

# 8870

## Data sheet

[www.adev.it](http://www.adev.it)

2018

Rugged Zirconia analyser for  
Oxygen measurements in  
combustion & inert gas

## Oxygen Analyser

For measurement in  
ppm and % range



The 8870 is an extractive Zirconia Oxygen analyser that is typically employed for O<sub>2</sub> trace measurements in pure gases (typical in technical gas production industry) or in heavy duty applications with presence of high amount of dirty, acid components and Carbon Monoxide (CO) thanks to an extremely rugged sensor.

Anyway, the field of application is wide and goes from heat treatments atmosphere control, to breweries and to every other application with not combustibles background gasses where an in situ measure is not convenient.

# Technical Specification

## 8870 Zirconia Analyser

### Performance Specification

Accuracy	with control unit: $\pm 1\%$ of span or $\pm 1$ ppm (whichever is worse) transmitter: $\pm 2\%$ of span or $\pm 0.05\%$ O <sub>2</sub> (whichever is worse)
Repeatability	$\pm 0.5\%$ of span (short term).
Linearity	better than $\pm 1\%$ of full scale
Response Time	Initial < 0.1 sec.; 90%: < 1 sec. (with max. 300 cc/min. flow rate)
Drift	Zero: max. $\pm 1\%$ of span per week Span: negligible
Ambient Temp. Influence	max. $\pm 0.06\%$ of reading per °C
Atm. Pressure Influence	Free vent: no influence Pressurized vent: $\pm 0.1\%$ per hPa
Flow Rate Influence	less than 0.3% of span over flow range of 100 to 200 cc/min.
Line Voltage Influence	max. 0.02% of span, for each 1% change of power voltage.
Gas Interference	combustible gases + O <sub>2</sub> reduce the measure

### Operative Specification

Sample Requirements	Sample Flow Rate: 100 ÷ 300 cc/min. Pressure: 3000 Pa minimum (with filter and flow meter).
Reference Requirements	Dry and oil-free instrument air at Flow Rate: 100 ÷ 200 cc/min. (max. 500 cc/min.)
Range	Refer to ordering information
Output	Standard 8870 sensor output: logarithmic 50 mV/decade functioning as input of control unit that operates calculation, linearization and retransmits the isolated output current.  Transmitter version: 4-20 mA proportional to ordered range; max. load 500 $\Omega$ (or 350 $\Omega$ with galvanically insulated module)
Diagnostic NV Logical Output (non-valid)	Logical Non Valid output from relay free contact. Normally supplied in fail safe condition (triggered relay and closed contact if not in alarm). Can be modified in filed
Relative Humidity	90% maximum.
Operation Temperature	-10 ÷ +50°C (14 to 122 °F).
Temperature controlled	at 700°C
Storage Temperature	+70°C (158 °F) max.
Power Requirements	22 ÷ 30 Vac, 200 VA from dedicated power supplier.
Pneumatic Connections	Sample IN, sample OUT, reference air: 1/8" NPT-F
Wiring Connections	N°2 cable glands for cables 10 ÷ 12 mm



### Key Applications

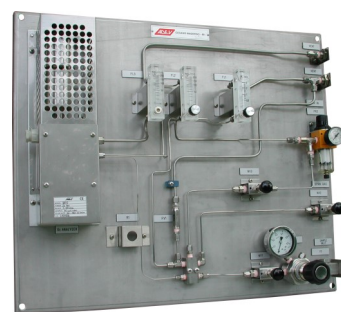
- Gas production industry (purity monitoring of N<sub>2</sub>, Ar, He, CO<sub>2</sub>)
- Air Separators
- Nitrogen Generators
- Heat treatments
- Mixers
- Welding Gas
- Combustion Gas
- Endothermic Generators
- Any application for ppm or % O<sub>2</sub> measurement in inert gas or combustion gas



### Sampling System

The 8870 needs an external sampling system able to deliver an almost clean sample gas to the analyser at the proper temperature, pressure and flow rate.

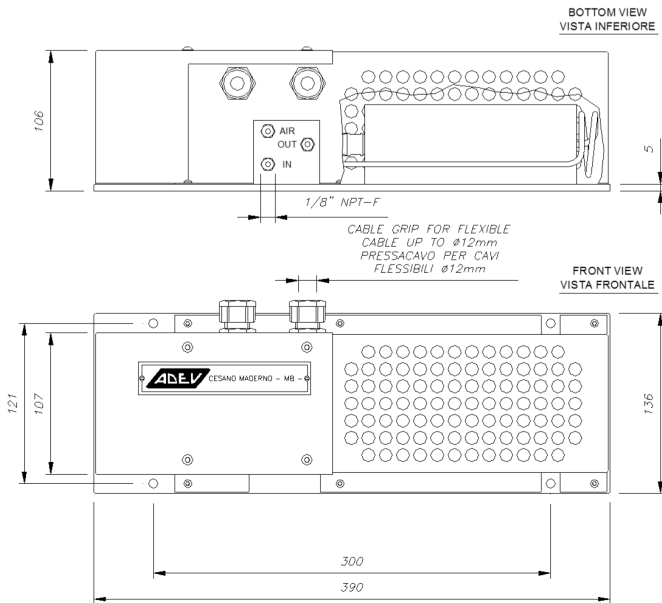
ADEV has a wide experience in process and can provide the 8870 analyser combined with a sample and condition system designed for the specific application requirements. Contact ADEV for details



