

## Gas Analysers & Integrated Systems for Process Gas Analysis

### Zirconia Oxygen Analyser



## G 405 A

#### Main Applications

- Oxygen purity monitoring
- In line measurements of trace O2 in pure, inert gases
- Pure Oxygen measurements on Aircrafts and molecular sieves generators
- Nitrogen and Oxygen generators
- Air separation industry
- Inerting circuits with not combustible gases
- Trace measurements in semiconductors industry
- Mixers
- Laboratories

#### Features

- All parts wetted by gas "Grease Free"
- Completely insensitive to very wide barometric variations
- No reference gas required
- Complete integrated sampling system for variable inlet pressure
- Very high accuracy
- Response time < 1 sec. (initial)
- Excellent stability and sensitivity

## Sensing Unit

### The Measure

The model G 405 A is an Oxygen analyser that integrates an advanced Zirconia sensor, specific for Oxygen purity measurements, for use with molecular sieves O<sub>2</sub> generating systems and for extremely accuracy trace (ppm) in line measurements in pure, inert gases.

The analyzer is configured as a smart aluminum case in which are housed the sensing unit with the sensor and the supporting board, the control unit and a pressure reducer that stabilizes the inlet pressure. A flow meter on front panel complete the analyser.

The sensor is surrounded by an heater that maintains it at a constant temperature. A specific design makes the sensor a very rugged monolithic block packaged in its insulating material, allowing a very high shock resistance.

All the signal conditioning and the sensor temperature control are performed by the supporting board.

The instrument has been designed to withstand severe operative conditions. The modular construction make it possible an extremely easy maintenance.

### 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 ratio. The reference side is linked, through a patent pending design, to ambient air, so the reading is insensitive to barometric pressure variations.

## Specifications...

### ...Performance

#### Accuracy:

Low ranges: ± 0.03% O<sub>2</sub> or 0.5 ppm  
(whichever is worse)

High ranges: ± 0.1% of Full Scale (short term)

#### Repeatability:

± 0.1% of span (short term).

#### Drift:

negligible

#### Response Time:

Initial: less than 1 sec.

99% of step-change: less than 3 sec.

#### Ambient Temperature Influence:

max. ± 0.02% of reading per °C

#### Atmospheric Pressure Influence:

With free vent: no influence

With pressurized vent: ± 0.1% of reading per hPa

#### Line Voltage Influence:

max. 0.02% of span, for each 1% change of power voltage.

#### Gas Interference:

combustibles gases + O<sub>2</sub> reduce the measure.

### ...Operative

#### Sample Requirements

Without integral pressure reducer:

Flow Rate: 1400 ÷ 2300 cc/min. Max. absolute 3000 cc/min (foresee external system to control flow rate)

Pressure: 0,3 ÷ 0,7 bar

With integral pressure reducer:

Flow Rate: 1400 ÷ 2300 cc/min. Max. absolute 3000 cc/min

Pressure: 1 ÷ 12 bar (14.7 ÷ 174.6 PSIA) with filter and flow meter.

#### Range of atm. pressure variation:

70 KPa ÷ 130 KPa

#### Range:

Menu A: Field selectable: 0-25%; 0-10%; 0-5%; 0-1%; 0-1000 ppm; 0-100 ppm O<sub>2</sub>

Menu B: Field selectable: 98-100%; 95-100%; 90-100%; 80-100%; 50-100%; 0-100% O<sub>2</sub>

#### Output:

4-20 mA proportional to the set range

#### Ambient Requirements

Relative Humidity: 90% maximum.

Operation Temperature: -10 to +50 °C

Storage Temperature: -10 to +70 °C

#### Power Requirements:

220 / 110 Vac; 50/60 Hz; 40 VA

#### Pneumatic Connections:

Sample In / Out 1/8" NPT-F ; Purge (if connected): 1/8" NPT-F

#### Wiring Connections:

Power and customer terminal board on back panel

### ...Physical

#### Material Contacting Sample Gas:

AISI 316, Platinum, Teflon, Viton, Zirconia, Alumina

**Weight:** about 7 Kg.

#### Dimensions:

133 x 320 x 492 mm (rack 19", 3U)

**Protection:** IP20

## Integrated M701 Control Unit

### Description

The M701 model is a smart instrument which elaborates the signals coming from the Zirconia probes, providing for the computing and displaying of the Oxygen value following the Nernst's law.

