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ABB MEASUREMENT & ANALYTICS

# **Continuous Emission Monitoring (CEM)**

Easy. Cost-effective. Compliant.



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# ABB's gas analyzer solutions

## Experts in emission monitoring

**In selecting ABB you are choosing a partner who offers the best measurement solution for your needs, enabling maximum return on your investment. When investing in ABB's measurement products and solutions you are receiving the best technology, reliability and service in the business.**

**Contact ABB for all your measurement needs – flow, pressure, temperature, level, flatness, tension, thickness, as well as a full-line of gas and liquid analyzers and valve automation solutions. All supported by first-class service world-wide.**

**Learn more at  
[abb.com/measurement](http://abb.com/measurement)**

Global warming, acid rain, air, water and soil contamination are all environmental issues that must be managed. Governmental and environmental pressure to monitor and reduce pollutants introduced into the environment will continue to increase.

ABB's emissions monitoring solutions have helped a wide variety of industries for over 50 years. Our Continuous Emission Monitoring Systems (CEMS) are designed to help customers maximize profit while operating in a sustainable way through technology and expertise.

ABB CEM solutions provide compliance with international, national and local environmental directives for measuring and reporting.

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### Did you know?

ABB's analyzers are used in space to monitor greenhouse gas emissions from satellites.



# The right solution

## For every industry and application

—  
01 LS400 in situ  
laser analyzer

—  
02 ACF hot/wet system  
for emission and  
process monitoring

ABB is dedicated to help our customers provide cleaner and more efficient fuels, cleaner and safer drinking water, cleaner and less harmful emissions and cleaner and less costly combustion processes. As a supplier of analyzers to the space program, we are proven and trusted in the most demanding applications.

Our full-line of in-situ and extractive gas analysis modules and systems are trusted by the following industries for CEM applications:

- Power generation
- Waste incineration
- Oil and gas
- Chemicals and petrochemicals
- Pulp and paper
- Metals and minerals
- Landfills and biogas
- Marine
- Cement production

### Why are they used?

#### Compliance to environmental regulations

- Avoid regulatory penalties
- Support process control
- Optimize combustion to reduce fuel and lower emissions
- Increase plant efficiency for extended lifetime of equipment
- Decrease operating and maintenance costs of the plant
- Improve productivity

#### Safety measurement

- Filter monitoring
- Leakage monitoring
- Explosion protection

### Where are they used?

- Stack emission monitoring
- FGD (flue gas desulfurization)
- HCl scrubber control
- DeNOx (SCR and SNCR)
- Dust filter monitoring, either electrostatic precipitator
- ESP or fabric filter
- Boiler control
- Turbo generator
- Coal mill and coal bin

### Our offering

- Continuous gas analyzers and sampling handling equipment
- Pre-engineered continuous gas analyzer cabinets
- Turn-key systems tailored to your needs, including third party products
- Solutions to reduce total cost of ownership
- Upgrade packages to improve your equipments' performance during the lifecycle
- Commissioning support
- Maintenance contracts
- A worldwide and reliable partner providing comprehensive support

### Did you know?

ABB is the market leader for emission monitoring with 60,000 analyzers installed worldwide.

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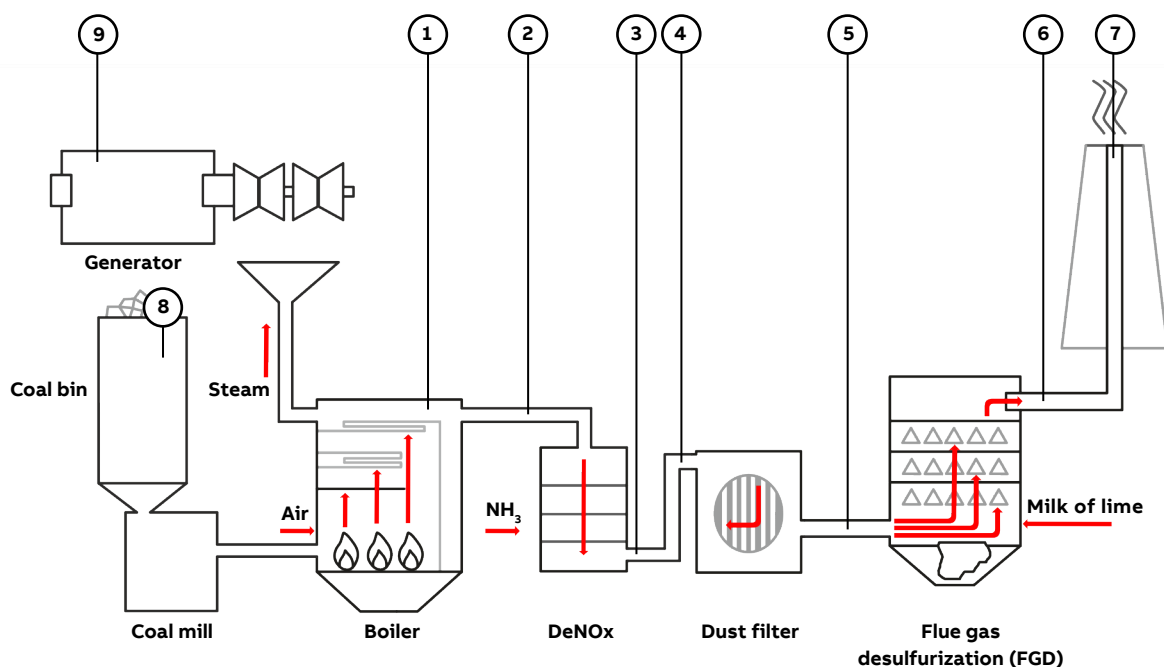
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# Example 1 – thermal power plant

