In-situ zirconia based oxygen analyzers

SYRE

OXYGEN ANALYZER FOR HIGH TEMPERATURE (500 – 1600 °C) BASED ON ZIRCONIUM OXIDE CELL FOR FLUE GASES WITH TWO-WIRE "SMART" TRANSMITTER FOR HAZARDOUS ATMOSPHERES

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.

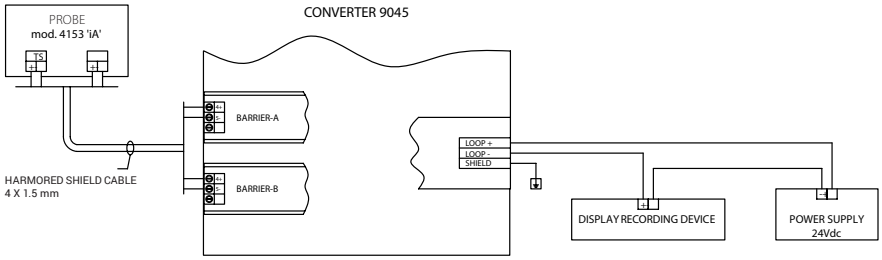
2. Separation properties: ZrO2 acts as an oxygen ion permeable membrane, separating two chambers: - Reference chamber: Exposed to a gas with known oxygen concentration (ambient air) - Measuring chamber: Exposed to the gas to be analyzed.

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.

- + Direct insertion into the process
- + Probe without gas circulation
- + Fast response time
- + Resistant to high concentration of acids
- + No need of calibration
- + Completely safe
- + Excellent stability
- + Inexpensive
- + HART protocol

Connections



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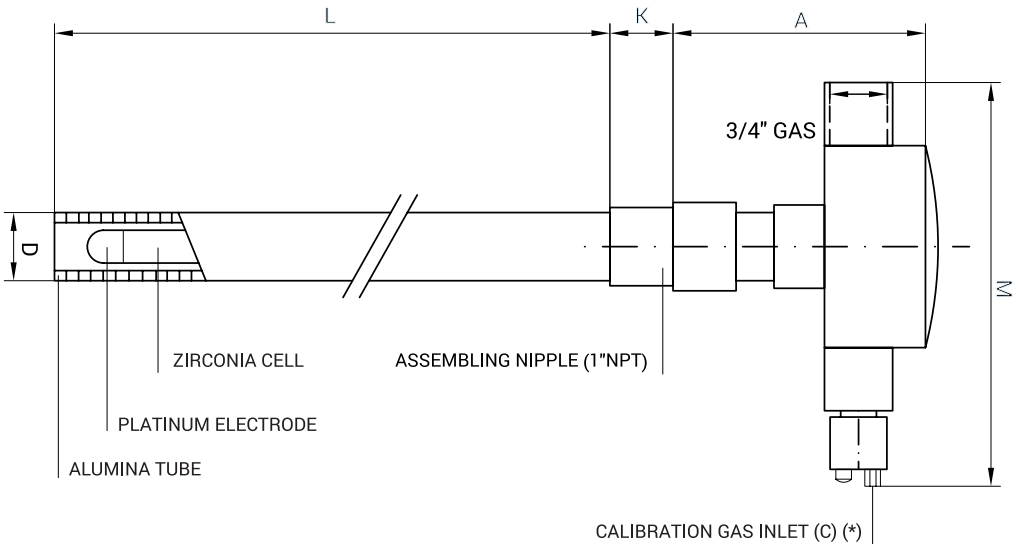
Dimensional drawings

