



PRODUCT CATALOGUE

AND COMPANY PROFILE

- Reliable and robust analyzers
- Certified accuracy and safety
- Customized solutions for combustion and emission measurement

Made in Germany

Over 44 years of experience for excellent products

ENOTEC was founded in 1980 with the objective to produce innovative and accurate gas analyzers for process control and CEMS, enabling energy-saving and reduction of harmful emissions, hence the name **ENOTEC** - **EN**ergy **Optimization** **TEC**hnology.

Starting with the production of the **OXITEC** O₂ analyzer, based on the zirconium oxide principle of measurement, ENOTEC has continuously developed this sensor to make it the worldwide reference for InSitu O₂ analysis. Combining robust materials with unique self-developed manufacturing processes, the ENOTEC O₂ sensor is, to this day unmatched in robustness, accuracy and durability.

Investing in R&D and using an expert workforce, ENOTEC steadily expanded its product range:

The **COMTEC** O₂/COe analyzer incorporates the world's first true InSitu combustible sensor.

The **CEMTEC** high temperature probe with O₂ & CO measurements for cement plant kilns is constructed with uncompromised quality and equipped with several sophisticated self-cleaning features.

The **SILOTEC** is built for the safe and fast monitoring of silos containing coal dust or other potentially combustible contents.



Expanding on the successful product development, ENOTEC over time founded subsidiaries in the United Kingdom, the USA and other countries. These subsidiaries and numerous partners worldwide guarantee technical expertise, regional knowledge, and competent support to solve all your analysis problems.

Continuous product development and over 4 decades of experience enable our engineers and technicians to advise you expertly and reliably on all questions relating to gas analysis in all types of applications.

ENOTEC InSitu Sensors

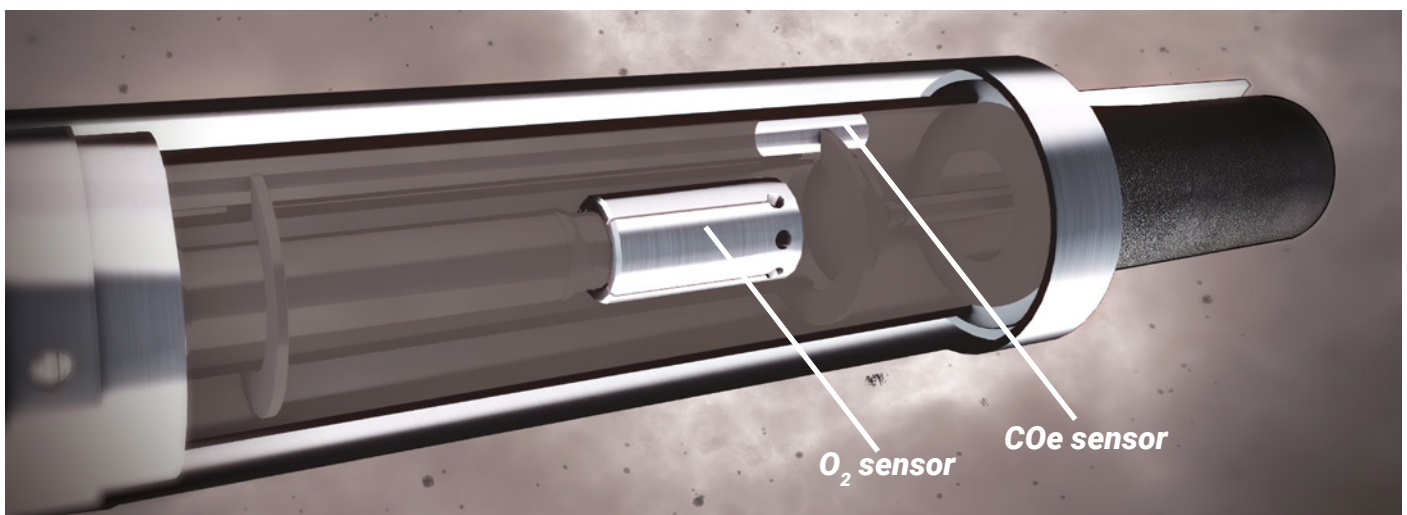
InSitu measurement

ENOTEC employs sophisticated manufacturing processes in combination with the most robust materials to create sensors, which have an operational life span superior to any comparable sensor on the world market.

