

## EX-PROOF IN SITU ZIRCONIUM OXYGEN ANALYZER FOR COMBUSTION CONTROL


- > ATEX/IECEx Zone1 IIB+H2 T3 Gb Probe 
- > Field-replaceable Flame-arrester
- > Compact & Light Design
- > Excellent accuracy and dependability
- > Remote electronics and calibration



Figure 1 ZR SYSTEM Probe

## ANALYZER OVERVIEW

The oxygen measurement enables the control of burner fuel/air ratios to ensure combustion efficiency and process safety. RB-Technologies O2 Analyzer is adapted to be installed in hazardous areas and to withstand critical environments as:

- > Refinery process heaters
- > Petrochemical reactor furnaces
- > Industrial large scale boilers

The in situ O<sub>2</sub> Analyzer includes the following parts  
(see *typical assembly p.3*):

- > 1 ZR PROBE type ZPF2
- > 1 Remote O2 TRANSMITTER type ZTF2
- > 1 Deflecting sampling tube
- > 1 Junction box and connection cable if Probe-Transmitter distance >2m
- > 1 Calibration kit

In situ ZR PROBE type ZPF2 is ATEX and IECEx certified to be used in hazardous areas classified up to Zone 1 IIB+H<sub>2</sub> T3 Gb, meaning that it complies with the very demanding international standards of ex-proof security.



Figure 2 Probe Nose

The ZR PROBE design ensures low maintenance costs and long life-time with excellent accuracy and dependability. It is compact and light (<4kg) to be easily carried for installation and maintenance operations in difficult-to-reach places on site. Its full 316L stainless steel design ensures excellent resistance to saline, humid and corrosive atmospheres over time.

The probe features a “flame-arresting nose” which is consumable and replaceable on site. INCONEL600 flame-arrestors are available to improve the probe lifetime with very corrosive applications.

In situ sampling is done thanks to a deflecting tube mounted on the flue gas duct mating flange. The tube deflects some of the process flue gas from its main stream and drives it to the probe. This assembly provides fast, highly accurate and reliable measurement while keeping the probe away from the aggressive furnace core. No extractive sampling system is required, avoiding excessive maintenance job typical of ejection pump systems. Also the probe remains easily accessible for maintenance operations.



This flexible sampling technology enables the O2 Analyzer to operate at process temperatures up to 1500°C with highly corrosive or dusty flue gas. Each deflecting tube is designed and made-to-order in order to fit the unit's specifications (see *corresponding data sheet*).

ZR Probes type ZPF2 are compatible with all RB-Technologies sampling tubes and O2 transmitters already installed. They can efficiently replace worn ZR Probes type ZR PROBE, if ex-proof specifications permit. This compatibility also improves customer stock management.

O2 Transmitter type ZTF2 is ATEX certified Zone 1 IIC T6 Gb. It is to be installed remotely from the probe, either on self standing racks at ground level or on wall-mounted panels on platform. This device supplies the power for heating ZR Probes to their operation temperature. Then it turns the sensor's signal (mV) into O<sub>2</sub> (%vol.) concentration. The measured values are displayed on the transmitter's

screen and can be sent to control rooms with 4-20mA line. Also the electronic converters can provide several helpful functions:

- > Analyzer Default Contacts
- > Alarm contacts (Very Low, Low, High, Very High)
- > Automatic Blow down – Automatic Deflecting tube cleaning with pressured air
- > Auto calibration gas sequencer

