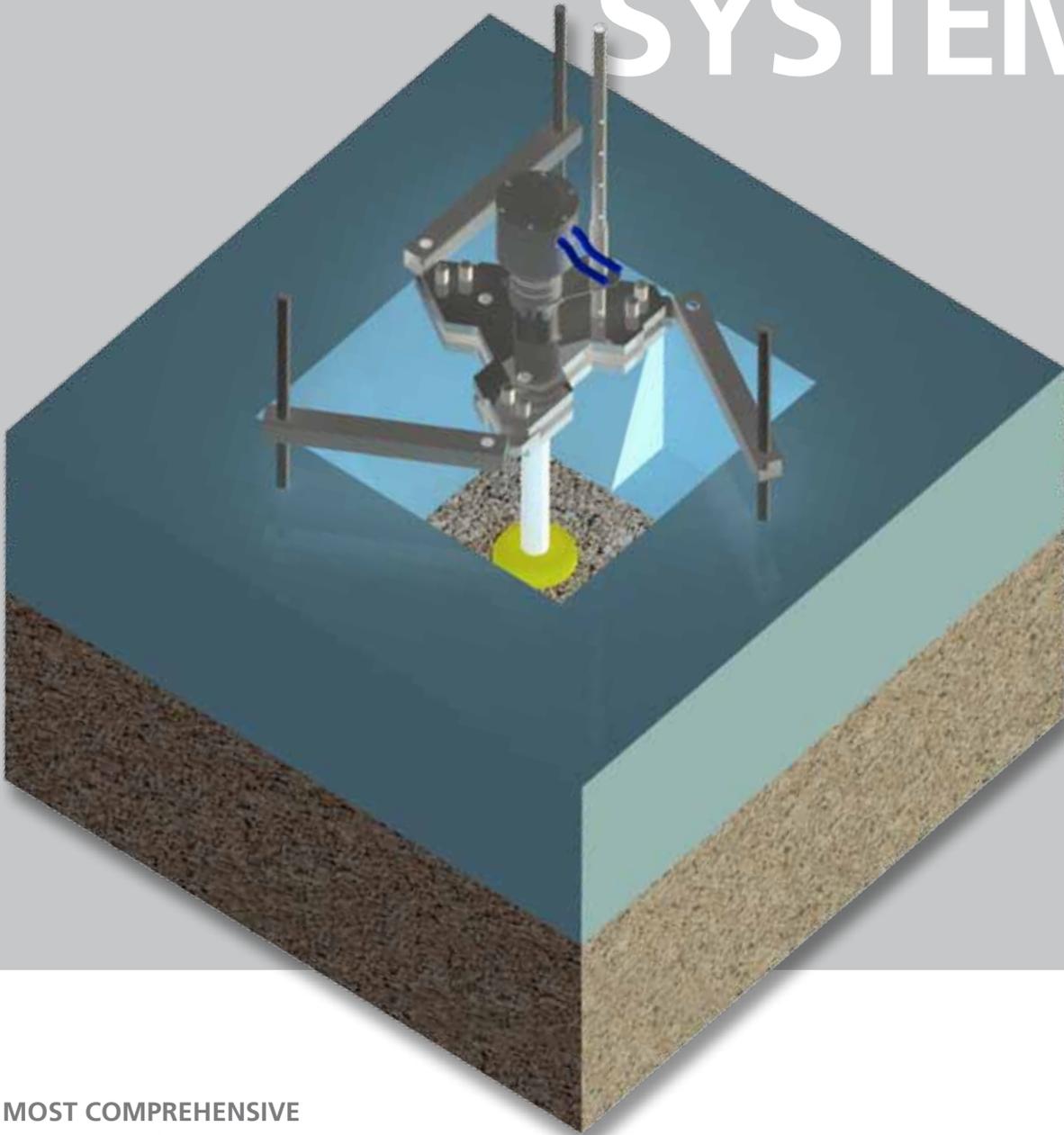


OXYGEN MEASURING SYSTEMS



THE MOST COMPREHENSIVE
PROGRAM OF ZIRCONIA BASED OXYGEN
MEASURING SYSTEMS FOR THE GLASS INDUSTRY.