This premium ENOTEC **O₂ sensor** allows oxygen measurement in harsh process conditions, such as high dust loads and aggressive or corrosive flue gas compositions up to 1400 °C.

A **MLT** porous protective layer on the O₂ sensor protects the sensor electrode from aggressive components, e.g. high concentrations of SO₂.

The ENOTEC **COe sensor** enables a supplementary detection of combustible flue gas components. This additional measurement permits a safer combustion as the COe and O₂ content in flue gas are inversely related to each other and can thus serve as an ideal indicator for complete and efficient combustion.



Cross-section of the COMTEC filter head

The ENOTEC-produced sensors measure oxygen and unburnt gas molecules directly in high dust, hot/wet flue gas. The structure of the sensor technology and the patented filter design have been continuously optimized.

The smallest changes in the flue gas composition are detected within seconds and form the basis for safe and efficient plant operation—permanently and sustainably.

An **InSitu calibration** can be carried out at any time, manually or automatically.

OXITEC[®]

O₂ ANALYZER SYSTEMS

OXITEC 5000 InSitu analyzers precisely measure the O₂ concentration in any flue gas for combustion control. This important parameter needs to be controlled for fuel efficiency and emissions reduction.

Depending on the application, oxygen values below 0.5% (incomplete combustion) or above 5% (wasteful energy input, e.g. unnecessary heating of combustion air) should be avoided and are an indicator of the combustion efficiency.

Alternatively, OXITEC can be applied for oxygen measurement in CEMS.

ENOTEC's robust SME-5 electronic unit provides plausibility to ensure a safe and efficient combustion process.

OXITEC[®] 5000 safe area

A durable InSitu O₂ analyzer for exact and fast combustion control.

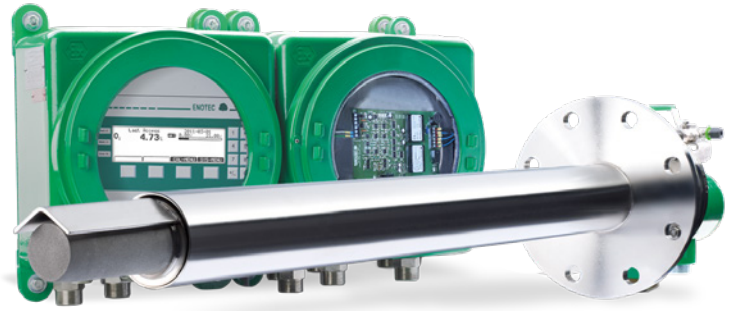


TECHNICAL DATA

PROCESS GAS TEMPERATURE	max. 600 °C - max. 800 °C for INCOLOY probe - continuous / max. 1400 °C with cooling protection tube	
PROBE INSERTION LENGTHS/MATERIAL	493 mm to 3689 mm (others on request) / Stainless steel (SS316TI)	
MEASURING PRINCIPLE	Zirconium oxide	
AMBIENT TEMPERATURE	Probe: - 40 °C to + 80 °C	Electronic Unit: -20 °C to + 55 °C
O₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol.% to 0-25 Vol.% (others on request)	
HOUSING	Probe: IP65	Electronic Unit: IP66

OXITEC® 5000 GasEx

The rugged OXITEC 5000 GasEx analyzers provide safe and reliable InSitu O₂ measurements in ATEX zones 1/2.



