

ABB MEASUREMENT & ANALYTICS | DATA SHEET

EasyLine EL3000 Series

Continuous gas analyzers



Measurement made easy

Intelligently simple, simply intelligent

A wide variety of measurement technology

- Detectors for multiple process and emission monitoring applications
 - Up to five sample components per device
 - Suited for measuring flammable gases
 - Version in IP rating II 3G for measuring non-flammable gases
 - Performance-tested for emission monitoring in accordance with EN 15267
 - QAL3 monitoring in accordance with EN 14181 (optional)
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Straightforward handling

- Automatic calibration including control of pump and valves
 - Simplified calibration with air or integral calibration cells eliminating the need for test gas cylinders
 - Self-monitoring function indicates when maintenance is required
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Application-oriented design

- Housing design for 19-inch rack mounting or wall mounting
 - Integrated gas feed as an option in model EL3020
 - Ethernet, Modbus and PROFIBUS interfaces
 - Configurable analog outputs and digital inputs and outputs
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User-friendly operation

- Simple user interface
- Clear-text status messages
- Configuration of seldom required functions with configuration software

Overview of the gas analyzers

Measuring technology (analyzers)

The following analyzers are available for selection:

- Uras26 infrared photometer for the measurement of infrared-active gas components, e.g. CO, NO, SO₂,
- Ultraviolet photometer Limas23 to measure NO, NO₂ and SO₂.
- Magnos206 oxygen analyzer for the measurement of O₂ in process gas or in N₂,
- Magnos28 oxygen analyzer for the measurement of O₂ in process gas or in N₂,
- Magnos27 oxygen analyzer for the measurement of O₂ in flue gas or in N₂,
- The ZO23 trace oxygen analyzer is used for the measurement of O₂ in pure gases (N₂, CO₂, Ar).
- Caldos27 thermal conductivity analyzer for the measurement of binary gas mixtures with different thermal conductivity, e.g. Ar in O₂, H₂ in Ar, CH₄ in N₂
- Fidas24 flame-ionization detector for the measurement of hydrocarbons
- Electrochemical oxygen sensor for the measurement of O₂

Magnos206 and Magnos28 can also be used in combination with Uras26 or Limas23.

Magnos27 and Caldos27 can also be used in combination with Uras26.

Magnos28 can also be used in combination with Magnos28.

Magnos28 can also be used in combination with Caldos27.

Caldos27 can also be used in combination with Caldos27.

Fidas24 and ZO23 cannot be used in combination with one of the other analyzers.

The electrochemical oxygen sensor can only be used in combination with Uras26 or Limas23. Two electrochemical oxygen sensors can be used in combination with Uras26 with separate gas paths (only in model EL3020).

Each analyzer has one physical measurement range per sample component. A section of the physical measurement range can be mapped to the current output (analog output) by on-site configuration.

Calibration is always executed in the physical measurement range. The permissible measurement range limits are given by the specification of the smallest and largest measurement ranges for the individual analyzers.

A total of up to five measurement components can be measured with one gas analyzer.

Calibration

Calibration can be performed automatically or manually or externally controlled via the Modbus.

Automatic calibration – for all sample components together – is normally started on a cyclically time-controlled basis; it can also be started by an external control signal or via the Modbus as well as manually on the display and operator control unit of the gas analyzer.

Normally, simplified calibration methods with the built-in calibration cells or the so-called single-point calibration are used for automatic calibration. If calibration with test gases is required the control of solenoid valves for switching on five test gases, zero gas and sample gas via digital outputs can be configured.

Concept of operation

The functions required in normal operation are operated and configured directly on the gas analyzer.

The device functions which are only seldom required, e.g. during commissioning, are configured offline using the ECT configuration program ('EasyLine Configuration Tool' on the enclosed DVD-ROM) and then loaded into the gas analyzer.

QAL3 monitoring

The gas analyzer can optionally be equipped with QAL3 monitoring, used to fulfill the requirements in accordance with EN 14181 for the storage and analysis of device adjustment data. The QAL3 monitoring option features the following functions:

- Automatic acquisition, verification and documentation of drift and precision at zero and reference points
- Reporting via CUSUM and Shewhart control charts
- QAL3 data storage in the gas analyzer (maximum 1 year)
- QAL3 data display and read-out as well as parameter setting via web browser
- Status messages on deviations beyond requirements
- Data export for further processing with spreadsheet programs

... Overview of the gas analyzers

Electrical interfaces

The electrical interfaces for the output of measured values and communication with external systems include

- The integrated Ethernet-10/100BASE-T interface for
 - device configuration using the ECT configuration program
 - QAL3 data transfer if the QAL3 monitoring option is integrated in the gas analyzer
 - Data transmission using the Modbus TCP/IP protocol (measured values, status signals, control signals)

as well as the integrated I/O modules depending on the functional range and order

- Profibus module with one RS485 and one MBP interface (also in accordance with VDI 4201 Part 2),
- Modbus module with one RS232 and one RS485 interface (also in accordance with VDI 4201 Part 3),
- Digital I/O module with four digital inputs and four digital outputs,
- 2-way analog output module with two analog outputs,
- 4-way analog output module with four analog outputs.

