

In-situ zirconia based oxygen analyzers

HL 305

RESIDUAL OXYGEN ANALYZER
FULL IN-SITU, FOR LOW AND
HIGH TEMPERATURE (200-1200 °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.

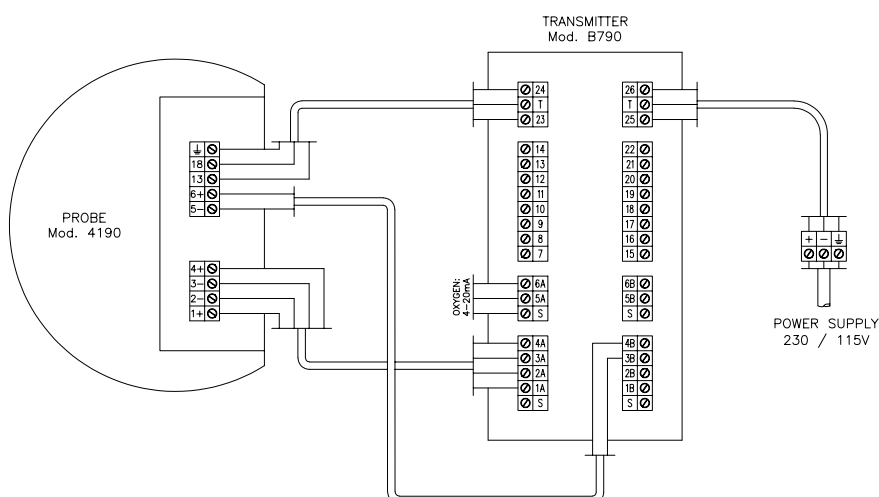
2. Separation properties: ZrO₂ acts as an oxygen ion permeable membrane, separating two chambers: - Reference chamber: Exposed to a gas with known oxygen concentration (ambient air) - Measuring chamber: Exposed to the gas to be analyzed.

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.

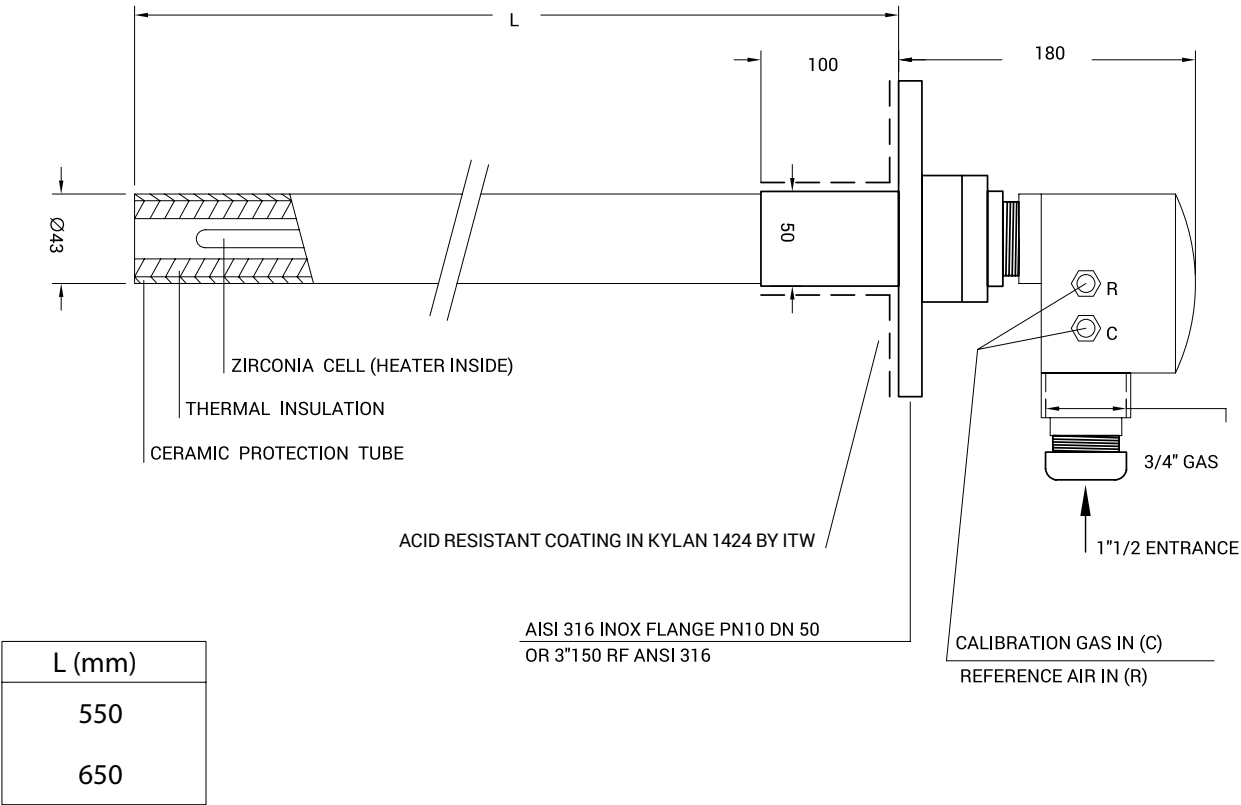
- + The only in situ oxygen analyzer for temperature from 200 to 1200 °C
- + Double analogical output for oxygen content and temperature
- + Cell galvanic regeneration circuit integrated in the transmitter
- + Completely designed and manufactured by Fer Strumenti
- + Can be used in processes with high particulate content and aggressive acids
- + The analyser has no drift due to the accurate compensation
- + No periodic calibrations are required
- + Ideal for combustion control in incinerators