The instrument has been designed to re-transmit the 4-20 mA signal according to the set range and may be connected to a PC or an external printer in order to have a chronological tabulation of both measures and alarms. In case of malfunction, the instrument will automatically provide for the supervision of the probe. Isolated current output is standard. Optional RS232C output can directly drive a printer with selectable timing and baud rate.

### Single or dual alarm

A single alarm (high or low) or dual alarms (1 high and 1 low, 2 high or 2 low) can be provided as option. Each alarm consists of: 1) a keyboard configurable alarm threshold; 2) a LED, which is lit when an alarm is detected; 3) a relay contact that can be used to actuate an external signal or to start a shutdown process device.

### Display

It provides a continuous readout indication of the requested variable in engineering units (e.g. %), of alarms set point and alarms condition.

### Specifications

#### Inputs

Input signals: 1 for self-heated probe, 2 for process-heated probe; 3 for process-heated probe and auxiliary external TC (same type). Scanning time: 0,6 seconds Conversion type: double ramp. Resolution: 1/20000 Response time: 1 second typical. Input's impedance: 100 Mohm typical Isolation between channels: none

### Alarms

Contact rating: N.O./N.C. 1 A @ 250 Vac (define the alarm contact condition -soldering type- at order)  
Set: programmable on 100% of range  
Relay status: normally triggered / not triggered  
Number of alarms: 2 on concentration, 1 on temperature t1, 1 on temperature t2 Hysteresis: 5 / 1 / .5 / .1% of range  
Delay: 10 / 5 / 1 / .1 seconds  
Alarm scanning: ON/OFF programmable  
Threshold: high or low to be selected at order; field adjustable by soldering jumpers.

### Serial interface

Standard: RS 232 C; Check lines: CTS  
Speed: 9600, 4800, 2400, 1200, 600, 300 baud/sec.  
Parity: even, odd, none. Isolation: 1500 V

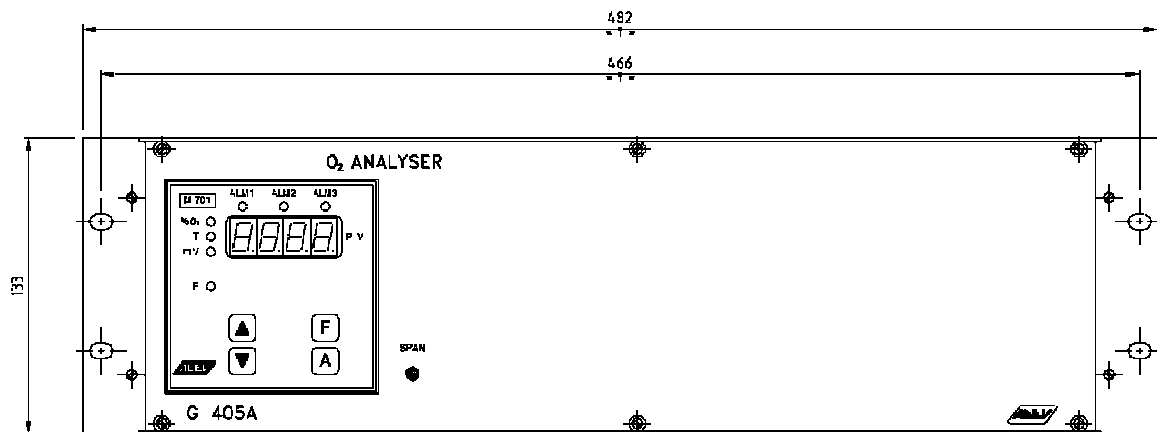
### Analogical output

Output: 4-20 mA isolated proportional to 100% of range on maximum load of 500 Ω Total Range (over range): 3.6 - 24 mA  
Resolution: 1/3800. Isolation: 1500 V  
Uploading time: 1 second

### Printing messages

Periodical printing: programmable in hours, min.  
Alarm printing: automatic printing  
Printing message: year, month, day, hours, minutes, % O<sub>2</sub>, temperature, alarm 1 status, alarm 2 status

## Dimensional Specifications



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### Conformity to European Normative

In accordance to Low Voltage directive 2006/95/EC  
In accordance to EMC directive 2004/108/EC:  
- EN 61000-6-2  
- EN 61000-6-3  
- EN 50270

All specifications are subjected to variations for products improvement without notice.