ABB MEASUREMENT & ANALYTICS

Oxygen measurement made easy

Analyzer portfolio overview

Measurement made easy

Oxygen is the most important gas of our planet; as useful to many industries as it is to nature itself.

It converts combustibles into an energy source. It is used in the synthesis of countless chemicals.

Its oxydizing power can also be a threat to catalysts and industrial assets.

In any case, one needs to know the right oxygen concentration.

ABB has the right analyzer for your oxygen application. Because it is vital!

Table of contents

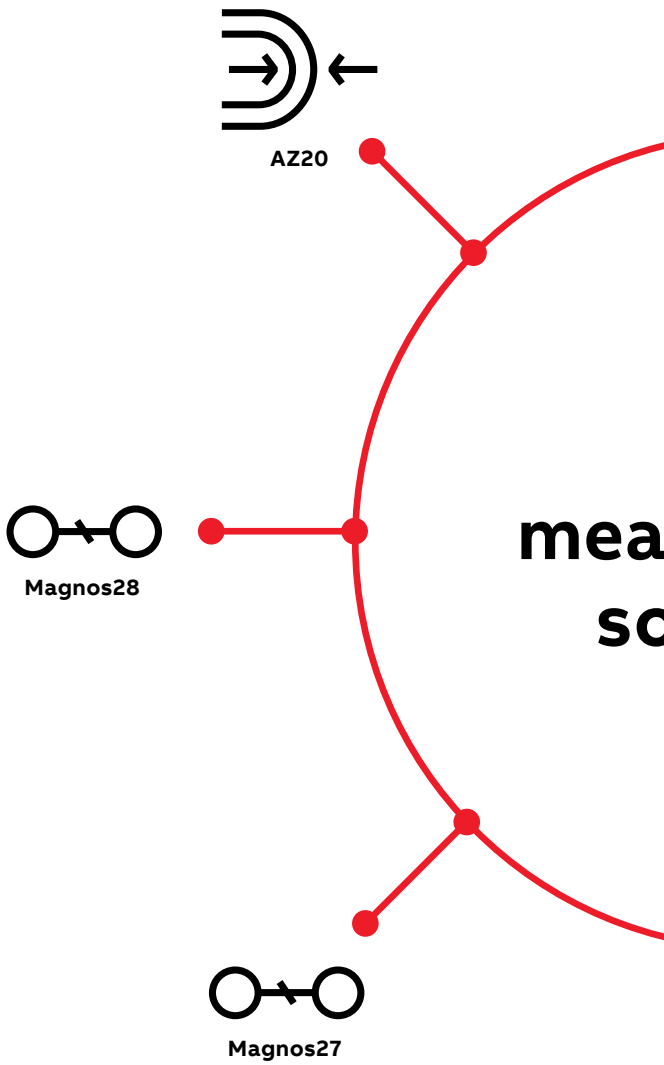
Analyzer series and modules
The right technology for your measurement

