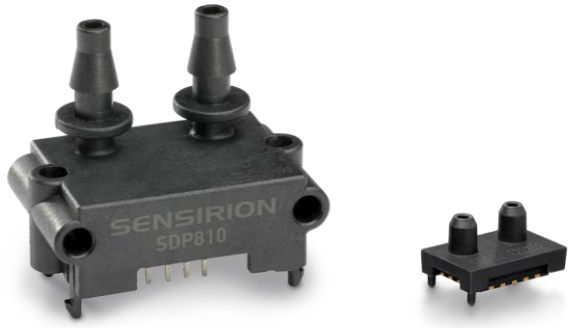
SENSIRION

SDP Selection Guide

Choose the right Sensirion Differential Pressure sensor for your application



A precise measurement of gas flow often is key for the success of bringing a technology into everyday life. Sensirion's unique CMOSens technology fulfills exactly this ambition for Sensirions Differential Pressure (SDP) sensor series: high measurement precision at low gas flows is coupled with fast measurement speed. The SDP is a microthermal flow sensor, ready for versatile use as differential pressure sensor or as gasflow sensor in your application. This versatility enables optimal use of the sensor in various gas flow systems.

This selection guide provides a first-glance comparison of all key features of the SDP sensor product portfolio. It allows a direct comparison between all SDP sensors on the market.

The decision for the most suitable SDP is typically driven by the target pressure range, pneumatic connection, and electrical interface. Other use case-specific requirements can be dust resistance, measurement sensitivity, or supply voltage.

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Contents

1 SDP Sensor Portfolio

		 **SDP8xx**	 **SDP3x**
Measurement	Measurement range	±125 Pa ± 500 Pa fully bi-directional	±125 Pa ± 500 Pa ±1500 Pa fully bi-directional
	accuracy of measured value	3% m.v.	3% m.v.
	lowest detectable pressure	<0.01 Pa (±125Pa) <0.02 Pa (±500 Pa)	<0.01 Pa (±125Pa) <0.02 Pa (±500 Pa)
	Measurement speed	digital 0.5 ms analog 5 ms	digital 0.5 ms analog 5 ms
	Measurement parameter	DP, mass flow and volume flow	DP, mass flow and volume flow
	Calibrated for	air, N2	air, N2
	Gas compatibility[1]	Air, inert gas	Air, inert gas
Electrical	Electrical Interface	digital I2C, analog	digital I2C, analog
	Supply Voltage	3 – 5 V	3 – 5 V
Mechanical	Pneumatic connection	manifold connection tube connection	manifold connection
	Form factor	18 x 29 mm w/ manifold 14 mm w/ tube con. 23 mm	5.5 x 8.5 x 5.1 mm
	Weight	6 g	0.2 g
Production process	electrical connection	wave soldering or cable	reflow solderable
	shipping package	tray	tape & reel
Quality	Dust performance	+++	+
	Certifications	REACH/RoHS	REACH/RoHS

Table 1. Each SDP sensor series has its own characteristics. This table allows for a direct comparison between the most relevant sensor parameters.

[1] Sensor is compatible with inert gases. Sensor calibration is for air and nitrogen. For the measurement of non-calibrated inert gases, a correction factor may apply.

2 SDP Selection Process

This chapter guides you through the necessary steps to identify the right sensor for your application. Relevant criteria are pressure ranges, pneumatic connection and form factor.
After the selection process, Sensirion recommends continuing with sensor evaluation and compatibility testing in the gas flow system of the target application. Refer to the SDP Engineering Guide for details.

2.1 Measurement Range

SDP sensors are available with measurement ranges between 125 Pa to 1500 Pa full scale. The most common measurement range is 500 Pa. Availability varies between sensor series. The measurement principle of the sensor is particularly effective at low pressure ranges: it provides excellent sensitivity at pressures well below 0.01 Pa. Therefore, a sensor with a measurement range of 125 Pa is still a perfect choice for your application if you want to measure in a range as low as ± 25 Pa.
For a translation of pressure range to mass flow or volume flow, the flow characteristic of the overall gas flow system must be considered: for flow measurements, the SDP sensor is commonly designed-in with the so-called "bypass configuration". Here, the differential pressure range is defined through the specific flow system design with its pressure drop element. Typical volume flows through the sensor are a few 10-fold mL/min.
Other application-dependent requirements can be measurement accuracy or measurement speed.