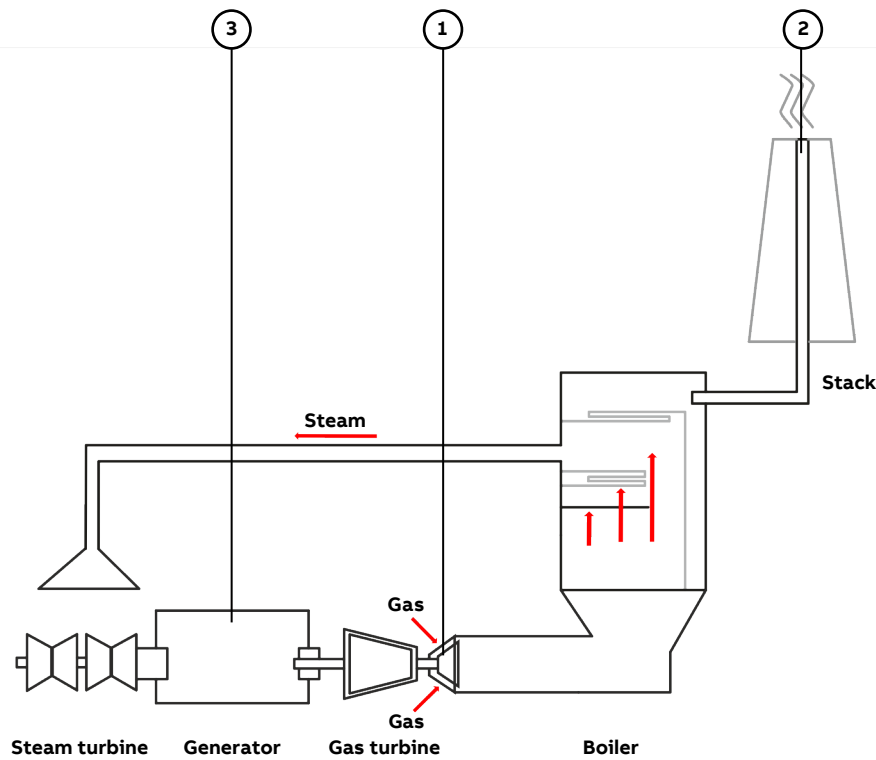
## Measuring points and solutions



Measuring point	Application	Measuring task	Measuring components	Solution	Analyzers
1	Boiler filter control	<ul style="list-style-type: none"> <li>Optimization of combustion</li> <li>Lower fuel consumption</li> </ul>	CO, O <sub>2</sub>	ACX, LS25, LS4000, AZ20	Uras, Magnos
2	DeNOx upstream	<ul style="list-style-type: none"> <li>Monitor NOx to control treatment process</li> </ul>	NO, NO <sub>2</sub> , NOx, O <sub>2</sub>	ACX	CL3020, Uras, Limas, Magnos
3	DeNOx downstream	<ul style="list-style-type: none"> <li>Effectiveness of DeNOx</li> <li>NH<sub>3</sub> slip control</li> </ul>	NO, NO <sub>2</sub> , NOx, NH <sub>3</sub> , O <sub>2</sub>	ACX, ACX + LS4000	CL3020, Limas, Uras, Magnos
4	Dust filter monitoring	<ul style="list-style-type: none"> <li>Safety measurement</li> <li>Explosion protection</li> </ul>	CO, CO <sub>2</sub> , O <sub>2</sub>	ACX, LS25	Uras, Magnos
5	FGD upstream	<ul style="list-style-type: none"> <li>Control of FGD process</li> <li>For example, milk of lime dosing</li> </ul>	SO <sub>2</sub>	ACX	Uras
6	FGD downstream	<ul style="list-style-type: none"> <li>Effectiveness of FGD</li> </ul>	SO <sub>2</sub> , O <sub>2</sub>	ACX	Uras, Limas, Magnos
7	Stack	<ul style="list-style-type: none"> <li>Emission monitoring</li> </ul>	CO, NOx, SO <sub>2</sub> , O <sub>2</sub> , HCl, NH <sub>3</sub> , HF, flow	ACX, LS25, LS4000, ACF, FPD580	CL3020, Uras, Limas, Magnos, StackFlowMaster
8	Coal bin monitoring Coal mill monitoring	<ul style="list-style-type: none"> <li>Safety measurement</li> <li>Detection of smoldering fire</li> </ul>	CO	ACX, LS25	Uras
9	Turbo generator monitoring	<ul style="list-style-type: none"> <li>Safety measurements</li> <li>Leakage monitoring</li> <li>Inertization and filling</li> </ul>	H <sub>2</sub> in air, CO <sub>2</sub> in air, H <sub>2</sub> in CO <sub>2</sub>		Caldos (Ex or GP)