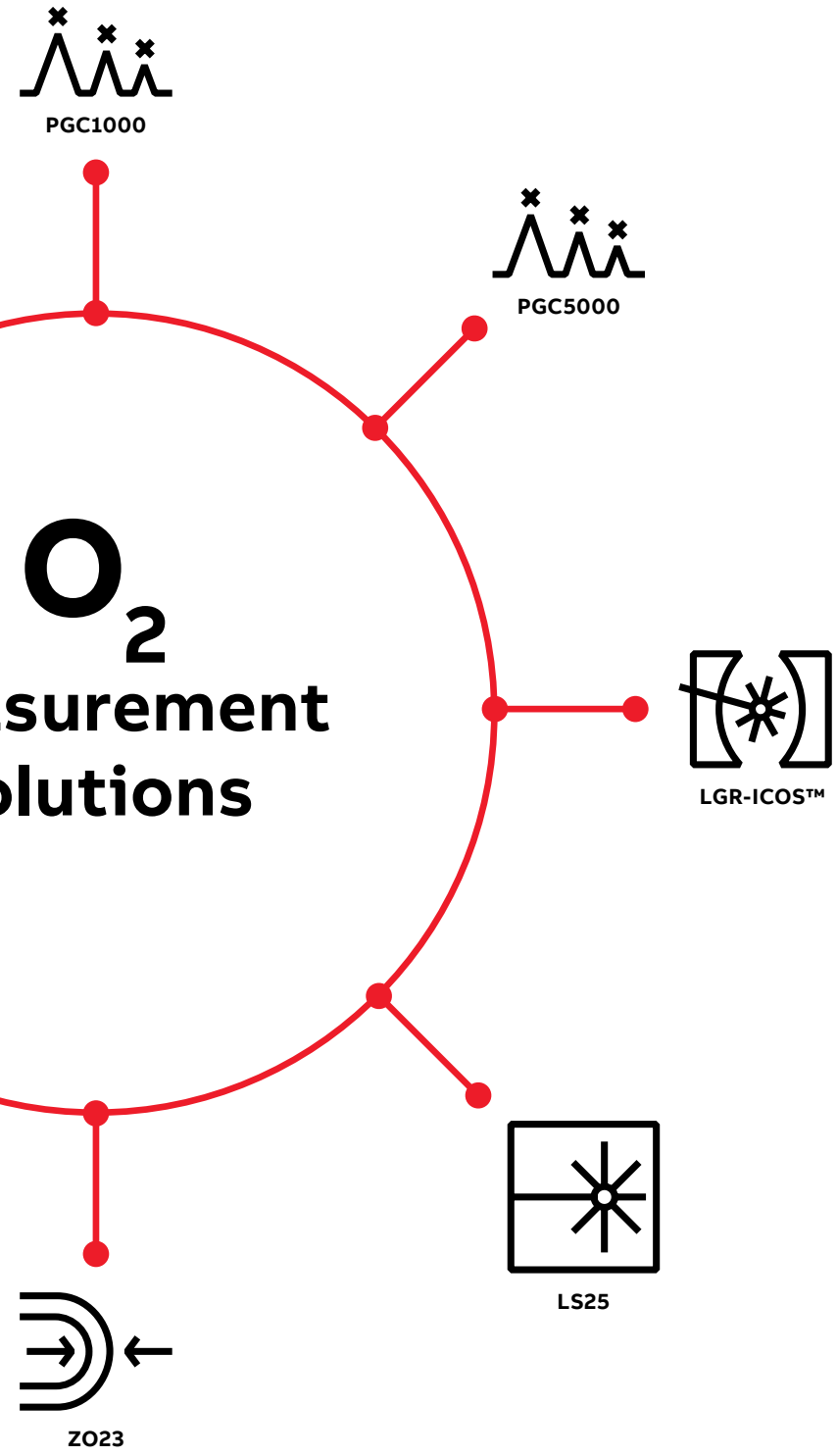
AZ Endura series
Zirconium dioxide probes
- Robust in-situ oxygen probe
- Ranges: 0 - 0.01 up to 100 vol% with optional automatic calibration
- Integral transmitter or remote transmitter
- Easy maintenance and filter exchange
- Long cell life and stability

Magnos28
Paramagnetic detector
- Components: O_2
- Ranges: 0 - 0.5 vol% up to 100 vol%
- Patented Microwing® offers improved repeatability
- Semi-automatic manufacturing for consistent quality
- Inert materials suitable for corrosive applications
- Fast response (1.3s) for improved process control
- Suppressed ranges (99.5 - 100 vol%) for purity applications
- SIL declaration available acc. EN 61508 (2010) part 2

Magnos27
Thermomagnetic detector
- Components: O_2
- Ranges: 0 - 10 vol% up to 100 vol%
- Reliable measurement for flue gas applications
- Robust cell design ideal for corrosive samples
- Easy to clean even after liquid/acid contamination
- Very popular for cement and metals applications

