



*Gas Analysers & Integrated Systems
for Process Gas Analysis*

Paramagnetic Oxygen Analyser

4400 P



Main Applications

- Inertizing
- Centrifuges and reactors feed gases
- Chemical and petrochemical industry
- Pharmaceutical industry
- Laboratories
- Solvents recovery
- Fertilizers
- Biogas and landfill gas
- Oxygen control in ovens and furnaces
- Oxygen control in steel plants
- and many others

Features

- Accuracy better than 1% of full scale
- It can be integrated with filters, pumps, etc... making it such as a compact analysis system
- It can be combined with others analysers of the 4000 series to have a multi gas analyser.
- Parts contacted by gas in selected materials to resist the attack of aggressive substances
- Temperature controlled sensing unit
- Fast response time
- Excellent long term stability
- Powerful microprocessor based control unit integrated

Sensing Unit

The Measure

The 4400 P paramagnetic Oxygen analyzer allows the selective analysis of the oxygen concentration in process gases taking advantage of the evident Oxygen paramagnetic property that makes it attracted by a magnetic field. This particular feature of the Oxygen is the base of the selectivity of this measuring principle. The advantages of an Oxygen measurement based on this measuring principle are the **extremely fast response time** and the **minimum interference due to the presence of other gases into the background**.

High Accuracy

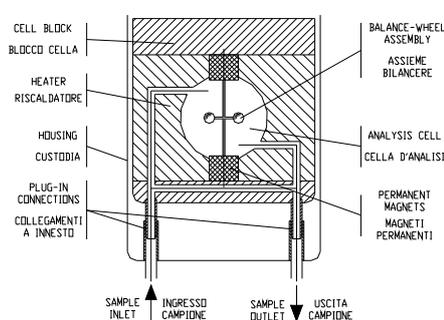
The 4400 P is an high accuracy analyzer (class of accuracy better than 1%). For this reason the inner sensing unit is temperature controlled in order to be completely insensitive to ambient temperature variations.

Great Versatility

The model 4400 P is an extremely all rounded instrument. It can be provided in transportable version (with different types of handle) or for rack mounting (every standard). It's the ideal solution for laboratory use, when it's necessary to move the instrument in different steps of the process or (in case of rack solution) to install it into a cabinet. The instrument can integrate sampling components like filters, pumps, flow meters, pressure reducers, electro valves, etc... being configured as a compact as analysis system and can be used for continuous measurements where process conditions are nor extremely severe (in this case a proper external sample and conditioning system is required).

Combo Versions

The model 4400 P can be combined with every other analyser of the 4400 and G line due to obtain a multi gas analyser equivalent to a real analysis system.



Cell Assembly

The Cell Block assembly is made of stainless steel and contains the cell cavity and pole pieces which produce two powerful magnetic fields in the cavity. The magneto-dynamic cell consists of two nitrogen-filled quartz spheres arranged in the form of a dumb-bell. A single turn coil of platinum wire is placed around the dumb-bell which is suspended in a symmetrical non-uniform magnetic field.

At its center the dumb-bell bears a small mirror. When the surrounding gas contains Oxygen the spheres are pushed out of the magnetic field caused by the relatively strong Paramagnetism of Oxygen. The force on the dumb-bell is corrected by a current through the coil which is controlled by a photo-detection system via a light beam and the mirror on the dumb-bell.

The feedback current, required to compensate the torque acting on the dumb-bell will be proportional to the Oxygen concentration in the gas sample through the cell.

Specifications...

...Performance

Accuracy:

± 1% of span (output signal).

Repeatability:

± 0.3% of span (short term).

Reproducibility:

24 hours: ± 1% of span.

Response Time (max. 1000 cc/min flow rate)

Initial, less than 1 sec.

95% of step-change: less than 3 seconds.

Drift:

Zero: max. ± 1% of span per week

Span: max ± 1% of span per week (without autocalibration).

