

In-situ zirconia based oxygen analyzers

AT 300

RESIDUAL OXYGEN ANALYZER IN
THE COMBUSTION CHAMBER, HIGH
TEMPERATURE (500-1600 °C)
SPECIAL FOR GLASS MELTING TANK

Zirconium oxide (ZrO₂)-based cells use an electrochemical principle to measure the concentration of oxygen in gases. Their operation is based on a few key properties:

1. Ionic conductivity: At high temperatures (over 500°C), yttria stabilized ZrO₂ (YSZ) exhibits high ionic conductivity for oxygen ions.

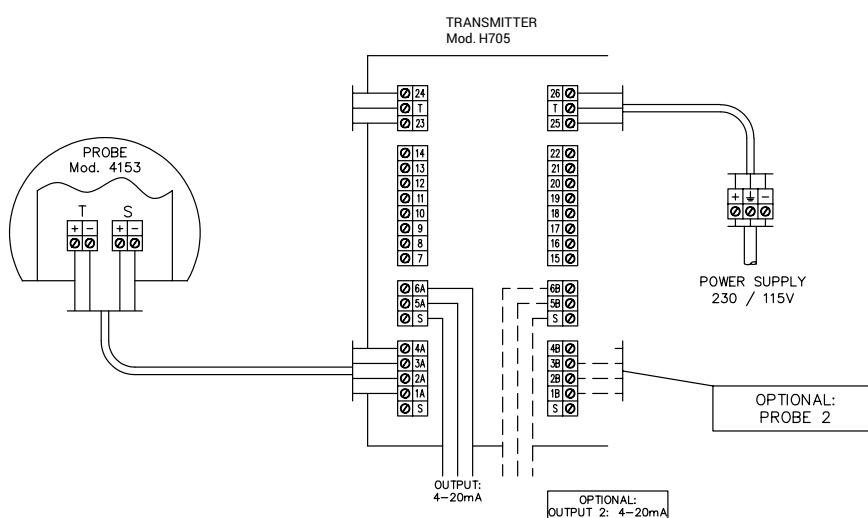
2. Separation properties: ZrO₂ acts as an oxygen ion permeable membrane, separating two chambers: - Reference chamber: Exposed to a gas with known oxygen concentration (ambient air) - Measuring chamber: Exposed to the gas to be analyzed.

3. Oxygen partial pressure difference: A partial pressure difference of oxygen is created between the two chambers which induces the migration of oxygen ions through the ZrO₂ membrane.

4. Electromotive Force Generation (FEM): The migration of oxygen ions generates an electric current proportional to the partial pressure difference of oxygen. This FEM is measured as a useful signal.

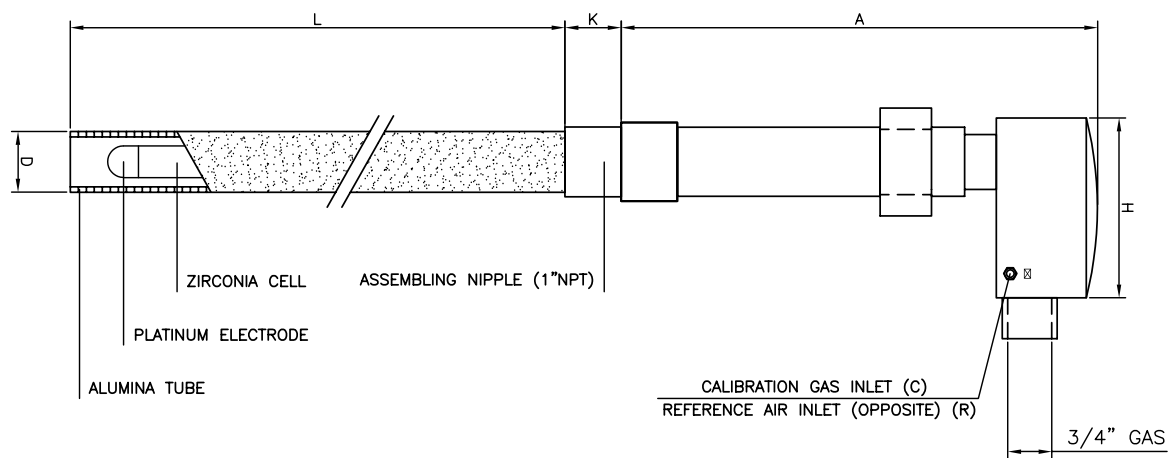
- + Completely designed and manufactured by Fer Strumenti
- + Possibility of having two probes connected to the same electronic unit
- + Dual analog outputs for second O₂, Temperature
- + Cell galvanic regeneration circuit integrated into the transmitter
- + Very useful for NO_x containment
- + High response speed
- + Resistant to hostile and dusty atmospheres
- + Ideal for automatic combustion control
- + Full in-situ, without internal circulation
- + Available accessories for automatic mounting with plant running

