

Oxygen Sensor

Micro Oxygen Sensor - SO-A0-xxx (TO 39)

- Full scale ranges from 100 ppm to 96 % Oxygen
- High accuracy
- Stable Sensor characteristic across range
- Sensor signal not affected by temperature
- Minimal interference with other gases

Description

The Sensore SO-A0 series delivers accurate oxygen measurement from 100 ppm to percent levels in a very compact design. Using proven zirconium dioxide technology, these sensors provide long life and stable performance with minimal impact from temperature, pressure, or interfering gases. SO-A0 offers a very small form factor.



Specifications

Sensor technology	
Measuring Gas	Oxygen (O ₂)
Measuring Principle:	Limiting current, ZrO ₂ -cell
Sensor cell	
Bias voltage	0.7...1.6 V _{DC}
Resulting sensor current	0...250 µA 0...420 µA (96 % measurement range)
Sensor heater (platinum heater element)	
Basic heater operation	Constant heater voltage
Warm up procedure	30 seconds heater voltage ramp-up or heater current limitation <0.5 A
Constant heater voltage	4.0 VDC (depends on application)
Power consumption	1.7 W (depends on application)
Heater resistance at 25°C	3.25 Ω ± 0.25 Ω
Advanced heater operation	Active heater resistance control
Environmental conditions	
Maximum operating temperature	250 °C
Humidity	non-condensing (max. 90 % r.h. @ 40 °C)
Pressure range*	700-1300 mbar (absolute)
*Contact SENSORE for extended pressure range options	
Reliability data under clean laboratory conditions	
Lifetime (MTTF)	typical 10 years
Calibration stability (MTTF)	typical 20 000 hours
Vibration resistance	sensors meet the European Norm EN60068-2-6 (Sinusoidal vibration tests)

Housing and gas interface	
Type	SO-A0
Housing	TO39
Dimensions see also next page	TO-8: Ø 9.2 mm, height = 6.4 mm
Housing temperature during operation	250 °C (at ambient temperature of 25°C)
Gas exchange	Gas diffusion through mesh on top
Response time (t90)	< 12 seconds
Flow rate	Usually there is no convection flow in a A0 housing. Exposure to massive airflows might affect the sensor performance
Part number ordering information	
Sensor part number	Measuring range*
SO-A0-001	Housing not optimized for this range
SO-A0-010	0.01 % O ₂ – 1.0 % O ₂
SO-A0-020	0.01 % O ₂ – 2.0 % O ₂
SO-A0-050	0.05 % O ₂ – 5.0 % O ₂
SO-A0-250	0.10 % O ₂ – 25.0 % O ₂
SO-A0-960	1.00 % O ₂ – 96.0 % O ₂
*Operation outside the specified measuring range can cause a permanent damage of the electrode	
Application remark	
TO39 offers a very compact sensor size, but the high housing temperatures (250°) can lead to thermal challenges, for most applications TO8 housings will be the recommended choice.	

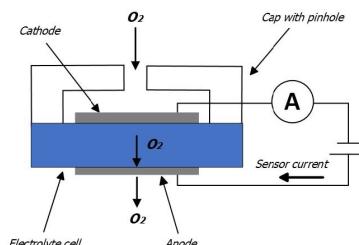
Sensor specification for different O₂ measurement ranges with N₂ balance

Sensor part number	Measuring range*	Output current at O ₂ concentration	Accuracy	Reproducibility	Bias voltage
SO-A0-010	0.01 % O ₂ – 1.0 % O ₂	150 – 250 µA at 1% O ₂	± 100 ppm O ₂	< 100 ppm O ₂	0.75 V _{DC}
SO-A0-020	0.01 % O ₂ – 2.0 % O ₂	150 – 250 µA at 2.0 O ₂	± 200 ppm O ₂	< 100 ppm O ₂	0.75 V _{DC}
SO-A0-050	0.05 % O ₂ – 5.0 % O ₂	150 – 250 µA at ± 500 ppm O ₂	± 500 ppm O ₂	< 250 ppm O ₂	0.80 V _{DC}
SO-A0-250	0.10 % O ₂ – 25.0 % O ₂	100 µA – 200 µA at ± 0.25 % O ₂	± 0.25 % O ₂	< 0.1 % O ₂	0.85 V _{DC}
SO-A0-960	1.00 % O ₂ – 96.0 % O ₂	15 µA – 30 µA at 20.9 % O ₂	± 1.00 % O ₂	< 0.2 % O ₂	1.00 Vdc**

Operation outside the specified measuring range can cause a permanent damage of the electrode

** If the sensor is mainly operated between 70 and 96.0% O₂ bias voltages up to 1.6 VDC can be applied

Sensor principle



Sensor characteristic

Sensor Characteristic

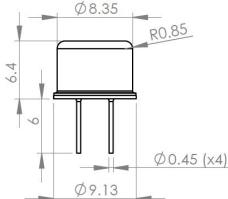
$$I_s(O_2) = -k \cdot \ln\left(1 - \frac{[O_2]}{100}\right)$$

Is (O₂) Sensor current in µA
[O₂] Oxygen concentration in %
k specific constant of sensor

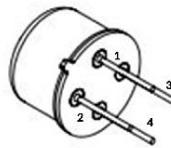
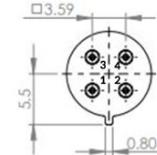
Pin layout

Nr	Function
1	Heater H+
2	Heater H-
3	Sensor S+
4	Sensor S-

Standard housing TO39 (Type SO-A0-xxx)



Pin-Side View



For electronics control board option see Datasheet "GSB- Generic Sensor Board"

Generic Sensor Board (GSB) provides a standard connection for board (solder) or cable mount sensors.

Power supply: 12VDC 0.5 A. Linear signal outputs: 0-5VDC, 4-20 mA and digital RS232 outputs.

Customers should test under their own conditions to ensure the equipment is suitable for the intended application(s).

We adopt a continuous development program, which sometimes necessitates specification changes without notice.



Improving the world, one measurement at a time.™

