In-situ zirconia based oxygen analyzers

HT 300

RESIDUAL OXYGEN ANALYZER AND CO IN THE COMBUSTION CHAMBER, HIGH TEMPERATURE (500-1600 °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.

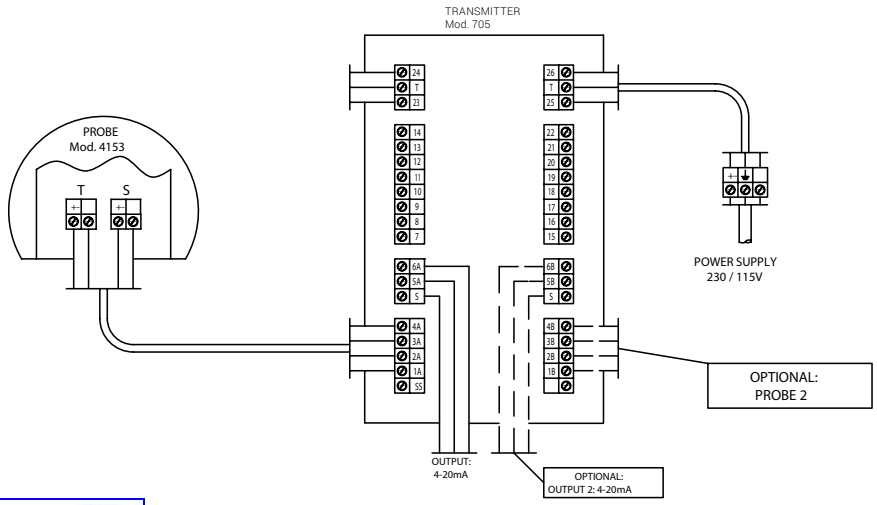
2. Separation properties: ZrO2 acts as an oxygen ion permeable membrane, separating two chambers: - Reference chamber: Exposed to a gas with known oxygen concentration (ambient air) - Measuring chamber: Exposed to the gas to be analyzed.

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, COe
- + Cell galvanic regeneration circuit integrated into the transmitter
- + Very useful for NOx containment
- + High response speed
- + Resistant to hostile and dusty atmospheres
- + No need for calibration
- + The probe can be mounted in any position. Preferred vertical

Connections



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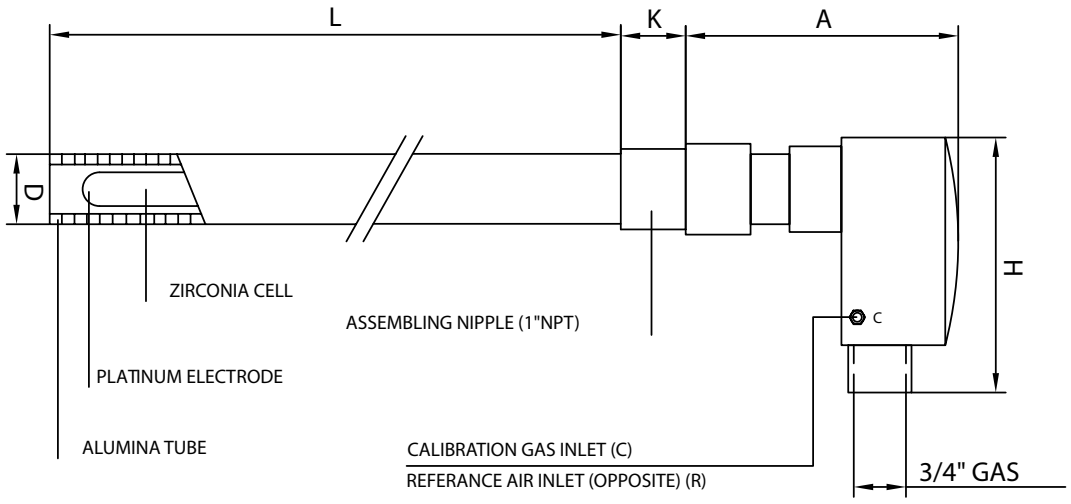
Dimensional drawings

