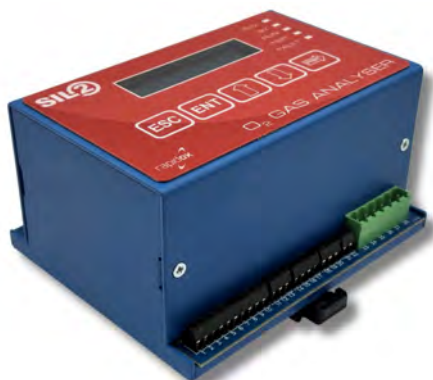# Rapidox 2100 OEM-SIL2

The Rapidox 2100 OEM-SIL2 is a high-performance zirconia oxygen (O₂) analyser that is designed to meet the SIL2 requirements of IEC 61508/61511 under high demand use for safety integrity as part of a Safety Instrumented System (SIS). The analyser design uses two microprocessors that continuously monitor the state of operation, quality of readings and the integrity of the digital & analogue outputs and the alarm relays. The likelihood of a fault being undetected is reduced by several orders of magnitude compared with a non-SIL2 equivalent product.

The compact design (4.5" x 3.0") allows integration into the tightest of spaces yet comes with the same performance specs and features of our existing analyser range. The analyser comes with a robust cabled zirconia sensor, which is ideal for providing fast and accurate remote in-situ gas analysis over the full oxygen range 10-20^{ppm} to 30% O₂.

Zirconia oxygen sensors are extremely rugged and particularly suitable for monitoring inert atmospheres and aggressive industrial applications directly within manufacturing processes such as additive manufacturing (3D printers), soldering ovens and furnaces. High temperature (650°C) and vacuum applications are particularly suited to this model. The SIL2 version is particularly suited to applications where there is an additional risk of human suffocation, and the sensor needs to be relied upon to warn correctly of the presence of a suffocating atmosphere. The SIL2 design shrinks the failure window where a dormant fault condition could exist from days or weeks to just a few minutes.

The Rapidox 2100 OEM-SIL2 analyser is supplied in a custom DIN rail enclosure with or without local display and keypad (these are for programming and not in the scope of SIL2). The sensor cable can be made to any length up to 25m and there are a choice of sensor mounting options including aluminium and stainless manifolds as well as vacuum fittings (ISO-KF and CF). It has fully programmable analogue (voltage and current) outputs and alarm relays as well as RS232 / RS485 digital signalling as standard. In addition to the standard Rapidox digital communications protocol and software, Modbus-RTU is included as standard. The analyser is designed specifically for seamless integration to PLC systems.

SIL2 Features for this model include:

- A watchdog microprocessor (PIC) to monitor the operational health of the main program PIC
- Zirconia oxygen sensor signal sensor output and heater circuit are monitored for reliability
- Auto-test function set every ten (10) minutes to test alarm relay operation by injecting a false sensor signal without disruption to the attached equipment
- Multiple high-spec electrical alarm relays with built in redundancy
- Digital outputs tested for the flow of data without interruption
- Voltage (0-5V) and current (4-20mA) outputs checked for integrity
- Alarm indications such as sounder are continuously monitored for integrity
- Master alarm and Master relay added
- Set of LED status indicators (continuously integrity tested)
- Designed to meet the requirements of IEC 61508/61511 under high demand use

Though highly configurable to suit individual customer requirements, the Rapidox 2100 OEM-SIL2 product possesses a number of standard features to enhance functionality.

- SIL2 dual microprocessor design to meet the requirements of IEC 61598/61511
- Zirconia sensor supplied with bespoke cable
- Miniature 4.5" x 3" circuit board with DIN rail mount enclosure options
- Fast and accurate measurement of oxygen
- Pre-calibrated sensors for uninterrupted service

- Fully programmable analogue outputs
- Data logging software
- Two programmable alarm relays
- Type K thermocouple option (out of the scope of SIL2)
- 24Vdc 20W power
- Password protected menu system

Applications

Additive Manufacturing	Metal Powder Processing	Solder Reflow Oven
Combustion	Glove Boxes	Metal Heat Treatment
Manufacturing	Inert Gas Blanketing	Forming Gas
Research & Development		

Accessories

1. Calibration Kit
2. Multiplex Sampling System
3. Gas Recovery Bag
4. Thermal Printer
5. Calibration Service Gas
6. Filters

SIL2 Specification - Meeting the requirements of IEC 61598/61511

O_2 Sensor Range	10^{-20} ppm to 30% Zirconia version. 10^{-26} ppm extended range available on request
O_2 Sensor Accuracy	±1% of the actual measured oxygen content OR 0.5ppm (whichever is the greater)
Ambient Operating Temperature	5-35°C 0-95% RH non condensing
Ambient Operating Pressure	800 to 1200mbar absolute
Max Sample Gas Pressure	Up to 10 bar gauge (200bar burst pressure)
Temperature	650°C
O_2 Sensor Response	4 seconds for a T90 step change @1L per min flow
Life Expectancy	>17,000 hours
Sensor Cable	2m high temp as standard. Any length up to 25m available on request
Voltage	24V VDC +/-10%
Voltage Outputs	0-5V (0-10V on request) - continuously self-tested under SIL2
Current Outputs	4-20mA - continuously self-tested under SIL2
Digital Outputs	RS232 / RS485 & Modbus RTU - continuously self-tested under SIL2
Sample Connections	Nipple or Swagelok
Display	OLED display & keypad on enclosure version (not in the scope of SIL2)
Circuit Board Dimensions	4.5" x 3" (114mm x 76mm)
Weight	<0.5kg in enclosure, OEM board 120g
Power / Warm-up Time	20W / 1-2 minutes at 20°C
Alarms	2 alarm relay circuits, fully user-configurable - self-tested every 10 minutes under SIL2
Calibration	Any 2 or 3 gases - Pre-calibrated Sensors available
UL Compliance	All paints, cables, wires, plastic materials etc are UL certified and marked
Enclosure Materials	painted aluminium
Din Rail Option	DIN Rail Mountable enclosure
Functional Safety	Meets the requirements of SIL2 under IEC 61508/61511

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