Integral gas feed

The integral gas feed (optional in model EL3020) is available in two versions. It includes

- either the solenoid valve, pump, coarse filter, capillary tube and flow sensor modules
- or the flow sensor module.

Housing design

The EL3020 gas analyzer model features a 19-inch housing with 3 height units (4 height units with Magnus27) and IP rating IP20 (IP40 in version for emissions monitoring).

The housing for the EL3040 gas analyzer model is designed as wall-mount housing with degree of protection IP65.

Infrared Photometer Uras26

Measurement principle

Non-dispersive infrared absorption

Photometer with 1 or 2 beam paths (gas paths) to measure up to 4 sample components

Sample components and measurement ranges

Sample components and smallest measurement ranges

sample component	Smallest meas. range
CO	0...100 ppm
CO ₂	0...100 ppm
NO	0...150 ppm
SO ₂	0...100 ppm
N ₂ O	0...100 ppm
CH ₄	0...100 ppm

Measurement range quantity

2 measurement ranges

Measurement range limits

Smallest meas. range	Largest measurement range
0...100 ppm (NO: 0...150 ppm)	0...500 ppm (NO: 0...750 ppm)
0...200 ppm	0...1000 ppm
0...600 ppm	0...3000 ppm
0...2000 ppm	0...10000 ppm
0...0.6 vol.%	0...3 vol.%
0...2 vol.%	0...10 vol.%
0...6 vol.%	0...30 vol.%
0...20 vol.%	0...100 vol.%

An individual measurement range within the limits shown in the table can be factory-set on special order.

Measurement ranges are freely adjustable within the limits shown in the table.

Measurement ranges should not be set within ignition limits.

Version for use in air separation units

Only for binary gas mixtures consisting of the sample component in Ar, N₂ or O₂

sample component	Smallest/greatest measuring range
CO	0...10 ppm / 0...50 ppm
CO ₂	0...5 ppm / 0...25 ppm
N ₂ O	0...10 ppm / 0...50 ppm
CH ₄	0...20 ppm / 0...100 ppm

Other than the data valid for the standard version the following data apply for this version (in % of the smallest measurement range shown in the table):

Zero point drift: ≤ 1.5 % per day

Sensitivity drift: ≤ 1 % per week

Output signal fluctuation (2 σ): ≤ 0.5 % at T₉₀ = 15 s

Temperature effect: ≤ 2 % per 10 °C

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant. They relate to the smallest measurement range.

Linearity deviation

≤ 1 % of span

Repeatability

≤ 0.5 % of span

Zero point drift

≤ 1 % of span per week

Sensitivity drift

≤ 1 % of measured value per week

Output fluctuation (2 σ)

≤ 0.2 % of span at electronic T₉₀ time (static/dynamic) = 5/0 sec

Detection limit (4 σ)

≤ 0.4 % of span at electronic T₉₀ time (static/dynamic) = 5/0 sec

Influence effects

Flow effect

Flow rate in the 20...100 l/h range:

Associated gas effect/cross sensitivity

The knowledge of the sample gas composition is necessary for the analyzer configuration. Selectivation measures to reduce the associated gas effect (options): incorporation of interference filters or filter cells, internal electronic cross-sensitivity or carrier gas correction for one sample component by other sample components measured with the gas analyzer.

Temperature effect

Ambient temperature in the permissible range

- at zero point: ≤ 2 % of span per 10 °C
- on the sensitivity with thermostat effect:
 - ≤ 3 % of the measured value per 10 °C
- on the sensitivity with thermostat effect (optional): ≤ 2 % of the measured value per 10 °C
 - thermostat temperature = 55 °C

Air pressure effect

- at the zero point: no effect
- On sensitivity with pressure correction using an integrated pressure sensor: ≤ 0.2 % of the measured value per 1 % of air pressure change

The pressure sensor is located in the sample gas path if hoses are used as the internal gas lines. If stainless-steel tubing is used for internal gas lines the pressure sensor is routed to the outside via a hose.

Power supply effect

Voltage and frequency in the permissible range; no effect

... Infrared Photometer Uras26

Dynamic response

Warm-up time

Approx. 30 minutes without thermostat; approx. 2 hours with thermostat

T₉₀ time

T₉₀ ≤ 2.5 sec for sample gas flow = 60 l/h and electronic T₉₀ time (static/dynamic) = 5/0 sec

Calibration

Zero-point calibration

With inert gas, e.g. nitrogen, or with ambient air that is free of the sample component.

End-point calibration

With gas-filled calibration cells (optional) or with test gas mixtures. It is recommended to verify the calibration cell set values once a year.

