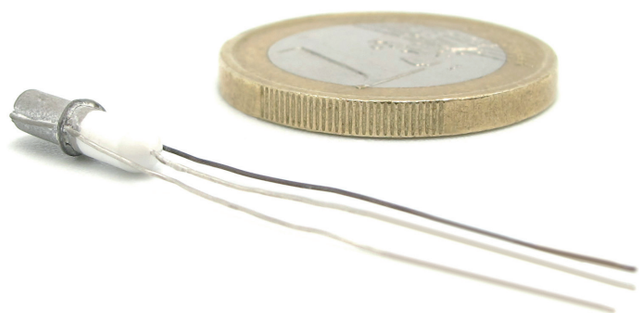
MicroPoas®
by SETNAG

ZIRCONIA SENSOR WITH INTERNAL METALLIC REFERENCE

TECHNICITY AND TECHNOLOGY FOR TAILOR-MADE SOLUTIONS



SETNAG

.PRODUCTS WITH PROVEN PERFORMANCES

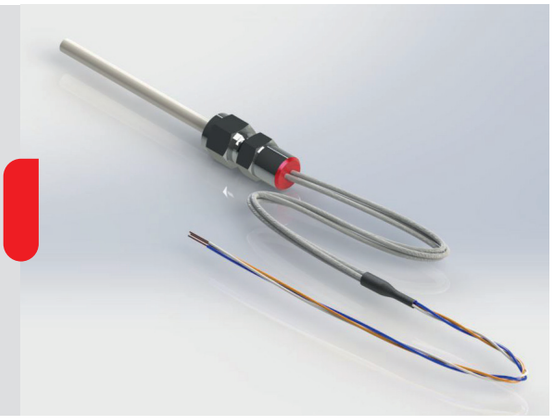
Miniature, ultra precise, autonomous and without reference gas, the zirconia sensor with a built-in internal metallic reference, the MicroPoas, fits perfectly into the process of innovation, of meeting the strict criteria of gaseous oxygen measurement, of improving industrial and scientific uses, of regulating combustion and incineration, of controlling processes, etc...

The integration of the MicroPoas sensor into SETNAG's oxygen analysers gives them excellent precision and unrivalled linearity. It has excellent resistance to thermal shock, extreme pressure and low power consumption. Its great robustness guarantees low and controlled maintenance costs.

The MicroPoas® allows to offer products covering a wide range of industrial industrial and scientific applications

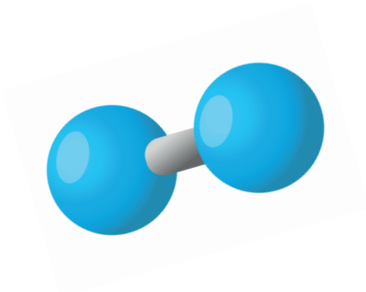
.APPLICATIONS

- Combustion and incineration control
- Basic research
- Materials research
- Measurement of oxygen trace in pure gases
- Control of atmospheres (thermal treatment, breathing, leakage detection)
- Research on fuel cells



.ZIRCONIA MEASUREMENT PRINCIPLE

At high temperature, zirconia becomes conductive to oxygen ions. When two metallized surfaces of a zirconia wall are in contact with two gaseous atmospheres at different oxygen partial pressures, an electrochemical voltage is developed between these two surfaces. This voltages obeys the Nernst law, as follow :

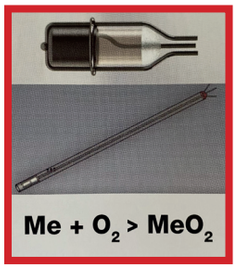


$$E = \frac{RT}{4F} ln \frac{Pmes}{Pref}$$

E = *tension mesurée en V*
T = *température en K*
R et F = *constantes*

Knowing one of the oxygen partial pressures (called reference pressure), and measuring the voltage (E) and the temperature (T), it is possible to calculate the measured oxygen partial pressure.
Regarding the **MicroPoas®**, the reference partial pressure is fixed by a mixture of a metal and its oxide.

.THE MICROPOAS®



Unlike conventional zirconia sensors, known as “air reference” sensors, the MicroPoas has its own reference, using a metal/ metal oxide mixture sealed inside the cell. This reference avoids the need for a reference gas.
At the operating temperature of the **MicroPoas®**, between 550°C and 1050°C, the mixture of the metal and its oxidised form creates a thermodynamic equilibrium controlled only by temperature: the partial pressure of oxygen in the mixture depends only on the temperature.
This miniaturised probe is in the form of a cylinder 3 mm in diameter and 10 mm in length.
An “S” type or “K” type thermocouple accurately measures the temperature of the **MicroPoas®**.
Thanks to its design, the **MicroPoas®** is highly accurate and has long useful life, resulting namely from its great resistance to thermal shocks. The **MicroPoas®** and its “S” or “K” thermocouple are integrated in a ceramic tube.