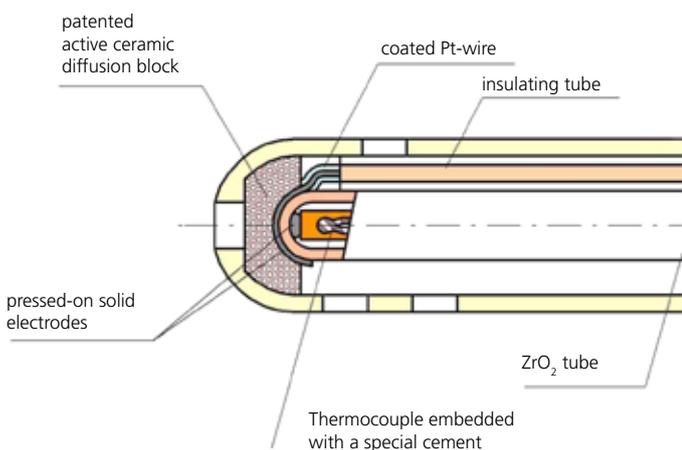
euRox
SAUERSTOFF MESS-SYSTEME

A MEMBER OF THE **HORN** GROUP

EUROX DIRECT INSERTED OXYGEN SENSOR

OXYGEN SENSORS *DiRox 1500-elpro*

The oxygen sensor *DiRox 1500-elpro* measures oxygen content in exhaust gas, thereby helping to increase the efficiency of the furnace. It is specially designed for application at high temperature in regenera-



tive furnaces in hollow glass or flat glass production where a short reaction time is required due to atmosphere changes during reversal of the firing-side.



Benefits:

- Increased furnace efficiency
- high temperature oxygen sensor with unique electrodes attached by spring forces up to 1500 °C
- fast reaction at changing atmosphere
- long lifetime due to the patented active ceramic diffusion block and the particular electrode protection (elpro)
- fast and safe installation within 2 hours by the EUROX Holding Device, flexible and adaptable to all furnace roof geometries

The sensor *DiRox 1500-elpro* consists of a monolithic zirconium (ZrO₂) tube, which is gas-tight and enables fast and safe installation. Attached to the zirconium tube are the solid, inner and outer



Eurox Oxygen-Sensor HTOS *elpro*

electrodes, made of a special chemical resistant platinum alloy. Both electrodes are constantly pressed against the zirconium tube by compressive spring force. In addition, this measuring cell can operate in reduced atmospheres of up to approx. 1500 °C and in spite of any chemical attacks.

This measuring cell is installed in a protection tube, which has a measuring hole on the tip and additional side bores as inlet for the measuring gas to assure a fast reaction without any mechanical gas extraction.

The outer platinum electrode is separated from the measuring gas by a permeable, patented active ceramic diffusion block and special electrode protection (elpro) developed by EUROX. This offers full protection for the measuring cell against attacks by harmful components of the exhaust gases.

The *DiRox 1500-elpro* sensor is optimized for atmosphere control of regenerative operated glass melting furnaces with alternating firing-sides and changing atmospheres e.g. preheated combustion air and furnace exhaust gases.



MOUNTING AND HOLDING DEVICES

The holding and mounting device HD-TOP allows easy and safe installation and is designed to fix the EUROX oxygen sensors on top of the regenerator roofs (crowns) of glass melting furnaces. Its multiple settings possibilities enable adaptations to varying roof geometries. The diameter between the legs of the holder can be extended from 140 mm up to 375 mm.

The unique design and fast adjustment of the threaded footholds and central supporting tube eases the work in harsh conditions.

The installation is simplified by two adjustment steps: a first, rough adjustment of the installation height of the device on the footholds and a fine setting of the threaded central supporting tube. An easily attachable mounting device and the improved thermal shock-resistant design of the oxygen sensor enables a **safe, easy and fast insertion in steps of 5 cm every 5 minutes** without having the trouble of preheating the sensor separately.



HD-TOP Holding Device
at the smallest radius = approx.. 140 mm



HD-TOP Holding Device
at maximum radius = approx.. 375 mm



Installed sensor with the Mounting and Holding Device

REFERENCE AIR SUPPLIES



Reference Air Unit with pressure control valve and Air Pulsing Unit

A suitable supply of reference air to the oxygen sensors is of utmost importance for the accuracy of the oxygen-readings and the lifespan of the sensors. Inserted air is used as the reference gas and the zirconium cell's measuring principle is based on the comparison of oxygen content of the measuring gas with that of the reference gas. Air with a constant oxygen content of 20,9 % is commonly used as reference gas.