ZO23
Zirconium dioxide detector
- Components: O_2
- Trace level measurement for purity applications
- Low influence from flammable gases
- Wide dynamic range for start-up/shut-down operation
- T_{90} response time < 60 sec for alternation of 2 test gases
- Automatic self-check function without test gases





PGC1000

Online Chromatography

- Compact design: mounted closer to sample point
- Versatile: capable of a variety of simple vapour applications
- Cost effective: shelterless design and low utility consumption
- Technology leader: highly sensitive TCD
- Serviceable: modular design decreases maintenance and downtime

PGC5000

Process Chromatography

- Flexibility: multiple ovens to controller configuration
- Versatile: liquid and vapour applications, multiple detectors option
- Cost effective: integrated controller oven, supporting capital investment reduction and ensuring system reliability
- Condition monitoring system: complete system diagnostics for rapid troubleshooting and maintenance

LGR-ICOS™ GLA531/GLA231 series

Patented OA-ICOS laser-based technology

- High precision and accuracy
- Fast measurement rate and response time
- Multicomponent configurations (CO, CO_2, H_2O)
- 10,000:1 linear dynamic range: 0 – 5 vol% with a limit of detection down to 0.5 ppm, up to 100 vol% capabilities
- Unique stability without need for recalibration
- No consumables, low maintenance and field serviceable

LS25

Tunable diode laser absorption spectroscopy

- In-situ measurement in harsh conditions: up to 10 bar and 1500˚C
- Ranges depending on available optical path length
- Cross duct measurement of all the gases
- Fast response (T_{90} < 2 sec) for improved
- process control

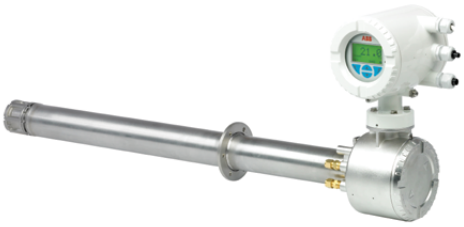
AZ Endura series
The combustion gas analyzer

Superior technology and quality from the world leader in zirconia probes for oxygen measurement

Harsh environments demand rugged and robust measurement equipment; solutions that are effective and efficient even in the toughest applications. This is where the Endura AZ series is introduced as the world leader in oxygen measurement. In diverse sectors, from hydrocarbon processing and power generation to process industries, the Endura AZ series will deliver enhanced business and operational benefits.

All series features
- Advanced design and precision manufacturing
- Unique integrated, in-situ auto-calibration system
- Industry-standard flange configurations
- Advanced transmitters
- Unique cell release and full site-serviceable probe
- HART communication, plus digital and analog output

Measurement Performance
- 0.01 to 100 % O_2
- T90 < 10 seconds
- Accuracy < 0.75% or reading
- Drift < 0.2% typical



Specifications AZ20 series
- General purpose
- From -20 to 800˚C process temperature
- Integral or remote transmitter
- Probe length up to 4 m (13 ft)
- Full servicing and maintenance on site

Specifications AZ25 series
- From 600 to 1400 C process temperature
- Remote transmitter only due to high application temperatures
- Probe lenghts up to 1.25 m (4 ft)
- Variety of probe material options available to ensure application suitability

Specifications AZ30 series
- ATEX version
- From -20 to 800°C as standard
- Extractive bypass accessory allows use in application temperature of up to 1400˚C
- Integral or remote mounted ATEX transmitter
- Probe length up to 4 m (13 ft)

Find out more about the AZ Endura series

LGR-ICOS™
Laser-based analyzers and solutions

The highest overall performance at a low cost of ownership to address the most critical and challenging applications requiring uninterrupted monitoring and reliable process control.

