

## Zirconium oxide Oxygen probes for continuous measurement of O<sub>2</sub>-residue concentration in waste gas



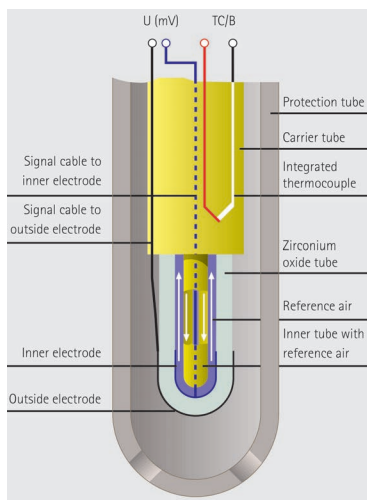
### Technical data

Standard length:	1.000 mm
Diameter:	25 mm protection tube
Probe voltage:	-10 ... 1.000 mV
Thermo voltage:	thermocouple type B
Measuring range:	0.0 ... 80.0 % O <sub>2</sub>
Operation temperature:	700 °C ... 1.500 °C
Measuring place:	regenerator crown or waste gas channel, vertical position

### Benefit

- Economical use of energy by controlled low excess air: approx. 1,5 % energy saving potential, depending on conditions (in a combination with STG Lambda Control)
- Controlled reliable near stoichiometric operation with O<sub>2</sub> residue concentrations below 1 %, as requirement to reduce the NO<sub>x</sub> emission
- Monitoring and control of air infiltration, e.g. reversal leakages, ingressed air
- Monitoring and compensation of CO Peaks after reversal

**Important:** About 2 ... 10 % of combustion air results form uncontrolled air ingress, which is not detected by combustion air flow measurement !



### Delivery of complete Oxygen measurement system

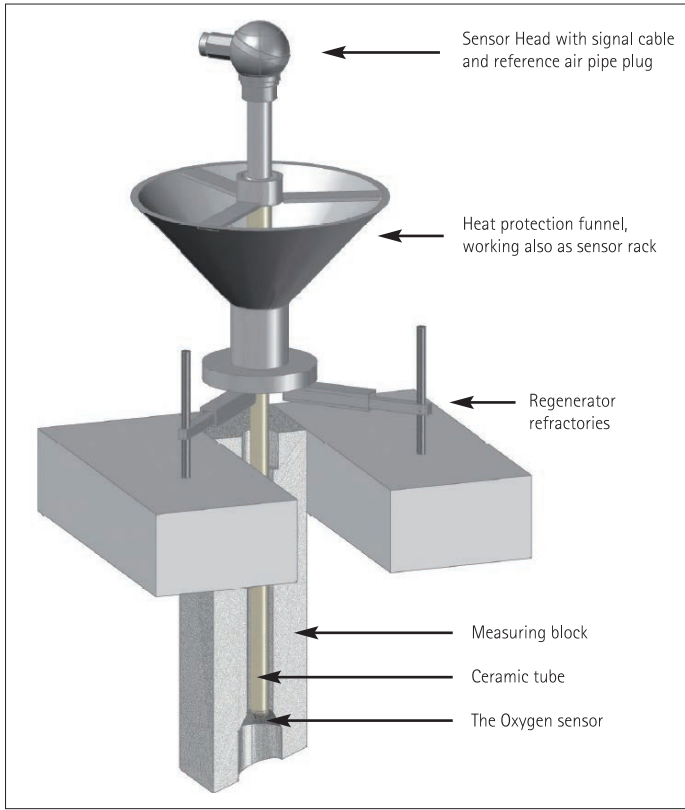
- Zirconium oxide Oxygen probe, type standard
  - special designs for oxyfuel and technical glass
- Special measuring block needed (delivery on request)
- Protection funnel, to use as heat protection and sensor rack
- Signal cable junction box and coupling for reference air copper pipe
- High temperature signal cable and reference air copper pipe
- Reference air control boxes with:
  - Pump for ambient air or
  - Pressure regulator for compressed air
  - Air filter, microflowmeter and valves
- Installation and start up

### Signal processing

- Advanced Signal Processing with continuous monitoring of O<sub>2</sub>, CO, Process value Lambda, Ingressed air – Patent EP 13169976.1
  - Separate signal processing unit mounted in local control box or
  - Implementation into existing Control System / Visualisation (Siemens, Allen-Bradley)
- Automatical Lambda Control for optimisation of combustion Patent WO 2012/038482 A1
  - Identify air ingress
  - Minimize air ingress
  - Compensate air ingress
  - Analyze temperature footprint of air ingress XF