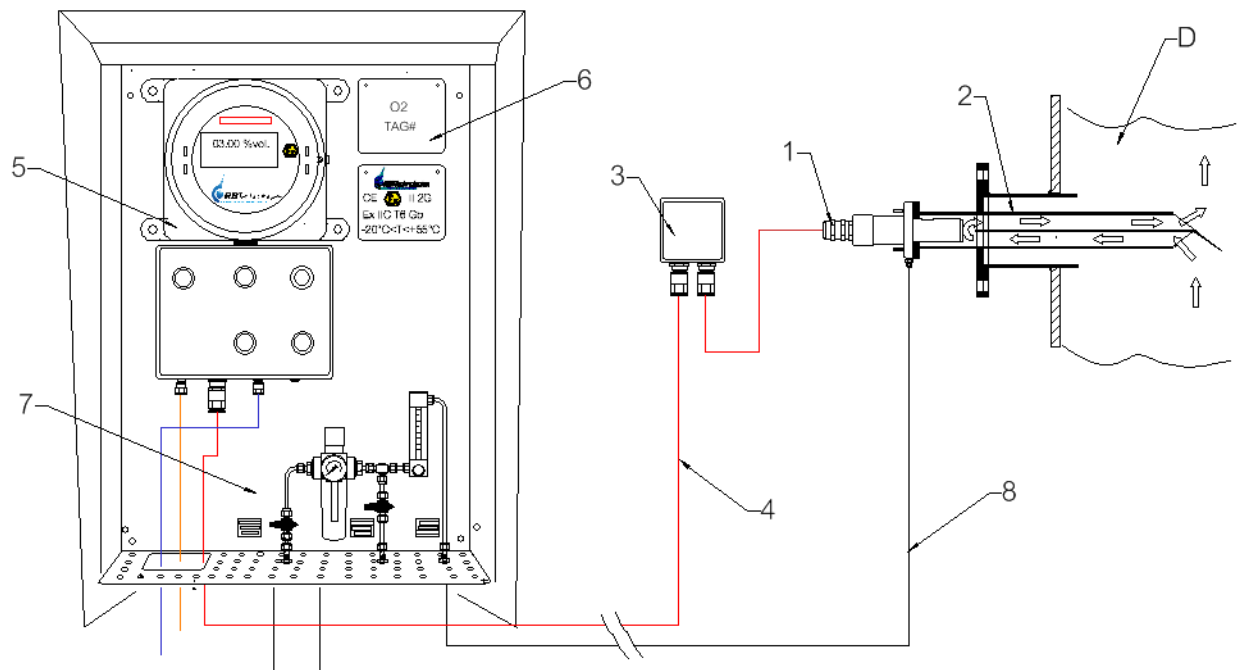
Maintenance operations such as calibration and analyzer settings are performed from the transmitter. Calibration gases are sent to the probe from a remote calibration system. Recommended calibration gases are the following:

- > 1% O<sub>2</sub> in N<sub>2</sub> balances - ZERO calibration
- > 20.9% O<sub>2</sub> in N<sub>2</sub> balance - SPAN calibration

Reference air reaches the sensor through an EX-PROOF vent mounted on the probe body. That's why instrument air is not required for reference.



## O2 ANALYZER TYPICAL ASSEMBLY

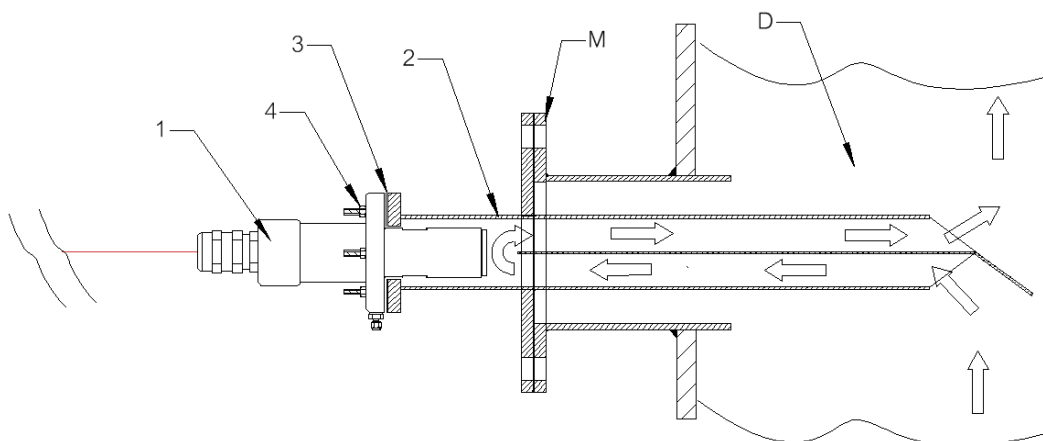


1 ZR PROBE	5 Remote O2 Transmitter with Push button Junction box
2 Deflecting Sampling Tube	6 Labelling
3 Intermediary Junction Box – To be used if Probe-Converter distance > 2m	7 Calibration Kit
4 Interconnection Cable	8 Calibration Line

### Accessories and consumables

- > Accessories for installation and calibration
- > Spare Flame-Arrestor Probe Nose made with either SS316L or INCONEL600
- > Probe filters