Dimensionals

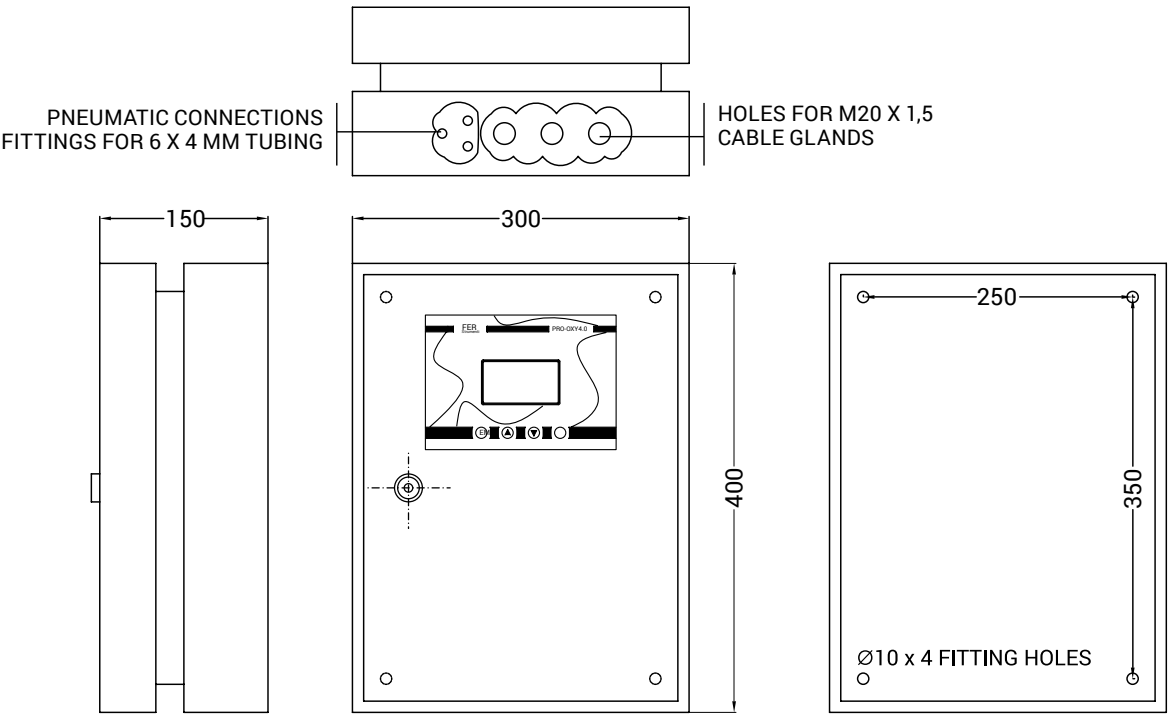


Dimensional drawings

+ 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 probe is equipped with a special heater capable of withstanding high temperatures (max 1200 °C) thanks to the special materials used. Thanks to this heater analyzer is then able to work from 200° C.

Applications

For all industrial plants where it is necessary to measure the residual oxygen of combustion in a wide range of temperatures, such as incinerators and waste-to-energy plants.

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: $\pm 2\%$ of the theoretical value or 0.5% of O ₂ (whichever is greater). In the ppm range: 0.5% of FS
Stability	Within 1% of range
Response time (90%)	(90%): 1" < cell, 60" < system

Technical specification Probe (Analyzer) 4190

Heater power supply	Directly from the converter 230/115 Vac
Measuring range	Oxygen : 0.0001 ÷ 25% O ₂ by volume
Compensation thermocouple	Double S type for compensation and temperature control
Storage temperature	-40°C/+80°C
Operating temperature	Flue gas from 200 to 1200°C, < 200° C for the probe head
Process connections	Flange 3" 150 RF AISI flange or PN 10 DN 50
Pneumatic connections	Compression fittings for 6x4 mm hose (EDxID)
Electrical connections	PG16 cable glands, customizable on request
Enclosure protection rating	IP66

Technical specification B790 Transmitter

Power supply	115V - 230V $\pm 10\%$, 50/60 Hz, 500 Va max
User Interface	Backlit LCD display and 4-key membrane keypad
Probe heater power output	40 Vac from triac with PID control
Analog inputs	n. 4 with 22 bit ADC
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 0-1200 °C Probe temperature or Auxiliary temperature
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 through modbus to drive external modules
Digital inputs	- n. 1 for automatic remote control calibration of the probe - n. 1 for HOLD measurement request
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

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