2.2 Pneumatic Connection

SDP sensors are available with manifold connector or with tube connector.

Manifold ports for direct integration to flow system

Barb ports for tube connection

Tube connectors are optimized for connection of the sensor to gas flow tubes. Choose tube connectors if the sensor is not placed in direct proximity to the gas flow chambers or channel of the gas flow system. The mechanical strength of SDP tube connectors is not optimized for external device connection. Due to their size, tube connectors can be offered only above a certain SDP form factor.
Manifold connectors are for direct connection of the sensor with the gas flow system. They are specifically suited for gas flow measurements in bypass configuration. Sensirion recommends not connecting tubes with SDP manifold connectors.

2.3 Form Factor

SDP8xx sensors with larger form factor (18 x 29 mm) are specifically designed for applications with requirements on dust resistance (i.e. VAV controller). They are available with tube and cable connectors.
SDP3x sensors with smaller form factor (5.5 x 8.5 mm) are specifically designed for applications with requirements on light device weight (i.e. Smart Inhaler). They are available with manifold connectors.

2.4 Production Handling

SDP electrical connection differs between sensor series. Sensors with cable connection usually come with higher production efforts than sensors with solder connection. Check with your production department whether a specific solder technique is required for sensor assembly.

SDP shipping package and shipping volume depend on sensor form factor. Tray packages require manual sensor placement in production. Tape&Reel packages allow fully automated sensor placement. Details on shipping volumes are indicated in each SDP datasheet.

2.5 Start Testing

The evaluation method of your SDP sensor of choice depends on whether it has a digital or an analog interface. The SDP is mostly used in digital versions.

Digital Sensor Evaluation

The fastest way to start an experiment is the SDP evaluation kit. It connects to your computer through the SEK-SensorBridge, and the Sensirion ControlCenter Software. Purchase your Evaluation Kit directly from our website.
Alternatively, we also offer an Arduino library, RaspberryPi drivers, and Python drivers for your SDP experience on GitHub.
Sensirion recommends starting testing with the SDP8xx evaluation kit. It features easy handling and provides straightforward connection of the sensor to a lab bench test setup. While it comes with the SDP810-500 Pa sensor, you can also connect and test any other digital SDP8xx sensor version.

SEK-SDP8xx evaluation kit

SEK-SDP3x evaluation kit

3 Further Information

Useful Resources

For further details on Sensirion's SDP sensor series, please visit our website. Here, you can find many more information on sensor use and design-in instructions.

- Product catalog Product catalog (sensirion.com)
- Technical download Technical download (sensirion.com)
- SDP sensor evaluation Differential pressure evaluation (sensirion.com)
- GitHub Sensirion AG · GitHub
- FAQ FAQ (sensirion.com)
- Technical Customer Support Support contact (sensirion.com)

Calibration

Thanks to the stability of the MEMS-based sensor element and the robust mechanical design, Sensirion Differential Pressure Sensors, SDP, do not drift and do not require recalibration in the field.

High manufacturing standards used during production ensure that our Differential Pressure Sensors are extremely reliable and have a very low failure rate. This is supported by field surveys and measurements.

Customized Solutions

Many SDP applications are successful with our standard products and benefit from their economies of scale. However, some applications require customized solutions. In case you can't identify an SDP sensor that covers your specific sensor need, Sensirion is ready to support your high-volume project. Please contact us for details.

4 Revision History

Date	Version	Pages	Changes
01 2024	0.1	all	Initial version
06 2024	1.0	all	Release

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. 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 shall purchase or use 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 shall be 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 warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be 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 repair and/or replace this product, in SENSIRION's discretion, 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 design, 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.

This warranty does not apply to any equipment which has not been installed and used within the specifications recommended by SENSIRION for the intended and proper use of the equipment. 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 does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer's applications by customer's technical experts. Recommended parameters can and do vary in different applications.

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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