## Physical Specification

Wet Parts Materials	316SS, 303SS, Anticorodal, Platinum-Iridium, Viton, Zirconia, Alumina
Dimensions	390 x 136 x 106 mm
Weight	4 kg.
Finish	304SS
Protection	IP 20

## Outline Dimensions



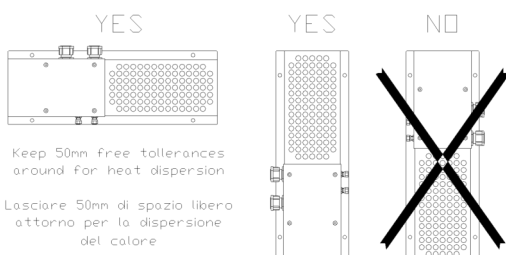
## High Accuracy & Simple Design

The 8870 is an high accuracy analyzer that features a special Zirconium Oxide sensor with an inner reference air flow system that eliminates the effects of barometric pressure variations.

The sensor is surrounded by an heater that keeps it at a constant temperature of 720 °C. The sensor assembly can be removed from the head block.

This head block includes the thermocouple assembly, the inner electrode and reference circuit. Sample inlet and outlet and reference inlet are also provided in the unit.

There are no inner moving parts; installation position and eventual vibrations don't alter the accuracy and stability of the measure.



## Output Signal & Resolution

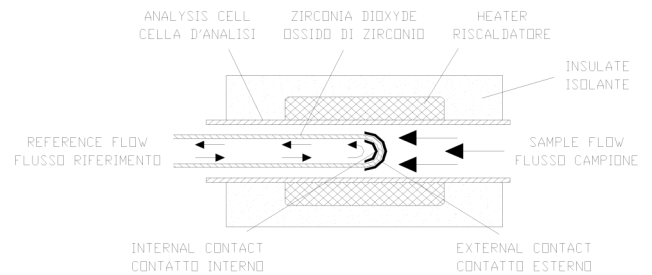
The 8870 is available as 4-20 mA transmitter (with ranges 0-5 / 10 / 25% O<sub>2</sub> Full Scale) or it can have a low level logarithmic output that operates as input for one of the ADEV control units.

## Measuring Principle

The measuring principle on which the analysis is based is linked to the use of Zirconium oxide which, at high temperatures, can behave like a solid state electrolyte, developing an electromotive force on two electrodes placed in contact with different O<sub>2</sub> concentrations (partial pressures), proportional to the temperature in Kelvin degrees (°K) and the logarithm of the ratio between the two pressures PO<sub>2</sub>' and PO<sub>2</sub>" in accordance with Nernst's well-know ratio:

$$E = RT/nF(Lg PO_2' / PO_2'')$$

where: R = Perfect gas constant (8,31 Joule/degree bulk)  
 F = Faraday's constant  
 T = Absolute temperature in °Kelvin  
 n = 4

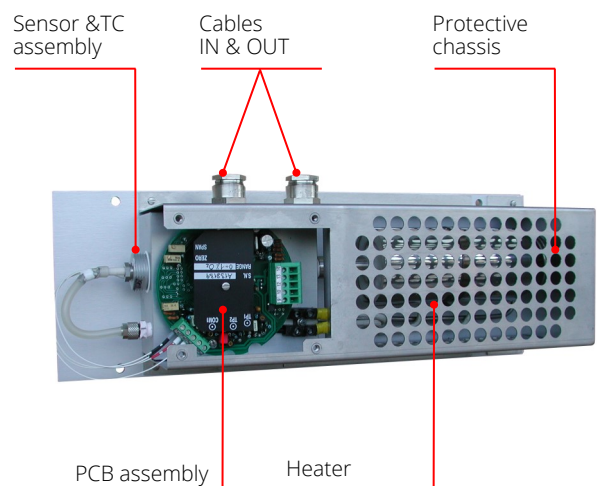


## European Compliance

- Complies with Low Voltage Directive 2014/35/EU
- Complies with EMC Directive 2014/30/EU



## Analyser Mani Blocks



# Ordering

# Contacts

Oxygen Analyser	8870	...	...	...	...
<b>Stream Gas</b>					
Combustion gas		1			
Inert gas		2			
Heat treatment atmosphere		3			
<b>Range (with 4-20 mA output) *</b>					
0-5%			05		
0-10%			10		
0-25%			25		
Other (with log output) **			99		
<b>Output Signal</b>					
50 mV/decade logarithmic output **				1	
4-20 mA output ***				2	
Special				9	
<b>Options</b>					
None					0
Diagnostic in fail safe mode on the NV output					1
Special					9

\* Contact ADEV for other ranges

\*\* With the low level logarithmic output 50 mV/decade from sensing, acquired by a device able to manage the signal accordingly to Nernst's Law, it is possible to measure whichever O<sub>2</sub> variation over 26 decades.

\*\*\* Zero & Span calibration performed by trimmers

All specifications are subjected to variations for product improvement without notice. ADEV does not accept any responsibility for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents in whole or in parts is forbidden without prior written consent of ADEV.



[www.adev.it](http://www.adev.it)

ADEV S.r.l.



Via S. Eurosia, 27/A  
20811 Cesano Maderno (MB) - Italy



+39 (0)362 641684



+39 (0)362 575058



info@adev.it