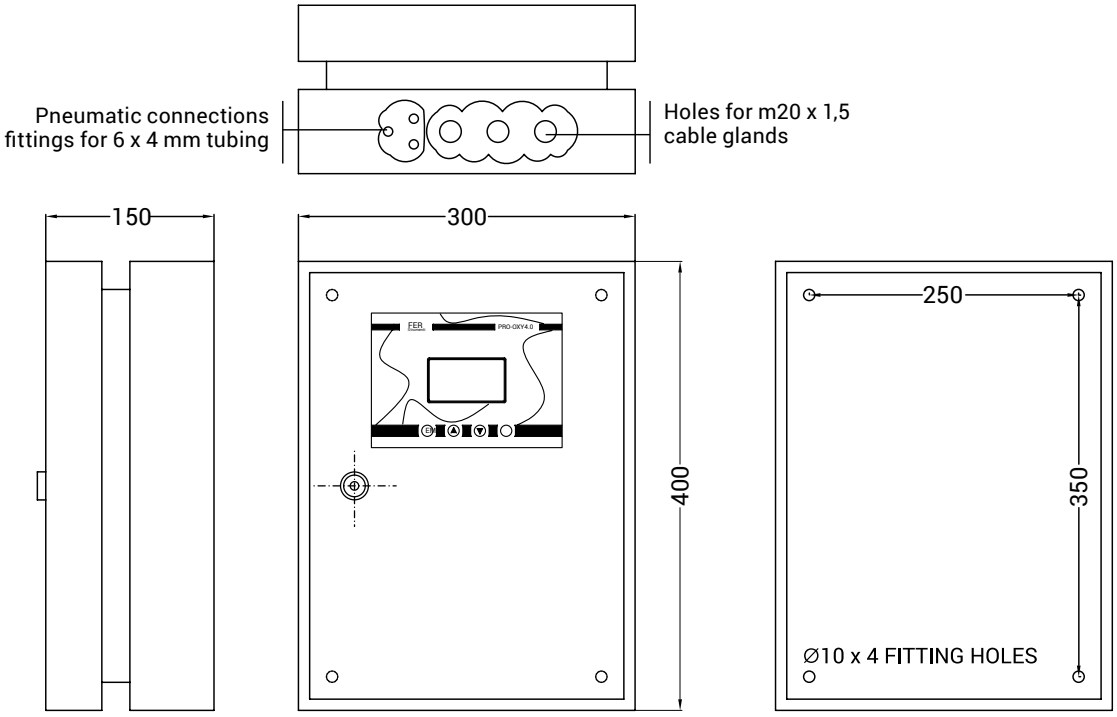
+ Probe



A = 155 mm	L (mm)
H = 112 mm	310 350 500 650 900
K = 25 mm	
D = 23 mm	

Pneumatic connections
[ ] 1/4" NPT
[ ] Fittings for 6x4 mm tubing
[ ] Fittings for 6.35x4.35 mm tubing

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

Applications

All industrial combustion plants where the temperature can reach 500 °C.

Certifications and Marking

CE

MC according to EN 50081 and EN 50082

EAC

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: ± 0.5% of the theoretical value or 0.5% of O2 (whichever is greater). In the ppm range: 0.5% of FS - COe: 50 ppm
Stability	Within 1% of range
Response time (90%)	1" <" cell, 15" < system
Technical specification Probe (Analyzer) 4153	
Power supply	Not necessary
Analog inputs	n. 4 with 22 bit ADC
Measuring range	- Oxygen : 0.0001 ÷ 25% O2 by volume - COe: 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
Pneumatic connections	Compression fittings for 6x4 mm hose (EDxID)
Electrical connections	PG16 cable glands, customizable on request
Enclosure protection rating	IP66
Technical specification H705 Transmitter	
Power supply	115V - 230V ± 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 COe or greater
Digital comunication 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 f or 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

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OPCIONES

KIT DE SUMINISTRO DE AIRE DE REFERENCIA Y GAS DE CALIBRACION, OPCIONAL

Equipo neumático para suministrar al sensor el gas de referencia y los gases de calibración de cero (aire) y span. Este sistema puede colocarse dentro de la caja de la unidad electrónica para montaje en campo o suministrarse como un equipo independiente. El suministro de aire puede hacerse por medio de una bomba eléctrica o por medio de un regulador de presión para usar la red de aire de instrumentación de la planta.

MODELO 60

Usa aire de instrumentación. Un regulador de presión con filtro y descarga de condensados, envía el aire a los rotámetros. No se recomienda si el aire de instrumentación se seca con sílica gel, o contiene grasa

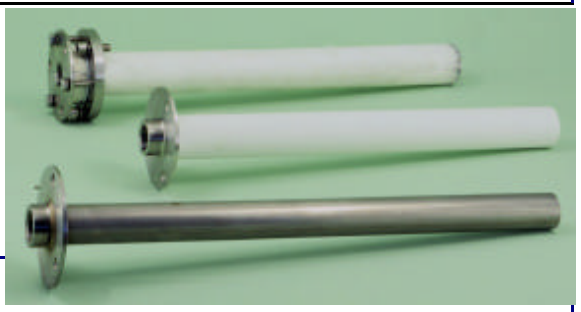
MODELO 62

Si no tenemos aire de instrumentación, se le incorpora una bomba eléctrica, en lugar del regulador de presión, y enviamos el aire generado a los rotámetros

ESPECIFICACION TECNICA

Presión de entrada del aire	1-8 bar (solo para modelo 60)
Rotámetro de aire de referencia:	0.0÷0.5 l/minuto
Rotámetro para el gas de calibración:	0.0÷5 l/minuto
Alimentación (solo modelo 62)	220 ó 110 Vca 50-60 Hz 5 W (a definir)
Conexiones:	1/8" para tubo de 6 mm O.D., ó 1/4" NPT-H
Caja:	Metálica IP65, o montado en la caja para la unidad de control de montaje en campo
Dimensiones:	230x300x170 mm Peso 7 Kg

TUBOS DE PROTECCION Y EXTENSION



Por ser estos analizadores completamente cerámicos, se recomienda montarlos siempre con un tubo de protección o de protección/ extensión. El tubo se conecta al proceso por medio de la brida que incorpora y el analizador se rosca sobre el mismo. Los tubos de extensión tienen un diseño que fuerza el gas a pasar por el analizador

ESPECIFICACION TECNICA

Tubo de Inconel	Temperatura máxima 1180 ºC Longitudes de inserción: 350, 600 700, 1000 ó 1350 mm
Tubo de alúmina	Temperatura máxima 14000 ºC Longitudes de inserción: 350, 550, 600 ó 750 mm
Tubo de electro-fundido	Temperatura máxima 1600 ºC Longitudes de inserción: 600 ó 750 mm
Conexión a proceso	Brida de 125 mm ó 4” 150 Lbs RF según tipo y logitud, otras como opción