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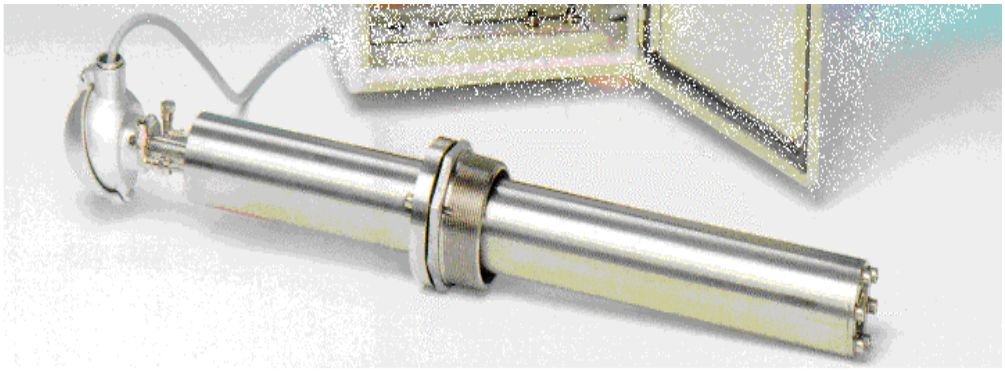

Zirconia oxygen probe MODEL 502

User´s Guide

Release 3

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Introduction 1

This chapter gives a short overview of the oxygen probe model 502, and a brief description of the functional principles.

1.1 Probe components and mounting of the probe

The zirconia oxygen probe model 502 mainly consists of an outer pipe in AISI 316, a zirconia-oxide cell, sample and connection tubes/pipes, junction box and mounting.

Probe insert length

The insert length of the probe is variable due to the use of compression fitting for mounting. Standard length is 500 mm, but variable from 250 mm up to 1500 mm in the Extended Probe Length-configuration.

Mounting on the stack wall

The probe is mounted on the stack wall with a 3" WPT DIN/ISO 228 compression fitting.

1.2 Calibration of the probe

In-situ calibration is easily done by injecting calibration gas directly into the probe cell. The probe signal is then transmitted to the monitoring unit, where the microprocessor calculates the oxygen signal.

For span calibration:	Clean and dry atmospheric air; 1-3* NLPM.
For zero calibration:	Nitrogen (N_2) with a content of app. 2 % oxygen; 1-3* NLPM.

* Depending on positive and negative pressure in the application.

Reference gas

Atmospheric air from monitor, preferably taken from a dry and clean place.

1.3 Electrical connections

Electrical connections are housed in a water- and dust-proof junction box.

Probe-to-monitor connection

Electrical and pneumatic connections between probe and the monitor are supplied by the customer.

1.4 Principle of operation

The zirconia oxygen probe model 502 is based on in situ-measurement of oxygen contents in stack gas without any sampling. The 502 probe measures total oxygen contents in stack gases in boilers and other combustion environments on wet basis, independently of the fuel in use.

The 502 probe is a high-quality probe suitable for standard applications and characterized by very easy maintenance. It is available in standard configuration with probe insert length 500 mm and an Extended Probe Length up to 1500 mm. The zirconia-oxide sensor of the 502 probe gives a measurement accuracy better than 0.1 % at 2 % oxygen in stack gas. Maintenance is low due to long working life of the zirconia-oxide cell and the fact that in situ, non-extractive measurement means no moving parts in the probe.

The 502 probe is developed to work in conjunction with the oxygen monitor model O2000, which features LCD-display, alarm functions, micro-controller for fast and easy operation and built-in reference air pump. We therefore cannot guarantee proper function and operation of the 502 probe unless monitored by an O2000 monitor.

The probe is equipped with a stopper to prevent it from sliding into the stack.

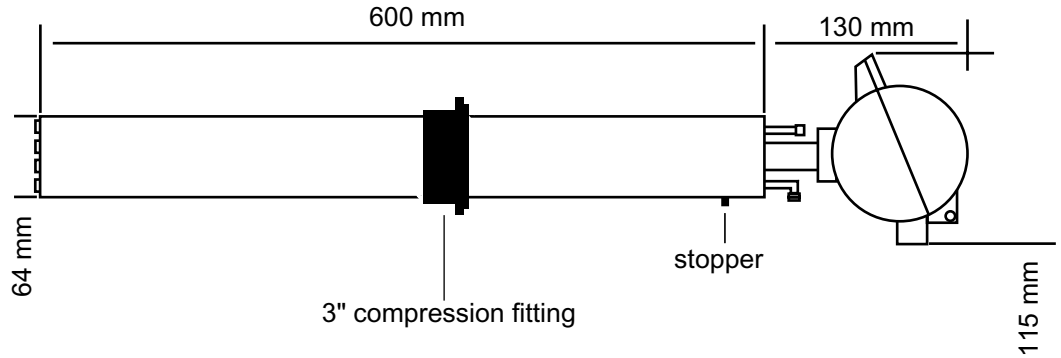

Figure 1.1. Profile of the probe, MODEL 502.

1.5 Probe specifications

Technical specifications of the M502 probe	
Max. stack gas temperature	450 °C (500 °C during short periods)
Ambient temperature	0 - 70 °C
Sensor type	Zirconia-oxide cell (ZrO_2)
Sensor accuracy	±0.1 % at 2 % oxygen in stack
Outer pipe/probe material	AISI 316
Mounting on stack wall	3” WPT DIN/ISO 228 compression fitting
Probe total length	730 mm standard
Probe insert length	250 - 500 mm as standard
Cable length probe-to-monitor	10 meters as standard
Power supply	12 V_{DC} from O2000 monitor
Power consumption	Warm-up < 4 Amps Operation < 2 Amps
Weight	4 kg

Installation 2

The installation procedures of the oxygen probe are described below. This includes unpacking, mounting and the electrical connections.

