GEN'AIR

SETNAG

OXYGEN ELECTROCHEMICAL PUMP

GEN'AIR

Based on the ionic conduction properties of zirconia, **GEN'AIR** makes it possible to create and measure very different oxygen atmospheres.

Le **GEN'AIR**consists of two parts:

- The pump : it depletes or enriches with oxygen the gas passing through its zirconia tube. It requires a low gas flow : between 1 and 12 l/h. It can be used for inert gas/oxygen mixtures or buffered/oxygen mixtures such as$CO/CO_2/O_2$ or $H_2/H_2O/O_2$.

- - The sensor : it measures the oxygen partial pressure generated by the pump.

The use of MicroPoas®[1] gives it an excellent response time and very good measurement accuracy.

1 - *Patent ANVAR/CNRS/UNIV. Grenoble.*

.ITS STRENGTHS

- Generation and analysis of atmospheres with controlled oxygen levels
- Use of carrier gases in small quantities
- Cost limitation by using a single gas
- High working dynamics
- Compact and safe system
- Limited maintenance and servicing
- Excellent measurement stability
- Measurement of oxygen partial pressure from 10^{-35} to 0.25 atm

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.PRINCIPAL OF OPERATION

THE PUMP :

A touch-screen display allows data visualisation and pump's parameters setting. The pump can be controlled with pO2 or current regulation.

The flow of oxygen generated by the pump in the case of oxidizing or neutral gas can be calculated using the formula :

$$X = X^0 \pm 0.209 \frac{I}{D}$$

Where :
X° : molar fraction of oxygen before the pump
X : molar fraction of oxygen after the pump
I : current [A]
D : carrier gas flow rate [l/h]

THE GAUGE :

Placed after the pump, it is used to validate the partial pressure generated by the pump. The measure is performed using the MicroPoas®, a zirconia probe with a metallic internal reference.

Like all zirconia probes, the MicroPoas operates according to **Nernst's law** :

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

In the case of the MicroPoas®, the reference is set by an equilibrium a metal and its oxide.

.EXEMPLE OF PERFORMANCES

At 5l/h and 800°C, the performances obtained with different carrier gases are as follows :

Gas	pO_2 mini	pO_2	pO_2 maxi
Air	17.2 %	20.9 %	25 %
Nitrogen	10^{-8} atm	10^{-7} atm	10^{-2} atm
Ar+5%H_2	10^{-30} atm	10^{-27} atm	10^{-24} atm
CO/CO_2*	10^{-19} atm	10^{-17} atm	10^{-16} atm

* Note that the CO/CO2 balance is not very stable in these conditions.

.TECHNICAL DATA

MEASURING PRINCIPLE	MicroPoas® , zirconia probe with internal metal reference
MESUREMENT RANGE	10^{-35} at 0,25 atm* O_2
FLOW RATE	from 1 to 12 l/h**
OUTPUT SIGNALS	RS485 link ModBus or RS232 protocol
DIMENSIONS AND WEIGHT	430x170x430 mm (wxhxp) - 15kg
POWER SUPPLY	230 Vac – 50/60 Hz
POWER	550 VA

*Measuring traces of oxygen with a zirconia probe is tricky because the presence of traces of impurities such as combustible compounds can create instability. This is particularly true in the 10^{-8} to 10^{-12} atm O_2 range. The use of buffered mixtures makes it possible to generate reducing atmospheres in a controlled manner.

** Flow control must be provided by an external system. The use of a mass flow regulator is recommended (consult us).