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01 GLA531 series ATEX Zone 1 integration on an off-shore platform

LGR-ICOS™ laser-based process analyzers perform sensitive, accurate and precise oxygen mesurements in refining, petrochemical, specialty chemical and other industrial facilities. With their highly selective, interference-free and wide dynamic range analytical performance, these analyzers provide very fast, reliable and repeatable results in every application. Where the most challenging of detection capabilities are required for quality assurance, critical process control or the protection of a precious process catalyst, no other laser analyzer can match their performance. LGR-ICOS™ analyzers are simple to use, start up in minutes, require no field calibration and have minimal preventative maintenance requirements.

Every LGR-ICOS™ analyzer uses ABB's patented Off-axis ICOS technology, a fourth-generation cavity enhanced absorption technique. Off-axis ICOS analyzers have many advantages over conventional technologies, including improved sensitivity, precision and selectivity for a wider range of gases, as well as significantly improved alignment and vibration tolerance. The non-critical alignment of the optical bench and sample cell allows for easy service in the field.

Patented high-performance technology
- Significantly higher sensitivity compared with conventional laser analyzers
- Higher accuracy and precision enables improved process and quality control
- Wider dynamic range reduces the quantity of analyzers required to measure both low levels and process excursions
- Fast response time allows rapid adjustment to process changes and upset conditions
- Lack of consumables reduces cost-of-ownership and increases reliability and ROI

Low cost of ownership
- Low OPEX provides rapid ROI
- No consumables, columns, carrier gases or liquids, or pre-scrubbers are required
- Simplified sample conditioning reduces system complexity and maintenance cost
- Minimal annual preventive maintenance requirement, estimated at less than 4 hours total for hazardous locations and less than an hour for rackmount analyzers
- Continuous analyzer health status reporting and warnings avoid emergency repairs
- Field-serviceable sample cell and mirror cleaning require no factory repair time

Flexibility
- Real-time continuous online measurements of multiple gases in a single analyzer
- General purpose uses and options of Hazardous Area Certifications (GLA531 series): North American Class I Division 1 and 2 or ATEX/IECEx Zone 1 and 2
- Industry standard communications including analog 4-20 mA, digital Modbus TCP and Modbus RTU
- Hazloc-approved USB portal access for file download and field serviceability

Find out more about LGR-ICOS™

Advance Optima and EasyLine
Continuous gas analyzers

Through a wide choice of technologies, AO2000 and EL3000 series analyzer solutions can address everything from simple measuring tasks to complex and flexible systems, including hazardous areas.

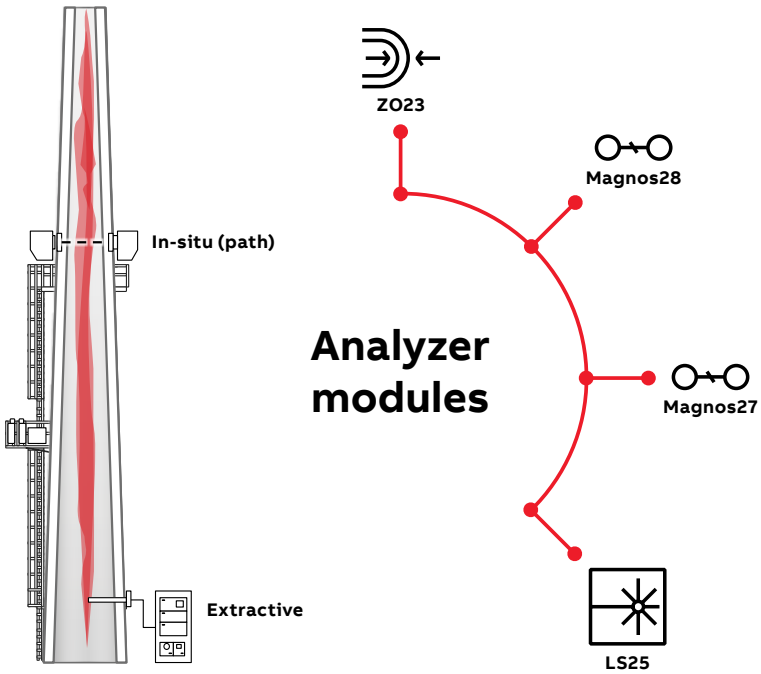
The different analyzer platforms give you the opportunity to choose the right solution for the measurement task. This could depend on the place of installation, as well as the interaction that is required from the analyzer. The same high-quality analyzer modules can be integrated in all platforms.

