ABB MEASUREMENT & ANALYTICS

Advance Optima

Modular continuous gas analyzers

Advance Optima
Innovative modular analyzer technology

01 Advance Opima series gas analyzers

Advance Optima gas analyzers combine advanced technologies with more than 75 years of experience in processing and environmental analysis.
They are the innovative solution for the demands of today and the challenges of tomorrow.
Being tailored to satisfy the requirements of various industries, the Advance Optima series can be used in almost every form of production and has proven itself in the toughest processing environments – worldwide.

Typical applications
- Refineries, petrochemicals and chemical plants
- Air separators and pure gas production
- Pharmaceuticals, food and beverages
- Metals, minerals, pulp and paper
- Power generation
- Environmental technology
- Waste incinerators
- Ambient air monitoring
- Silo monitoring
- O_2 trace and purity measurement
- Emission monitoring according international directives (approved according to EN 15267 and EN 14181, fully compliant to US EPA)

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The advantages to you – Advance Optima offers advanced and reliable technology

- Unrivalled economy
- Integrated system solutions – for added flexibilty
- Multi-analyzer systems – up to four analyzer modules
- Integrated control and monitoring
- Simple, user-friendly operation
- ‘Packaging’ that fits right in
- Reliable and powerful
- Always the right analyzer for the job. Whatever the measuring task!
- Unlimited access to analytical data

Unrivalled economy
- Cost-effective operation, service and maintenance over the entire life cycle
- High quality design with a long lifetime
- Lower training and documentation expenses

Integrated system solutions – for added flexibility
In its basic version Advance Optima consists of a central processing unit and one analyzer module. Standardized modules can be adapted to your measuring tasks and combined to systems tailored to your individual requirements. And all of these assemblies are designed to integrate flexibly with each other – from analyzer modules to housings, from displays to control units and from power supplies to sample conditioning.

Multi-analyzer systems
In its most extensive version, an Advance Optima multi-analyzer system consists of four analyzer modules and it can measure six different components. Other locally installed system components for the conditioning of sample gas, such as sample gas feeding units and coolers, can also be integrated. All the modules are operated by the central processing unit – and the analyzer module can even be installed up to 350 m away.

Multi component analyzer
Tailored to your needs

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02 Advance Opima series gas analyzers rack mounted version
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03 Installation in analyzer room

Integrated control and monitoring
High performance processor technology for rapid signal processing is used for sophisticated calculations, such as cross-sensitivity corrections and auto-calibration. Internal PLC functions with programmable function blocks eliminate the need for additional external logic controllers.

Simple, user-friendly operation
- Simultaneous display of up to six sample components
- Clear status and maintenance messages
- Operation menus with online help
- 10 menu languages are available
- Operator controls can be customized

'Packaging' that fits right in
Two system housings are available: a 19" slide-in version for cabinet installation and a wall mounted housing. All these housings can be purged for the measurement of toxic or corrosive gases.

Reliable and powerful
- Measurements of even low level, trace values
- Calibration without test gas cylinders
- Easy-to-service design
- Standardized electrical and pneumatic connections
- Proven measuring technology with minimized maintenance
- Corrosion-proof housings made from coated stainless steel
- High quality design with a long service life

Always the right analyzer for the job. Whatever the measuring task!
Advance Optima offers analyzer modules using various measurement principles which are suitable for practically any processing task, including:
- Infrared analyzer modules
- Ultraviolet analyzer modules
- Thermal conductivity analyzer modules
- Oxygen analyzer modules
- Flame ionization detectors
- Laser analyzer modules

Unlimited access to analytical data
- Ethernet with TCP/IP protocol for direct integration into existing PC networks or control systems
- OPC interface for direct integration into centralized process control equipment
- First analyzer in the market with PROFIBUS-DP/PA interface certified for emission monitoring systems according VDI 4201-2
- Modbus protocol via Ethernet and serial port, also for Windows applications and certified for emission monitoring systems according VDI 4201-3

Asset management facility wide
The asset management software 'Analyze IT Explorer' permits centralized maintenance of all analyzers and systems via the Ethernet – as well as worldwide via an Intranet connection.
- Increased system availability through rapid trouble-shooting and diagnosis
- Reduced costs through planned predictive maintenance
- Surveillance, interpretation and reporting according to EN 14181 with QAL3 package in Analyze IT Explorer

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Improving safety for people, facilities and the environment

01 Advance Opima series gas analyzers wall mounted version

02 Application in chemical industry

03 Application in technical process plants

Advance Optima with all its associated safety engineering assemblies is certified for operation in hazardous zone 2 and Class I Division 2 designated areas.