### Options

- Renting & Service Contract: Basic installation, regular services with maintenance of measurement incl. replacement of any sensors – renting from day 1
- Annual Maintenance Contract: regular services with maintenance of measurement incl. replacement of any sensors (recommended: disclose with expiration of warranty period)



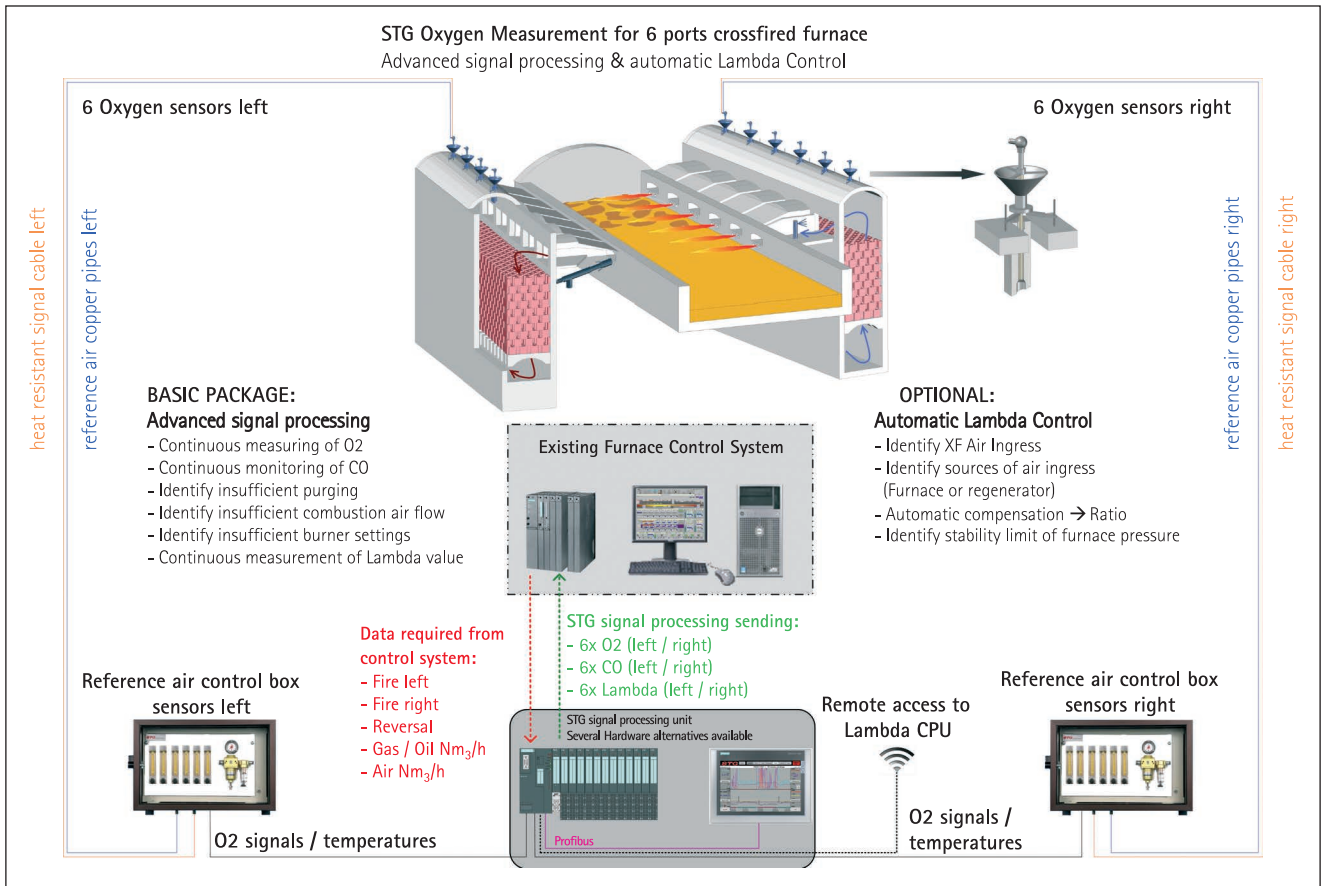
Oxygen sensor with measuring block



Oxygen sensors installed on regenerator crown at a crossfired furnace



reference air control box w. local signal processing unit (endport for 2 sensors)



System overview Oxygen measurement and signal processing