AO2000 series

Flexible, multi-analyzer system

- Up to 10 different analyzer technologies
- Up to 4 different analyzers for O_2 measurement
- Up to 6 different components simultaneously
- Up to 4 analyzers in one system
- 2 different housing types
- Optional integrated gas feed unit
- Different interface options: Digital I/Os, AOs, Modbus, Profibus, Ethernet, OPC
- Auto calibration option
- Remote operation

Find out more about the AO2000 series



EL3000 series

Compact, easy analyzer system

- Up to 8 different analyzer technologies
- Up to 3 different analyzers for O_2 measurement
- Up to 5 different components simultaneously
- Up to 2 analyzers in one housing
- 2 different housing types
- Optional integrated gas feed unit
- Different interface options: Digital I/Os, AOs, Modbus, Profibus, Ethernet
- Auto calibration option
- Intuitive operation

Find out more about the EL3000 series

EL3060 series

Compact, easy hazardous area analyzer system

- Certified for Zone 1 installation
- Certified acc. IECEx, ATEX, EAC, NEPSI, TIIS, KCs
- Ex-d housing for analyzer modules
- Ex-e housing for customer cabling
- Magnos28 for O_2 measurement with SIL2
- Up to 4 different analyzer technologies
- Up to 5 components simultaneously
- Different interface options:Digital I/Os, AOs, Modbus, Profibus, Ethernet
- Auto calibration option
- Intuitive operation

Find out more about the EL3060 series

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01 Continuous gas analyzers AO2000, EL3000 and EL3060

ZO23

Extractive; zirconium dioxide technology

Measurement principle
- Potentiometric measurement
- Zirconium dioxide cell

Measurement range
- Min. 0 – 1 ppm
- Max. 0 – 250,000 ppm
  – 4 measuring ranges

T_{90} response time
- T_{90} < 60 sec for the alternation of 2 test gases in the measuring range of 10 ppm
  – sample gas flow rate = 8 l/h
  – electronic T_{90}-time = 3 sec

Magnos28

Extractive; paramagnetic/magnetomechanic design

Measurement principle
- Paramagnetic behaviour of oxygen
- Magnetomechanical oxygen module

Measurement range
- Min. 0 – 0,5 vol%
- Max. 0 – 100 vol%
  – 4 measuring ranges
- with suppressed zero-point:
  – max. 1:200, e.g. 99.5 – 100 vol%

T_{90} response time
- T_{90} < 3 sec at a sample gas flow = 90 l/h

Magnos27

Extractive; paramagnetic/thermomagnetic design

Measurement principle
- Paramagnetic behaviour of oxygen
- Heavy-duty thermomagnetic module

Measurement range
- Min. 0 – 3 vol%
- Max. 0 – 100 vol%
  – 4 measuring ranges

T_{90} time
- T_{90} = 10 to 22 sec, depending on sample gas flow

LS25

In-situ; laser-based technology

Measurement principle
- Single-line tunable diode laser absorption spectroscopy

Measurement range
- Min. 0 – 1 vol%
- Max. 0 – 100 vol%
  – 1 measuring range
  – max. 10 bar, 1500 °C

Response time
- Less than 2 seconds without signal averaging

Process gas chromatographs

Process measurements can be accomplished with different technologies depending on the requirements and process gas chromatography is a powerful analytical method for these measurements.

