

**COMTEC<sup>®</sup>**

*O<sub>2</sub> / CO<sub>e</sub> InSitu analyzer systems*

**REDUCE EMISSIONS  
AND INCREASE  
FUEL EFFICIENCY**

DEVELOPED AND  
MANUFACTURED  
IN GERMANY



**ENSitu**<sup>®</sup>  
SENSOR TECHNOLOGY

**COMTEC**<sup>®</sup>  
CO<sub>e</sub> – THE INDICATOR OF SAFE COMBUSTION

The family of *ENSitu* sensors are engineered for maximum durability. *ENOTEC* use only the most robust materials in creating sensors, giving them an operational life span superior to any comparative sensor on the world market.

The *ENSitu MLT* sensor is the premium sensor for measurement of oxygen in harsh process conditions such as with high dust load, aggressive or corrosive flue gas compositions. The MLT production method of the O<sub>2</sub> sensors make them highly resilient and robust.

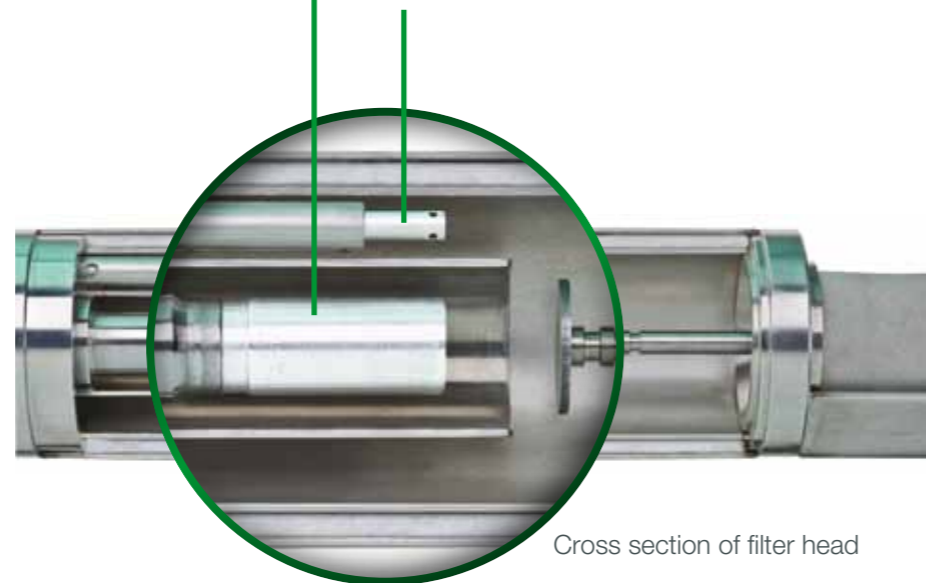
The *ENSitu MXP* sensor found in *COMTEC* probes provide a supplementary measurement of combustibles in addition to oxygen measurement from the MLT sensor. This additional measurement guarantees a safer combustion as the CO<sub>e</sub> and oxygen content in flue gas are directly related to each other.

**MLT sensor**

The best sensor for measurement of O<sub>2</sub>, which is just as reliable and robust in reducing atmospheres, thanks to integrated Cell Surface Protection.

**MXP sensor**

Undistorted CO<sub>e</sub> analysis due to fast measuring InSitu mixed potential sensors, which are particularly recommended for challenging high temperature applications.



**ROBUST SENSORS,  
DESIGNED TO LAST**

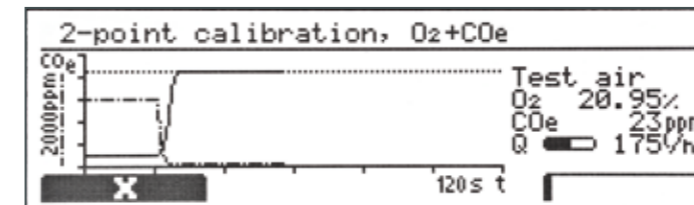
KEX-6001 probe  
(immersion depth 470mm)

The „e“ in CO<sub>e</sub> represents the word equivalent and refers to the sum of unburned molecules such as carbon monoxide (CO), methane (CH<sub>4</sub>) or hydrogen (H<sub>2</sub>) in the process gas. This group

of unburned molecules form, apart from oxygen molecules, the only gases in which by means of InSitu measurement, the quality of combustion can be analysed. High CO<sub>e</sub> values are an indi-

cator for an inefficient, climate harmful and plant hostile process control. From a safety point of view, monitoring the CO<sub>e</sub> values can also be used for recognition of smouldering fires.

