Table 2: Additional sensor specifications.

Media	Air, N_2 – for other gases contact Sensirion AG.
Operating Conditions: - Temperature - Humidity	 -10 °C … +60 °C / 14°F … 140 °F non-condensing
Ambient storage conditions[1]	-40 °C … +80 °C / -40°F … 176 °F
Orientation sensitivity	below resolution
Response time	40 ms (for faster response time contact Sensirion)
Admissible overpressure (short term)	1 bar (14.5 PSI)
Burst Pressure Capability	2 bar (29 PSI)
Weight	14 g
Protection Class	IP 20
Wetted materials	Glass (silicon nitride, silicon oxide), Silicon, PPS (Polyphenylene Sulfide), PEEK (Polyetheretherketone), FR4, Silicone as static sealing, Epoxy, Gold
Gas flow through sensor	see Figure 6.
Lead free	The SDP1000 family is fully RoHS compliant

(1) For maximum 2 weeks

1.1 Temperature Compensation

The SDP1000 / SDP2000 differential pressure sensors feature a sophisticated built-in temperature compensation circuit. The temperature is measured on the CMOSens chip by means of a PTAT bandgap reference temperature sensor. Its data is fed into a compensation circuit which is also integrated on the CMOSens® sensor chip. No external temperature compensation is therefore required.

1.2 Altitude Correction

The SDP1000 / SDP2000 differential pressure sensors achieve their unsurpassed performance by using a dynamic measurement principle, i.e. an applied differential pressure forces a small air flow through the sensor. This results in a dependence of the indicated differential pressure on the ambient air density. While the temperature effect is compensated (see Paragraph 1.1) the altitude above sea level has an influence on the SDP1000 / SDP2000 output. If desired, this effect can be compensated by a correction factor according to the following equation:

$$Dp_{eff} = Dp_{sensor} * P_{cal} / P_{amb}$$

where Dp_{eff} is the effective differential pressure, Dp_{sensor} the differential pressure indicated by the SDP1000 / SDP2000, P_{cal} the absolute pressure during calibration (966 mbar) and P_{amb} the actual ambient absolute pressure.

This leads to the following correction factors:

Table 3: Altitude correction factors.

Altitude [meter]	Ambient Pressure (P_{amb}) [mbar]	Correction Factor P_{cal} / P_{amb}
0	1013	0.95
250	984	0.98
425	966	1.00
500	958	1.01
750	925	1.04
1500	842	1.15
2250	766	1.26
3000	697	1.38

Example:

The SDP1000 is used at 750 m above sea level. The output of the SDP1000 shows 0.5 V, which corresponds to Dp_{sensor} = 33.3 Pa. Taking into account the correction factor P_{cal} / P_{amb} = 1.04 the effective differential pressure Dp_{eff} is 33.3 Pa * 1.04 = 34.6 Pa.

Note:

In many HVAC applications such as filter monitoring, fan/ventilator control or air flow measurement the described effect is actually welcome since at the end the mass flow and not volume flow is the effective value to control.

2 Electrical Specifications

2.1 Power Supply

The SDP1000 / SDP2000 differential pressure sensors require a stable voltage supply of 5 V. Influence of the supply voltage variation on the offset and the sensitivity are given in Table 5.

2.2 Voltage Output

The SDP1000 / SDP2000 features a voltage output from 0.25 V to 4.0 V (Figure 2, 3). An output voltage below 0.25 V indicates a negative differential pressure. This range is not calibrated however. Exempt from this statement is the SDP1000-L025, which features a fully bidirectional calibration with 0.2 to 4.0 V output.
The resistive load at the output pin should be larger than 20 kOhm. The capacitive load at the output pin must not be larger than 200 pF. If the design shows a larger capacity at the output pin an additional resistor is required in series at the output (e.g. 620 Ohm).

Linear output

Formula: P = lfactor * (voltage[(1)] – 0.250)/3.750

lfactor =	SDP1000-L05	SDP1000-L	SDP2000-L
Pascal	125	500	3500
Inch water	0.5	2	14

[(1)] voltage: measured output voltage in Volt.

Square Root output

Formula: P = rfactor * (voltage[(1)] -0.250)^2

rfactor =	SDP1000-R
Pascal	35.55556
Inch water	0.14222

[(1)] voltage: measured output voltage in Volt.

For bi-directional SDP1000-L025

Formular: P=lfactor * (voltage – 2.10)/1.90
lfactor = 62 Pa or 0.25 Inch water

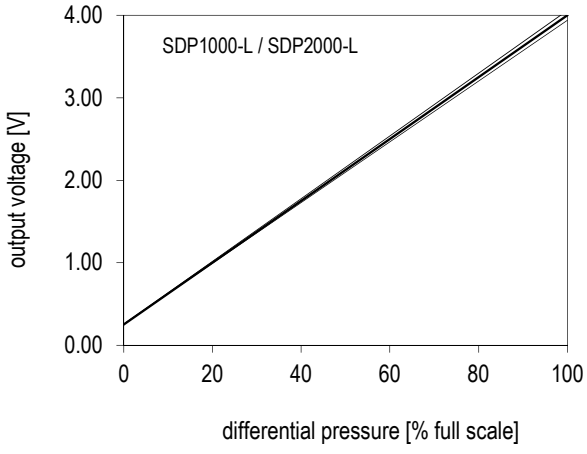

Figure 2: Linear output at 5 Vdc supply of the SDP1000-L and the SDP2000-L. The fine lines indicate the maximum tolerances including a temperature variation from 0 to 50°C.

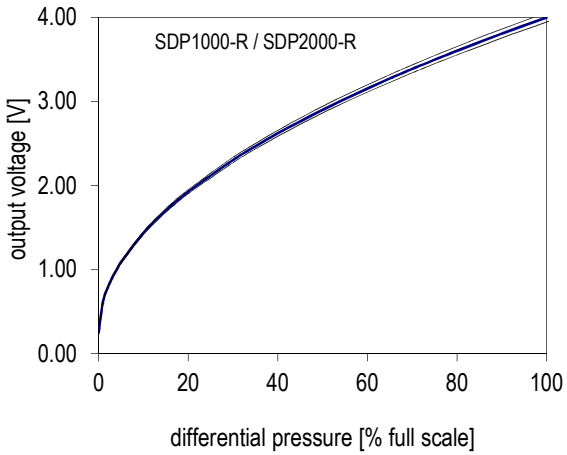

Figure 3: Square root extracted output of the SDP1000-R and the SDP2000-R at 5 Vdc supply. The fine lines indicate the maximum tolerances including a temperature variation from 0 to 50°C.