TECHNICAL DATA

PROCESS GAS TEMPERATURE	max 500 °C continuous / max. 1400 °C with cooling protection tube	
PROBE INSERTION LENGTHS/ MATERIAL	464 mm / 924 mm (others on request)/ Stainless steel (SS316TI)	
MEASURING PRINCIPLE	Zirconium oxide	
AMBIENT TEMPERATURE	Probe: -20 °C to + 55 °C	Electronic unit: -20 °C to + 55 °C
O ₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol.% to 0-25 Vol.% (others on request)	
IGNITION PROTECTION TYPE	II 2G Ex db IIC T3 Gb	
HOUSING	Probe: IP66	Electronic unit: IP66

OXITEC® 500E

The extractive OXITEC 500E analyzer in a 4HE 19" rack for installation in analyzer cabinets continuously measures O₂ and contains the same sensor technology used in the proven OXITEC 5000 analyzers.



TECHNICAL DATA

MEASURING PRINCIPLE	Zirconium oxide	
AMBIENT TEMPERATURE	-20 °C to + 55 °C	
O ₂ MEASURING RANGE	2 ranges, freely configurable from 0-2 Vol.% to 0-25 Vol.%	
HOUSING	IP20	

ENSITU[®]

O₂ TRANSMITTER PROBE

ENSITU 7000 InSitu O₂ transmitter probe provides an analytical solution for boilers and furnaces.

Constructed using high-quality stainless steel and the proven ENOTEC O₂ sensor, the ENSITU is designed for easy installation and setup—as simple as plug and play.

The practical handling is done with a smartphone or tablet using the ENOTEC Remote App. The App can be used to calibrate the analyzer and for troubleshooting. Protocols of the measurement and analyzer history can be downloaded or archived for future reference.

The controller is connected directly to the probe. However, should the installation position be difficult to reach, the controller is detachable and can be installed wherever convenient (within 50 meters distance).

The probe can withstand flue gas temperatures of up to 600 °C and operate in high dust loads caused by numerous fuels (coal, oil, gas, biomass, etc.).

ENSITU[®] 7000

Install, power up, and measure oxygen. No reference air or other continuous gas supply is required for operation.



TECHNICAL DATA

PROCESS GAS TEMPERATURE	max 600 °C	
PROBE INSERTION LENGTHS/MATERIAL	313 mm to 993 mm (others on request)/ Stainless steel (SS316Ti)	
MEASURING PRINCIPLE	Zirconium oxide	
AMBIENT TEMPERATURE	Probe: - 40 °C to + 55 °C	Electronic Unit: -40 °C to +70 °C
O ₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol.% to 0-25 Vol.% (others on request)	
HOUSING	Probe: IP65	Electronic Unit: IP66

AQUATEC

O₂ / H₂O ANALYZERS

AQUATEC 1000 is an InSitu O₂ analyzer installed directly in the process gas, using the O₂ concentration before and after each drying stage to determine the H₂O value.

Drying is an energy-intensive and time-consuming process, irrespective of the product, e.g., gypsum, tobacco, etc.

The InSitu measurement enables a fast reaction to any changes in the process. This reduces the drying time considerably and optimizes the energy usage.

Additionally, the quality can be controlled by drying the product to the exact point of residual moisture.

AQUATEC[®] 1000

Control and reduce drying times considerably with simultaneous increased product quality and fast O₂/H₂O InSitu measurements.



TECHNICAL DATA

PROCESS GAS TEMPERATURE	max. 200 °C (with active carbon filter) max. 400 °C (with ceramic filter)	
PROBE INSERTION LENGTHS/MATERIAL	max. 615 mm (others on request)/ Stainless steel (SS316TI)	
MEASURING PRINCIPLE	Zirconium oxide	
AMBIENT TEMPERATURE	Probe: - 40 °C to + 80 °C	Electronic Unit: -20 °C to + 55 °C
O ₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol. % to 0-25 Vol. % (others on request)	
H ₂ O MEASURING RANGE	0 to 100 %	
HOUSING	Probe: IP65	Electronic Unit: IP66

COMTEC®

O₂ / CO_e ANALYZERS

The **COMTEC 6000** InSitu analyzer incorporates a robust O₂ sensor and CO_e sensor. While the O₂ measurement allows efficient combustion control, the CO_e sensor enables additional optimization by precisely determining the remaining excess combustibles in the flue gas.