Explosion protection
The analyzers for a zone 2 installation are available in different versions depending on the condition of the measuring gas. The central processing unit can be installed either in a zone 2 area or in a non-hazardous area via an extended system bus.

Safety concept
A sophisticated safety concept which is built into Advance Optima ensures the impermeability of its measuring system. Minimized purging volumes and superior Ex nA nC (non incendive) protection even permits the installation of these modules in hazardous zone 2 areas for measurement of flammable gases.

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Hazardous area zone 2 or Class I Division 2
The designs for operation in zone 2 for measurement of non flammable gases and the Class I, Division 2 version for the USA and Canada do not require additional case purging. All the assemblies have been tested to ensure that they are nonincendive.

Alarm System
In addition, an innovative 24-7 alarm system has also been integrated, which can send messages to maintenance personnel via the standard network, as well as by e-mail or SMS.

Quality assurance
ABB fulfills all ISO 9001 quality guidelines.
All development and production processes are monitored.

Typical applications
- Chemical industry
- Technical process plants
- Pharmaceutical industry
- Waste incinerators
- Bio gas plants
- Production, storage and transport of flammable gases in hazardous areas

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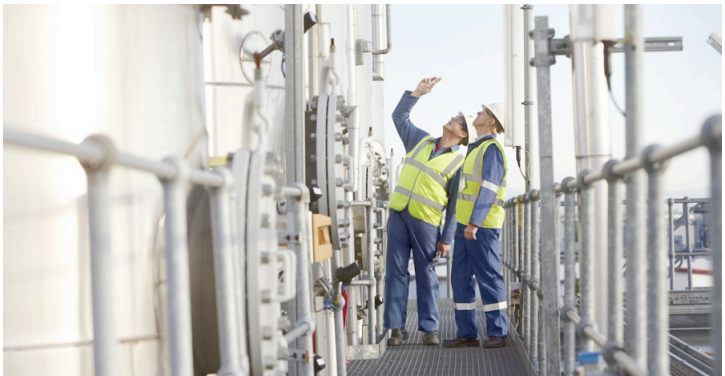

Thermal conductivity analyzer modules

— 04 Application in gas industry

Caldos25

The Caldos25 is designed for highly corrosive applications. The measuring cell with its glass-coated resistor is especially resistant to corrosive gases. With Caldos25 pressure correction is not required. The measurement signal is completely independent of the sample gas pressure – whether negative or positive.

Typical applications
- Chlorine production
- Analysis of SO_2 in metal roasting plant off-gas
- Ammonia dissociation

Sample components – smallest measuring ranges (examples)

H_2 in N_2 or air	→	0 to 0.5 Vol%
SO_2 in N_2 or air	→	0 to 1.5 Vol%
H_2 in Cl_2	→	0 to 0.5 Vol%

Calibration
- Zero-point calibration with sample component-free process gas or substitute gas
- End-point calibration with process gas having a known sample gas concentration or with substitute gas

Measurement principle
The analyzer module's measuring principle is based on the differences in thermal conductivity between gases. Individual gas components are quantitatively analyzed in a binary or quasi-binary mixture based on their thermal conductivity.

Caldos27

Small measuring ranges and fast measurements are characteristic for the Caldos27 thanks to its silicon sensor. The smallest volumes and the direct coupling to the gas feed path result in extremely short T_{90} times. The measuring ranges can be freely selected. The extremely high long-time stability of the sensor enables single-point calibration with only one gas.

Typical applications
- Hydrogen purity measurement
- Turbo generator monitoring
- Inert gas monitoring
- Monitoring of explosive limits

Sample components – smallest measuring ranges (examples)

Ar in O_2	→	0 to 2 Vol%
H_2 in Ar	→	0 to 0.25 Vol%
H_2 in N_2 or air	→	0 to 0.3 Vol%
CH_4 in N_2 or air	→	0 to 2 Vol%
Ar in N_2	→	97.5 to 100 Vol%
He in N_2	→	97 to 100 Vol%

Calibration
- Zero-point calibration with sample component-free process gas or substitute gas
- End-point calibration with process gas having a known sample gas concentration or with substitute gas
- Simplified calibration with standard gas avoids the need for separate zero- and end-point calibration with test gases
- Automatic calibration by means of internal control

Measurement principle
Difference in thermal conductivity of various gases using micromechanical silicon sensor with especially short T_{90} time ($T_{90} \leq 2s$).

