

# OXITEC® Oxygen Analyser Systems



Maximum Efficiency and Supreme Quality  
for the World Market

**ENOTEC**

# Theory = Practice

## ENOTEC goes for it with Nernst

Measuring oxygen using the zirconium oxide principle has been recognised a million times over as a simple and cost-efficient method for measuring oxygen in flue gases.

ENOTEC has resolutely put the Nernst equation into practice for the user's benefit.

The Nernst equation and its "leak-tight fraction line".

A process gas (A) with an unknown oxygen ( $O_2$ ) concentration flows around the outside of a measuring probe which is sealed off to the process gas by means of a heated zirconium-oxide measuring cell (B). A reference gas (C), with a known oxygen ( $O_2$ ) concentration, flows to the inside of the measuring cell.

At an optimum temperature a voltage (U) in mV is created between the two surfaces of the cell. At a constant temperature in the cell this voltage is dependent only on the ratio of the oxygen concentrations (partial pressures) in (A) and (C).

Using air (oxygen content at constant 20.95%) as a reference gas, the measured voltage is a direct measure of the oxygen concentration in the process gas (A), provided that the isolation between the process gas and the reference gas is **absolutely gas-tight**, thus ruling out distortion of the resulting measured value.

Only probes manufactured by ENOTEC truly comply with the Nernst equation.

$$U = K \cdot T \cdot \log \frac{P_1}{P_2} + C \rightarrow \begin{array}{|l} \text{Reference gas with partial pressure } P_1 \\ \text{Process gas with partial pressure } P_2 \end{array}$$

U = measurable voltage (mV)

K = natural constant

T = temperature (measuring cell)

$P_1 = O_2$  - partial pressure in the reference gas

$P_2 = O_2$  - partial pressure in the process gas

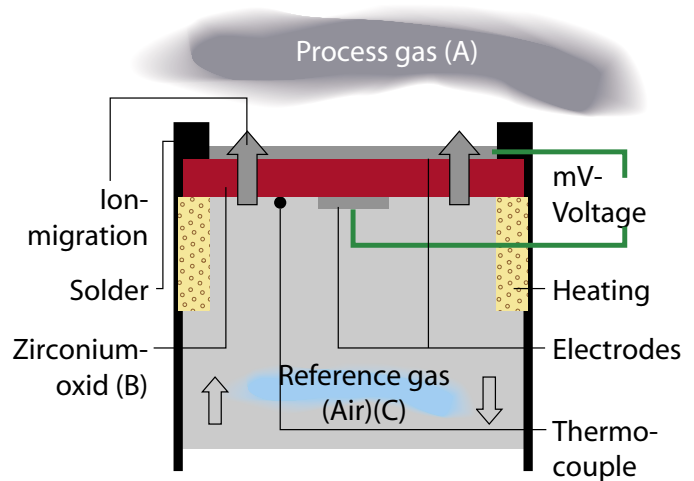
C = constant offset

With a "leak-tight fraction line" and air as the reference gas, all parameters in the Nernst equation – except for  $P_2$  – are constant. This means that the mV signal is dependent only on the  $O_2$  partial pressure ( $P_2$ ) in the process gas.

**The Nernst equation therefore does not require calibration**

## Configuration of the measuring cell

The technological and structural design of the OXITEC® zirconium oxide measuring cell guarantees permanent gas-tight separation of process gas from reference gas.



Thanks to the special soldering technique used in their manufacture, only OXITEC® probes guarantee the leak-tight fraction line.