Connections



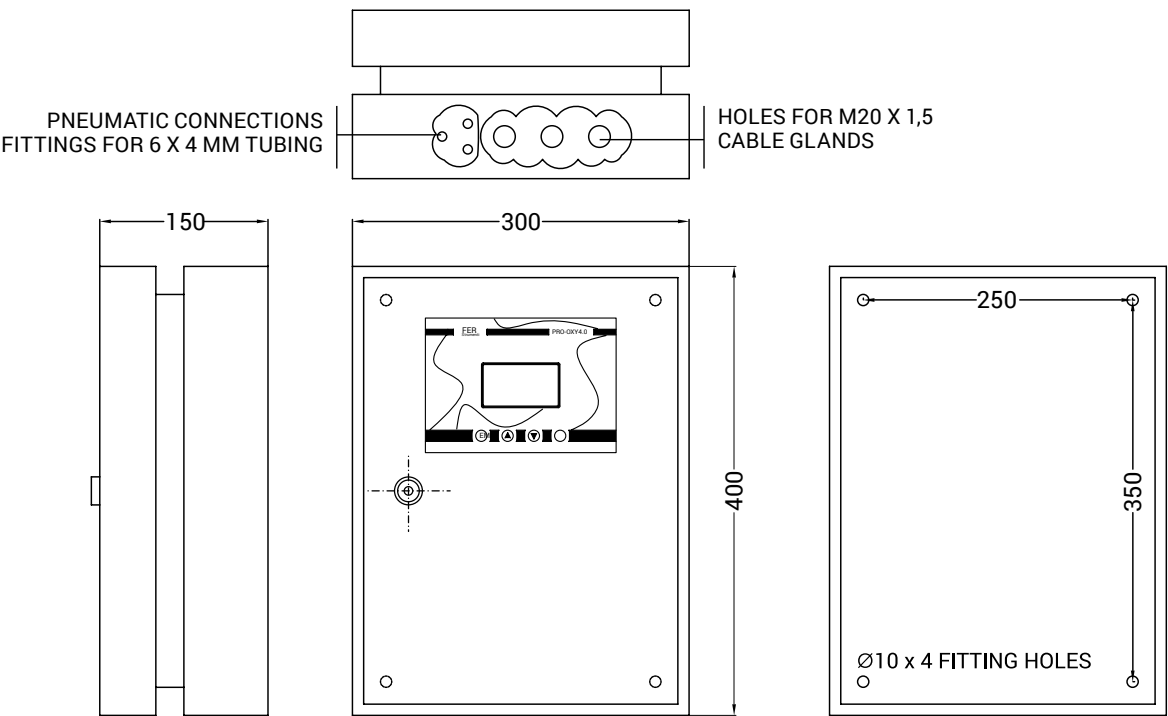
Dimensional drawings

+ Probe



A = 255 mm	L (mm)
H = 112 mm	500
D = 28 mm	650
K = 25 mm	

+ Transmitter



Description

The reference and measuring gases flow into the two chambers respectively. Oxygen ions migrate through the ZrO₂ membrane based on the partial pressure difference when it is at a temperature greater than 500 °C Ion migration generates a FEM proportional to the oxygen concentration in the gas to be analyzed.

The measurement of CO_e is carried out with a second special electrode where the oxidation of the CO_e to CO₂ takes place with the release of electrons. The migration takes place through the electrolyte with a current from whose logarithm the CO_e concentration can be obtained through an algorithm managed by the transmitter.

Applications

All glass melting plants with and without regeneration chamber.

Certifications and Marking



MC according to EN 50081 and EN 50082



EAC declaration of conformity according to TR-CU-004 and TR-CU-020

Accessories

- Flow meters boxes models 60 and 62
- AISI 316 stainless steel containers
- Pressure reducer instead of electric pump
- Mounting flanges and tubes for probe protection
- 4x1.5 shielded connection cables and 6x4 mm hoses
- Electrical and pneumatic connections can be customized upon request

Technical specification

Accuracy - Oxygen: In the % range: $\pm 0.5\%$ of the theoretical value or 0.5% of O₂ (whichever is greater). In the ppm range: 0.5% of FS
- CO_e: 50 ppm

Stability Within 1% of range

Response time (90%) (90%): 1" < cell, 15" < system

Technical specification Probe (Analyzer) 4153 special with extension

Power supply Not necessary

Measuring range - Oxygen : $0.0001 \div 25\%$ O₂ by volume
- CO_e: 0-1000 minimum

Compensation thermocouple Integrated type B as standard others available

Storage temperature -40°C/+80°C

Operating temperature Flue gas from 500°÷1600°C , < 200° C for the probe head

Process connection 1" NPT-M Thread

Lengths - Analyzer 500 mm, 650 mm

Mounting Vertical

Pneumatic connections Compression fittings for 6x4 mm hose (EDxID)

Electrical connections PG16 cable glands, customizable on request

Enclosure protection rating IP66

Accessories ZAC protection tubes: 600 mm, 750 mm

Technical specification H705 Transmitter

Power supply 115V - 230V $\pm 10\%$, 50/60 Hz, 50 Va max

Analog inputs n. 4 with 22 bit ADC

User Interface Backlit LCD display and 4-key membrane keypad

Analog outputs 2 x 4 ÷ 20 mA 500 ohms or 0 – 10 V linear on one of the following ranges:
0 ÷ 1999 ppm O₂
0 ÷ 5% vol. O₂
0 ÷ 10% vol. O₂
0 ÷ 21% vol. O₂
0 ÷ 25% vol. O₂
0-1600 °C Probe temperature or Auxiliary temperature
0-1000 CO_e or greater

Digital communication protocols - Modbus TCP over ethernet
- Modbus RTU over RS485
- Hart Protocol Version 6.0

Digital outputs n. 2 relay for fault and service request, other functionality trough modbus to drive external modules

Digital inputs - n. 2 for automatic remote control calibration of the two probes
- n. 1 for HOLD measurements request for both channels

Pneumatic connections Compression Fittings for 6x4 mm Hose (EDxID)

Electrical connections 23 mm holes for cable glands mounting o customizable reductions

Storage temperature -40°C/+80°C

Calibration - Built-in zero air pump and flowmeters
- Automatic by means of solenoid valves controlled through modbus TCP

Operating temperature -20 ÷ +45° C; Relative humidity < 90% non-condensing - for lower temperatures, fibreglass protection boxes are available

Degree of protection IP65

FER STRUMENTI S.r.l. reserves the right, without any notice, to make any modifications needed for improving the product.

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