CO_e refers to the sum of unburnt molecules: carbon monoxide (CO), hydrocarbons (C_xH_y), and hydrogen (H₂). The amount of oxygen and unburnt molecules must be known to judge the quality of combustion.

Low values of O₂ and CO_e after the combustion process relate to an optimal and efficient process, saving fuel and reducing emissions to a minimum.

A high CO_e value is an indicator of an inefficient, climate-harmful, and plant-hostile process operation.

COMTEC® 6000 safe area

A durable InSitu O₂/CO_e analyzer for exact and fast combustion control.



TECHNICAL DATA

PROCESS GAS TEMPERATURE	max. 500 °C continuous / max. 1400 °C with cooling protection	
PROBE INSERTION LENGTHS/ MATERIAL	440 mm to 1820 mm (others on request)/ Stainless steel (SS316TI)	
MEASURING PRINCIPLE O ₂	Zirconium oxide	
MEASURING PRINCIPLE CO _e	MXP (mixed potential)	
AMBIENT TEMPERATURE	Probe: - 40 °C to + 80 °C	Electronic Unit: -20 °C to + 55 °C
O ₂ MEASURING RANGE	2 ranges, freely configurable from 0-2 Vol.% to 0-25 Vol.% (others on request)	
CO _e MEASURING RANGE	0 to 5000 ppm	
HOUSING	Probe: IP65	Electronic Unit: IP66

Failsafe certified O₂/COe InSitu gas analysis



Have trust in our certifications for your process analyzers. Minimize explosion risks – optimize your combustion:

Not every **Ex-certified** analyzer is suitable for safe use under typical process conditions without limitations. They may require additional components, such as a purging unit. These restrictions result in unnecessary risks for the plant operation process.

Only analyzers which acquire the **ATEX certified** ignition safety for the use in hazardous areas under actual process conditions can be considered safe.

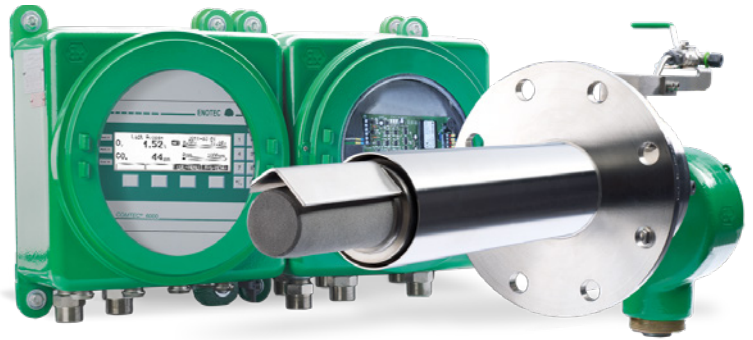
The **OXITEC** (O₂) and **COMTEC** (O₂/COe) InSitu analyzers are accordingly **ATEX certified**. Manufactured to highest quality and material standards, they are thus extremely resistant against abrasion and corrosion.

Our certificate:

- Systems have been ATEX certified under process conditions of up to 500 °C
- No sampling & conditioning necessary
- The only InSitu product for simultaneous O₂ and COe analysis
- Certified for ATEX zones 1/2 and 21/22
- No additional components required, e.g. purging unit
- Easy installation and InSitu verification
- ENOTEC Remote included

COMTEC® 6000 GasEx

The rugged COMTEC 6000 GasEx analyzers provide safe and reliable InSitu O₂ / COe measurements in ATEX zones 1/2.