To assure correct sensor operation, EUROX has developed a reference air unit with unique features and comprehensive equipment to increase the operational reliability:

- double diaphragm pumps with special membranes and high pressure and suction power
- a pressure control valve and two manometers for easy functional checks
- an „air pulsing“ unit: a unique feature developed by EUROX allows for stable, long-term dosage of air between approx. 0.3 and 2,0 l/h
- the unit also ensures efficient operation over many years and an increased filter life-span
- Two Filters: a fine filter (99,99 % / > 0,1µm) and an activated carbon filter (to remove oil mist from the air)
- pressure alarm switch (wired to a potential-free relay)

EUROX EXTRACTIVE AND HEATED OXYGEN SENSOR

OXYGEN SENSOR *EpRox 900*

for continuous control of fuel gas/air premixes and protective gases

The zirconium measuring cell is heated to an exceptionally high temperature of 900 °C. At this temperature a complete catalytic transformation of the gas-air-mix at very short reaction times is assured. The unique design of the measuring cell and its heating facility produces oxygen values strictly according the Nernst Equation. This "true NERNST behaviour" of the EUROX probe allows the calculation of various additional data (e.g. the CO content or the dew-point temperature) based on thermodynamic laws directly from the measured values, with no need for calibration as would be required for common Lambda probes.

A permeable, patented active ceramic diffusion block offers full protection for the measuring cell against attacks by harmful components of the exhaust gases. In addition, it features electrodes made of a special platinum-alloy with high chemical resistance. The unique technique of solid electrodes (no platinum paste!) which are attached by compressive spring forces prevents the measuring cell from electrode debonding or long-term measuring errors which are caused by CO cross-sensitivity effects. The design of the measuring chamber prohibits sooting – even at continuous operation at highly reduced atmospheres.

For the application with **fuel gas-air premixes (e.g. for feeder burners)** a catalytic transformation takes place and the real oxygen content is measured according an "ideal, complemented combustion".

The very short reaction time of the sensor ($t_{95} = < 15 \dots 30$ sec. from air \rightarrow N₂, including the full time of the measuring gas passing through the internal flow line) allows switch-over times of only 2 minutes and thus the multiple collecting of up to 10 sampling points. For this purpose the unit is equipped with a solenoid valve block to collect the samples.

This fast response and multiple samplings are advantageous for the application with **protective gases (e.g. N₂/H₂ of the tin bath at the floatglass production)**. It allows the representative monitoring of a large tin bath with the use of one measuring unit only, which makes it easy to find out in which part a leakage takes place, very quickly. If the dew-point temperature is required it can be consequential calculated from the measured oxygen values without installing numerous, customary dew-point analysers (which have a very slow response time (e.g. T₉₅ = 2 hours).

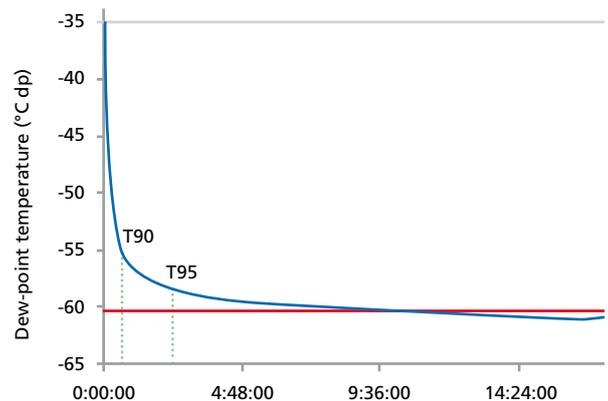


Benefits:

- exceptionally high measuring cell temperature of 900 °C
- very short reaction time ($t_{95} = < 15 \dots 30$ sec. from Air \rightarrow N₂)
- true "NERNST-behaviour" requires no mV-offset and enables easy calculation of other values like % CO or the dew-point temperature
- designed for a rugged, industrial application
- highest measuring accuracy and long-term-stability
- minimum maintenance service required
- no sooting or CO cross-sensitivity



Solenoid valve block



Typical response time of dew-point transmitters (e.g. from + 10 to - 60 °C dp) T₉₅ is approx. 2 hours. In comparison, the EUROX oxygen sensor offers a T₉₅ = approx. 15 .. 30 Sec // Air to N₂(5.0).

Typical application areas are:

- burner groups for feeders in the glass industry (multiple sampling)
- protective gas atmospheres of float glass bathes (multiple sampling recommended)
- protective gases in the metal and ceramic industries (e.g. N₂; N₂/H₂; H₂)



Heated Oxygen sensors MPLS for fuel gas/air premixes and protective gases

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