# Example 2 – combined cycle gas turbine power plant

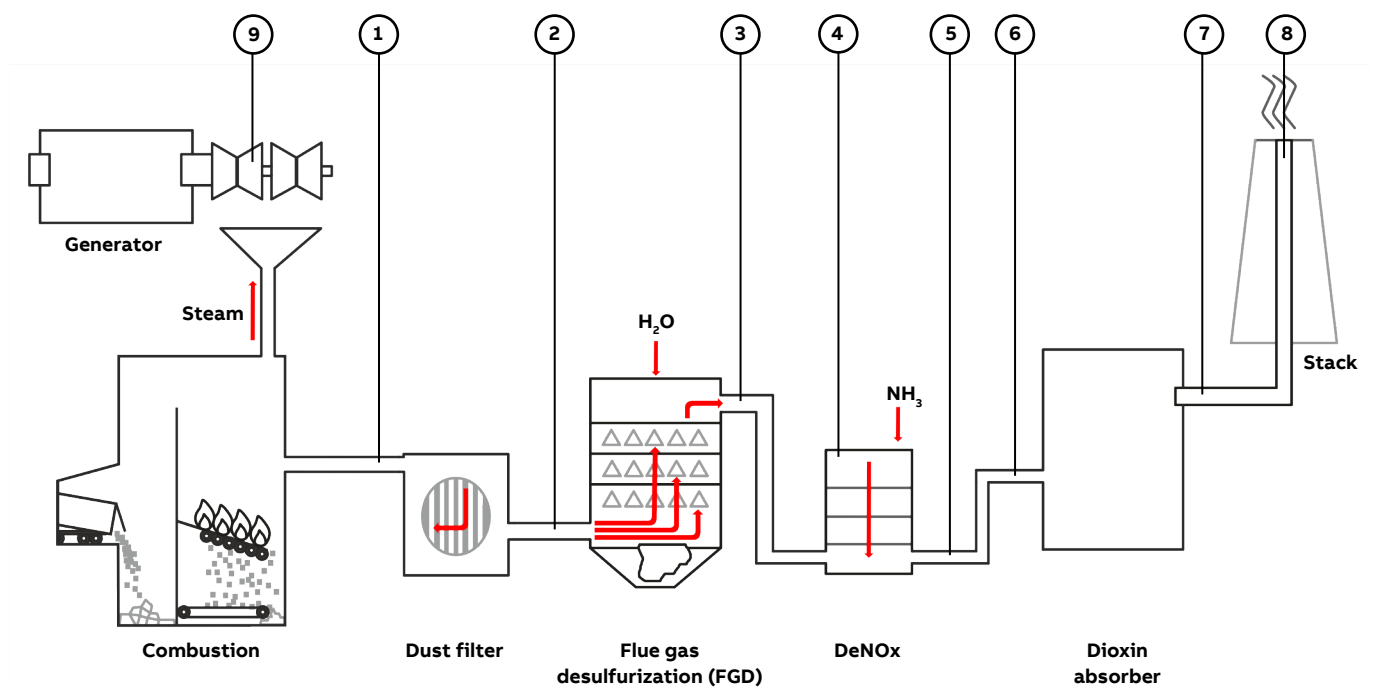
## Measuring points and solutions



Measuring point	Application	Measuring task	Measuring components	Solution	Analyzers
1	Gas Turbine	Fuel mix monitoring Process control	CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub> , CO <sub>2</sub> , H <sub>2</sub> , O <sub>2</sub>		Uras, Magnos, Caldos
	Boiler control	Optimization of combustion Lower fuel consumption	CO, O <sub>2</sub>	ACX, LS25, LS4000, AZ20	Uras, Magnos
2	Stack	Emission monitoring	NH <sub>3</sub> , NOx, SO <sub>2</sub> , O <sub>2</sub> , HF, HCl, CO, NOx,	ACF, ACX, LS25	CL3020, Uras, Limas, Magnos
3	Turbo generator monitoring	Safety measurements Leakage monitoring Inertization and filling	H <sub>2</sub> in air, CO <sub>2</sub> in air, H <sub>2</sub> in CO <sub>2</sub>		Caldos (Ex or GP)