# ENOTEC

# All OXITEC® Oxygen Analyser Systems Have the Following Outstanding Qualities:

- Automatic start-up through intelligent electronics
- No calibration necessary
- Maximum precision of measurement
- Complete package including installation accessories and connection cables
- Integrated pneumatic unit
- Maximum protection for the measuring cell ensures reliable and long-lasting operation
- Maintenance-free technology and design
- Components can be replaced by the customer
- Gas-tight cell design using ENOTEC soldering technique
- No need for gas sampling and processing
- Explosion-proof designs
- Probes are suitable for applications at up to 1400 °C
- Optimum positioning in the flue gas stream for representative O<sub>2</sub> values measured
- Individual manufacturing technology
- Comprehensive accessories



## Competence and Experience

Many thousands installed World-wide in all processes and applications, a few of which are listed below:

- Power generation
- Waste incineration
- Iron and steel
- Inert processes
- Foodstuffs
- Chemicals industry
- Petrochemicals industry
- Cellulose
- Paper
- Cement
- Glass



# Competence for the Benefit of our Customers

Ideal for all Industrial Steam Generators



The Optimum Solution for all Utility Boilers



## OXITEC® KES-132x

Flue gas temperature: up to 600 °C  
up to 1400 °C (with KSR-cooling tube)

Compatibility: Westinghouse 132

Insertion length: 385 mm (KES-1321)  
475 mm (KES-1322)  
615 mm (KES-1323)

Ambient temperature: - 40 °C up to + 80 °C

## OXITEC® KES-200x & KIS-200x

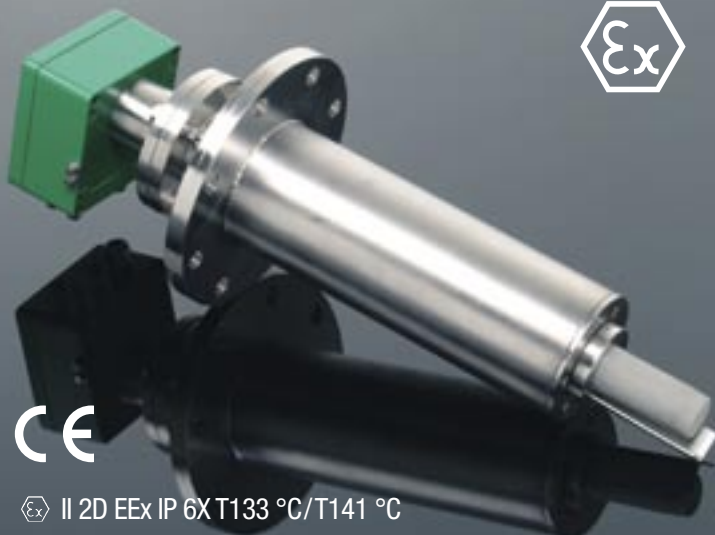
Flue gas temperature: up to 600 °C (KES-200x)  
up to 800 °C (KIS-200x)  
up to 1400 °C (with KSR-tube)

Compatibility: Westinghouse 218, 225

Insertion length: 495 mm (KES-2001)  
925 mm (KES-2002)  
1835 mm (KES-2003)  
2768 mm (KES-2004)  
3682 mm (KES-2005)  
Other lengths on request

Ambient temperature: - 40 °C up to + 80 °C

ATEX Certified for Dust-Ex Applications



II 2D EEx IP 6XT133 °C/T141 °C

## COMTEC® KES600x (qualified for OXITEC®)

Flue gas temperature: up to 600 °C

Insertion length: 540 mm (KES6001)  
960 mm (KES6002)

Protection class: II 2D EEx IP 6XT133 °C/T141 °C

Ambient temperature: - 20 °C up to + 70 °C



## Compatible with all World-Market Analysers



## Simply the Safest Explosion-Proof Probe



Ex II 2G EEx d IIC T3



### OXITEC® KES500x

Flue gas temperature:	up to 600 °C up to 1400 °C (with KSR-tube)
Compatibility:	ABB Kent, Rosemount, Thermox, Yokogawa
Insertion length:	520 mm (KES5001) 950 mm (KES5002) 1865 mm (KES5003)
Ambient temperature:	- 40 °C up to + 80 °C