Materials of the wetted parts

Analyzer (sample cells)

Tube: aluminum; window: CaF₂ or BaF₂; connectors: stainless steel 1.4305

Gas lines and connectors

Gas lines: FPM hoses or PTFE tubes; gas connectors: stainless steel 1.4305; solenoid valve gas connectors (optional in model EL3020): PVDF.

Design when flammable components are present in the sample gas: Gas lines: stainless steel tubes 1.4571; gas connectors: stainless steel 1.4305.

Gas connections

See page 28 and page 29

Sample gas inlet conditions

The analyzer must not be used for measurement of ignitable gas/air or gas/oxygen mixtures.

Temperature

The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required.

Pressure

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere. Internal pressure drop < 5 hPa with standard flow rate 60 l/h. Permissible absolute pressure range: 800...1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request. Overpressure in the sample cell max. 500 hPa.

Flow rate

20...100 l/h

Corrosive gases

Highly corrosive associated gas components, e.g. chlorine (Cl₂) and hydrogen chloride (HCl), as well as gases or aerosols containing chlorine must be cooled or undergo prior absorption.

Flammable gases

In the version with gas lines and gas connectors made of stainless steel the analyzer is suitable for measuring flammable gases in non-explosive environments (see page 23).

Ultraviolet photometer Limas23

Measurement principle

UV-RAS method (UV Resonance Absorption Spectroscopy) for sample component NO,
 NDUV method (Non-Dispersive UV Absorption Spectroscopy) method for sample components NO₂ and SO₂

Photometer to measure up to 3 components

Sample components and measurement ranges

Sample components and measurement ranges

sample component	Smallest/greatest measuring range
NO	0...50 ppm / 0...5000 ppm
NO ₂	0...50 ppm / 0...500 ppm
SO ₂	0...100 ppm / 0...5 vol.%

The NO_x measurement value can be evaluated as the sum of the NO and NO₂ measurement values and output at an analog output. The NO_x measuring range results from the sum of the NO and NO₂ measuring ranges.

NO processed through a converter can be indicated as sample component 'NO_x' on the display (factory-set). For indication of the NO_x measurement value in mg/m³, the factor 1.53 is taken into account for conversion of NO to NO_x (factory-set).

Measurement range quantity

2 measurement ranges

Measurement range limits

Smallest meas. range	Largest measurement range
0...50 ppm	0...250 ppm
0...100 ppm	0...500 ppm
0...200 ppm	0...1000 ppm
0...400 ppm	0...2000 ppm
0...1000 ppm	0...5000 ppm
0...4000 ppm	0...20000 ppm
0...1 vol.%	0...5 vol.%

An individual measurement range within the limits shown in the table can be factory-set on special order.

Measurement ranges are freely adjustable within the limits shown in the table.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant. They relate to the smallest measurement range.

Linearity deviation

≤ 1 % of span

Repeatability

≤ 0.5 % of span

Zero point drift

- For NO: ≤ 2 % of span per week
- For NO₂ and SO₂: ≤ 3 ppm per week for measuring ranges ≤ 100 ppm (daily automatic zero-point check is recommended), ≤ 2.5 % of span per week for measuring ranges > 100 ppm

Sensitivity drift

≤ 1 % of measured value per week

Output fluctuation (2 σ)

≤ 0.5 % of span at electronic T₉₀ time = 20 sec

Detection limit (4 σ)

≤ 1 % of span at electronic T₉₀ time = 20 sec

Influence effects

Flow effect

Flow rate in the 20...100 l/h range:

Associated gas effect/cross sensitivity

The knowledge of the sample gas composition is necessary for the analyzer configuration. Selectivation measures to reduce the associated gas effect (options): internal adjustment or internal electronic cross-sensitivity correction for one sample component by other sample components measured with the gas analyzer.

Temperature effect

Ambient temperature in the permissible range

- At zero point: ≤ 1 % of span per 10 °C
- on the sensitivity ≤ 1.5 % of the measured value per 10 °C

Air pressure effect

- at the zero point: no effect
- On sensitivity with pressure correction using an integrated pressure sensor: ≤ 0.2 % of the measured value per 1 % of air pressure change

The pressure sensor is located in the sample gas path.

Power supply effect

Voltage and frequency in the permissible range; no effect

... Ultraviolet photometer Limas23

Dynamic response

Warm-up time

Approx. 2 hours

T₉₀ time

T₉₀ ≤ 3 s at sample gas flow = 60 l/h and electronic

T₉₀ time = 0 sec

Calibration

Zero-point calibration

With inert gas, e.g. nitrogen, or with ambient air that is free of the sample component.

End-point calibration

With gas-filled calibration cells (optional) or with test gas (for each sample component). It is recommended to verify the calibration cell set values once a year.