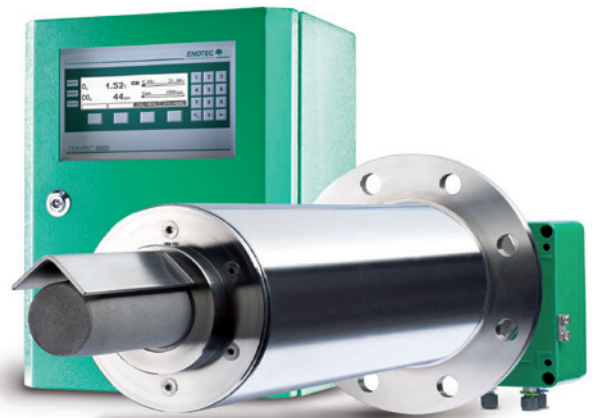


TECHNICAL DATA

PROCESS GAS TEMPERATURE	max 500 °C continuous / max. 1400 °C with cooling protection	
PROBE INSERTION LENGTHS/MATERIAL	403 mm / 863 mm (others on request)/ Stainless steel (SS316Ti)	
MEASURING PRINCIPLE O ₂	Zirconium oxide	
MEASURING PRINCIPLE COe	MXP (mixed potential)	
AMBIENT TEMPERATURE	Probe: - 40 °C to + 70 °C	Electronic Unit: -20 °C to + 55 °C
O ₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol.% to 0-21 Vol.% (others on request)	
COe MEASURING RANGES	0 to 5000 ppm	
IGNITION PROTECTION TYPE	II 2G Ex db IIC T3 Gb	
HOUSING	Probe: IP66	Electronic Unit: IP66

COMTEC® 6000 DustEx

COMTEC 6000 DustEx is a highly robust InSitu O₂/COe analyzer for Dust ATEX zones 21/22 for continuous measurement in potentially explosive dust atmospheres.



TECHNICAL DATA

PROCESS GAS TEMPERATURE	max. 600 °C	
PROBE INSERTION LENGTHS/MATERIAL	540 mm / 960 mm (others on request)/ Stainless steel (SS316Ti)	
MEASURING PRINCIPLE O ₂	Zirconium oxide	
MEASURING PRINCIPLE COe	MXP (mixed potential)	
AMBIENT TEMPERATURE	Probe: - 20 °C to + 70 °C	Electronic Unit: -20 °C to + 55 °C
O ₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol.% to 0-21 Vol.% (others on request)	
COe MEASURING RANGES	0 to 5000 ppm	
IGNITION PROTECTION TYPE	II 2D Ex tb IIIC T133°C/141°C Db	
HOUSING	Probe: IP66	Electronic Unit: IP66

SILOTEC[®]

CO_e / O₂ ANALYZER

SILOTEC 8000 is a permanent safety monitoring analyzer for CO_e and O₂ in silos with potentially explosive contents (Zone 20 designation), such as coal or biomass silos.

- The O₂ measurement continuously monitors the inert state of the silo to ensure ideal and safe conditions.
- The CO_e measurement will immediately detect a smoldering fire, and subsequently, an inertization of the silo can be triggered.

The SILOTEC 8000 unit is installed on the roof of the silo and provides a representative measurement of the complete silo atmosphere. The controller is located at ground level for easy access.

The SILOTEC 8000 system is self-monitoring and will automatically carry out a filter purge should the gas flow to the sensors be restricted.

SILOTEC[®] 8000

Fast, reliable and safe monitoring for ATEX Zone 20 in silos and other potentially explosive dust atmospheres.



TECHNICAL DATA

PROBE INSERTION LENGTHS/MATERIAL	500 mm insertion length in ATEX zone 20 silo/ Stainless steel (SS316T1)	
MEASURING PRINCIPLE O₂	Zirconium oxide	
MEASURING PRINCIPLE CO_e	MXP (mixed potential)	
AMBIENT TEMPERATURE	Probe: -20 °C to + 55 °C	Electronic Unit: -20 °C to +55 °C
O₂ MEASURING RANGES	2 ranges, freely configurable from 0-2 Vol.% to 0-25 Vol.% (others on request)	
CO_e MEASURING RANGES	0 to 5000 ppm	
HOUSING	Probe: IP66	Electronic Unit: IP66

CEMTEC®

HOT/WET PROBE ANALYZER SYSTEM

The patented **CEMTEC** probe system was developed by ENOTEC to enable the permanent O₂ and CO monitoring of kiln flue gases in cement plants and continuously supplies dust-free flue gas to the downstream analyzers.