**FAST RESPONSE TIME**



Here a 2-point calibration is taking place showing the actual oxygen and CO<sub>e</sub> content - here 20.95 % O<sub>2</sub> and 23 ppm CO<sub>e</sub>. The fast reaction to process gas after calibration (<5 seconds) is evident and this speed of measurement is the same when the sensor reacts to changes of the oxygen concentration in flue. An immediate regulation of the combustion process is thus possible.

**DYNAMICS OF THE PROCESS**

Calibration results	
O <sub>2</sub> volt.at testgas	44.95 mV
O <sub>2</sub> response to testgas	2.3 s
O <sub>2</sub> response to process	6.6 s
O <sub>2</sub> sensor life	0 (     ) 100%

The possibility to refer to earlier calibrations enhances your knowledge of your process conditions and reduces the risk of handling errors during future calibrations. The self monitoring and self diagnostic functions of *ENOTEC* analyzer systems include „O<sub>2</sub> Sensor Life“. Here one is informed of the state of the sensor.

**HART**   
COMMUNICATION FOUNDATION   
...and more interfaces available.



**COMTEC® 6000**  
INSITU MEASUREMENTS IN SAFE AREAS

**COMTEC® 6000 GasEx**  
INSITU MEASUREMENTS IN HAZARDOUS AREAS

COMTEC 6000 is the world's first InSi-tu analyzer for measurement of oxygen and combustibles in flue and process gases, which allows redundant measurement of both gases with high accuracy in real time.

The dual measurement of both O<sub>2</sub> and CO<sub>e</sub> enhances plant safety!

Ideally a combustion process should emit as few combustibles as possible. The O<sub>2</sub> and CO<sub>e</sub> values are dependant on each other: As the O<sub>2</sub> content declines, the CO<sub>e</sub> content will rise, indicating inefficiency and creating unsafe conditions. This can be monitored and offset by regulating the combustion process with COMTEC 6000.

TECHNICAL DATA

INSERTION DEPTH OF PROBE	up to 1850mm
O <sub>2</sub> / CO <sub>e</sub> RANGES	0% O <sub>2</sub> to 100% O <sub>2</sub> 0 to 1000ppm CO <sub>e</sub> (others on request)
MEASUREMENT ACCURACY	0,2% of O <sub>2</sub> value - better 5% of CO <sub>e</sub> range end
REACTION TIME	0,5s (process flow velocity > 10m/sec.)
PROCESS GAS TEMPERATURE	max. 500°C max. 1400°C (with cooling protection tube)
AMBIENT TEMPERATURE	-40°C to 80°C (probe) -20°C to 55°C (electronic unit)
INTERFACE	HART, FIELDBUS, RS485 MODBUS RTU, RS232
IP CODE	probe - IP65 electronic unit - IP66



SME-53 electronic unit and KES-6002 probe (immersion depth 930mm)

**MAINTAINS SAFE OPERATING CONDITIONS**

Safe, reliable and accurate are the main characteristics of the ATEX certified COMTEC 6000 GasEx. The COMTEC 6000 GasEx is an Ex protected analyzer for safe measurement of oxygen and combustibles in gas hazardous environments (gas explosion zones 1 and 2).

The patented probes are highly robust and withstand even the harshest flue gas conditions. Using the COMTEC 6000 GasEx, plant safety is enhanced while lowering emissions by controlling fuel usage in the combustion process.

TECHNICAL DATA

INSERTION DEPTH OF PROBE	up to 1000mm
O <sub>2</sub> / CO <sub>e</sub> RANGES	0% O <sub>2</sub> to 100% O <sub>2</sub> 0 to 1000ppm CO <sub>e</sub> (others on request)
MEASUREMENT ACCURACY	0,2% of O <sub>2</sub> value - better 5% of CO <sub>e</sub> range end
REACTION TIME	0,5s (process flow velocity > 10m/sec.)
PROCESS GAS TEMPERATURE	max. 500°C max. 1400°C (with cooling protection tube)
AMBIENT TEMPERATURE	-20°C to 55°C (probe) -20°C to 55°C (electronic unit)
INTERFACE	HART, FIELDBUS, RS485 MODBUS RTU, RS232
IP CODE	probe - IP66 electronic unit - IP66

Certified in operation for realistic process conditions by an independent German ATEX test house.