Materials of the wetted parts

Analyzer (sample cell)

Tubing: aluminum; windows: CaF₂; connectors: stainless steel 1.4305. Optional: tubing, windows and connectors made of quartz glass.

Gas lines and connectors

Gas lines: FPM hoses;

Gas connectors: stainless steel 1.4305

Gas connections

See page 30

Sample gas inlet conditions

The analyzer must not be used for measurement of flammable gases and ignitable gas/air or gas/oxygen mixtures.

Temperature

The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required.

The internal temperature of the gas analyzer is at least 10 °C above ambient temperature.

Pressure

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere. Internal pressure drop < 5 hPa with standard flow rate 60 l/h. Permissible absolute pressure range: 800...1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request. Overpressure in the sample cell max. 500 hPa.

Flow rate

20...100 l/h

Corrosive gases

Highly corrosive associated gas components, e.g. chlorine (Cl₂) and hydrogen chloride (HCl), as well as gases or aerosols containing chlorine must be cooled or undergo prior absorption.

Note

The analyzer cannot be used in combination with the integral gas feed.

Oxygen analyzer Magnos206

Measurement principle

Paramagnetic behavior of oxygen

Magnetomechanical oxygen analyzer

Sample component and measuring ranges

sample component

Oxygen (O₂)

Smallest meas. range

0...2 Vol.-% O₂

Measurement range quantity

2 measurement ranges

Measurement range limits

Measurement ranges are freely adjustable;

they are factory-set per order 0...5 vol % O₂ or 0...100 vol.% O₂ or 98...100 vol.% O₂.

Largest measurement range

0...100 vol.% O₂

Measuring ranges within ignition limits cannot be provided.

Measurement ranges with suppressed zero-point

Suppressed measuring ranges are freely adjustable in the range 0...100 vol.% O₂. Smallest span 2 vol.% O₂. The combination of a suppressed and an initial measurement range is not possible.

Pressure correction with a pressure sensor is required. A pressure sensor is installed when the analyzer has been ordered with suppressed measurement range.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant. Relative information refers to the span of the measuring range; the smallest span is 2 vol.% O₂.

Linearity error

≤ 0.5 % of span

Repeatability

≤ 50 ppm O₂ (time base for gas exchange ≥ 5 minutes)

Zero point drift

≤ 3 % of span of the smallest measurement range (per order) per week, minimum 300 ppm O₂ per week; following prolonged transport and storage time the drift can be higher during the first weeks of operation.

Span drift

≤ 0.1 vol.% O₂ per week or ≤ 1 % of measured value per week (not cumulative), whichever is smaller;

≤ 0.25 % of measured value per year, minimum 0.05 vol.% O₂ per year

Output fluctuation (2 σ)

≤ 25 ppm O₂ at electronic T₉₀ time (static/dynamic) = 3/0 sec

Detection limit (4 σ)

≤ 50 ppm O₂ at electronic T₉₀ time (static/dynamic) = 3/0 sec

Influence effects

Flow effect

≤ 0.1 vol.% O₂ in the 30...90 l/h range

Associated gas effect

Data regarding the effect of associated gases can be found in IEC 61207-3: 2002 'Gas analyzers – Expression of performance – Part 3: Paramagnetic oxygen analyzers'.

Temperature effect

Ambient temperature in the permissible range

– at the zero point: ≤ 1 % of span per 10 °C, ≤ 2 % of span per 10 °C in combination with Uras26

– on the sensitivity ≤ 0.3 % of the measured value per 10 °C

Thermostat temperature = 64 °C

Air pressure effect

– on sensitivity without pressure correction:

≤ 1 % of the measured value per 1 % of air pressure change

– On sensitivity with pressure correction using integrated pressure sensor (option):

≤ 0.1 % of measured value per 1 % air pressure change;

for highly suppressed measuring ranges ≤ 0.01 % of measured value per 1 % air pressure change or ≤ 0.002 vol.% O₂ per 1 % air pressure change, whichever is greater.

Power supply effect

Voltage and frequency in the permissible range: ≤ 0.2 % of the span

Position effect

Zero-point shift ≤ 0.05 vol.% O₂ per 1° deviation from horizontal location. Position has no effect on the hard-mounted unit.

... Oxygen analyzer Magnos206

Dynamic response

Warm-up time

< 1 hour

T₉₀ time

T₉₀ approx. 4 sec at a sample gas flow = 90 l/h and electronic
T₉₀ time (static/dynamic) = 3/0 sec, gas change from nitrogen to air

Calibration

Zero-point calibration

With oxygen-free process gas or substitute gas

End-point calibration

With process gas with a known oxygen concentration or a substitute gas such as dried air

Single-point calibration

Zero-point calibration with any oxygen concentration, e.g. with nitrogen or ambient air, processed through a cooler or H₂O absorber.

Pressure correction by means of pressure sensor is recommended for single-point calibration with air.

