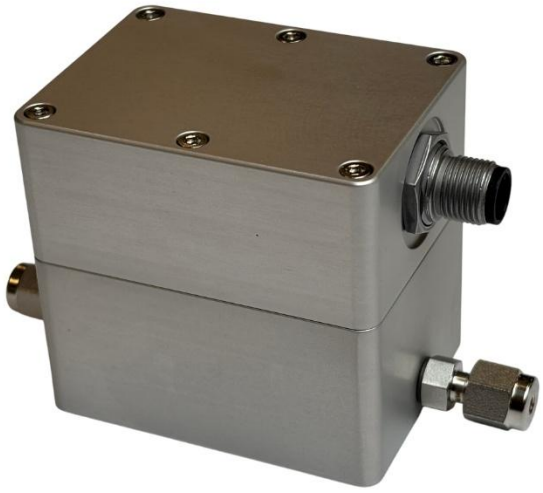
# Thermal Conductivity Gas Sensor

The XEN-5420 series are the next generation gas sensors with a wide application in industry where it is desirable to analyse binary gas mixtures. The sensor is based on the measurement of the thermal conductivity of the ambient gas, using the proven thermal conductivity sensor XEN-3880. Applications include hydrogen and helium gas experimentation and binary gas composition measurement.



## Features

- Long-term stable analysis of gases in binary and quasi-binary mixtures
- Fast response and data update rate
- High sensitivity and resolution
- Long lifetime and low maintenance
- Flow effects compensating design
- Temperature and humidity corrected output
- Allows user zero and gain calibration
- User configurable output calibration curves
- LabView read-out and programming software
- Read-out via CAN bus
- RoHS compliant
- CE and FCC certified

## Technical Specification

Preliminary Specifications at 23 °C, 101 kPa, 50 %RH

### Mechanical

| | |
|---|---|
| enclosure | 70 x 52 x 66 |
| weight | 550 g |
| mounting | 4 x M5 |

### Environmental

| | |
|---|---|
| temperature range | -20 to + 70 °C |
| humidity range | 0 to 95 %RH (non condensing) |
| pressure range | 0.5 – 10 bar |
| Max flow | TBD |
| Flow at calibration | 1000 mln/min |
| Min flow | 0 mln/min |

### Electrical

| | |
|---|---|
| supply Voltage | 9 - 24 VDC |
| power consumption | 200 mW |
| maximum cable length | 200 m |
| Connector | M12 - 5pin |

## Applications

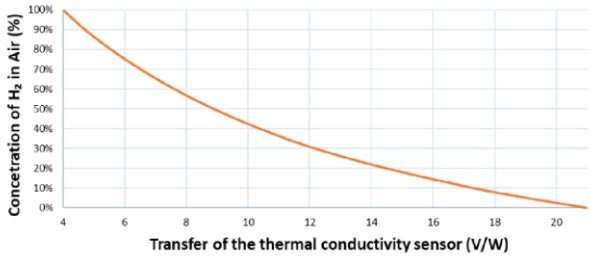
Monitoring of hydrogen, helium, CO2, argon, nitrogen and methane gas mixtures in medical, R&D and industrial environments.

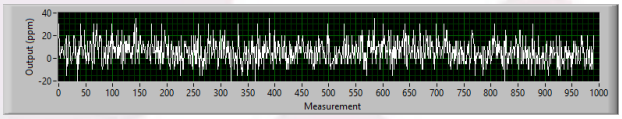
## Principle of operation

The XEN-5420 determines the gas composition by measuring the temperature elevation of a micromachined heater element. For each binary gas mixture the ratio of temperature increase to heating power is dependent on the mix ratio. For enhanced accuracy, the correction is made for ambient temperature and humidity.

## Typical Output

The output of the XEN-5420 primarily consists of timestamped information about thermal conductivity transfer, temperature and humidity of the ambient gas. The gas mixture concentration is calculated using the compensated transfer of the thermal conductivity sensor and the user selectable calibration curve for the relevant gas mixture.



## Performance

Preliminary Specifications at 23 °C, 101 kPa, 50 %RH

### General

| | |
|---|---|
| sensitivity for traces of $H_2$ | -2 %/% |
| sensitivity for traces of He | -1 %/% |
| sensitivity for traces of CO2 | +0.3 %/% |
| inaccuracy $H_2$ and He | 1 %FS |
| short term drift | < 100 ppm |
| long term zero drift | 0.2 %/year |
| noise $H_2$ mode | Typical < 50 ppm |
| noise He mode | Typical < 75 ppm |
| range | |

### Operational speed

| | |
|---|---|
| system start up time | 0.3 s |
| t90 response time | < 0.2 s |
| t10 recovery time | < 0.2 s |
| t63 response time RH sensor | 4 s |
| data update rate | 300 ms |

### Selectivity

The thermal conductivity sensor is non-selective in that it will give an output in the presence of any gas having a thermal conductivity different than air. Measurement of hydrogen or helium in air or nitrogen is particularly attractive, due to the fact that the thermal conductivities of hydrogen and helium are very different from air and nitrogen.

### Calibration

The XEN-5420 offers the possibility to perform a zero and gain calibration. This will position the begin point and the end point of the calibration curve at the right value, minimizing errors. The gain calibration can be performed at 1%, 5%, 10%, 30%, 50% and 100%. In addition, the user can capture their own calibration curve for a specific gas mixture and upload it in to the device.

### Ordering options

| | |
|---|---|
| 1/8 inch pipe fittings | ◯ |
| 4 mm hose fittings | ◯ |
| Glued fittings | ◯ |
| Test report 0-100% $H_2$ in $N_2$ | ◯ |
| Test report 0-100% He in $N_2$ | ◯ |
| Test report other | ◯ |
| Gain calibration 100% | ◯ |
| Gain calibration other | ◯ |

## Outline drawing