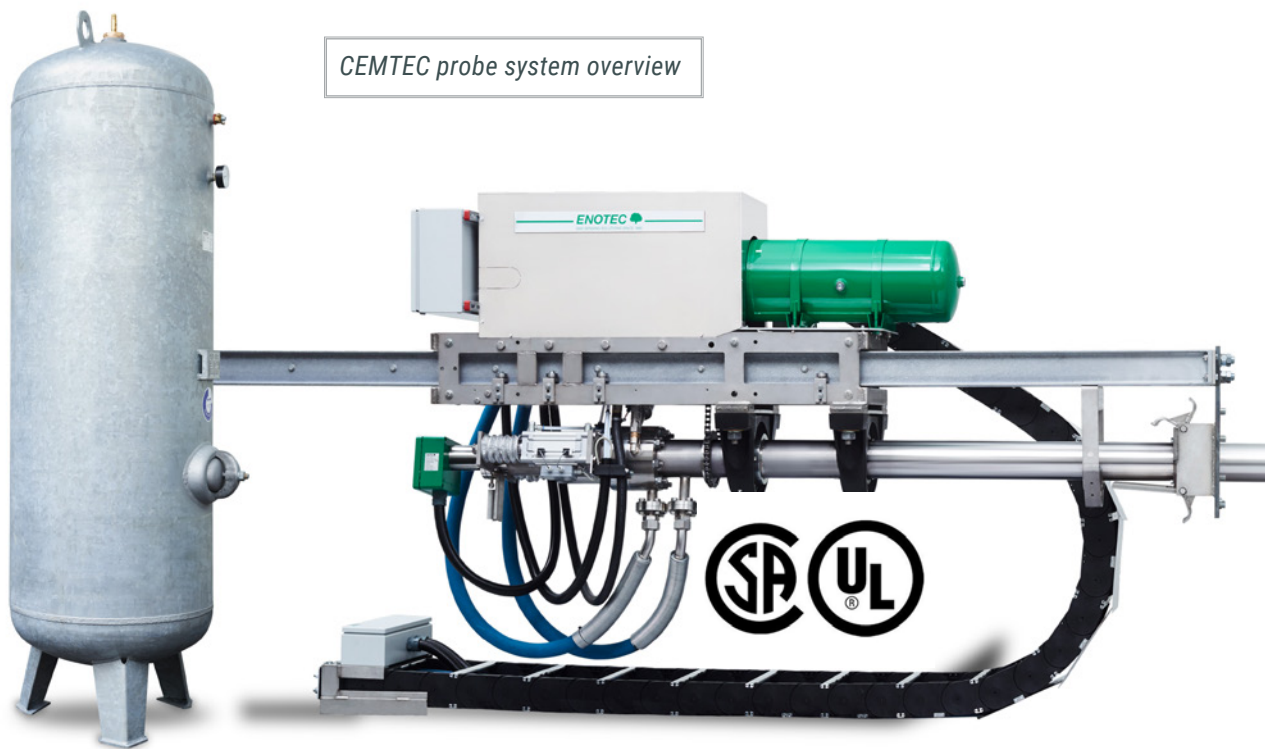
Subsequently, by optimizing the air to fuel ratio, the kiln burner efficiency can be significantly increased.

Operating the process at optimal and consistent parameters enables an increased clinker output with uniform quality.

Continuous control of the burner settings reduces harmful emissions such as NO_x and CO.

As worldwide emission regulations for cement plants become significantly more stringent year by year, the monitoring of the combustion is inevitable.

Additionally, the increased use of RDF (refuse-derived fuel) necessitates permanent combustion control due to fluctuating calorific values and changing ingredients in the fuel.



CEMTEC probe system overview

CEMTEC[®] hot/wet

Only CEMTEC guarantees 95 % availability of kiln gas values.

CEMTEC requires only one maintenance cycle per year, due to the highly effective self-cleaning and monitoring features of this robust system.

All drives in the CEMTEC system are pneumatically operated, which is a distinct advantage compared to electrical drives.