.USE OF THE MICROPOAS® SENSOR AND ITS DIFFERENT ASSEMBLIES

The MicroPoas oxygen sensor is a patented[1] innovation from French research. This unique technology is regularly adapted to meet the needs of our customers. The MicroPoas® sensor, also called MicroPoas®, probe meets the security needs of different facilities. Its miniaturization and built-in reference enable its direct installation in high temperature processes (e.g. thermobalance, TGA, ...)

Assembly N°	Ceramic 4-hole tube diameter	Length	MicroPoas diameter	Type of wires
3	2.8 mm	105, 250 ou 450 mm	3 mm	Extension (10mm)
5	5.5 mm	105, 250, 450 ou 700 mm	3 mm	Extension (10mm)
6	5.5 mm	105, 250, 450 ou 700 mm	3 mm	Compensation (1m)
7	4 mm	105, 250, 450 ou 700 mm	2 mm	Compensation (1m)
8	4 mm	105, 250, 450 ou 700 mm	2 mm	Extension (10mm)
9	2 ou 2.2 mm	170 mm	2 mm	Extension (10mm)

These assemblies are available in standard (500-800°C) and in high temperature (600-1050°C) [2] version.
All of them include a “S” thermocouple to measure temperature.

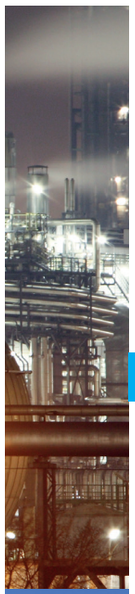
Please contact us for more information.

OPTIONS

- 230Vac/24Vdc power supply for Oxybox’Air
- Extra length of extension wires (Pt) for assemblies n° 3, 5 and 9
- Extra length of compensation wires (CuNi) for assemblies n° 6 and 7.
- *Solutions for sealing adapted with your installation (e.g. swagelok fitting)*

1 - ANVAR/CNRS/UNIV Grenoble patent .
2 - Depending on the gas composition, especially for use in highly reducing atmospheres

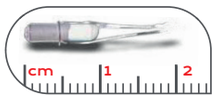
.THE INNOVATIVE CONCEPT OF THE MICROPOAS : MINIATURIZATION AND AUTONOMY



.MINIATURIZATION

The smallest zirconia sensor

- 3 mm diameter for the basic model (2mm depends on application)
- 10 mm in length



Miniature, ultra-precise, autonomous, without reference gas

.AUTONOMY

The highest measurement accuracy

- Specific to gaseous oxygen
- Built-in metallic reference : made of a mixture of a metal and its oxide, it is sealed inside the zirconia sheath.
- Integrated thermocouple (S or K type): the exact temperature of the MicroPoas is taken into account.

Unique features

- No need for reference gas
- High resistance to thermal shocks
- Longer life span
- Special assemblies for measurement under vacuum and under pressure (10-4mbar to >70bar)
- Response time <1s
- Life time >5years on clean gases
- Measured oxygen partial pressure : 10-30 to 10atm
- Working temperature : from 500°C to 1050°C.
- Resistance to thermal shocks : >100 cycles between 20 and 700°C within 10s
- Fast set-up

MICROPOAS® AND OXYBOX'AIR®

• The Oxybox'Air® allows acquiring the signals sent by the MicroPoas® (cell voltage and temperature) and then calculate the oxygen partial pressure. Information can then be collected via the digital RS485 output (ModBus protocol) or via the USB port.

• The transmitter requires 24Vdc power supply, it is mounted into a DIN rail type box (157*86*58mm).

• The Oxybox'Air is supplied with an USB/USB cable, and a software for configuration and data acquisition.

MicroPoas®

by SETNAG

SETNAG

*Brevet Université de Grenoble, CNRS et ANVAR

MASE
AMÉLIORER LA PERFORMANCE SSE

Technopole de Château-Gombert, 22-26 rue John Maynard Keynes, 13013 MARSEILLE
Tel : +33(0)4 91 95 65 12 Fax : +33(0)4 91 64 22 27 email : contact@setnag.com
www.setnag.com

International Organization for Standardization
ISO
9001