Depending on the measurement task involved, the zero- and end-points should be verified periodically (recommendation: once a year).

Calibration of measurement ranges with suppressed zero-point

Highly suppressed measurement ranges ($\geq 95 \dots 100$ vol.% O₂) should only be calibrated with test gases having concentrations in the selected measuring range.

Materials of the wetted parts

Analyzer

Measuring chamber (direct connection): stainless steel 1.4305, glass, platinum, rhodium, epoxy resin; gaskets: FPM (fluorocarbon rubber), PEEK, FFKM

Gas connectors of the solenoid valve (option in model EL3020)

PVDF

Gas connections

See page 31

Sample gas inlet conditions

The analyzer must not be used for measurement of ignitable gas/air or gas/oxygen mixtures.

Temperature

The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required. Water vapor content variations cause volume errors.

Pressure

Operation under atmospheric pressure: the sample gas outlet is open to atmosphere. Internal pressure drop < 5 hPa with standard flow rate 60 l/h. Permissible absolute pressure range: 800...1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request.

Operation under elevated pressure: a pressure sensor is required for pressure influence compensation. Absolute pressure ≤ 1250 hPa: an optional internal pressure sensor can be connected to the sample gas path. Absolute pressure ≥ 1250 hPa: an external pressure sensor must be connected to the sample gas path.

The analyzer module is function-tested for 5000 hPa internal pressure without damage.

Flow rate

30...90 l/h

Corrosive gases

Consultation with ABB Analytical is required if the sample gas contains Cl₂, HCl, HF or other corrosive components. The AO2000-Magnos206 analyzer should be used if the sample gas contains NH₃.

Flammable gases

The analyzer is suited for measuring flammable gases in non-explosive environments (see page 23).

Oxygen analyzer Magnos28

Measurement principle

Paramagnetic behavior of oxygen

Magnetomechanical oxygen analyzer

Sample component and measurement range

sample component

Oxygen (O₂)

Smallest meas. range

0...0.5 vol.% O₂

Quantity and measurement range limits

2 measurement ranges

Range limits are freely adjustable. They are set at the factory per order to 0...5 vol.% O₂, 0...25/100 vol.% O₂ or 98...100 vol.% O₂

Largest measurement range

0...100 vol.% O₂

Measuring ranges within ignition limits cannot be provided.

Measurement ranges with suppressed zero-point

Suppressed measuring ranges are freely adjustable in the range 0...100 vol.% O₂.

Smallest span 0.5 vol.% O₂.

Multiple measuring ranges must be overlapping.

Pressure correction with a pressure sensor is required. A pressure sensor is installed when the analyzer has been ordered with suppressed measurement range.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant.

Linearity deviation

≤ 0.5 % of the span or 0.005 vol.% O₂ the greater value applies

Repeatability

≤ 50 ppm O₂

Zero point drift

≤ 3 % of the span of the smallest measuring range (in accordance with order) per week or 0.03 vol.% O₂ per week, whichever is greater.

The value may be elevated during first commissioning or after a longer service life.

Sensitivity drift

≤ 0.1 vol.% O₂ per week or ≤ 1 % of measured value per week (not cumulative), whichever is smaller; ≤ 0.15 % of measured value per three months, minimum 0.03 vol.% O₂ per 3 months, whichever is greater

Output fluctuation (2 σ)

≤ 25 ppm O₂ at electronic T₉₀ time (static/dynamic) = 3/0 sec

Detection limit (4 σ)

≤ 50 ppm O₂ at electronic T₉₀ time (static/dynamic) = 3/0 sec

Influence effects

Flow effect

Sample gas N₂: ≤ 0.1 vol.% O₂ in permissible flow rate range;
Sample gas air: ≤ 0.1 vol.% O₂ at a flow rate change of 10 l/h

Associated gas effect

Data regarding the effect of associated gases can be found in IEC 61207-3: 2002 'Gas analyzers – Expression of performance – Part 3: Paramagnetic oxygen analyzers'.

Temperature effect

Average temperature effect in permissible ambient temperature range:

- at zero point: ≤ 0.02 vol.% O₂ per 10 °C
- on sensitivity: ≤ 0.3 % of the measured value
- For highly suppressed measuring ranges (when factory configured): ≤ 0.01 Vol.% / 10 °C in the same measuring range

Thermostat temperature = 60 °C

For highly suppressed measuring ranges (≥ 99...100 vol.% O₂) and very small measuring ranges (≤ 0...1 vol.% O₂) greater temperature fluctuations (≥ 5 °C) at the installation site should be avoided.

Air pressure effect

- on sensitivity without pressure correction:
 - ≤ 1 % of the measured value per 1 % of air pressure change
- On sensitivity with pressure correction using integrated pressure sensor (option):
 - ≤ 0.1 % of measured value per 1 % air pressure change; for highly suppressed measuring ranges ≤ 0.01 % of measured value per 1 % air pressure change or ≤ 0.002 vol.% O₂ per 1 % air pressure change, whichever is greater.