- The **pneumatic motor** for insertion and retraction, which automatically removes the probe with a force of 2 tons.
- The **pneumatic turning actuator** with 700 Nm prevents the probe from sticking in the process and material build up on the probe.
- The **pneumatic plunger motor** regularly keeps the gas entrance free from clogging.
- A 1000 l **compressed buffer tank** is a permanent energy reserve for the probe system. Should any event potentially threaten the probe, e.g., coolant under/over-temperature, under/over-pressure or loss of power (an electrical blackout in the plant), the probe will automatically retract from the kiln.

In addition, the probe tube is purged periodically by the blaster tank, removing all residual dust from the internal large probe filter tube.



TECHNICAL DATA

PROCESS GAS TEMPERATURE	≤ 1400 °C
PROCESS DUST LOADING	up to 2000 g/m ³
INSERTION DEPTH LENGTHS	up to 4.5 m
PROBE RE-COOLING METHOD	water / water or air / water
PROBE OPERATION	100% pneumatic drives (insertion/retraction, rotation, plunger and purging)

SYSTEMS INTEGRATION

ENGINEERING AND ASSEMBLING

Gas analysis systems from ENOTEC are in operation worldwide as high-quality, complete solutions for process and CEMS measurements.

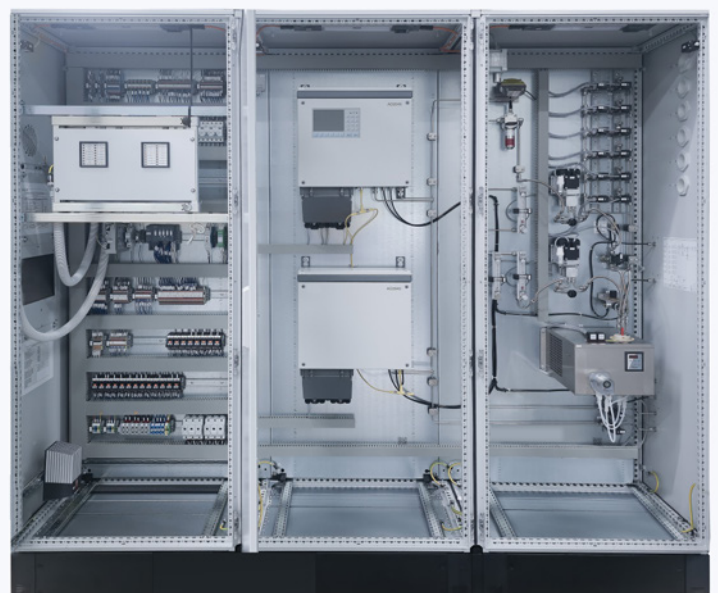
These range from complex analysis systems ensuring plant safety to official emission measurements in compliance with country-specific environmental protection regulations.

ENOTEC not only offers a one source solution including optimal planning, installation, and commissioning of complete analysis systems, but also competent consulting with a team of professional after-sales service technicians.

As an analysis systems provider, ENOTEC is not restricted to a specific brand and can therefore respond flexibly to individual customer requirements.



Assembling and testing of CEMTEC components.



Customized concepts for each application

SERVICE

COMPREHENSIVE SERVICES AND TRAINING

Besides our in-house repair service, ENOTEC's technicians are available for the after-sales service of process and CEMS analyzers worldwide.

After consultation with EPCs or customers, ENOTEC develops customized service concepts that ensure the continuous and problem-free operation of the installations.

Benefit from our experience of over 44 successful years, and let us take care of your installation, commissioning and maintenance, irrespective of whether the measuring technology on site is produced by ENOTEC or other OEM.

A comprehensive service, which always includes a regular calibration and testing of the analyzing equipment, ensures trouble-free operation for many years to come. Potential weaknesses can be identified and corrected at an early stage, irrespective of the brand.

On request, ENOTEC can also provide a complete modernization concept for an existing measurement technology to keep your facility up to date.



In-house and on-site repair services and expertise.



Repairs for ENOTEC and other OEM analyzers.

ENOTEC

Exceeding Expectations


Fast


Robust

Accurate

Durable

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MADE IN GERMANY