

In-situ zirconia based oxygen analyzers

BT 300

RESIDUAL OXYGEN ANALYZER
AND CO IN THE COMBUSTION
CHAMBER, LOW TEMPERATURE
(ROOM-700 °C)

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.

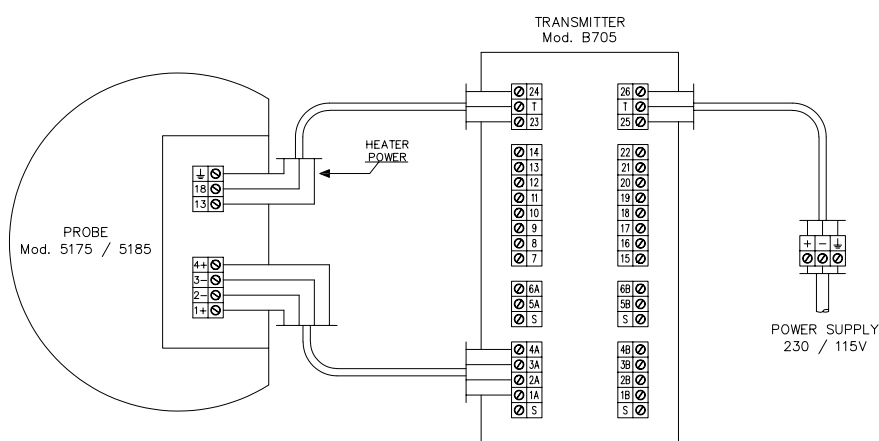
2. Separation properties: ZrO₂ acts as an oxygen ion permeable membrane, separating two chambers: - Reference chamber: Exposed to a gas with known oxygen concentration (ambient air) - Measuring chamber: Exposed to the gas to be analyzed.

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.

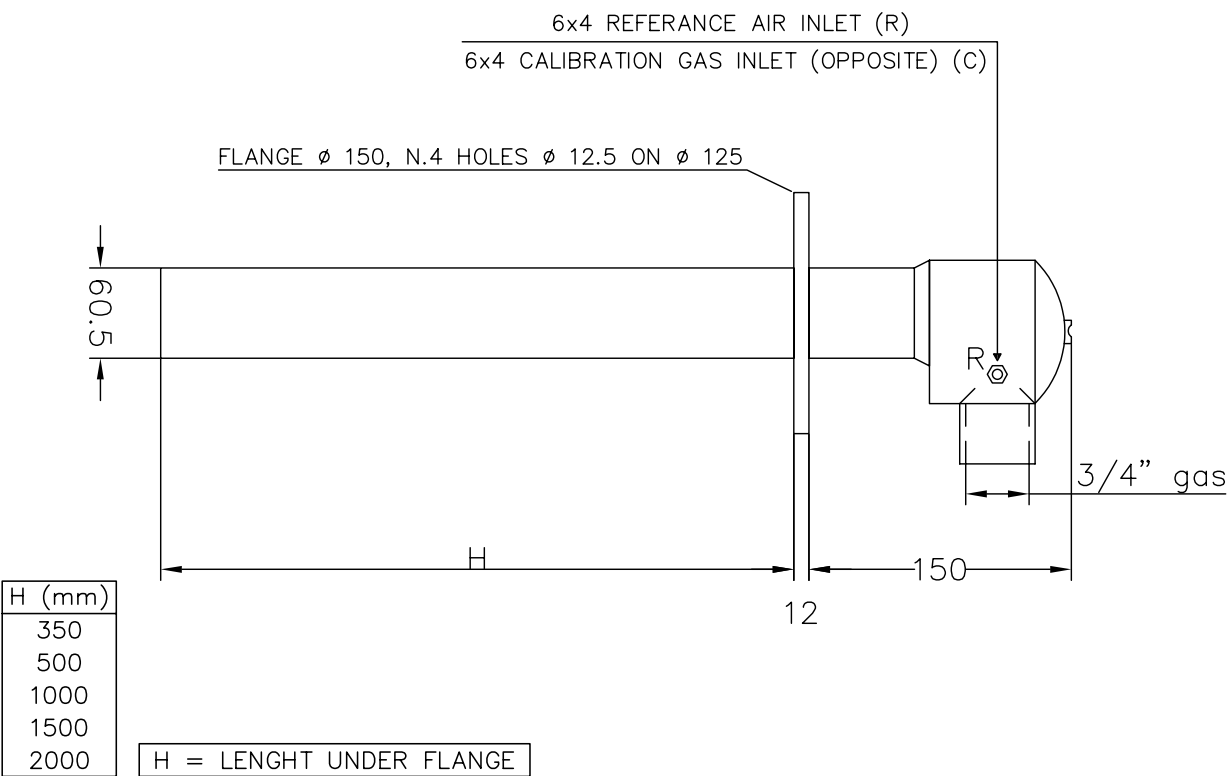
- + Completely designed and manufactured by Fer Strumenti
- + Full in-situ, without internal circulation
- + Possibility of having two probes connected to the same electronic unit
- + Dual analog outputs for second O₂, Temperature, CO
- + Cell galvanic regeneration circuit integrated into the transmitter
- + Resistant to hostile atmospheres
- + Ideal for automatic adjustment
- + Accessories available for dusty processes