**II 2G Ex d IIC T3 Gb (probe)**  
**II 2G Ex d IIC T6 Gb (electronic unit)**



ATEX certified SME-5D electronic unit and KEX-6001 probe (immersion depth 470mm)

**ATEX APPROVED FOR YOUR PROCESS CONDITIONS**

## COMTEC® 6000 DustEx INSITU MEASUREMENTS IN HAZARDOUS AREAS

## COMTEC® 600E EXTRACTIVE MEASUREMENT

The **COMTEC** 6000 DustEx provides permanent and reliable gas analysis in flue with high dust loads. The probe design used for the DustEx is extremely robust and withstands the abrasive forces present in dusty atmospheres. The ATEX certification for the DustEx is for dust explosion protection zones 21/22.

These characteristics are the foundation for energy optimisation and fuel reduction by means of accurate process control.

### TECHNICAL DATA

INSERTION DEPTH OF PROBE	up to 960mm
O <sub>2</sub> / CO <sub>e</sub> RANGES	0% O <sub>2</sub> to 100% O <sub>2</sub> 0 to 1000ppm CO <sub>e</sub> (others on request)
MEASUREMENT ACCURACY	0,2% of O <sub>2</sub> value - better 5% of CO <sub>e</sub> range end
REACTION TIME	0,5s (process flow velocity > 10m/sec.)
PROCESS GAS TEMPERATURE	max. 600°C
AMBIENT TEMPERATURE	-20°C to 55°C (probe) -20°C to 55°C (electronic unit)
INTERFACE	HART, FIELDBUS, RS485 MODBUS RTU, RS232
IP CODE	electronic unit - IP66 probe - IP66

Certified in operation for realistic process conditions by an independent German **ATEX** test house.



II 2D Ex tD A21 IP6X T133°C/T141°C

**ATEX APPROVED  
FOR YOUR PROCESS  
CONDITIONS**

SME-53 electronic unit and  
ATEX protected KES-6001 probe  
(immersion depth 540mm)



### TECHNICAL DATA

O <sub>2</sub> / CO <sub>e</sub> RANGES	0% O <sub>2</sub> to 100% O <sub>2</sub> 0 to 1000ppm CO <sub>e</sub> (others on request)
MEASUREMENT ACCURACY	0,2% of O <sub>2</sub> value - better 5% of CO <sub>e</sub> range end
AMBIENT TEMPERATURE	-20°C to 55°C
INTERFACE	HART, FIELDBUS, RS485 MODBUS RTU, RS232
IP CODE	IP20

The **COMTEC** 600E extractive analyzer has a 19" rack housing, built for installation in analyzer cabinets. The analyzer continuously measures O<sub>2</sub> and CO<sub>e</sub>. The 600E is equipped with the same tried and tested **ENSITU** O<sub>2</sub> sensor as well as a CO<sub>e</sub> sensor for measurement of CO<sub>e</sub>.

In combination with an **ENOTEC** gas sampling and conditioning system, oxygen and combustibles can be measured in wet / dry flue gas with a detection limit of 1ppm.

Apart from the 19" version, a desktop version is also available for standalone applications such as in laboratories.



**QUALITY GERMAN  
ENGINEERING**



COMTEC 600E

# COMTEC®

## SAFE AND CLEAN COMBUSTION

### COMPANY

ENOTEC has provided gas sensing solutions since 1980, producing products with a high degree of accuracy, quality and durability - Made in Germany.

Our flexibility allows us to quickly develop solutions individually designed to meet your problems.

On request, we also offer after delivery service concepts - the world over.

### SYSTEM FEATURES

- > InSitu measurement in real-time
- > Overview of calibration history
- > Overview of calibration
- > Low-maintenance design
- > Self-monitoring
- > Sensor life expectancy on display
- > Gas tight sensor construction

### CONTACT

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**ENOTEC** has four subsidiaries:  
**ENOTEC USA, ENOTEC ASIA, ENOTEC UK, ENOTECOOO** and over 50 distributors world wide...

The ENOTEC product configurator: Configure your analyzer in 5 minutes.



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[www.youtube.com/ENOTECsensors](http://www.youtube.com/ENOTECsensors)