



### General

Measuring depleted Oxygen levels in the Flue gas has long been recognised as one of the best measures of combustion conditions and is an essential pre-requisite to reducing fuel costs and improving environmental performance of new and existing industrial boiler plant. Hysteresis, linkage wear, cable and control failures are some of the typical causes of significant fuel wastage.

### Environmental

The optimum air to fuel ratio is critical to efficient energy conversion and to minimising noxious emissions from boiler plant. Burning less fuel also means producing less CO<sub>2</sub>.

### Safety

Maintaining the correct air to fuel ratio reduces the risk of flame impingement and resultant failure of boiler tubes. Combustion efficiency tests carried out when the boiler is routinely serviced do not protect against interim faults developing, or catastrophic component failure with the risk of a serious explosive incident.

### Plant performance, outages and damage

Poor combustion accelerates the formation of carbon deposits on the heat transfer surfaces, reducing boiler efficiency. These deposits can also cause thermal stress, which may result in costly boiler repairs and unscheduled outages. Continuous monitoring of oxygen levels can therefore greatly reduce maintenance costs.

### The cost effective solution

A continuous "watchdog" oxygen measurement system that alerts the plant operator to an inadmissible deviation of the fuel air ratio, is the safe, environmentally sound and economically sensible solution.

- **Combustion monitoring for efficiency**
- **Fuel to air ratio safety watchdog**
- **Unique cost effective design**
- **Low maintenance costs**
- **4-20mA output (galvanically isolated)**
- **Interfaces with BMS & SCADA systems**
- **Digital Display & Alarm Options**
- **Suitable for O<sub>2</sub> trim systems**
- **Custom versions available**
- **HART™ option available**

The **PRO<sub>2</sub>Sensor (IHT)** combines the field proven Apollo Connect oxygen sensor with an intelligent in-head transmitter (IHT) to provide a low cost and easily installed oxygen monitoring system. The design eliminates the need for an external signal-conditioning unit (normally housed in a separate panel).

This enables a direct connection to the sensor thus providing optimum EMC immunity, low cost installation and servicing.

The IHT unit is connected directly to a standard Apollo Solutions **PRO<sub>2</sub>Sensor** and converts the O<sub>2</sub> cell output to an industry standard process signal (4-20mA).

The **PRO<sub>2</sub>Sensor** installation kit includes a DIN rail mountable pre-set dc supply (required for its internal heater), probe assembly, flange & gasket.

Cable assemblies can also be supplied for ease of installation.



## Installation

The **PRO<sub>2</sub>Sensor (IHT)** is supplied with a mounting flange, which is welded to the boiler flue. A flue gas probe, which is screwed into the flange, is locked in place with a lock nut. This part of the installation is permanent. The **PRO<sub>2</sub>Sensor (IHT)** assembly bolts on to the probe body, remote from the flue, (this considerably eases maintenance) The In-head transmitter (IHT) is directly mounted on the sensor. A 4-20mA signal output is scaled to 0.1% - 20.9% O<sub>2</sub>

The **PRO<sub>2</sub>Sensor (IHT)** can be supplied with a pre conduited 4-wire cable assembly, and is supplied with an external power supply, typically mounted in the boiler panel.



IHT Kit

## Options

- Flue Gas temperature probe (as above)
- Digital O<sub>2</sub> & Temperature displays with alarm options.
- Extended probe for larger diameter flues
- Flange adapter plates available (to order) for retrofitting probe in existing O<sub>2</sub> sensor mounting positions
- Pre conduited cable assemblies (c/w IP66 plugs & sockets)
- Contact us for specialised applications



Optional displays

## Maintenance

The **PRO<sub>2</sub>Sensor** has been developed specifically with ease of maintenance in mind.

Many of the components are recyclable, and the service exchange units, pre-calibrated by Apollo Solutions set a new benchmark for ease of servicing and low cost of ownership.

## Technical specification

### PRO<sub>2</sub>Sensor

- Type Zirconium (Protected with a sintered stainless steel filter)
- Range 0.1% - 20.9%
- Accuracy +/- 5% of reading
- IP Rated IP20
- Housing Stainless Steel
- Connection Amphenol C16-1 Plug
- Dimensions 210 x 62mm (max)
- Heater supply nom. 1.4A @13.1Vdc

### In Head Transmitter Unit (IHT)

- Output 4-20 mA (0.1% - 20.9% O<sub>2</sub>)  
Galvanically isolated  
Polarity protected
- Supply 12-35Vdc
- Isolation 1500Vac for 60 Sec's
- Air humidity 0-90% RH (non condensing)
- Temp range -40oC to 85oC
- IP Rated IP65
- Connections Amphenol C16-1 Plug and socket
- EMC Emissions EN50081-1  
Immunity EN50082-2
- Dimensions 110 x 55mm (max)

### Power supply

- Input 100 - 240Vac @ 1.2A  
50/60Hz
- Output 13.1Vdc (regulated)  
Din rail mounted
- Dimensions 129 x 98 x 38mm

### Options

- Flue gas temperature 4-20 mA (0-500oC)
- Standard probe 190 x 62mm (max)
- Extended probe 360 x 62mm (max)
- Digital display Pre configured to allow alarm thresholds:  
custom Relay output  
250Vac @ 5A / 12Vdc @1A  
Open collector output  
48Vdc @ 0.5A (NPN)