T_{Amb} Influence (with temperature controller):

± 0.002% O₂ per °C or ± 0.02% of span per °C, whichever is greater

T_{Amb} Influence (without temperature controller):

Zero: < ± 0.05% O₂ per °C

Span: < ± 0.25% of reading per °C

Atmospheric Pressure Influence:

± 0.1 % of reading per hPa

Sample Flow Rate Influence:

less than 0.5% of span over flow range of 100 to 1000 cc/min.

Line Voltage Influence:

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

Linearization:

within 1% of span

...Operative

Sample Requirements

Sample Flow Rate: 250 ÷ 1000 cc/min.

Sample Pressure: 3000 Pa minimum (with filter and flow meter).

Range:

see suffix C on the ordering information

Ambient Requirements

Relative Humidity: 90% maximum.

Operation Temperature: -10 to +50 °C

Temperature controlled: at 50°C

Storage Temperature: 70° C max.

Power Requirements:

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

Pneumatic Connections:

In / Out 1/8" NPT-F

Wiring Connections:

Power and customer terminal board on back panel

...Physical

Material Contacting Sample Gas:

AISI 316, AISI 303, Platinum, Platinum-Iridium, Viton (Buna, others), Glass, PPS filled with PTFE

Weight: about 9 Kg.

Dimensions:

177 x 320 x 237 mm (without accessories)

Protection: IP 43

...Control Unit

Inputs

Input signals: 3 adjustable and linearizable from 10 mV with accuracy better than 1:10000

Scanning time: 0,5 seconds

Conversion type: double ramp

Resolution: 1/20000

Input 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. Refer to suffix E).

Set: programmable on 100% of range

Relay status: normally triggered / not triggered

Number of alarms: 2 on concentration. Wrong calibration and fault alarms available.

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 h., min.

Alarm printing: automatic printing

Printing message: year, month, day, hour, minutes,

% (Ch1), temperature (Ch2, Ch3), alarm 1

status, alarm 2 status

Integrated M702 Control Unit

Description

Powerful microprocessor-based system (keyboard configurable) allowing selection of range, type of alarms, set point and it can receive 3 analogical input signals (2 of them can be used for cross sensitivity compensation or special functions).

On request, a system to perform zero and/or full scale autocalibration can be provided.

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.

Auxiliary functions

Other options with diagnostic and calibration fault contacts are available.

Display

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

Other versions

The model 4400 P can be provided for rack 19" mounting or process version with split sensing and control units and the possibility to configure the analyser for installation in hazardous area Zone 1 (ATEX).