Position effect

Zero-point shift ≤ 0.05 vol.% O₂ per 1° deviation from horizontal location. Position has no effect on the hard-mounted unit.

... Oxygen analyzer Magnos28

Dynamic response

Warm-up time

< 5 hours

The value may be elevated during first commissioning or after a longer service life.

T₉₀ time

T₉₀ ≤ 3 sec at a sample gas flow of 90 l/h and electronic T₉₀ time (static/dynamic) = 3/0 sec, gas change from nitrogen to air (applies to an analyzer unit only with Magnos28)

Calibration

Zero-point calibration

With oxygen-free process gas or substitute gas

End-point calibration

With process gas with a known oxygen concentration or a substitute gas such as dried air

Single-point calibration

Zero-point calibration with any oxygen concentration, e.g. with nitrogen or ambient air, processed through a cooler or H₂O absorber.

Pressure correction by means of pressure sensor is recommended for single-point calibration with air.

Depending on the measurement task involved, the zero- and end-points should be verified periodically (recommendation: once a year).

Calibration of measurement ranges with suppressed zero-point

Highly suppressed measuring ranges (≥ 95...100 Vol. % O₂) should be calibrated for the best possible accuracy with N₂ for the zero point and 100 % O₂ for the end point.

Single-point calibration can also be done within a suppressed measurement range. The O₂ concentration of the test gas must lie within the measurement range.

Materials of the wetted parts

Analyzer

Stainless steel 1.4305, nickel alloy, glass, PtNi, silicon, gold, PTFE; FPM gaskets, optional: FFKM75

Gas connectors of the solenoid valve (option in model EL3020)

PVDF

Gas connections

See page 35

Sample gas inlet conditions

The analyzer must not be used for measurement of ignitable gas/air or gas/oxygen mixtures.

Temperature

The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required. Water vapor content variations cause volume errors.

Pressure

Operation under atmospheric pressure: the sample gas outlet is open to atmosphere. Internal pressure drop < 5 hPa with standard flow rate 60 l/h. Permissible absolute pressure range: 800...1600 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request.

Operation under elevated pressure: a pressure sensor is required for pressure influence compensation. Absolute pressure ≤ 1250 hPa: an optional internal pressure sensor can be connected to the sample gas path. Absolute pressure ≥ 1250 hPa: an external pressure sensor must be connected to the sample gas path. Correction is done externally.

Flow rate

30...90 l/h

Changes in the sample gas flow rate should be avoided when using highly suppressed measuring ranges.

Corrosive gases

Consultation with ABB Analytical is required if the sample gas contains Cl₂, HCl, HF or other corrosive components. If the sample gas contains NH₃, FFKM75 gaskets must be used; in this case, the integral gas feed cannot be connected to the analyzer. The pressure sensor must not be connected to the sample gas path.

Flammable gases

The analyzer is suited for measuring flammable gases in non-explosive environments (see page 23).

Oxygen analyzer Magnos27

Measurement principle

Paramagnetic behavior of oxygen

Heavy-duty thermomagnetic analyzer

Sample component and measurement range

sample component

Oxygen (O₂) in flue gas or in nitrogen (N₂)

Smallest meas. range

0...10 Vol.-% O₂

Measurement range quantity

2 measurement ranges

Measurement range limits

The measuring range is factory-set in accordance with customer order.

Largest measurement range

0...100 vol.% O₂

Measuring ranges within ignition limits cannot be provided.

Stability

Linearity deviation

≤ 2 % of span

Repeatability

≤ 1 % of span

Zero point drift

≤ 1 % of span per week

Sensitivity drift

≤ 2 % of measured value per week

Output fluctuation (2 σ)

≤ 0.5 % of smallest measurement range span at electronic

T₉₀ time = 0 sec

Detection limit (4 σ)

≤ 1 % of smallest measurement range span at electronic T₉₀ time

= 0 sec

Influence effects

Flow effect

≤ 1 % of span at a flow change of ±10 l/h. At an identical flow rate for test and sample gases the flow rate effect is automatically compensated.

Associated gas effect

Magnos27 calibration applies only to the sample gas shown on the identification plate (= sample component + associated gas).

Temperature effect

Ambient temperature in the permissible range

– at zero point: ≤ 2 % of span per 10 °C

– on the sensitivity: ≤ 0.5 % of the measured value per 10 °C based on temperature at the time of calibration

Thermostat temperature = 63 °C

Air pressure effect

– at zero point: < 0.05 vol.% O₂ per 1 % air pressure change

– on sensitivity without pressure correction:

≤ 1.5 % of the measured value per 1 % of air pressure change

– On sensitivity with pressure correction using an integrated pressure sensor (option):

≤ 0.25 % of the measured value per 1 % of air pressure change

Operating altitude over 2000 m

Power supply effect

DC 24 V ±5 %: ≤ 0.2 % of span

Position effect

Approx. 3 % of smallest measurement range span per 1° deviation from horizontal orientation. Position has no effect on the hard-mounted unit.