## Example 3 – incinerator

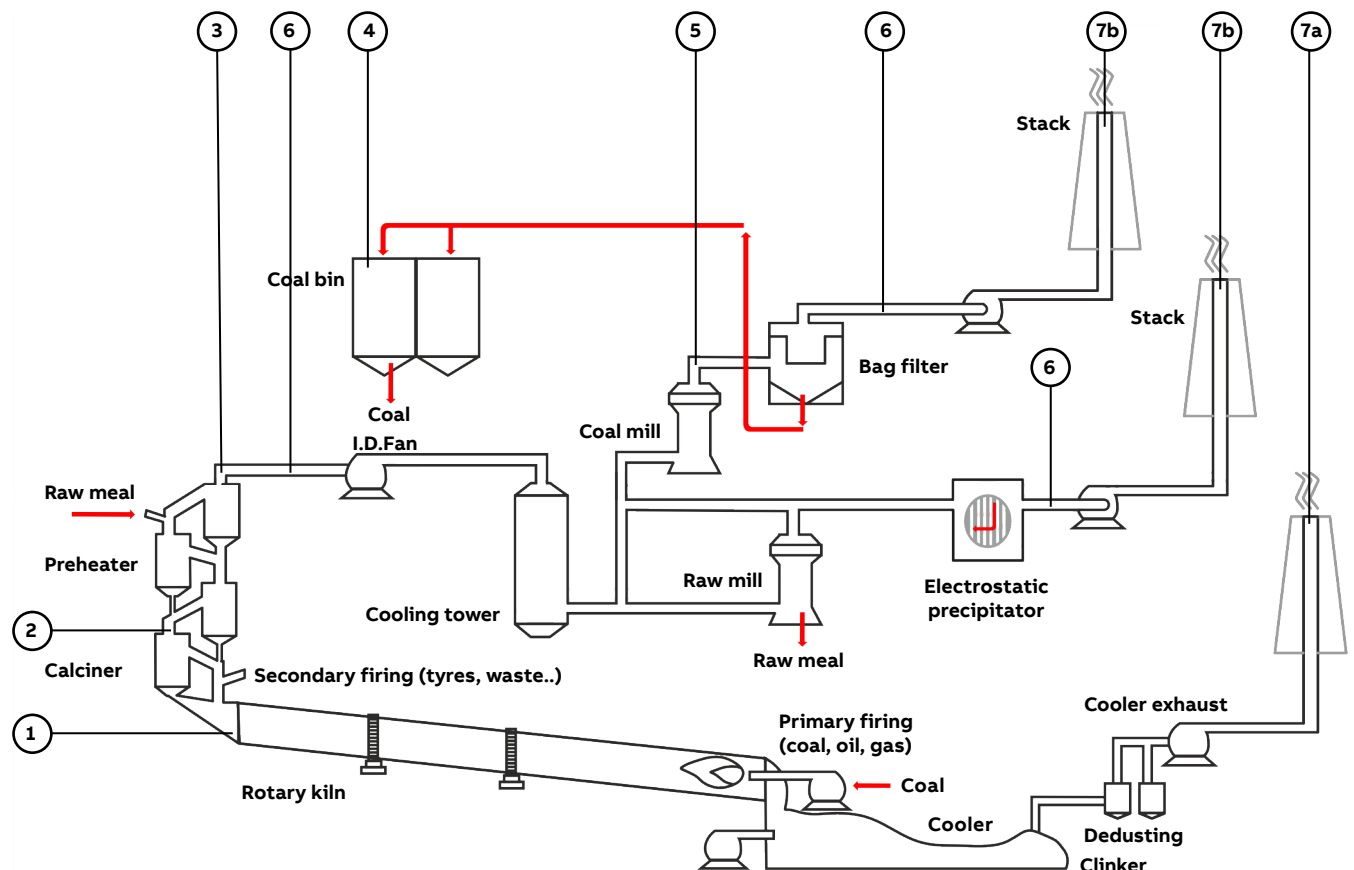
### Measuring points and solutions



Measuring point	Application	Measuring task	Measuring components	Solution	Analyzers
1	Boiler and dust filter control	<ul style="list-style-type: none"> <li>Optimization of combustion</li> <li>Dust filter explosion protection</li> <li>Catalyzer protection</li> </ul>	CO, O <sub>2</sub>	ACX, LS25, LS4000, AZ20	Uras, Magnos
2	Flue gas scrubber upstream	<ul style="list-style-type: none"> <li>Process control</li> <li>For example, milk of lime dosing</li> </ul>	SO <sub>2</sub> , HCl, H <sub>2</sub> O	ACX + LS25	Limas
3	Flue gas scrubber downstream	<ul style="list-style-type: none"> <li>Efficiency of flue gas scrubber</li> </ul>	SO <sub>2</sub> , HCl, H <sub>2</sub> O	ACX + LS25	Uras, Limas
4	DeNOx upstream	<ul style="list-style-type: none"> <li>Monitor NOx to control treatment process</li> </ul>	NO, NO <sub>2</sub> , NOx, O <sub>2</sub>	ACX	CL3020, Uras, Magnos
5	DeNOx downstream	<ul style="list-style-type: none"> <li>Efficiency of SCR/SNCR</li> </ul>	NO, NO <sub>2</sub> , NH <sub>3</sub> , O <sub>2</sub>	ACX + LS4000	CL3020, Uras, Magnos
6	Dioxin absorber upstream	<ul style="list-style-type: none"> <li>CO for absorber efficiency</li> </ul>	CO	ACX	Uras
7	Dioxin absorber downstream	<ul style="list-style-type: none"> <li>Delta CO for absorber efficiency</li> </ul>	CO	ACX	Uras
8	Stack	<ul style="list-style-type: none"> <li>Emission monitoring</li> </ul>	CO, NOx, N <sub>2</sub> O, SO <sub>2</sub> , O <sub>2</sub> , NH <sub>3</sub> , HCl, HF, VOC	ACF	CL3020, Uras, Magnos, Fidas
9	Turbo generator monitoring	<ul style="list-style-type: none"> <li>Safety measurements</li> <li>Leakage monitoring</li> <li>Inertization and filling</li> </ul>	H <sub>2</sub> in air, CO <sub>2</sub> in air, H <sub>2</sub> in CO <sub>2</sub>		Caldos (Ex or GP)

## Example 4 – cement production

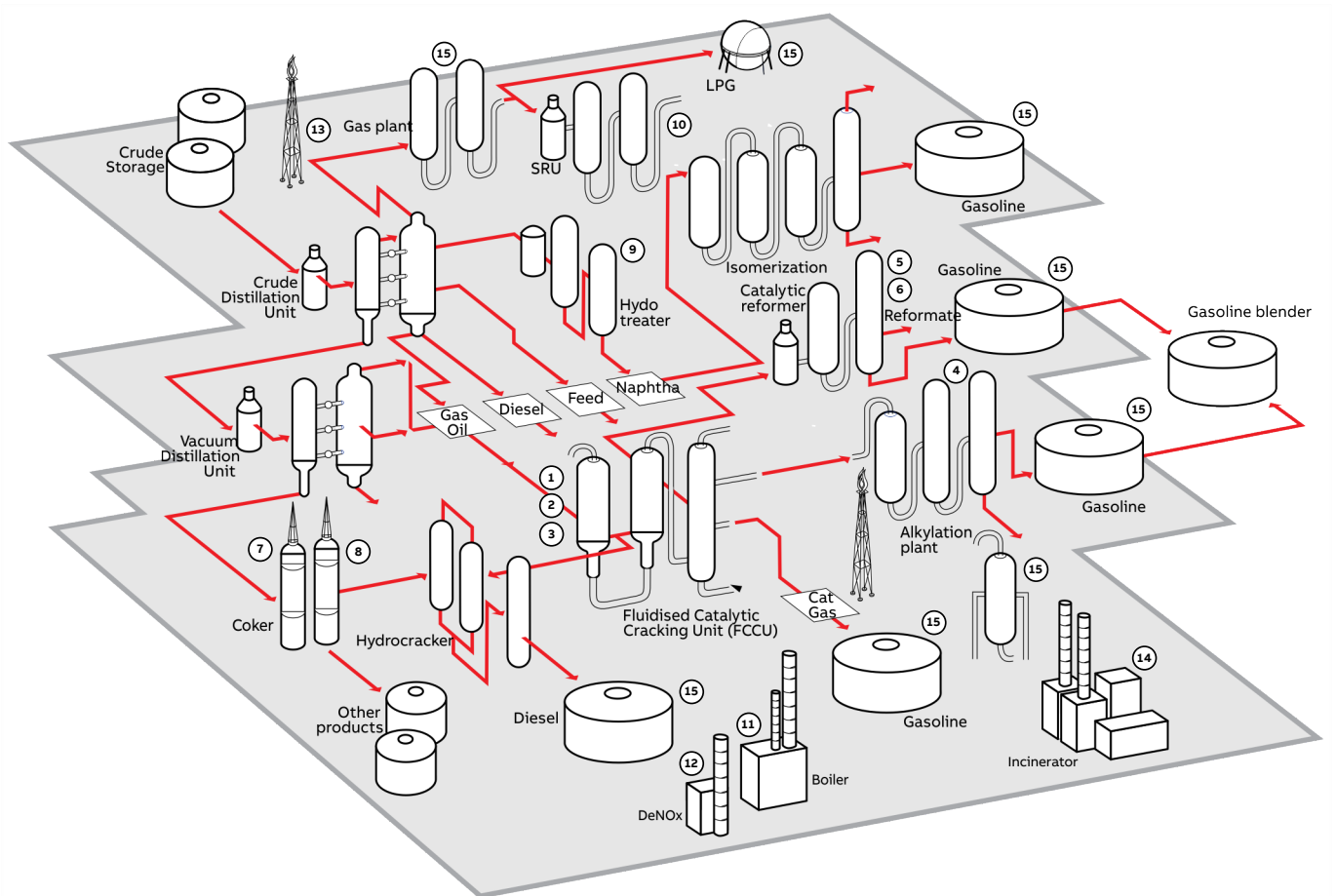
### Measuring points and solutions



Measuring point	Application	Measuring task	Measuring components	Solution	Analyzers
1	Kiln gas outlet	<ul style="list-style-type: none"> <li>Optimization of primary firing</li> <li>Lower fuel consumption</li> <li>Maintain clinker quality</li> </ul>	CO, O <sub>2</sub> , NO, CO <sub>2</sub> , CH <sub>4</sub> , SO <sub>2</sub>	ACX + SCK	Uras, Limas, Magnos
2	Calcliner	<ul style="list-style-type: none"> <li>Optimization of secondary firing</li> <li>Lower fuel consumption</li> </ul>	CO, O <sub>2</sub>	ACX ACX + SCK	Uras, Magnos
3	Preheater	<ul style="list-style-type: none"> <li>Safety measurement</li> <li>Prevention of explosion in ESP</li> <li>Control of false air in preheater</li> </ul>	CO, O <sub>2</sub>	ACX, LS25	Uras, Magnos
4	Coal bin	<ul style="list-style-type: none"> <li>Safety measurement</li> <li>Prevention of smoldering (monitor of air entrance)</li> </ul>	CO, (O <sub>2</sub> )	ACX, LS25	Uras, (Magnos)
5	Coal mill	<ul style="list-style-type: none"> <li>Safety measurement</li> <li>Prevention of smoldering</li> <li>Monitor of air entrance</li> </ul>	CO, O <sub>2</sub>	ACX	Uras, Magnos
6	DeNOx	<ul style="list-style-type: none"> <li>NH<sub>3</sub> measurement</li> </ul>	NH <sub>3</sub>	LS4000	
7a	Stack	<ul style="list-style-type: none"> <li>Emission monitoring</li> </ul>	CO, O <sub>2</sub>	ACX	Uras, Magnos
7b	Stack	<ul style="list-style-type: none"> <li>Emission monitoring</li> </ul>	CO, NOx, SO <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> , HCl, VOC, HF	ACF ACX + LS25	CL3020, Uras, Limas, Magnos