Process version model P8863

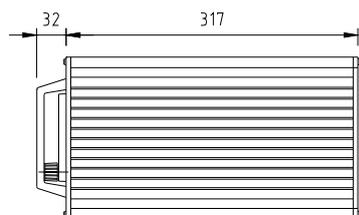


Rack 19" version

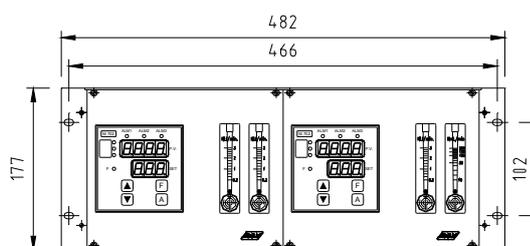


Multi gas analyser in rack 19" housing with mounting brackets

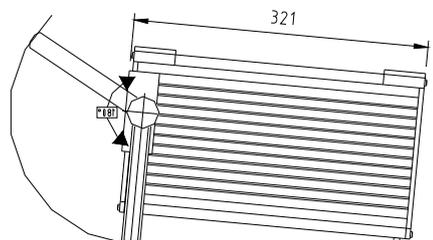
Dimensional Specifications



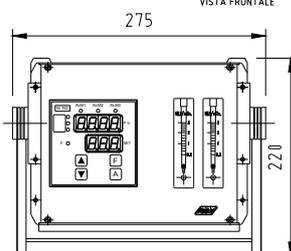
LATERAL VIEW
VISTA LATERALE



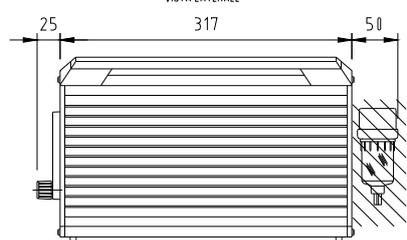
FRONT VIEW
VISTA FRONTALE



LATERAL VIEW
VISTA LATERALE

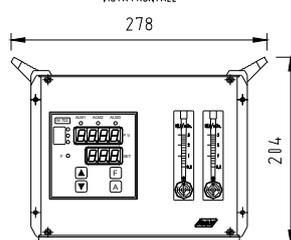


FRONT VIEW
VISTA FRONTALE



LATERAL VIEW
VISTA LATERALE

OPTIONAL FILTER
FILTRO OPZIONALE



FRONT VIEW
VISTA FRONTALE

Rack 19" 4U version with brackets for cabinet mounting

Possibility to integrate several sensing units in a unique case to have a multi-gas analyser.

Also available versions with:

- Floating handle
- Upper handles
- No mounting accessories

Transportable version with floating handle

Also available versions with:

- Mounting brackets for 1/2 rack 19" mounting
- Upper handles
- No mounting accessories

Transportable version with upper handles

Also available versions with:

- Mounting brackets for 1/2 rack 19" mounting
- Floating handle
- No mounting accessories

Ordering 4400 P

A - B - C - D1 - D2 - E - F - G - H - I - I

Suffix A - Line voltage

- 1 230 V 50/60 Hz
- 2 115 V 50/60 Hz

Suffix B - Stream composition

- 1 Standard background gases (N₂, combustion gases)
- 2 Not aggressive background gases
- 9 On specification

Suffix C - Range

- 002 0-2%
- 005 0-5%
- 007 0-7,5%
- 010 0-10%
- 015 0-15%
- 020 0-20%
- 025 0-25%
- 100 0-100%
- 125 15-25%
- 230 20-30%
- 901 90-100%
- 951 95-100%
- 992 Double range
- 999 On specification

Suffix D1 - Alarm threshold

- 0 None
- 1 1 low alarm
- 2 1 high alarm
- 3 1 high alarm + 1 low alarm
- 4 2 low alarms
- 5 2 high alarms
- 9 On specification

Suffix D2 - Wrong calibration and fault alarms

- 0 None
- 1 Wrong calibration alarm shared with an alarm threshold
- 2 Fault alarm shared with an alarm threshold
- 3 Wrong calibration alarm on dedicated relay
- 4 Fault alarm on dedicated relay
- 5 Wrong calibration alarm shared with fault alarm
- 9 On specification

Suffix E - Alarm contacts

- 0 None
- 1 Closed in alarm condition
- 2 Open in alarm condition

Suffix F - Serial output

- 0 NO
- 1 RS 232 C + internal clock

Suffix G - Mounting

- 00 Bench version without accessories
- 01 Transportable version with floating handle
- 02 Half-rack 19" version with brackets
- 03 Transportable version with upper handles
- 04 Rack 19" 4U version with brackets for cabinet mounting
- 99 On specification

Suffix H - Autocalibration

- 0 NO
- 1 Autocalibration
- 2 Autocalibration + autocalibration start inlet free contact
- 3 Autocalibration + autocalibration start inlet free contact with calibration in progress free contact
- 4 Calibration in progress free contact (for manual calibration)

Suffix I - Options

- 00 None
- 01 External printer + battery charger ^{a)}
- 02 Integrated printer ^{a)}
- 03 Inner pump
- 04 Pump with AISI external head on back panel
- 05 Inner piping in AISI 316 for explosive / toxic gases ^{b)}
- 06 In line AISI filter with interchangeable cartridge
- 07 External filter on rear panel
- 08 Inner battery + battery charger ^{c)}
- 99 On specification

Notes:

- ^{a)} Option selectable only combined with RS232 C (Suff. F = 1)
- ^{b)} Mandatory option in case of toxic and/or explosive gases (above LEL)
- ^{c)} Option available only without temperature control

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



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