### OXITEC® KEX500x

Flue gas temperature:	up to 500 °C up to 1400 °C (with KSR-tube)
ATEX certificate:	ATEX EX II 26 EEx d II C T3
Compatibility:	ABB Kent, Rosemount, Thermox, Yokogawa
Insertion length:	520 mm (KEX5001) 950 mm (KEX5002)
Ambient temperature:	- 20 °C up to + 55 °C

## Technical Data for the KES-132x, KES-200x, KIS-200x, KES500x, KEX500x, KES600x

Measuring principle:	zirconium oxide
Permissible operating data	
Flue gas temperature:	see type of probe
Flue gas pressure*:	-50 to +50 mbar
Flow velocity*:	0 to 50 m/s
Ambient temperature*:	see probe types
Response time (lag time):	0,5 s (flue gas flowing at > 10 m/second)
T90 time:	5 s (flue gas flowing at > 10 m/second)

\* others on request

Probe material:	V4A (1.4571/316SS)*
Type of protection (terminal box):	IP 65
Detection limit:	less than 1 ppm O <sub>2</sub>
Voltage supply:	via electronics unit
Dimensions:	see dimensional drawing
Compatibility:	see probe types
Service life:	up to 10 years, depending on the application
Insertion length:	see probe types

## Multi-Layer-Technology (MLT)

All OXITEC® oxygen analyser systems be can optionally supplied with the MLT cell technology developed by ENOTEC.

MLT guarantees maximum working life – even under the most difficult flue gas conditions.

