT. ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY EXCLUDED AND DECLINED.

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SENSIRION reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

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