## Example 5 – refinery

### Measuring points



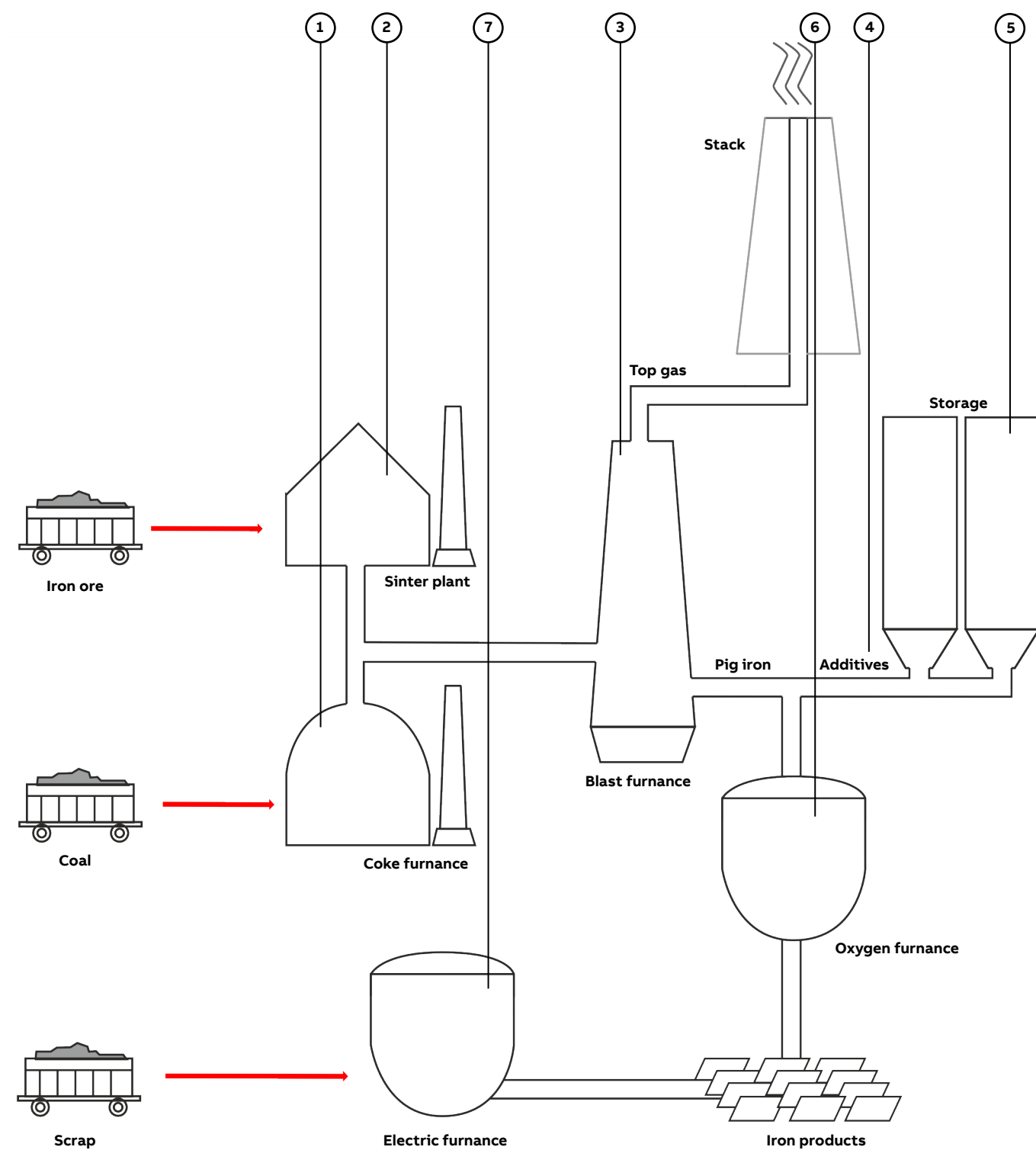


# Measuring points and solutions

Measuring point	Unit – application	Measuring task	Measuring components	Solution	Analyzers
1	<b>Catalytic cracker</b> • Gas abatement after regenerator	• Emission monitoring • Flue gas effectiveness	NO, NO <sub>2</sub> , SO <sub>2</sub> , CO, CO <sub>2</sub>	ACX	CL3020, Uras
2	<b>Catalytic cracker</b> • Regenerator flue gas	• Combustion optimization	CO, CO <sub>2</sub>	ACX	Uras
3	<b>Catalytic cracker</b> • Off-gas	• Catalyst efficiency to minimize waste and improve fuels yield	CO, CO <sub>2</sub> , O <sub>2</sub>	ACX	Uras, Magnos
4	<b>Alkylation unit</b> • Stack	• Emission monitoring	NO, NO <sub>2</sub> , SO <sub>2</sub> , CO, CO <sub>2</sub> , HF	ACF ACX + LS25	CL3020, Uras, Limas
5	<b>Catalytic reformer</b> • Wet scrubber	• Scrubber effectiveness	CO <sub>2</sub>	ACX	Uras
6	<b>Catalytic reformer</b> • Furnace	• Combustion optimization	CO <sub>2</sub> , O <sub>2</sub>	ACX, LS25 LS4000	Uras, Magnos
7	<b>Coking unit</b> • Coke calciner	• Green coke calcinations	NO, NO <sub>2</sub> , N <sub>2</sub> O, SO <sub>2</sub> , CO	ACX	CL3020, Uras, Limas
8	<b>Coking unit</b> • Flue gas coker	• Combustion optimization	CO, O <sub>2</sub>	ACX, LS25 LS4000	Uras, Limas, Magnos
9	<b>Hydrotreater</b> • Flue gas	• Combustion optimization	CO, O <sub>2</sub>	ACX, LS25 LS4000	Uras, Magnos
10	<b>Sulfur recovery unit</b> • Stack	• Emission monitoring	SO <sub>2</sub> , O <sub>2</sub>	ACX	Limas, Magnos
11	<b>Boilers</b> Process furnaces Gas turbines	• Combustion optimization	NO, NO <sub>2</sub> , SO <sub>2</sub> , CO, CO <sub>2</sub>	ACX	CL3020, Uras, Limas
12	<b>DeNOx</b> with SCR/SNCR	• Optimize denitrification	NO, NO <sub>2</sub> , NH <sub>3</sub> , N <sub>2</sub> O	ACX + LS4000	CL3020, Limas, Uras
13	<b>Flares</b>	• Safety monitoring	O <sub>2</sub>	LS4000	
14	<b>Incinerators</b>	• Emission monitoring	NO, NO <sub>2</sub> , SO <sub>2</sub> , CO, CO <sub>2</sub> , N <sub>2</sub> O	ACX	CL3020, Uras, Limas
15	Gas separators Storage facilities Oil/water separators Fugitive emissions points Vents	• Safety • Explosions prevention	O <sub>2</sub> , VOCs	ACX	Magnos, Fidas