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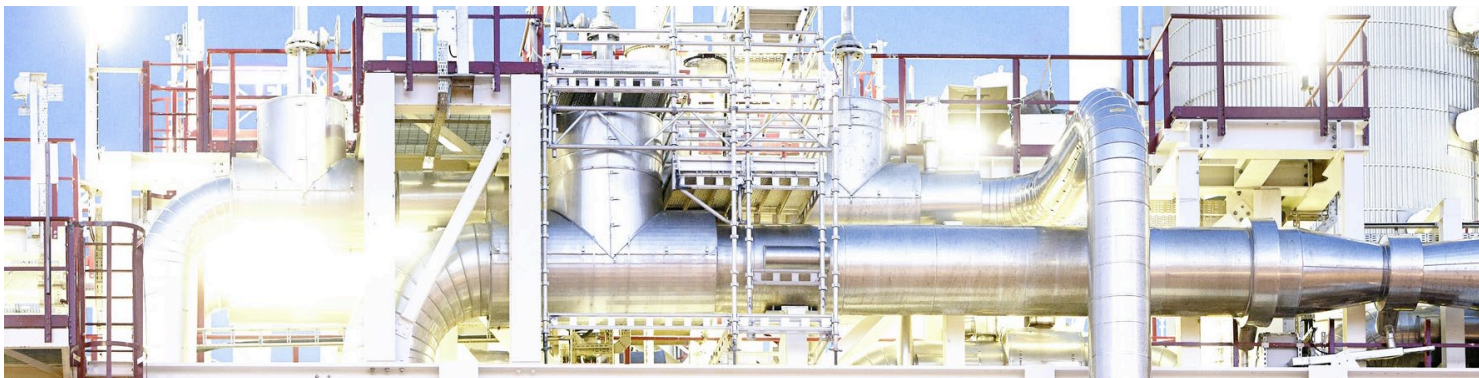

Infrared photometer analyzer module

— 01 Calibration cell

— 02 Application in production processes

Uras26

The Uras26 is an NDIR photometer suitable for continuous measurement of gases in emission monitoring and many other industrial process applications. The Uras26 can measure up to four infrared active gases in one analyzer module. The analyzer detectors are filled with gas that corresponds to the desired measuring component. This enables the detectors to provide optimum sensitivity and high selectivity over other gases present in the sample gas mixture, thereby achieving low detection limits.

A special safety cell is available for corrosive, toxic or flammable sample gas mixtures, whose windows can be purged whereby the purging is monitored internally by the system controller.

The optional gas filled calibration cells are an ideal substitute for expensive test gas bottles used for the automatic calibration.

Typical applications

- Emission monitoring
- Landfill gas monitoring
- Gas production/purity monitoring
- Burner optimization
- Process monitoring, for example in the chemical industry, steel and glass industry, power generation
- Fermentation process monitoring
- Blast furnace gas analysis

Sample components – smallest measuring ranges (examples)

CO	→	0 to 10 ppm
CO_2	→	0 to 5 ppm
NO	→	0 to 150 ppm
SO_2	→	0 to 25 ppm
N_2O	→	0 to 20 ppm
CH_4	→	0 to 50 ppm
C_3H_8	→	0 to 50 ppm
C_2H_4	→	0 to 300 ppm
R 134	→	0 to 50 ppm

Calibration

- Zero- and end-point calibration with gas-filled calibration cells or test gas mixture
- Automatic calibration by means of internal control

Measurement principle

Non-dispersive infrared (NDIR) absorption in the λ = 2.5 to 8 µm wavelength range.

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Ultraviolet photometer analyzer module

03 Application in chemical processes

Limas21

The Limas21 is an industrial photometer that can be configured to meet process measurement requirements or deployed for emission monitoring applications. The measuring principle is particularly reliable because of its high stability which is based on the four-beam signal processing principle. A high degree of selectivity is provided by using interference and gas filters correlation technique as well as optimum selection of measured wavelength and reference wavelength. The Limas21 is also a reliable and simple solution for measurement of flammable, corrosive and toxic gases, in hazardous area beside general purpose installation.

Typical applications

- Burner optimization
- Control of DeNOx process
- Nitric acid production
- Cement production
- Purity measurement in the chemical industry
- Production and processing of cellulose and viscose
- Natural gas and biogas analysis
- Cl_2 production and processing
- Automotive and marine exhaust gas monitoring
- Power plants emission monitoring

Sample components – smallest measuring ranges (examples)

NO → 0 to 10 ppm
SO_2 → 0 to 25 ppm
NO_2 → 0 to 50 ppm
H_2S → 0 to 25 ppm
Cl_2 → 0 to 100 ppm
CS_2 → 0 to 50 ppm
COS → 0 to 250 ppm

Measuring ranges

- 1 to 5 sample components
- Measurement ranges freely adjustable within a range ratio of 1:20 relative to the factory-set reference measuring range

Calibration

- Zero- and end-point calibration
- Automatic calibration by means of internal control
- Gas filled calibration cells

Measurement principle

Gas filter correlation or wavelength comparison in ultraviolet and visible spectrum range
λ = 200 to 600 nm

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Oxygen analyzer modules and ...