The key principles of this analytical method are separation and measurement. These two features greatly provide the expected quality and accuracy of each measured component in the analysis. ABB's process gas chromatographs can be optimized for each application with a wide variety of hardware options, including columns, detectors, and valves, to provide the lowest detection limit and best repeatability possible for each measured component. An additional benefit to using this technique is the large number of components that can be measured simultaneously without interference. All of these features and benefits make our Process Gas Chromatographs a very flexible and capable analytical process solution for industrial applications.

PGC1000
The PGC1000 is ideal for measuring light hydrocarbon gases in locations where minimal space is available and a simple, reliable, low cost measurement is required.

The PGC1000 is a shelterless field-mounted GC capable of measurements of C1 through C9+, inerts, H_2S and O_2 in various hydrocarbon processing industry (HPI) streams. This analyzer is an excellent choice for most gas processing industry applications because its integral stream selector allows sampling of up to four (4) different streams. Up to two of these sample streams can be designated as the “calibration/ validation sample”.

The PGC1000 is designed to retain historical data. This data can be used for audit trails, maintenance, and troubleshooting to verify chromatograph operation over time and provide a limited data backup for communication link reliability.

Servicing the PGC1000 requires minimal effort. The modular analytical hardware is easily removed by loosening one bolt.

Specifications
- Enclosure: CSA Type 4X, IECEx IP56, ATEX Type 4X
- Area classification:
  - CSA: Explosion-proof: NEC & CEC Class I, Div 1, Grp BCD, T6
  - ATEX: Flameproof: II 2G Ex d IIB+H2, T6 Gb
  - IECEx: Flameproof: Ex d IIB+H2, T6
- Carrier gas: helium, hydrogen or nitrogen
- Measuring range
  - Trace oxygen: 30 – 2000 ppm (cycle time: 330 seconds)
  - % level oxygen: 0.2 – 20% (cycle time: 330 seconds)
  - (*) Other components also available (light hydrocarbons, CO, H_2S, H_2, H_2O, etc.)
- Repeatability: Defined by application (typically 1% of the measured value)
- Ambient temperature range: 0°F to 130°F (-18°C to 55°C)
- Supply voltage: 12 or 24 VDC; 7 watts nominal
- Communications supported: Two serial digital ports, RS-232, RS-485, or RS-422. One USB MMI (RS-232 or USB). Optional USB hub (host and client) and Ethernet (TCP/IP) ports
- Protocols supported: OPC, Modbus ASCII or RTU, Modbus TCP
- Inputs/outputs: 2 digital inputs (DI)/2 digital outputs (DO); analog outputs externally

01 PGC5000 controller and oven configurations

PGC5000

The ABB PGC5000 series process gas chromatograph is based on over 50 years of innovation in online process gas chromatographs. It simplifies gas chromatography and increases reliability. The PGC5000 series has been designed for distributed control across multiple analytical smart ovens for limitless application approaches, offering a flexible platform for installation and a cost-effective alternative to traditional process GCs.

The PGC5000A Master Controller provides all analyzer system control functions for all PGC5000 ovens. The master controller supports up to 4 smart ovens. There are two oven models, PGC5000B and PGC5000C, with a complete line of detectors (TCD, FID, FPD and DBDID) and valves (vapour or liquid injection) to design and produce the best possible analytical measurement.

The PGC5000B has a smaller footprint and is designed for simple applications, while the PGC5000C is 28% larger and targets complex applications requiring multiple detectors. Both oven models have options for airbath or airless design, and an integrated controller.