## Example 6 – iron and steel

### Measuring points



# Measuring points and solutions

Measuring point	Unit – application	Measuring task	Measuring components	Solution	Analyzers
1	Coke furnace	Process optimization	CO, CO <sub>2</sub> , O <sub>2</sub>	ACX	Uras, Magnos
		Safety monitoring	O <sub>2</sub>	LS4000	
2	Sinter plant	Kiln optimization	CO, CO <sub>2</sub> , O <sub>2</sub>	LS25, LS4000	Uras, Magnos
		Oxygen leakage	O <sub>2</sub>	LS25, LS4000	
3	Blast furnace	Transverse probe (above burden/under burden) blast furnace optimization	CO, CO <sub>2</sub> , H <sub>2</sub> , (O <sub>2</sub> )		Uras, Caldos, (Magnos)
		Riser tube measurement Oven symmetry	CO, CO <sub>2</sub> , H <sub>2</sub>		Uras, Caldos
		Top gas measurement • Gas very dirty	CO, CO <sub>2</sub> , H <sub>2</sub>		Uras, Caldos
		Top gas measurement • Gas semi clean	CO, CO <sub>2</sub> , H <sub>2</sub> , H <sub>2</sub> O	LS25	Uras, Caldos
		Cowper waste gas Burner optimization	CO, O <sub>2</sub>	LS4000, LS25	Uras, Magnos
		Cold blast • Process optimization	O <sub>2</sub>	LS4000	
4	Additives	AOD converter off-gas Process control	CO		Uras
5	Storage Hot Metal Desulphurization (HMDS)	Calcium carbide silo • Safety monitoring	C <sub>2</sub> H <sub>2</sub> , O <sub>2</sub>		Uras, Magnos
		Magnesium silo • Safety monitoring	O <sub>2</sub>		Magnos
6	(Basic) oxygen furnace	Converter off-gas Process control & safety monitoring	CO, CO <sub>2</sub> , H <sub>2</sub> , O <sub>2</sub>		Uras, Caldos, Magnos
		Process control & safety monitoring > T <sub>90</sub> , lower temperature	CO, CO <sub>2</sub> , H <sub>2</sub> , O <sub>2</sub>		Uras, Caldos, Magnos
		ESP <sup>1</sup> , flare or consumer – safety monitoring	CO, O <sub>2</sub>	ACX fast, LS25, LS4000	Uras, Magnos
		Leakage detection	H <sub>2</sub> O	LS25	
7	Electric (arc) furnace	EAF off-gas monitoring Process & safety monitoring	CO, CO <sub>2</sub> , O <sub>2</sub>	LS4000, LS25	Uras, Magnos
Others 1-7	Stack/off-gas	Emission monitoring	CO, NOx, SO <sub>2</sub> , O <sub>2</sub> , NH <sub>3</sub> , HF, HCl	ACF, ACX LS25, LS4000	CL3020, Uras, Magnos
	Hot strip mill – slab reheating Steel rolling – pickling line	Monitoring	SO <sub>2</sub> , NOx, O <sub>2</sub> , NH <sub>3</sub> HCl	ACF, ACX LS25, LS4000	CL3020, Uras, Magnos

<sup>1</sup> Electrostatic precipitator

# ACX cold/dry extractive system

## Reliable. Flexible. Profitable.

—  
01 ACX cold/dry system  
for emissions and  
process monitoring

ACX is a pre-engineered system solution for continuous gas analysis, including everything from probe, sample lines and sample conditioning to reliable and certified analyzers of the Advance Optima series.

The system can be operated from a keypad and display in the front door without opening the shelter. The system is available with various options to be tailored to your measuring tasks; it is especially designed for easy service and maintenance.

ACX is suitable for non water-soluble components – typically NO, NO<sub>2</sub>, NOX, CO, CO<sub>2</sub>, SO<sub>2</sub>, CH<sub>4</sub>, O<sub>2</sub>, VOC.



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### ACX offers

- Certified analyzers with proven measuring technology: infrared/UV photometer, paramagnetic oxygen analyzer, electrochemical oxygen sensor, FID analyzer
- Up to six measuring components, in up to four analyzers with corresponding sample conditioning
- Convenient and easy external operation
- Communication interfaces: Modbus, Profibus or Ethernet to connect to a PC or process control system
- Integrated self-monitoring functions and easy remote service & maintenance
- Free licensed Analyze IT Explorer software for asset management and worldwide access for remote maintenance via Ethernet

### ACX benefits

#### Reliable

- Compliant according European, US and international standards
- Wide range of proven analyzers combined with worldwide support for engineering and certified service

#### Flexible

- Wide range of options to serve all relevant gas analysis applications
- Available in sheet steel or glass fiber cabinet, or mounting plate with separate control
- Easy integration in customer network through a broad variety of interfaces

#### Profitable

- Saving time and money with automatic calibration through built-in calibration cell without gas bottles
- Cost reduction for routine maintenance through self-diagnostic and remote control

### Did you know?

The ACX system can also integrate other suppliers signals for example, dust, P, T, V and mercury to transmit to DCS or DAHS

# ACF hot/wet extractive system

## The new benchmark in FTIR based CEMS

—  
02 ACF hot/wet system  
for emission and  
process monitoring

ACF is a fully certified analyzer system to accurately monitor the composition of exhaust gases.