2.1 Unpacking

After unpacking the probe, check that all specified parts are contained in the delivery and that these parts are in good condition. If anything is wrong or any parts missing, please contact your local dealer or agent immediately.

***Note**: To extend lifetime of the probe and to prevent damage of it: never mount probe in stack before heated up.*

***Note**: If the analyser is switched off for a longer period of time, dismount the probe from stack as condensation of stack gas in the cold probe can damage it!*

2.2 Mounting

Mount a suitable stand-off with a 3” compression fitting, see figure 3.1. The probe as such must be mounted where a good representative stream of stack gas is present, and there must not be any leaks or purge air from opacity meters etc. upstream in the stack, since this will lead to measurement errors. Probe insert length must also be chosen and adjusted to provide a representative stream of stack gas for measurement.

Further, the probe should if possible be inserted and directed in such a way, that the probe tip points away from the stack gas direction. This way particulates will not be shot into the front filter.

Do not exceed the 450 °C temperature limit of the probe (500 °C for short periods).

2.3 Electrical connections

Probe junction-box connections		
Terminal 1	HTR -	12 V_{DC}
Terminal 2	HTR +	12 V_{DC}
Terminal 3	CELL -	Signal Nom. -20 to 125 mV
Terminal 4	CELL +	Signal Nom. -20 to 125 mV

Most problems can be referred to miswiring, so please double-check all connections and shieldings. Check air-connections for leaks, especially the plug in the calibration fitting which must be 100 % tight.

Calibration 3

3.1 Zero calibration

Connect the zero gas to the probe cal. port and adjust the flow to 1-3 NLPM. The O_2 concentration must be between 0.5 % and 5 %.

3.2 Span calibration

Connect the span gas to the probe cal. port and adjust the flow to 1-3 NLPM. The O_2 concentration must be between 9 % and 25 %; normally atmospheric air with 20.9 % O_2 is used. Cell output signal with heated probe:

% OXYGEN	CELL mV
0.1	93.17
1.0	48.62
2.0	35.21
3.0	27.36
4.0	21.79
5.0	17.48
6.0	13.95
7.0	10.97
8.0	8.38
9.0	6.10
10.0	4.06
11.0	2.22
13.0	- 1.01
14.0	- 2.45
15.0	- 3.78
18.0	- 7.31
20.0	- 9.35
20.9	- 10.2

***Note**: Remember to plug the calibration port after calibration.*

3.3 Connection of reference air

The reference air is connected with the O2000 monitor at the ref. air input and ref. air output fittings on the monitor (see figure 3.1) by means of standard nylon-tube with an outside diameter of 6 mm.

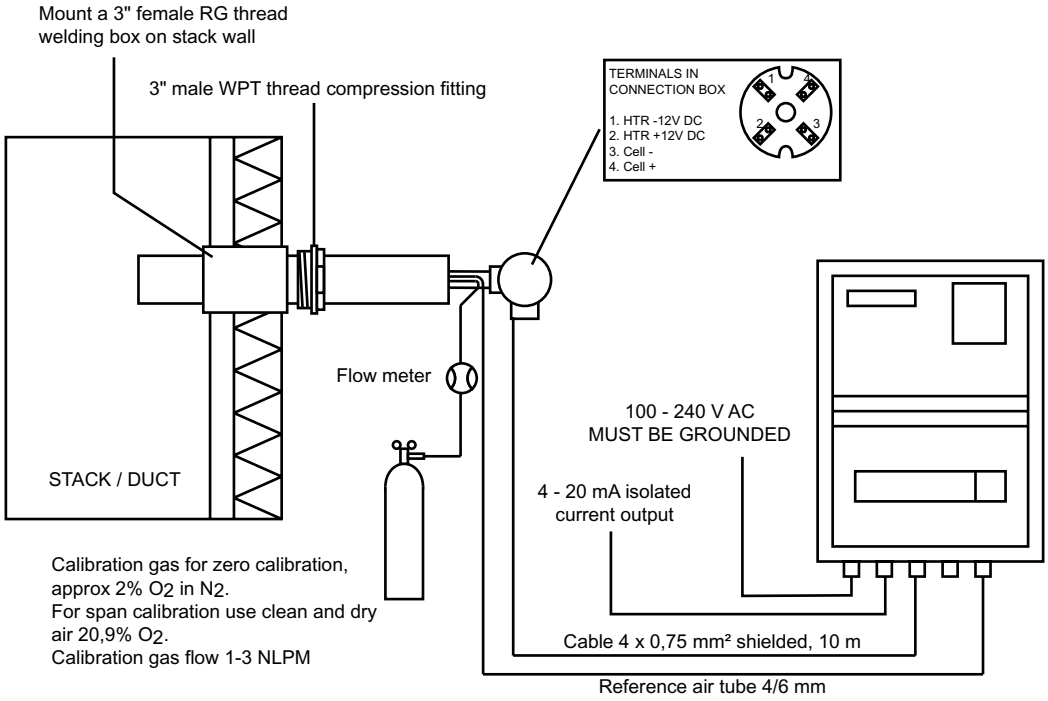

Figure 3.1. Mounting of M502 probe in stack.

Service and commissioning 4

Please contact your local representative for service or commissioning, or if you need further information.

You are also welcome to contact the manufacturer directly.