# OXITEC® 5000 Intelligent Electronics

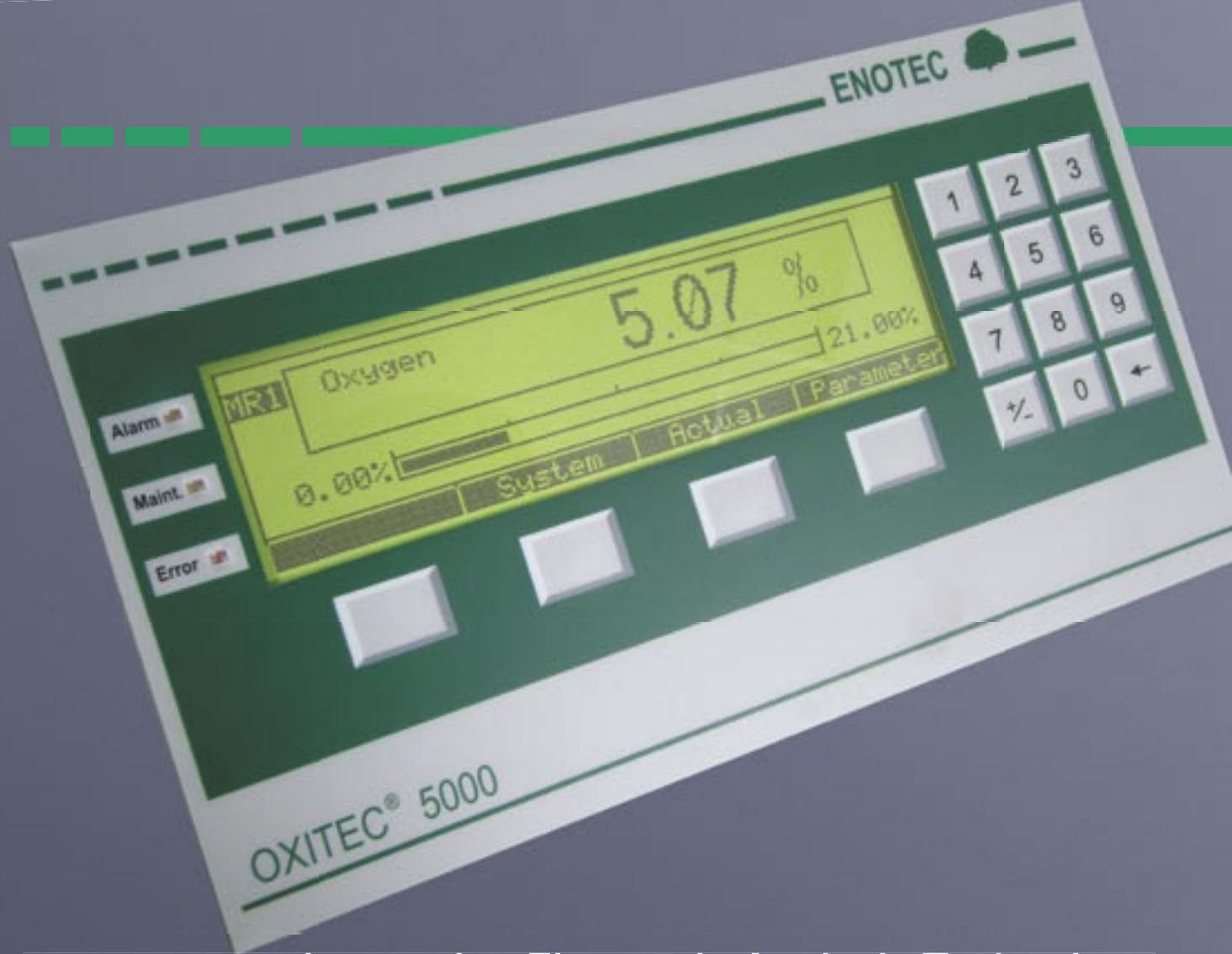


Version in explosion-proof housing  II 2 G EEx d IIC T6 (ambient temperature -20 °C to +55 °C)

Dimensions:	see dimension drawings
Mains voltage:	230V/50 up to 60Hz, tolerance $\pm 10\%$ 115V/50 up to 60Hz, tolerance $\pm 10\%$
Power consumption:	400 VA during heating-up 100 – 200 VA during operation
Series fuse recommended:	10A
Ambient temperature:	-20 °C up to +60 °C other temperatures on request
Immunity from disturbance:	according to EMVG and low-voltage directive 72/73 EEC EN 50081-2: July 1993 EN 50082-2: March 1995
Relay outputs potential-free:	for status signal: 24V / 1A for probe solenoid valve: 230V / 1A
Temperature compensation:	electronic
Signal output 0/4 to 20 mA	burden max. 500 ohm, potential-free
Response time of the mA output:	< 200 ms
Display:	LCD LED illuminated 240 x 64 points graphic display
Interfaces (optional):	RS 232, RS 485, Foundation Fieldbus, HART, (others on request)
Measuring accuracy:	$\pm 0,2\%$ of actualmeasured value



Version in sheet steel housing (IP 66)  
(ambient temperature -20 °C to +55 °C)



## Innovative Electronic Analysis Technology designed for Maximum Accuracy of Measurement with Simple Operator Interface



### Unrivalled Range of Functions

- Accuracy of measurement: deviation of only 0.2% from the measured value
- Fully automatic calibration
- Storage of measured values
- Freely adjustable output attenuation
- Electronically monitored pneumatic unit for reference air and calibration gas (optional\*)
- Two freely adjustable measuring ranges
- Double limit monitoring
- Self-regulating
- Intuitive operation via soft keys
- Status display with on-line help
- Display capable of graphics with
  - Digital display
  - Plain-text display
  - Bar-graph display

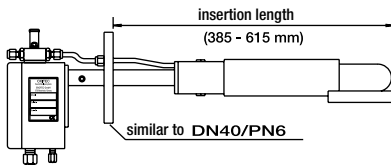
Version in 19" rack mounting module (IP-20)  
(ambient temperature 0 °C to +60 °C)

