

1 Gas, humidity and temperature sensor specification

1.1 Gas sensing performance

The values listed in **Table 1** are valid at 25°C, 50% RH and typical VDD.

Parameter	Signal	Values	Comments
Measurement range ¹	Ethanol signal	0 ppm to 1000 ppm	
	H ₂ signal	0 ppm to 1000 ppm	
Specified measurement range	Ethanol signal	0.3 ppm to 30 ppm	The specifications below are defined for this measurement range ² . The specified measurement range covers the gas concentrations expected in indoor air quality applications.
	H ₂ signal	0.5 ppm to 3 ppm	
Accuracy ^{3,4}	Ethanol signal	see Figure 1 typ.: 15% of meas. value	Accuracy of the concentration <i>c</i> determined by $\ln\left(\frac{c}{c_{ref}}\right) = \frac{(s_{ref} - s_{out})}{a}$ <i>a</i> = 512 <i>s_{out}</i> : EthOH/H ₂ signal output at concentration <i>c</i> <i>s_{ref}</i> : EthOH/H ₂ signal output at 0.5 ppm H ₂
	H ₂ signal	see Figure 2 typ.: 10% of meas. value	
Sensitivity	Ethanol signal	-1.0	Sensitivity <i>n</i> is defined by $\frac{s_{ref} - s_{out}}{512} = -n \cdot \ln\left(\frac{c}{c_{ref}}\right)$ The typical numerical value of <i>n</i> is <i>n</i> = -1 for both, the Ethanol and H ₂ signal. The sensitivity is understood as an average value over the specified measurement range as determined by a least square fit.
	H ₂ signal	-1.0	
Sensitivity tolerance ³	Ethanol signal	typ. tolerance: ±7% rel. error max. tolerance: ±14% rel. error	
	H ₂ signal	typ. tolerance: ±7% rel. error max. tolerance: ±14% rel. error	
Long-term drift ^{3,5}	Ethanol signal	see Figure 3 typ.: 1.3% of meas. value	Change of accuracy over time: Siloxane accelerated lifetime test ⁶
	H ₂ signal	see Figure 4 typ.: 1.3% of meas. value	
Resolution	Ethanol signal	0.2 % of meas. value	Resolution of Ethanol and H ₂ signal outputs in relative change of the measured concentration
	H ₂ signal		
Sampling frequency	Ethanol signal	Max. 40 Hz	Compare with minimum measurement duration in Table 13
	H ₂ signal		

Table 1 Gas sensing performance.

¹ Exposure to ethanol and H₂ concentrations up to 1000 ppm have been tested. For applications requiring the measurement of higher gas concentrations please contact Sensirion.

² ppm: parts per million. 1 ppm = 1000 ppb (parts per billion)

³ 90% of the sensors will be within the typical accuracy tolerance, >99% are within the maximum tolerance.

⁴ Valid at an air flow of > 1m/s.

⁵ The long-term drift is stated as change of accuracy per year of operation.

⁶ Test conditions: operation in 250 ppm Decamethylcyclpentasiloxane (D5) for 200h simulating 10 years of operation in an indoor environment.

Accuracy ethanol signal

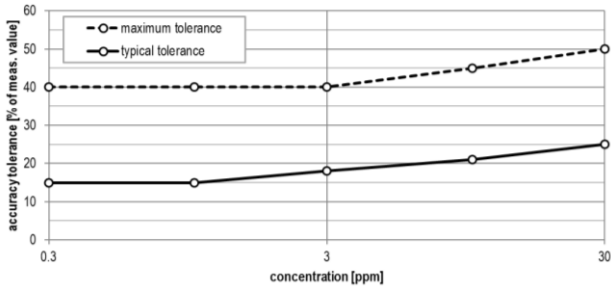


Figure 1 Typical and maximum accuracy tolerance in % of measured value at 25°C, 50% RH and typical VDD. The sensors have been operated for at least 24h before the characterization.

Accuracy H₂ signal

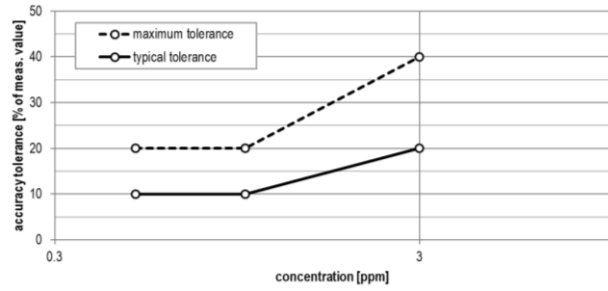


Figure 2 Typical and maximum accuracy tolerance in % of measured value at 25°C, 50% RH and typical VDD. The sensors have been operated for at least 60h before the characterization.

Long-term drift Ethanol signal

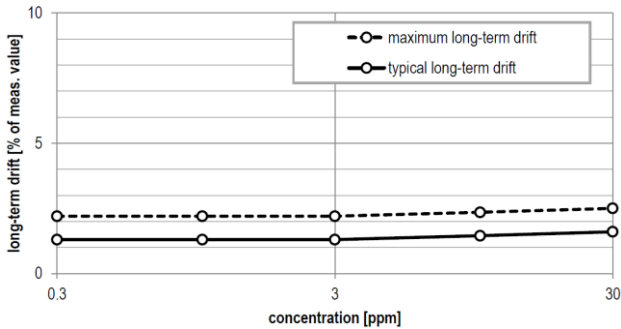


Figure 3 Typical and maximum long-term drift in % of measured value at 25°C, 50% RH and typical VDD. The sensors have been operated for at least 24h before the first characterization.

Long-term drift H₂ signal

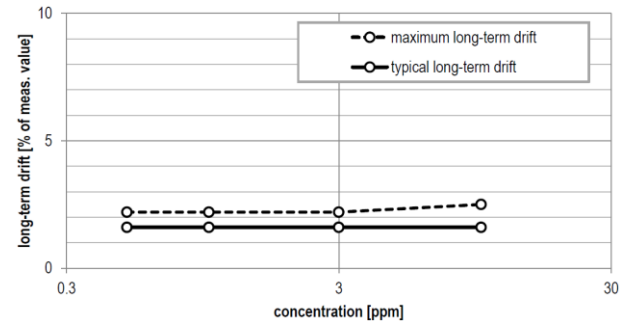


Figure 4 Typical and maximum long-term drift in % of measured value at 25°C, 50% RH and typical VDD. The sensors have been operated for at least 60h before the first characterization.

1.2 Air Quality Signals

Parameter	Signal	Value	Comments
Output range	TVOC signal	0 ppb to 60000 ppb	Maximum possible output range. The gas sensing performance is specified for the measurement range as defined in Table 1
	CO ₂ eq signal	400 ppm to 60000 ppm	
Resolution	TVOC signal	0 ppb - 2008 ppb	1 ppb
		2008 ppb – 11110 ppb	6 ppb
		11110 ppb – 60000 ppb	32 ppb
	CO ₂ eq signal	400 ppm – 1479 ppm	1 ppm
		1479 ppm – 5144 ppm	3 ppm
		5144 ppm – 17597 ppm	9 ppm
		17597 ppm – 60000 ppm	31 ppm
Sampling rate	TVOC signal	1 Hz	The on-chip baseline compensation algorithm has been optimized for this sampling rate. The sensor shows best performance when used with this sampling rate.
	CO ₂ eq signal	1 Hz	

Table 2 Air quality signal specification