— 01 Magnos28 sensor with microwing
— 02 Application in gas processes

Magnos28

The Magnos28 represents the future of paramagnetic oxygen measurement, leveraging ABB's pioneering technology leadership and over 75 years of innovation in the field of continuous gas analysis.

This exciting product completely rethinks paramagnetic oxygen analysis, replacing the glass dumbbell with a revolutionary new silicon sensor, the microwing, and automating historically manual manufacturing processes leading to levels of quality and reproducibility beyond anything that is currently available on the market.

The ability to set individual measuring ranges including suppressed ranges allows the analyzer to be easily tailored to specific measurement requirements. An outstanding characteristic of this analyzer is its long term stability. In most applications, calibration of the zero-point with ambient air or nitrogen is only required once a month. It is also suitable for measuring rapid changes in the concentration of the sample gas.

Typical applications
- Oxygen purity measurement
- Air separation plants
- Biogas monitoring
- Process gas monitoring
- Emission monitoring

Sample components – measuring ranges
O_2
- Smallest measuring range: 0 to 0.5 Vol% O_2
- Largest measuring range: 0 to 100 Vol% O_2
- Measuring range suppression max. 1:100, for example 99 to 100 Vol% O_2

Calibration
- Zero- and end-point calibration with nitrogen and air or test gas mixtures
- Single-point calibration with ambient air
- Automatic calibration via built-in pneumatic module or external valves

Measurement principle
Paramagnetic (magnetomechanical) oxygen analyzer

Magnos27

The Magnos27 is based on the thermomagnetical measuring principle. The robust measuring cell means that the Magnos27 is especially resistant to vibrations and shocks.

Typical applications
- Flue gas analysis
- Metal roasting plant off-gas analysis
- Cement flue gas analysis

Sample components – measuring ranges
O_2 in flue gas or nitrogen
- Smallest measuring range: 0 to 3 Vol% O_2
- Largest measuring range: 0 to 100 Vol% O_2

Calibration
- Zero-point calibration with oxygen-free process gas or substitute gas
- End-point calibration with process gas having a known oxygen concentration or with substitute gas
- Automatic calibration via built-in pneumatic module or external valves

Measurement principle
Paramagnetic (thermomagnetic) oxygen analyzer

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… in situ laser analyzer

— 03 Application in chemical industry
— 04 LS25 in situ Laser

ZO23

The trace oxygen analyzer ZO23 measures the gas concentration with a zirconium dioxide measuring cell. The measuring element consists of ceramics with a platinized surface, conducting oxygen ions at temperatures typically above 600 °C (1112 °F). The measuring cell is catalytically inactive.The measuring method is especially advantageous to small measuring ranges of down to 1 ppm. This makes the analyzer particularly suitable for measuring oxygen in pure gases.

Typical applications
- Purity measurement
- Air separation plants
- Quality control in tank farms

Sample components – smallest measuring range
O_2 in nitrogen or argon
- 0 to 1 ppm
- Four measuring ranges freely adjustable to 250,000 ppm

Calibration
Manual or automatic calibration

Measurement principle
Measurement of oxygen with catalytically inactive ZrO_2 cell

LS25

The LS25 is an in situ laser analyzer which selectively measures the concentration of up to two IR active sample components directly in the process.
The analyzer operates according to the principle of tunable diode laser 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 measuring component and calculates the gas concentration from this. The transmission rate is displayed as a signal for predictive maintenance. As an integrated part of the Advance Optima series it can be combined with further analyzer modules and completely operated remotely in Ethernet networks. The LS25 holds ATEX and CSA certificates for hazardous locations. Depending on the application, LS25 is suitable for measurements at elevated 1500 °C (2730 °F) and pressures up to 10 bar.

