

ABB MEASUREMENT & ANALYTICS | DATA SHEET

# LGR-ICOS 950 series

## Process laser analyzers



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## Measurement made easy

Winner of the ISA Analysis Division's Innovative product of the year, 2017

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### Sensitive measurement

- sub-ppb level

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### Fast measurement

- fast flow options
- fast data acquisition rate

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### Reliable results

- high accuracy
- high precision

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### Flexible analyzer

- wide range of measureable gases
- various communication outputs
- data access through WIFI or USB
- direct interaction through large touchscreen

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### Low cost of operation

- rugged; requires infrequent and inexpensive maintenance
- field serviceable



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## Flexibility

- Real-time continuous on-line measurements of multiple gases in a single analyzer
- Gases measured include CH<sub>4</sub>, CO<sub>2</sub>, CO, O<sub>2</sub>, H<sub>2</sub>S, HCl, NH<sub>3</sub>, HF, C<sub>2</sub>H<sub>2</sub>, H<sub>2</sub>O and more (please inquire)
- General purpose uses and options of Hazardous Area Certifications, such as North American Class I Division 1 or 2, European ATEX Zone 1 or 2, and IECEx.
- Industry Standard Communications including analog 4 to 20 mA and digital Modbus
- Hazloc-approved USB portal access for file download and field serviceability
- Options for sample line heater module, Hastelloy components and custom spectroscopy applications

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## Economical to purchase and operate

- Low CAPEX and 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 PM requirement estimated at 4 hours
- Continuous analyzer health status reporting and warnings avoid emergency repairs
- Field-serviceable sample cell and mirror cleaning requires no factory repair time

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## Patented Cavity Enhanced Absorption Spectroscopy

- 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
- Higher reliability, speed and accuracy over competitive systems that rely on chemical scrubbers

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## Introduction

The LGR-ICOS™ Laser Process Analyzer performs sensitive, accurate and precise measurements of trace gases in refining, petrochemical, specialty chemical and other industrial facilities. With its highly selective, interference-free and wide dynamic range analytical performance, this analyzer provides 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 from poisonous impurities, no other laser analyzer can match the capability of this analyzer in performance. The LGR-ICOS analyzer is simple to use, starts up in minutes, requires no field calibration and has 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 TDLAS analyzers 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. And, like all ABB process analyzers, the LGR-ICOS laser analyzers are supported by our expert Service and Technical Support staff with access to the analyzer via remote real-time wireless communications for prompt troubleshooting in the field where possible.

Where wireless access is not available, safe and easy file downloads and diagnostic information can be obtained and shared with our technical support experts through a state-of-the-art Hazardous Area certified and approved USB flash drive without the need for Red Tag procedures.

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## Applications

The LGR-ICOS process laser analyzer was designed for applications that require highest sensitivity, accuracy, precision and response times, including:

- Monitoring H<sub>2</sub>S, CO<sub>2</sub>, H<sub>2</sub>O and O<sub>2</sub> in fuel gas and natural gas pipelines to improve product quality, reduce corrosion and reduce degradation of process chemicals (amines)
- Trace contaminants in hydrogen for industrial processes and fuel for refineries
- Trace contaminants in ethylene and other hydrocarbon gases
- EPA-compliant HCl emissions and stack gas monitoring
- Trace contaminants in inert gases (N<sub>2</sub>, Ar, He, etc) for calibration gases and industrial-grade blanket gas

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## Ordering information

For hazardous location installations, please select protection system type, purge gas, AC or DC power, signal outputs and certification.

Please ask your local ABB representative to complete a request for quotation (RFQ) form. A quotation will be issued based on your specific application and additional details.

## Specification

### General purpose enclosure

#### Packaging

Single door NEMA 4 IP54 painted steel enclosure:

- 30 in. (762 mm) wide x 30 in. (762 mm) tall x 16 in. (406 mm) deep, wall-mounted
- 15 in. (381 mm) flat-panel HMI display with resistive touchscreen
- Weight 148 lbs. (67 kg)

#### Safety protection

- Non-hazardous area installation
- No enclosure purging or pressurization

#### Purging gas supply

None

#### Power entry

AC power input:

- 90 to 250 V AC, 5 A, single phase, 47 to 63 Hz
- Connection requirement: 3 wires, 18 to 12 AWG, cable through rigid conduit hub or cable gland (¾ in. NPT suitable for the installation location)

DC power input:

- 24 V DC, 15 A (class 2 power source)
- Connection requirement: 3 wires, 18 to 12 AWG, cable through rigid conduit hub or cable gland (¾ in. NPT suitable for the installation location)

#### Power consumption

95 watts average on continuous run  
(290 watts at cold start)

For heated sample inlet option:

115 watts average on continuous run  
(340 watts at cold start)

**Sample gas** (\*heated sample inlet is an option)

Standard configuration:

- Inlet and outlet ports: ¼ in. tube compression fitting (process compatible)
- Sample gas flow 0.2 to 1.0 lpm (depending on analyzer type)
- Maximum sample temperature 221 °F (105 °C) for both inlet and outlet ports
- 7.25 psig (1.50 barg) pressure limit for both inlet and outlet ports
- 104 °F (40 °C) moisture dew point limit (Heated option)

#### Analog outputs 4 to 20 mA

(all analog outputs are options)

Gas concentration monitors

(4 to 20 mA linear analog\* signal):

- Channel 1: gas concentration 1
- Channel 2: gas concentration 2
- Channel 3: gas concentration 3
- Channel 4: gas concentration 4

Analyzer warning – fault monitor outputs

(4 to 20 mA multi-step signals [20 mA is normal status]):

- Channel 5: temperature warnings and alarms
- Channel 6: analyzer warnings and alarms

\* Analog output connection:

screw terminals, single-ended pairs 28 to 18 AWG signal wires (1 pair per channel), signal cables through conduit hubs (2 holes available, ½ in. NPT suitable for the installation location).

#### Remote I / O

Modbus TCP:

- RJ45 connector, cable through a conduit hub (½ in. NPT suitable for the installation location)
- Transmit all gas concentration values and analyzer warning status (Channel 1 to 6 above)

Ethernet:

- RJ45 connector, cable through a conduit hub (½ in. NPT suitable for the installation location)
- Remote access for data and analyzer controls

#### Local data access

'A' type USB bulkhead port:

- Dust and waterproof sealing cover
- Flash drive NOT included

#### Environmental limits

Ambient operating temperature:

- –20 to 50 °C (–4 to 122 °F)
- Analyzer must be sheltered from rain and direct sunlight

Storage temperature:

–40 to 70 °C (–40 to 158 °F)

#### Certifications



Conformity to applicable EU Directives and Harmonized Standards:

- 2014/35/EU (LVD), EN 61010-1
- 2004/108/EU (EMC), EN 61326-1

## ...Specification

### Z-Purged enclosure

#### Packaging

Single door NEMA 4 IP54 painted steel enclosure:

- 30 in. (762 mm) wide x 30 in. (762 mm) tall x 16 in. (406 mm) deep, wall-mounted
- 15 in. (381 mm flat-panel HMI display with resistive touchscreen
- Weight 150 lbs. (68 kg)

#### Safety protection and alarm

Purged / Pressurized system for flammable gas fire and explosion prevention:

- Z-Purged enclosure, with alarm provision
- Temperature code T4

#### Alarm contacts

100 mA 30 V DC maximum, single pole normally open contact (open on alarm)

#### Alarm connections

2-wires, 28-18 AWG, cable through a conduit hub (¾ in. NPT suitable for the installation location)

#### Purging gas supply

Continuous air dilution system:

- Inlet port: ¼ in. tube compression fitting
- Compressed air service pressure 45 to 100 psig (4.10 to 7.89 bar)
- Operating flow rate up to 3.44 scfm (97.4 lpm), depending on analyzer type

N<sub>2</sub> gas leakage compensation system:

- Inlet port: ¼ in. tube compression fitting
- Nitrogen gas service pressure 45 to 100 psig (4.10 to 7.89 bar)
- Initial high flow purging 0.69 scfm (19.54 slpm) for 36 minutes
- Typical operating flow rate 0.067 scfm (1.90 slpm)

#### Power entry

AC power input:

- 90 to 250 V AC, 5 A, single phase, 47 to 63 Hz
- Connection requirement: 3 wires, 18 to 12 AWG, cable through rigid conduit hub or cable gland (¾ in. NPT suitable for the installation location)

DC power input:

- 24 V DC, 15 A (class 2 power source)
- Connection requirement: 3 wires, 18 to 12 AWG, cable through rigid conduit hub or cable gland (¾ in. NPT suitable for the installation location)

#### Power consumption

95 watts average on continuous run (290 watts at cold start)

For heated sample inlet option:

115 watts average on continuous run (340 watts at cold start)