... Oxygen analyzer Magnos27

Dynamic response

Warm-up time

2...4 hours

T₉₀ time

T₉₀ = 10...22 sec, depending on sample gas flow and on measurement cell connection (see page 36; applies to an analyzer unit only with Magnos27)

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

Materials of the wetted parts

Analyzer

Rust- and acid-resistant steel 1.4580 (SAE 316Cb) and 1.4305 (SAE 303), glass

Gas lines and connectors

Rust- and acid-resistant steel 1.4571 (SAE 316Ti) and 1.4305 (SAE 303), PVC-C, FPM

Gas connections

See page 36

Sample gas inlet conditions

The analyzer must not be used for measurement of flammable gases and ignitable gas/air or gas/oxygen mixtures.

Temperature

The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required. Water vapor content variations cause volume errors.

Pressure

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere. Internal pressure drop < 5 hPa with standard flow rate 60 l/h. Permissible absolute pressure range: 800...1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request. Overpressure in the sample chamber max. 100 hPa.

Flow rate

20...90 l/h

Note

The analyzer can only be mounted in the 19-inch housing (dimensional drawing see page 36). The analyzer cannot be used in combination with the integral gas feed.

Trace oxygen analyzer Z023

Measurement principle

Potentiometric measurement; zirconium dioxide cell for determination of the oxygen concentration in accordance with Nernst's equation; reference gas: ambient air.

The analyzer is used for the continuous measurement of oxygen in pure gases (N₂, CO₂, Ar). The measuring cell is catalytically inactivated to the extent that flammable carrier components in stoichiometric concentrations only negligibly reduce the oxygen value.

Sample component and measuring ranges

sample component

Oxygen (O₂)

Number of measuring ranges

2 measurement ranges

Measurement range limits

Measurement ranges are freely adjustable within the range 0...1 ppm to 0...250,000 ppm O₂; they are factory-set to 0...1/0...10 ppm O₂. The following measurement data refer to a span of 100 ppm O₂ with a regulated flow rate of 8 ± 0.2 l/h.

Stability

Linearity

Owing to the measurement principle, zirconium dioxide cells are base linear.

Repeatability

< 1 % of the measurement range or 100 ppb O₂ (whichever is greater)

Zero point drift

The zero point (reference point) is displayed if ambient air is present on the sample gas side. The value for air of 20.6 vol.% O₂ (for 25 °C and 50 % relative humidity) may deviate through aging of the cell. < 1 % of the measurement range per week or 250 ppb O₂ (whichever is greater)

Sensitivity drift

Depends on possible interfering components (catalyst poisons) in the sample gas and the aging of the cell. For pure gas measurements in N₂, CO₂ and Ar: < 1 % of the measuring range per week or 250 ppb O₂ (whichever is greater)

Output fluctuation (2 σ)

< ±0.5 % of the measured value or 50 ppb O₂ (whichever is greater)

Influence effects

Flow effect

≤ 300 ppbv O₂ in the permissible range

Associated gas effect

Inert gases (Ar, CO₂, N₂) have no effect. Flammable gases (CO, H₂, CH₄) in stoichiometric concentrations to the oxygen content: conversion O₂ < 20 % of the stoichiometric conversion. If higher concentrations of flammable gases are present, higher O₂ conversions must be expected. The concentration of flammable gases in the sample gas must not exceed 100 ppm.

Temperature effect

The effect of the ambient temperature in the permissible range of +5...+45 °C is < 2 % of the measured value or 50 ppb O₂ per 10 °C change in the ambient temperature (whichever is greater).

Air pressure effect

No effect through a change in air pressure; the sample gas must flow out of the outlet without back pressure.

Power supply effect

DC 24 V ±5 %: no effect

Position effect

No position effect for permanently installed instruments

... Trace oxygen analyzer ZO23

Dynamic response

Warm-up time

The operating temperature of the cell is reached after approx. 15 minutes. Offset calibration with reference gas (ambient air) after 2 hours flow. The measurement is ready-to-run after valves and lines have been purged with sample gas. Typical purging time for valves and lines: approx. 2...5 hours.

T₉₀ time

T₉₀ < 60 sec for the alternation of 2 test gases in the measuring range 10 ppm with a sample gas flow rate = 8 l/h and electronic T₉₀-time = 3 sec

Calibration

Offset calibration

The reference value for ambient air is calibrated at 20.6 vol.% by means of ambient air on the sample gas side.

