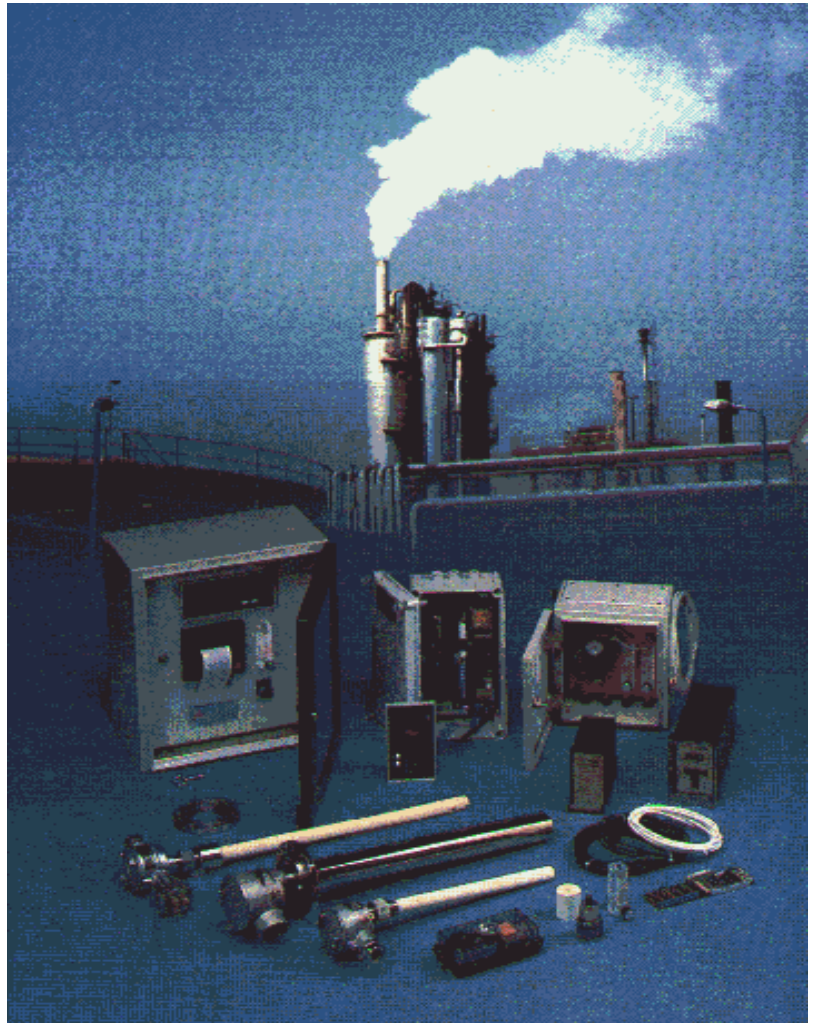


## ZIRCONIUM OXYDE OXYGEN ANALYSERS

- In situ application in combustion products
- Models for temperature up to 1600 °C
- Fast response time
- Low maintenance costs
- Excellent stability
- Fuel saving
- Low cost installation
- No moving parts
- Extractive models
- Wide range of accessories



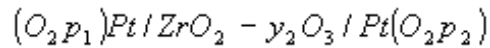
### General Information.

The whole range of the Oxygen Analyser of our production are based on a fully yttria stabilized, extra pure zirconium oxide (zirconia) element which ensure the best accuracy and the possibility of O<sub>2</sub> measuring at a rather low temperature.

## WORKING PRINCIPLE

Some materials have, at high temperature, a ionic conductivity; among these the zirconium oxide, yttria stabilized, shows a high mobility of Oxygen ions and can be used as a solid electrolyte.

The galvanic chain constituted by two films of porous platinum (electrodes) deposited on the ceramic material (solid electrolyte) can be figured:



Where p1 and p2 represent the oxygen partial pressure in the reference and measure compartment.

The E.M.F. of the cell which is generated by the different oxygen partial pressure in the reference and measure compartment is in accordance to the following equation:

$$E = \frac{RT}{4F} \ln \frac{p_1}{p_2} + C$$

Where:

E = E.M.F. is the potential of the cell (in volt)

R = Perfect gas constant (8314 joule<sup>-1</sup> mole<sup>-1</sup>)

F = Faraday constant (96487 coulomb g equiv<sup>-1</sup>)

p1 = Oxygen partial pressure of reference gas (air 20.95% O<sub>2</sub>)

p2 = Oxygen partial pressure of gas to be analysed

T = Temperature of the cell (Kelvin)

C = Constant of the cell

At temperature and reference partial pressure constant, the E.M.F. of the concentration pile is depending only by the oxygen partial pressure of the gas to be analysed.

Assuming the pressure of the reference and measure compartment to be atmospheric the oxygen partial pressure can be associated to the percentage of Oxygen. The error because of the pressure of the plant not atmospheric is usually neglectable (0,13% of theoretical value per mm of Hq) and can be adjusted using the ZERO regulation of the electronic unit.

FER STRUMENTI srl  
Italia - 20038 SEREGNO (MI) - Via Ripamonti, 58  
tel. +39 0362 231203 - Fax +39 0362 330349  
e-mail:ferstrumenti@fer-strumenti.com