E 705

ZIRCONIUM OXIDE CELL-BASED EXTRACTIVE ANALYZER

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.

- **+ Total absence of cross-interference with other gases**
- **+ Insensitivity to the variation of the flow of the gas to be analyzed**
- **+ Periodic calibration not required**
- **+ The lifetime of the cell is indefinite as it has no moving parts**
- **+ Hart Protocol 6.0**
- **+ Ideal for inclusion in an emissions analysis system**
- **+ Fully automatic electrode regeneration system**

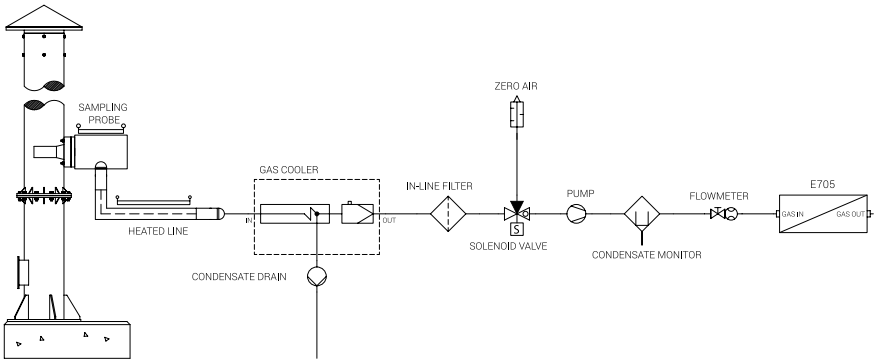
Dimensionals

Standard 19" 3U
450 x 132 x 430 mm depth

Front mask width
485 x 132 mm

Weight 12 Kg

Connections



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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 fully works properly.

Applications

- Monitoring of emissions for recalculation of the same to reference value
- All processes where it is not possible to use in situ measurements

Certifications and Marking

QAL1 according to EN 14181 and EN 14956 based on procedures contained in EN 15267-3

EAC Declaration of Conformity to TR-CU 004 and TR-CU 020
Pattern Approval (PAC)

CE according to En 61010-1 and EMC according to EN 50081 ed EN 50082

Accessories

Analog and digital hard-wired I/O expansion module

Technical specification	
Accuracy	<= 1% of range
Linearity	<= 1% of range
Riproducibility	<= 1% of range
Response time	Based on moving averages settable within 200 sec. for fields certified according to EN 15267-3
Warm up time	45 minutes, upon reaching temperature stability depending on environmental conditions
Drift	Negligible with automatic zero alignment activated
Inlet gas pressure	<=3 bar (300 kPa)
Sample flow	0.5-3 l/min
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 - 0-700 °C Probe temp.
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. 1 for automatic remote control calibration of the probe - n. 1 for HOLD measurements request
Pneumatic connections	Compression Fittings for 6x4 mm Hose (EDxID)
Electrical connections	Standard IEC-60320-C13 socket for power and SUB-D connector for signals
Storage temperature	- 40 °C/+80 °C
Calibration	Automatic via solenoid valves controlled via Modbus TCP
Operating temperature	-20÷ +45 °C; Relative humidity < 90% non-condensing

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