## ZR PROBE DEFLECTION SAMPLING PRINCIPLE



1 ZR PROBE	3 Probe Gasket
2 Deflecting Sampling Tube	4 6 Mounting M5 Nuts
M Mating Flange	D Furnace Duct

## ANALYZER GENERAL SPECIFICATIONS

<b>MEASUREMENT PRINCIPLE</b>	Zirconium Oxide Probe	<b>APPLICATION</b>	In situ O <sub>2</sub> % measurement in Combustion Flue Gas for process control
<b>PROBE CERTIFICATION</b>	II2G Ex d IIB+H2 T3 Gb (Ta : -20°C to +60°C) LCIE 13 ATEX 3045X IECEx LCIE 13.0027X	<b>CONVERTER CERTIFICATION</b>	II2G Ex d IIC T6 Gb (Ta : -20°C to +55°C) LCIE 13 ATEX 3066X
<b>IN SITU SAMPLING SYSTEM</b>	Made to order Flow Guide Tube ("Deflecting Tube") inserted into the flue gas duct. See relevant data sheet	<b>ASSEMBLY</b>	Probe on flue gas duct Remote transmitter up to 150m from probe
<b>MEASUREMENT RANGE</b>	From 0-2% to 0-50% O <sub>2</sub> freely settable by 1 vol% O <sub>2</sub> pitches	<b>OUTPUT SIGNAL</b>	4 to 20mA DC (<500Ω, allowable) or 0 to 1V DC (>100Ω output resistor) Digital RS232C or RS485 (option)
<b>MEASURED GAS T°</b>	120 to +1500°C depending on deflecting tube material and shape	<b>MEASURED GAS PRESSURE</b>	-3 to +3kPa (-306 to +306mmH <sub>2</sub> O)
<b>RESPONSE TIME</b>	<7s for 90% of final value (from calibration gas inlet)	<b>WARM-UP TIME</b>	Recommended >30min
<b>REPETABILITY</b>	+/-0.5% of full scale	<b>LINEARITY</b>	+/- 2% of full scale
<b>POWER SUPPLY</b>	Rated voltage : 200 to 240VAC ( 190 to 264V AC) Rated frequency; 50/60Hz	<b>POWER CONSUMPTION</b>	Max. 240VA (200VA + 40VA) Normal 70VA (50VA + 20VA) (Conv. + Sensor)
<b>CALIBRATION GAS</b>	Recommended concentration : Zero gas : 1.0% O <sub>2</sub> Span gas : 20.9% O <sub>2</sub> (Instr. Air)	<b>CALIB.GAS CONSUMPTION</b>	Average 5L of each calib. gas per calibration cycle at recommended 30-40NL/h flowrate.
<b>ACCESSORIES</b>	Mounting panel or self-standing rack Calibration kit. Sampling tube accessories	<b>MAINTENANCE FUNCTIONS</b>	Blow Off, Auto-calibration, Output contacts, Output Hold

## ORDERING INFORMATION

## ATEX PROBES TYPE ZPF2

Product Number	Product Description
ZRPOAK1-200	ZR PROBE O A K - 115V TC:K ATEX/IECEx TYPE ZPF2
ZRPOAK1-200 C	ZR PROBE O A K - 115V TC:K ATEX/IECEx TYPE ZPF2 WITH INCONEL 600 NOSE
ZRPOAK1-240	ZR PROBE O A K - 115V TC:K ATEX/IECEx TYPE ZPF2 WITH JUNCTION BOX
ZRPOAR3-200	ZR PROBE O A R - 230V TC:R ATEX/IECEx TYPE ZPF2
ZRPOAR3-200C	ZR PROBE O A R - 230V TC:R ATEX/IECEx TYPE ZPF2 WITH INCONEL 600 NOSE
ZRPOAR3-240	ZR PROBE O A R - 230V TC:R ATEX/IECEx TYPE ZPF2 WITH JUNCTION BOX

## ATEX TRANSMITTER TYPE ZTF2

ZRTOAK1-200	ZR TRANS O A K1 - 115V TYPE ZTF2
ZRTOAR3-200	ZR TRANS O A R3 - 230V TYPE ZTF2

## ACCESSORIES

PBJX-F01	JUNCTION BOX O2 ATEX/IECEx
ZRZOY	CABLE O2 (M)

## PROTECTION FILTER AND NOSE SPARE

ZRPACK 1	MAINTENANCE SET FOR O2 PROBE ATEX FILTER AND GASKET
ZRPACK ECO 5	MAINTENANCE SET FOR O2 PROBE ATEX FILTER AND GASKET X5
ZMPO-N01	FLAME ARRESTING NOSE SS316
ZMPO-N01C	FLAME ARRESTING NOSE INCONEL 600