\* Version depending on device type

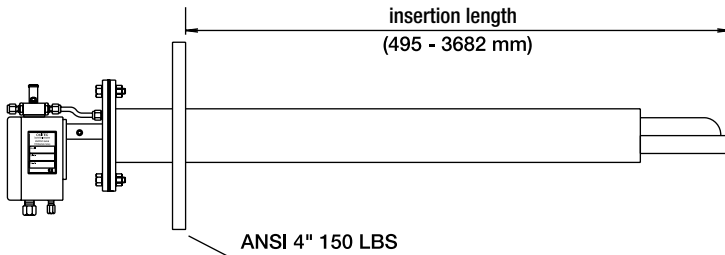


## Dimension of the Probes

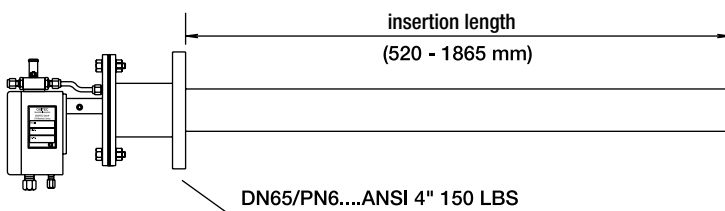
### OXITEC® KES-132x



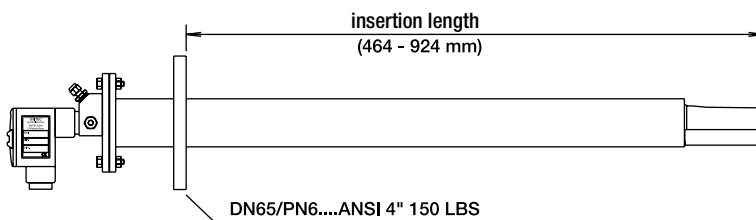
### OXITEC® KES-200x & KIS-200x



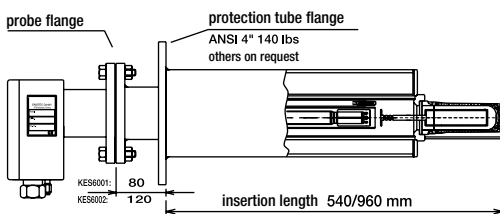
### OXITEC® KES500x



### OXITEC® KEX500x II 2 G EEx d IIC T3



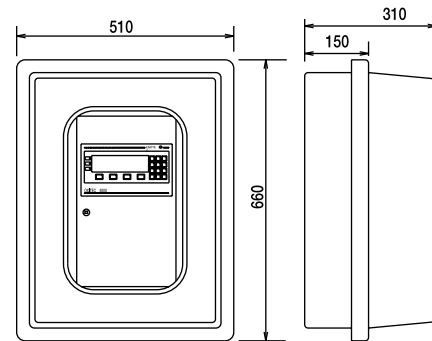
### COMTEC® KES600x Dust-Ex (qualified for OXITEC®) II 2 D EEx IP 6X T133 °C/T141 °C



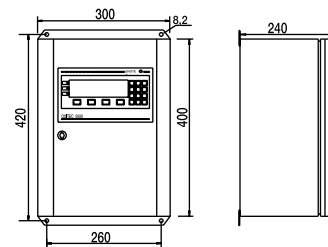
\* Please see dimensional drawings for flange dimensions

## Dimension of the Electronic Equipment

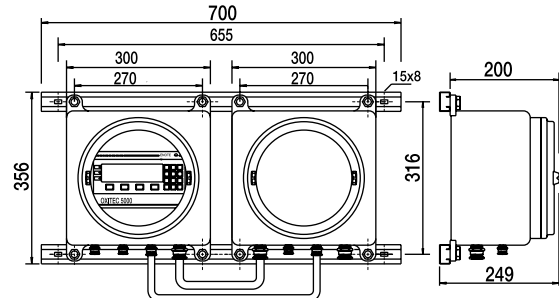
### GFK housing SME-56



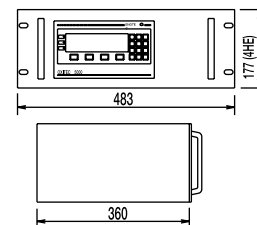
### Sheet steel housing SME-53



### Explosion proof housing II 2 G EEx d IIC T6



### 19" rack mounting module SME-54



All dimensions in mm

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