Typical applications
- Process and safety monitoring for example in chemical or petrochemical or steel industry
- Control of flue gas abatement equipment for example ammonia slip measurements
- Emission monitoring

Sample components – smallest measuring ranges (examples)

O_2	→ 0 to 1 vol%	HF	→ 0 to 3 ppm
NH_3	→ 0 to 20 ppm	H_2O	→ 0 to 30 ppm
HCl	→ 0 to 5 ppm	CO	→ 0 to 20 ppm

Calibration
Calibration on a separate calibration cell

Measurement principle
Tunable diode laser absorption spectroscopy

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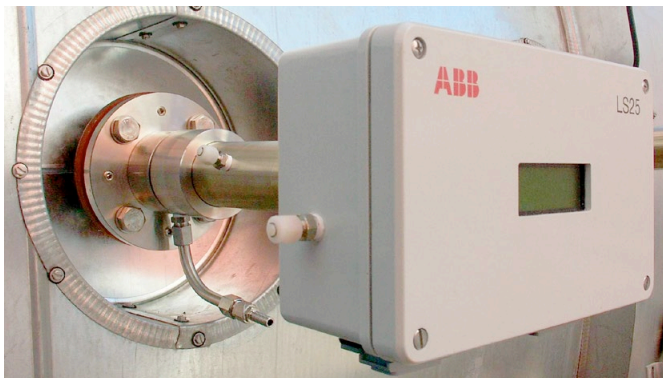


Flame ionization detector and Dynamic QR Code

— 01 Application in industrial gas processes
— 02 Advance Optima display with Dynamic QR Code

Fidas24

The Fidas24 is a single component flame ionization detector (FID) optimized for the continuous monitoring of volatile organic carbons (VOCs).
It can be employed in a vast number of applications, measuring hydrocarbons from low ppm levels as in emission applications through to 15 Vol% measurements, which is typical for process applications. A special version for the measurement of the total content of organic carbon with and without methane (NMHC – non methane hydrocarbon) is also available. The analyzer is heated to 180 °C (356 °F) and can be directly connected to a heated sample line. This results in no cold spots occurring at any point in the sample gas path.

Typical Applications
- Emission monitoring (for example power plants, waste incinerators)
- Process (for example chemical processes or solvent recovery)
- Quality (for example in HPI processing industry)
- Safety (HPI processing industry)
- Purity of gases such as O_2, N_2 and Ar
- Development of combustion engines for the automotive, marine and stationary operation

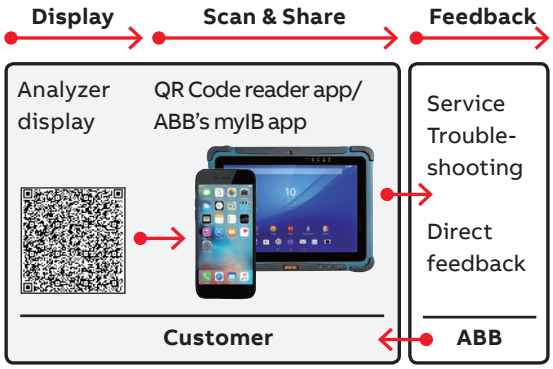
Sample components – measuring ranges
- Fidas24: Total C
- Fidas24 NMHC: Total C, CH_4 and NMHC
- Smallest measuring range: 0 to 5 mgC/m^3 (Total C) or 10 ppm CH_4
- Largest measuring range: 15 Vol% (CH_4)

Calibration
Manual or automatic calibration
- Zero point with air or nitrogen
- Endpoint calibration with propane or other Hydrocarbon in air or nitrogen

Measurement principle
Flame ionization

Dynamic QR Code

ABB's Dynamic QR Code is a unique feature to display dynamically generated QR codes on the analyzer display for easy communication.
In addition to static information for system identification, it contains also dynamic information on system configuration and analyzer health status. In combination with mobile devices, the Dynamic QR Code represents an innovative way of customer's communication which allows, for instance, improved case-specific support by ABB resulting in an increased availability of analyzer assets. It is compatible with standard QR code reader applications as well as ABB's application 'my Installed Base (myIB)'.



Generally applicable for all installations across all industries, especially interesting for
- Measurements with high availability requirements (for example CEMS)
- Remote installations
- Installations with constraint remote access due to information security guidelines

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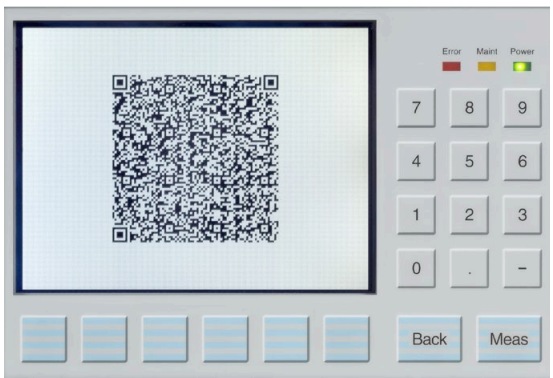

The Added Value
What you can expect from a market leader

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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