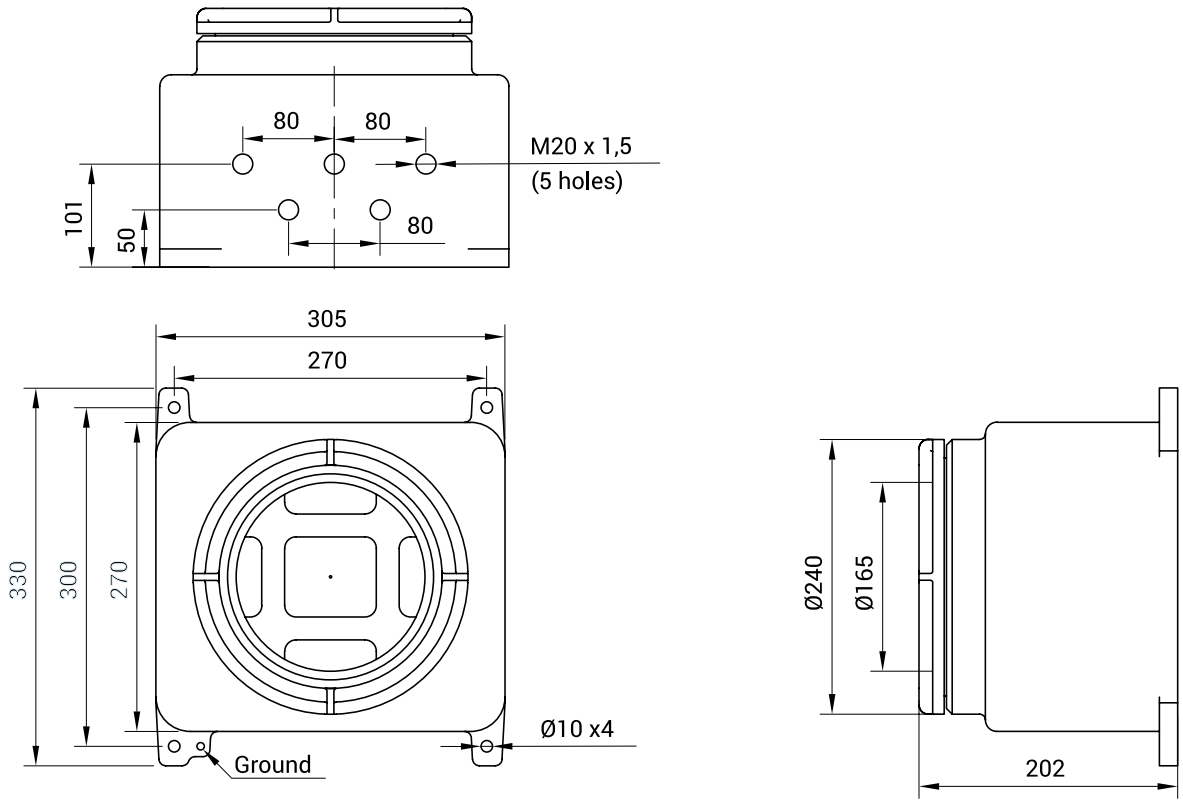
+ Probe



	L (mm)
M = 162 mm	310
A= 155 mm	500
K = 25 mm	650
D = 28 mm	900

(*) 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.

Applications

All industrial combustion plants classified as hazardous areas where the process temperature can reach 500° C.

Certifications and Marking

Atex
- II 2(1)G Ex db [ia Ga] IIC T6 Gb,
- II 2(1)D Ex tb [ia Da] IIIC T135°C Db
according to EN IEC 60079-0:2018; EN 60079-1:2014; EN 60079-31:2014; IEC 60079-11:2023; EN 60079-25:2010

IECex
- Ex db [Ex ia Ga] IIC T6 Gb
- Ex tb [Ex ia Da] IIIC T85°C Db
according to IEC 60079-0:2017, IEC 60079-1:2014, IEC 60079-11:2023, IEC 60079-31:2022

Declaration of conformity EAC according to TR-CU-004, TR-CU-020, TR-CU-012

Accessories

- Flow meters boxes models 60 and 62
- AISI 316 stainless steel containers
- Mounting flanges and tubes for probe protection
- 4x1.5 harmored 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
Stability	Within 1% of range
Response time (90%)	(90%): 1" <" cell, 15" < system
Technical specification Probe (Analyzer) 4153 "ia"	
Power supply	Not necessary
Measuring range	Oxygen: 0.0001 ÷ 25% O2 by volume
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	Cable gland for dedicated cable on 3/4" UNI inlet
Enclosure protection rating	IP66
Technical specification 9045 Transmitter	
Power supply	2 x 24 Vdc
User interface	LCD Display & Magnetic Keypad
Analog outputs	4 ÷ 20 mA max. load 500 ohms linear on one of the following ranges: 0 ÷ 5% vol. O2 0 ÷ 10% vol. O2 0 ÷ 21% vol O2 0 ÷ 25% vol O2
Other outputs	Hart Protocol Version 6.0
Electrical connections	4 x M20x1.5 inlets
Storage temperature	-40°C/+80°C
Calibration	Display-guided manual, flowmeter box available as an option
Operating temperature	-20÷ +45° C; Relative humidity < 90% non-condensing
Degree of protection	IP65

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