Connections

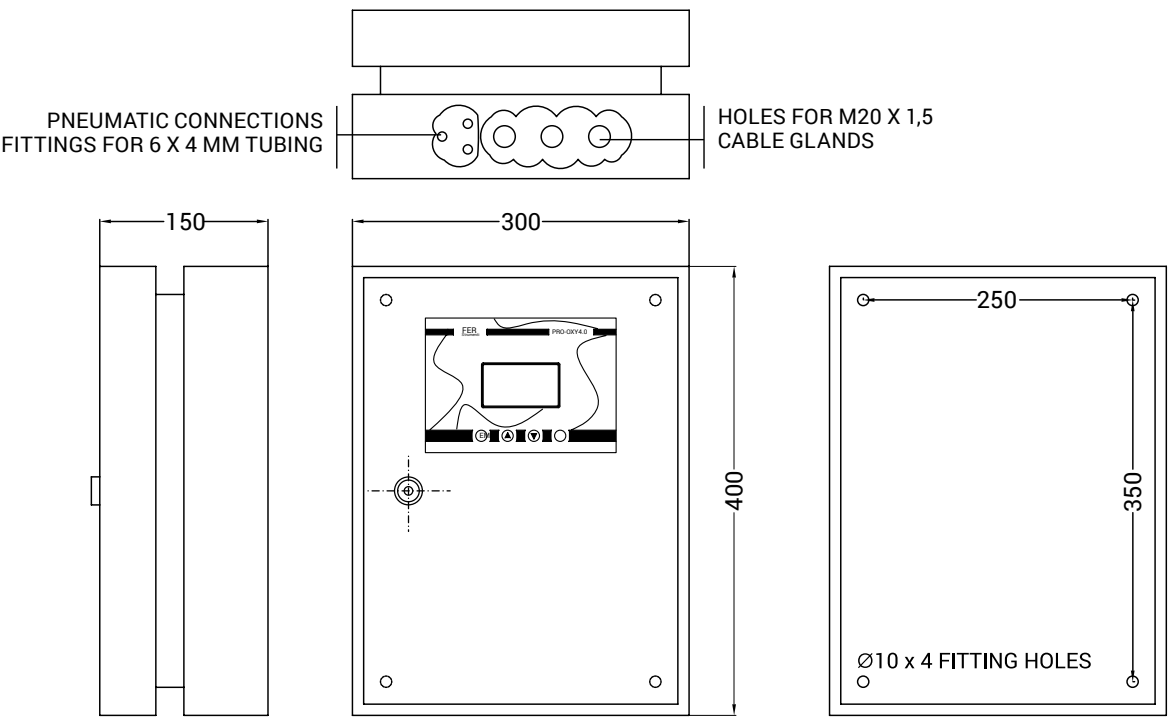


Dimensional drawings

+ Probe



+ 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 measuring cell is equipped with a special heater to raise its temperature to 700°C where this process works properly

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 industrial combustion plants where the flue gas temperature does not exceed 700 °C.

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
- Special cable designed for connecting B705 to 5175 Probe
- 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 O ₂ (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) 5175

Power supply	Not necessary
Measuring range	- Oxygen : 0.0001 ÷ 25% O ₂ 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 Room ÷ 700° C , < 200° C for the probe head
Process connections	Flange diam.150 mm, 4 holes diam. 12.5 on 125 mm diameter or Flange 3" 150 RF AISI flange
Mounting	Horizontal or vertical
Pneumatic connections	Compression fittings for 6x4 mm hose (EDxID)
Electrical connections	PG16 cable glands
Enclosure protection rating	IP66

Technical specification B705 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 O ₂ 0 ÷ 5% vol. O ₂ 0 ÷ 10% vol. O ₂ 0 ÷ 21% vol O ₂ 0 ÷ 25% vol O ₂ 0-700 °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	- Display-driven manual zero air pump and built-in 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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