Specifications

- Enclosure: IP54 (NEMA 3 Equivalent)
- Area classification:
  - CSA: Class I, Division 2 or Class I, Division 1 with type Y-purge; gas groups B, C, D
  - ATEX: Zone 1 II2G, Ex de py IIB+H2 T4 – T2 or Zone 2 II3G Ex de nA nL IIB+H2 T4 – T2
- Carrier gas: helium, hydrogen, nitrogen or argon
- Measuring range
  - O_2 application: > 50 ppm (cycle time: 240 – 360 seconds)
  - (*) Other components also available
- Repeatability: Defined by application (typically ±1% of the measured value)
- Ambient temperature range: 32°F to 122°F (0°C to 50°C)
- Supply voltage: 100 or 240 VAC
- Communications supported: dual Ethernet ports
- Protocols supported: Modbus TCP/IP or RTU
- Inputs/outputs: 8 analog outputs (AO); 4 digital outputs (DO)
- Historical data: SD card for 7 days of chromatogram and data storage

Find out more about process gas chromatographs

Product selection matrix

A comprehensive product portfolio of high quality analytical solutions to match your need for oxygen measurement.

				Integration type		Enclosure protection
Analyzer Product Line	**Analyzer Type**	**Technology**	**Additional Measured Components**	**in-situ**	**Extractive**	**IP Rating**
Combustion gas analyzer (01)	AZ Endura series	Zirconia	no	o		IP66
Continuous gas analyzers (02, 03)	LS25	Tunable diode laser	yes	o		IP66
	Magnos28	Paramagnetic	no		o	o IP20, IP54, IP65
	Magnos27	Magnetomechanical	no		o	o IP20, IP54, IP65
	ZO23	Zirconia	no		o	o IP20, IP54, IP65
Process gas chromatographs (04, 05)	PGC1000	Chromatography	yes		o	IP56
	PGC5000	Chromatography	yes		o	IP54
LGR-ICOS™ (06)	GLA531 series	Off axis - ICOS (TDL)	yes		o	IP54
	GLA231 series	Off axis - ICOS (TDL)	yes		o	IP52

o = Refer to options
*Application dependant; max sample inlet temperature must be below oven temperature

01

02

03

Hazardous location					Gas types			Sampling			Measurement ranges		
General Purpose	ATEX Zone 1	ATEX Zone 2	Class 1 Div 1	Class 1 Div 2	Flammable	Toxic	Corrosive	Max temperature	Max input pressure	Response time	Low ppm	High ppm/low %	low/high %
x	o	o	o	o				800°C, 1400°C		< 10 sec		x	x
x	o	o		o	x	x	x	1500°C	10 bar	< 2 sec		x	x
x	o	o		o	x	x	o	50°C	250 hPa	< 3 sec		x	x
x		o		o	x	x	o	50°C	250 hPa	10 sec			x
x					x			50°C	70 hPa	3 sec	x	x	x
x	x	x	x	x	x	x	x	*	2 bar	330 sec	x	x	x
x	x	x	x	x	x	x	x	*	10 bar	240 – 360 sec	x	x	x
x	x	x	x	x	x	x	o	105°C	0.5 bar	10 sec	x	x	x
x								40°C	0.5 bar	10 sec	x	x	x

04

05

06

Service
World-class after-sales support

- Installation & commissioning
- Maintenance
- Troubleshooting
- Advanced digital services
- Training
- Technical support & repairs
- Spare parts & consumables
- Extensions, upgrades and retrofits
- Service agreements
- End-of-life services
- Replacement services

Device management
Dynamic QR code (DQR)
- Offers access to similar analyzer health data as condition monitoring
- No network connection required
- Lower investment cost to enable real-time data analysis from ABB expert
- Right information = Rapid fault resolution
- No need for specialist operator knowledge analysis from ABB expert

* Only available for continuous gas analyzers

Device health & accuracy
ABB Ability™ condition monitoring for measurement devices
- Prompts remote expert analysis of health
- Checks by ABB experts: Identify potential issues before device failure
- Performs regularly scheduled on-site or remote health checks of analyzers – no on-site labour required
- Ensures 24/7/365 emissions measuring compliance

Augmented reality
ABB Ability™ remote insights for service
- Remote expert support
- Upskill staff
- Reduced travel costs associated with onsite maintenance
- Rapid response

ABB Measurement & Analytics

For your local ABB contact, visit:
abb.com/contacts

For more product information, visit:
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