- A completely pre-engineered CEM system for easy operation
- With lowest maintenance interval in the market
- Worldwide certified support

### ACF offers

- Measurement of 15 gas components
- Hot/wet extractive measurement
- Powerful FTIR technology
- Proven FID and ZrO<sub>2</sub> sensors to measure the unburned hydrocarbons and the oxygen content
- Completely pre-engineered system with a compact and modular design
- Communication, control and maintenance via fieldbus and Ethernet/TCP or modem
- Technical drawings available on the day of quoting

### International certifications

- TÜV certification according to the German and European requirements, EU Directives 2010/75/EN and EN 14181
- MCERTS certified in Great Britain
- Compliant to US and Canadian EPA requirements

—  
ACF is suitable for all components, including water soluble – typically NO, NO<sub>2</sub>, N<sub>2</sub>O, NH<sub>3</sub>, SO<sub>2</sub>, HCl, CO, CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>O, HF, O<sub>2</sub>, VOC.

### ACF benefits

#### Reliable

- More than 25 years experience with FTIR spectrometers in gas analysis and more than 1600 installations worldwide
- Fully compliant to European and international legislations
- Worldwide support through certified service engineers

#### Flexible

- Ready for operation – only electrical power supply and instrument air are needed
- Easy adding of further measuring components – no additional hardware
- Extra gas port to connect other analyzers – no need for a separate probe

#### Profitable

- Saving time and money with automatic validation through built-in validation cell without test gas
- Best maintenance interval in the market
- Maintenance-free sample transportation through aspirator pump
- Cost reduction for routine maintenance through remote control and diagnosis





# AO2000 and EL3000 series

## Proven and reliable continuous gas analyzers

— 01 Advance Optima series modular continuous gas analyzer

— 02 EasyLine series gas analyzers

The modular gas analyzers AO2000 combine advanced technologies with more than 75 years of experience in process and environmental gas analysis. They are the innovative solution for the demands of today and the challenges of tomorrow. The AO2000 series can be used in almost every form of production and has proven itself in the toughest processing environments.

### AO2000 key features

- Multi-analyzer systems with up to four fully combinable analyzer modules like Uras (NDIR), Limas (NDUV), Magnos (O<sub>2</sub>), Caldos (TCD) and Fidas (FID)
- Up to six measuring components
- Validation / calibration with proven calibration cells without test gas to save money for maintenance
- Full compliance with international environmental directives
- In-built PLC functionality with Function Block programming
- Analog I/O, digital I/O
- Unlimited communication over Ethernet or Modbus or PROFIBUS
- Free PC HMI simulation running over Ethernet
- Analyze IT Explorer: comprehensive asset management software
- Ex versions available



— 01

EL3000 is both a powerful and affordable series of instruments for the monitoring of gas concentrations in numerous applications. EL3000 is based on the proven and reliable analyzer technology of ABB for extractive continuous gas analysis.

### EL3000 key features

- Uras (NDIR), Limas (NDUV), Magnos (O<sub>2</sub>), Caldos (TCD) and Fidas (FID)
- Combine two analyzers in one enclosure for an excellent price-performance ratio
- Up to five measuring components in one unit
- Calibration with proven calibration cells without test gas to save money for maintenance
- Full compliance with international environmental directives
- Analog outputs, digital I/O, Modbus, PROFIBUS
- Ex versions available
- Asian languages available



— 02

# CL3020 CLD NOx analyzer

## Solid. Simple. Superior.

03 CL3020 CLD  
NOx analyzer

ABB's CL3020 CLD NOx analyzer utilizes next generation solid-state detection technology to measure low and ultra-low NOx in combustion applications.

### Solid.

#### Optimized for low ppm NOx

- Designed around EPA Method 7E and PS-2
- Third generation solid-state detector
- Removes unnecessary complexity
- Optional zirconia oxygen sensor
- Precise, stable and reliable performance

### Simple.

#### Clean and user-friendly inside and out

- Compact and tightly integrated NOx cell
- Combined NO<sub>2</sub> -> NO converter and ozone scrubber
- Single board approach reduces spare parts
- Minimal internal piping, wiring and fittings
- Intuitive touch-screen user interface
- Carefully designed for care-free maintenance

### Superior.

#### Peace of mind, money in your pocket

- Less parts that can go wrong
- Longer lifetime critical components
- Optionally mount two detectors inside one housing
- Most cost effective solution for DeNOx control
- Efficient solution lowers cost of ownership

#### Continuous NO/NO<sub>2</sub> speciation

It is often important to quantify both NO and NO<sub>2</sub> concentrations simultaneously. The sample may be split into two prior to the NOx analyzer with one stream routed directly to the first NOx detector and the other passing through the NO<sub>2</sub>-to-NO converter to the second NOx detector. This eliminates complex valve switching and provides real simultaneous continuous NO and NO<sub>2</sub> measurement.

#### Differential NH<sub>3</sub> slip measurement

The sample may also be split into two streams at the probe and a heated catalyst mounted at one of the outlets to convert NH<sub>3</sub> to NO. In this case the sample line includes an additional tube for transporting the NH<sub>3</sub> converted sample. Both streams are then simultaneously measured by two independent NOx detectors within the same analyzer enclosure.

### Did you know?

The CLD NOx analyzer CL3020 supplements ABB's extensive CEMS offering, including the EL3000 and AO2000 series and market leading NDIR, NDUV, paramagnetic O<sub>2</sub> and FID sensors installed more than 60,000 times worldwide.



# LS25, LS4000 tunable diode laser analyzers

## Highest precision for harshest conditions



—  
01 LS4000 in situ  
laser analyzer

Solution suitable for measurement directly in the process. Typically  $O_2$ ,  $NH_3$  ( $+H_2O$ ),  $HCl$  ( $+H_2O$ ),  $H_2O$  or  $CO$ ,  $CO_2$

LS25 and LS4000 are in-situ cross-duct analyzers for measuring gas component concentrations. Both apply the highly selective, optical measuring principle of tunable diode laser (TDL) absorption spectroscopy.

For measurement purposes a single absorption line is selected from the gas to be measured in the near infrared spectral range, at which no cross-sensitivity from other gases occurs. The absorption line is scanned and the receiver located opposite detects the absorption caused by the sample gas and calculates the gas concentration from this. The transmission rate is displayed as a signal for predictive maintenance.