#### Sample gas (\*heated sample inlet is an option)

Standard configuration:

- Inlet and outlet ports: ¼ in. tube compression fitting (process compatible)
- Sample gas flow 0.2 to 0.82 lpm (depending on analyzer type)
- Maximum sample temperature 221 °F (105 °C) for both inlet and outlet ports
- 7.25 psig (0.50 barg) pressure limit for both inlet and outlet ports
- 104 °F (40 °C) moisture dew point limit

#### Analog outputs 4 to 20 mA

(all analog outputs are options)

Gas concentration monitors

(4 to 20 mA linear analog\* signal):

- Channel 1: gas concentration 1
- Channel 2: gas concentration 2
- Channel 3: gas concentration 3
- Channel 4: gas concentration 4

Analyzer warning – fault monitor outputs

(4 to 20 mA multi-step signals [20 mA is normal status]):

- Channel 5: temperature warnings and alarms
- Channel 6: analyzer warnings and alarms

\* Analog output connection:

screw terminals, single-ended pairs 28 to 18 AWG signal wires (1 pair per channel), signal cables through conduit hubs (2 holes available, ½ in. NPT suitable for the installation location).

#### Remote I / O

Modbus TCP:

- RJ45 connector, cable through a conduit hub (½ in. NPT suitable for the installation location)
- Transmit all gas concentration values and analyzer warning status (Channel 1 to 6 above)

Ethernet:

- RJ45 connector, cable through a conduit hub (½ in. NPT suitable for the installation location)
- Remote access for data and analyzer controls

#### Local data access

(DR4 USB flash drive and bulkhead are options)

USB Flash Drive and bulkhead port 'Live Connect/

Disconnect in' module

- ROTA engineering DR4USB16G Flash Drive and DR4BFUSB10CAN bulkhead port
- Rated for Division 2 or Zone 2

## Environmental limits

### Ambient operating temperature:

- -20 to 50 °C (-4 to 122 °F)
- Analyzer must be sheltered from rain and direct sunlight

### Storage temperature:

-40 to 70 °C (-40 to 158 °F)

## Certifications



### Conformity to applicable EU Directives and Harmonized

#### Standards:

- 2014/35/EU (LVD), EN 61010-1
- 2004/108/EU (EMC), EN 61326-1

### Division 2 and Zone 2, Hazardous Area Certification

#### Options:

- 1 Class I Division 2 Group B, C, D, and IIB+H2:
  - Temperature Code T4
  - Standards: NEC and CEC, 61010-1, NFPA 496, NEMA 250, ISA 12.12.01, UL 60079-0, UL 60079-2, UL 60079-15
- 2 ATEX Zone 2:



- II 3G Ex pzc IIB+H2 T4 Gc -20 C < Ta < +50C - IP54
  - 2014/34/EU ATEX Directive: EN 60079-0, EN 60079-2, EN 60079-15
  - EN 61010, EN 61010-2-10 Laser Safety, EN 60825-1
  - 2004/108/EC EMC Directive, EN 61326-1
- 3 CSA for Canada and US:



- Class I Division 2 Group B, C, D, and Zone 2 Group IIB+H2
  - Temperature Code T4
  - Standards: NEC and CEC, 61010-1, NFPA 496, NEMA 250, ISA 12.12.01, UL 60079-0, UL 60079-2, UL 60079-15
- 4 IECEx:
    - Zone 2
    - Ex pzc IIB+H2 T4 Gc

## ...Specification

### X-Purged enclosure

#### Packaging

Single door NEMA 4 IP54 painted steel enclosure:

- 30 in. (762 mm) wide x 30 in. (762 mm) tall x 16 in. (406 mm) deep, wall-mounted
- X-Purge Controller Unit, 8 in. (203 mm) wide x 11 in. (279 mm) tall x 7 in. (178 mm) deep directly-mounted on top of enclosure
- 15 in. (381 mm flat-panel HMI display with resistive touchscreen
- Weight 170 lbs. (77 kg)

#### Safety protection and alarm

Purged / Pressurized system for flammable gas fire and explosion prevention:

- X-Purged enclosure, with alarm provision
- Power shut-down interlock
- Temperature code T4

#### Alarm contacts

100 mA 30 V DC maximum, single pole normally open contact (open on alarm)

#### Alarm connections

2-wires, 28-18 AWG, cable through a conduit hub (¾ in. NPT suitable for the installation location)

#### Purging gas supply

Continuous air dilution system:

- Inlet port: ¼ in. tube compression fitting
- Compressed air service pressure 45 to 100 psig (4.10 to 7.89 bar)
- Operating flow rate up to 3.44 scfm (97.4 lpm) depending on analyzer type

N<sub>2</sub> gas leakage compensation system:

- Inlet port: ¼ in. tube compression fitting
- Nitrogen gas service pressure 45 to 100 psig (4.10 to 7.89 bar)
- Nitrogen regulator setting 40 psig (2.76 bar)
- Initial high flow purging 0.69 scfm (19.54 slpm) for 36 minutes
- Typical operating flow rate 0.067 scfm (1.90 slpm)

#### Power entry

AC power input:

- 90 to 250 V AC, 5 A, single phase, 47 to 63 Hz  
**Note.** Requires manual jumper setting for a specific voltage input
- Connection requirement: 3 wires, 18 to 12 AWG, cable through rigid conduit hub or cable gland (¾ in. NPT suitable for the installation location)

DC power input:

- None (no DC power for X-Purge systems)

#### Power consumption

100 watts average on continuous run  
(295 watts at cold start)

For heated sample inlet option:

120 watts average on continuous run  
(345 watts at cold start)

**Sample gas** (\*heated sample inlet is an option)

Standard configuration:

- Inlet and outlet ports: ¼ in. tube compression fitting (process compatible)
- Sample gas flow 0.2 to 0.82 lpm (depending on analyzer type)
- Maximum sample temperature 221 °F (105 °C) for both inlet and outlet ports
- 7.25 psig (0.50 barg) pressure limit for both inlet and outlet ports
- 104 °F (40 °C) moisture dew point limit

#### Analog outputs 4 to 20 mA

(all analog outputs are options)

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(4 to 20 mA linear analog\* signal):

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Analyzer warning – fault monitor outputs

(4 to 20 mA multi-step signals [20 mA is normal status]):

- Channel 5: temperature warnings and alarms
- Channel 6: analyzer warnings and alarms

\* Analog output connection:

screw terminals, single-ended pairs 28 to 18 AWG signal wires (1 pair per channel), signal cables through conduit hubs (2 holes available, ½ in. NPT suitable for the installation location).

#### Remote I / O

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Ethernet:

- RJ45 connector, cable through a conduit hub (½ in. NPT suitable for the installation location)
- Remote access for data and analyzer controls

#### Local data access

None



## Environmental limits

### Ambient operating temperature:

- -20 to 50 °C (-4 to 122 °F)
- Analyzer must be sheltered from rain and direct sunlight

### Storage temperature:

- -40 to 70 °C (-40 to 158 °F)

## Certifications



### Conformity to applicable EU Directives and Harmonized Standards:

- 2014/35/EU (LVD), EN 61010-1
- 2004/108/EU (EMC), EN 61326-1

### Division 1 or 2 (Zone 1 or 2) Hazardous Area Certification

#### Options:

- 1 Class I Division 1 or 2 Group B, C, D, and IIB+H2:
  - Temperature Code T4
  - Standards: NEC and CEC, 61010-1, NFPA 496, NEMA 250, UL 1203, C22.2 No. 30, UL 913, C22.2 No. 157, UL 60079-0, UL 60079-1, UL 60079-2, UL 60079-11
- 2 ATEX Zone 1 or ATEX Zone 2:



#### Zone 1:

- II 2G Ex db ib pxb IIB+H2 T4 Gb  
-20 C < Ta < +50C – IP54
- 2014/34/EU ATEX Directive: EN 60079-0, EN 60079-1, EN 60079-2, EN 60079-11
- EN 61010, EN 61010-2-101 Laser Safety, EN 60825-1
- 2004/108/EC EMC Directive, EN 61326-1

#### Zone 2:

- II 3G Ex pxb IIB+H2 T4 Gc  
-20 C < Ta < +50C – IP54

- 3 CSA for Canada and US:



- Class I Division 1 (or 2) Group B, C, D, and Zone 1 (or 2) Group IIB+H2
- Temperature Code T4
- Standards: NEC and CEC, 61010-1, NFPA 496, NEMA 250, UL 1203, C22.2 No. 30, UL 913, C22.2 No. 157, UL 60079-0, UL 60079-1, UL 60079-2, UL 60079-11

- 4 IECEx Zone 1 or IECEx Zone 2:

#### Zone 1:

- Ex db ib pxb IIB+H2 T4 Gb

#### Zone 2:

- Ex pxb IIB+H2 T4 Gc

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## Notes



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