### LS25

As an integrated part of the Advance Optima series the LS25 can be combined with further analyzer modules and completely operated remotely in Ethernet networks. The LS25 holds ATEX and CSA certificates for hazardous locations as well as European emission certificates for  $NH_3$  and  $H_2O$  according to EN14181/EN15267.

### LS4000

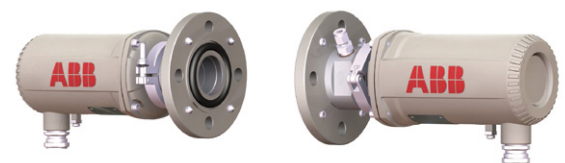
The LS4000 is a stand-alone system and is approved for use in hazardous areas according to international standards. The device consists of a transmitter unit with a laser light source and a receiver unit with a photodetector. The two units are mounted opposite each other on the process pipe or stack and are connected by a junction box.

### Typical applications

- Process control and safety monitoring
- Combustion control
- Control of flue gas abatement equipment for example, ammonia slip measurements
- Emission monitoring

### Typical industries served

- Chemical and petrochemical industry
- Power industry
- Iron and steel industry





# AZ series zirconia oxygen analyzers

## Optimizing combustion efficiency



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02 AZ20 combustion  
gas oxygen analyzer

Efficient combustion of a fuel in any industrial process is essential in cutting operating costs while reducing pollution to enable compliance with environmental legislation.

### **The challenge of finding the right air/fuel mix**

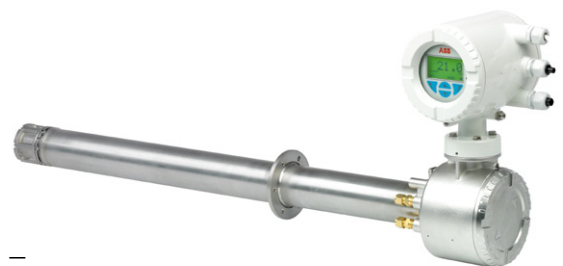
The ratio of air to fuel is a critical factor in efficient combustion. Where there is just sufficient oxygen to ensure complete combustion, this ratio is known as the stoichiometric mixture, and lambda equals one. This is a theoretical value which cannot normally be achieved in industrial combustion processes. Values for lambda of around 1.1 and above are more usual.

Controlling the air supplied to the combustion process is a fine balancing act. Insufficient air will mean incomplete combustion of fuel, resulting in fouling of heat transfer surfaces and emissions of soot, smoke and carbon monoxide. If air levels are too high, heat efficiency is reduced as the extra air carries more heat away in the flue gas, reducing overall boiler efficiency.

### **The solution is to measure your flue gas oxygen**

The level of oxygen present in the combustion waste gas is a key indicator of the amount of excess air supplied to the process. Oxygen measurement is therefore critical when optimizing combustion control for maximum efficiency.

ABB offers a range of combustion gas analyzers to accurately measure the oxygen concentration in a wide range of combustion processes. The analyzers can be used in conjunction with ABB's Sensyflow thermal mass flowmeters to regulate the amount of air supplied to the burner.



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# FPD580 StackFlowMaster

## CEM solution for emissions flow monitoring



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01 FPD580  
StackFlowMaster

StackFlowMaster is an ideal complement to CEM packages, meeting regulatory requirements and offering a total CEM solution from ABB.

### **The challenge of quantifying the pollutants emitted**

The release of stack emissions in many parts of the world is subject to legislation on the metering of the concentration and quantity of pollutants discharged to the environment. The legislation covers the performance standards that analyzer and flow monitoring systems must meet and specifies the testing and approval regimes required to ensure these standards are met, both at the time of purchase/installation and also during the operating life.

The flow metering gas can be complicated by the presence of one or more of the following factors that will affect the choice of meter technology that can be used, its materials of construction and method of installation:

- High temperatures
- Large diameter stacks
- Significant particulate loading

### **The solution is a robust flow metering system**

StackFlowMaster is an averaging pitot tube flowmeter which incorporates a multivariable transmitter for compensated gas flows. Available with flanged or threaded stack connections, StackFlowMaster measures the flow in stacks both small and large, with alternative materials available for high temperatures. An end-supported design and/or a probe with a greater diameter is available for large diameter stacks.

A choice of materials is available to handle both the corrosive properties of the gas and its temperature. Where particulates in the gas could cause blockages, an optional automatic air purging system is available. To simplifying compliance with legislative requirements for meter verification, an automatic zero and span calibration facility is available, enabling verification to be carried out without the need for either external test equipment or partial dismantling of the meter.





# The added value

## What you can expect from a market leader

As one of the world's leading suppliers of analyzer technology, we offer our customers additional benefits and services other manufacturers can not provide. With the added values ABB Analytical helps to improve performance and reliability at work.

### **Best choice of analyzers tailored to your needs**

We offer the broadest selection of measuring principles under one roof. All types of analyzers share a common operation to reduce the need for training and spare parts.

### **Certified sales and service partners wherever you are**

Our "Manufacturer Certified Service" program involves more than 300 service specialists with many years of experience and comprehensive know-how working for our clients on-site worldwide. Our engineers are your professional partners dedicated to finding the best solutions for your measuring tasks. They regularly undergo manufacturer training and certification.

### **Long-term security in your investment**

Our comprehensive and transparent life cycle plan for each of our products covers the service of spare parts and service support for their entire lifetime. Our products are extendable with upgrade programs keeping them technologically up-to-date at all times.

### **Most powerful software solutions**

Full remote control and maintenance access to the system inside a protected network and quality monitoring (QAL3) are available for ABB analyzers. Integrated controllers with PLC functionality provide monitoring while controlling the measurement from sample taking right up to analysis.

### **Unique time and cost saving calibration concepts**

ABB has 30 years of unrivalled experience in producing gas-filled calibration cells, allowing internal calibration without test gas cylinders for photometers. Single-point calibration with ambient air as the standard gas is also possible.

### **Unrivalled options for connectivity**

ABB gas analyzers and systems excel in Ethernet networkabilities and Modbus or PROFIBUS interfaces. This enables the analyzer data to be easily read, archived and visualized on a PC, PLC or process control system.

### **Assured quality through independent certification**

ABB provides all major international certificates for CEMS, hazardous area installations, metrological approvals, electrical safety and quality and environmental management.



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