End-point calibration

By means of test gas O₂ in N₂ (or in CO₂ or Ar); O₂ concentration in the measuring range, e.g. 10 ppm O₂

Function test

An extended response time or reduced sensitivity are dimensions for the correct functioning of the measuring cell. The function test can be carried out by feeding the sample gas without any additional test gases. On the basis of the progression of the test, it can be assessed whether the reaction time of the sensor lies within a specified tolerance. The function test is started manually and lasts approx. 15 minutes.

Materials of the wetted parts

Analyzer

Zirconium dioxide cell: ZrO₂, electrodes containing platinum; dust filter (option): PP; flow sensor (option): on semiconductor basis, nickel-plated brass

Gas lines and connectors

Stainless steel 1.4571, FPM and silicon hoses in the gas outlet; gas connections: stainless steel 1.4401/1.4305-

Gas connections

See page 37

Sample gas inlet conditions

The analyzer must not be used for measurement of ignitable gas/air or gas/oxygen mixtures.

Temperature

+5...+50 °C

Inlet pressure

p_e = ≤ 70 hPa

Outlet pressure

Atmospheric pressure

Flow rate

4...20 l/h. Use a metering valve to set the flow rate.

Corrosive gases

The presence of corrosive gases and catalyst poisons, e.g. halogens, gases containing sulfur and heavy-metal dust, leads to faster aging and/or destruction of the ZrO₂ cell.

Flammable gases

The analyzer is suited for measuring flammable gases in non-explosive environments (see page 23). The concentration of flammable gases in the sample gas must not exceed 100 ppm.

Purge gas

If case purging is selected, purging may only be carried out with air (not with nitrogen), since the ambient air is used as a reference gas.

Note

The analyzer cannot be used in combination with the integral gas feed.

Thermal conductivity analyzer Caldos27

Measurement principle

Difference in thermal conductivity of various gases

Micromechanical silicon sensor with especially short T_{90} time

Sample components and measurement ranges

Sample component and associated gas	Smallest meas. range	Smallest measurement range with suppressed zero-point
Air in Ar	0... 6 vol.%	94...100 vol.%
Ar in air	0... 6 vol.%	94...100 vol.%
Air in CO ₂	0... 10 vol.%	90...100 vol.%
CO ₂ in air	0... 10 vol.%	90...100 vol.%
Air in H ₂	0... 3 vol.%	–
H ₂ in air	0... 1 vol.%	–
Ar in He	0... 3 vol.%	98...100 vol.%
He in air	0... 2 vol.%	97...100 vol.%
Ar in CO ₂	–	50...100 vol.%
CO ₂ in Ar	0... 50 vol.%	–
Ar in H ₂	0... 3 vol.%	99...100 vol.%
H ₂ in Ar	0... 1 vol.%	97...100 vol.%
Ar in He	0... 3 vol.%	99...100 vol.%
He in Ar	0... 1 vol.%	97...100 vol.%
Ar in N ₂	0... 6 vol.%	94...100 vol.%
N ₂ in Ar	0... 6 vol.%	94...100 vol.%
Ar in O ₂	0... 10 vol.%	90...100 vol.%
O ₂ in Ar	0... 10 vol.%	90...100 vol.%
CH ₄ in H ₂	0... 4 vol.%	99...100 vol.%
H ₂ in CH ₄	0... 1 vol.%	96...100 vol.%
CH ₄ in N ₂	0... 6 vol.%	94...100 vol.%
N ₂ in CH ₄	0... 6 vol.%	94...100 vol.%
CO in H ₂	0... 3 vol.%	99...100 vol.%
H ₂ in CO	0... 1 vol.%	97...100 vol.%
CO ₂ in H ₂	0... 3 vol.%	99...100 vol.%
H ₂ in CO ₂	0... 1 vol.%	97...100 vol.%
CO ₂ in N ₂	0... 10 vol.%	90...100 vol.%
N ₂ in CO ₂	0... 10 vol.%	90...100 vol.%
H ₂ in N ₂	0... 1 vol.%	97...100 vol.%
N ₂ in H ₂	0... 3 vol.%	99...100 vol.%
H ₂ in NH ₃	0... 10 vol.%	90...100 vol.%
NH ₃ in H ₂	0... 10 vol.%	90...100 vol.%
He in N ₂	0... 2 vol.%	97...100 vol.%
N ₂ in He	0... 3 vol.%	98...100 vol.%

Sample components and measurement ranges for monitoring hydrogen-cooled turbo generators

Sample component and associated gas	Measurement range
CO ₂ in air or Ar in air	0... 100 vol.%
H ₂ in CO ₂ or H ₂ in Ar	100... 0 vol.%
H ₂ in air	100... 80 vol.%

Other sample components on request.

Measurement range quantity

2 measurement ranges

Measurement range limits

Measurement ranges are freely adjustable within the limits shown in the table.

Largest measurement range

0...100 vol.% or 0 vol.%...saturation, depending on measurement task. Measurement ranges should not be set within ignition limits.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant. They are based on the smallest measuring ranges given in the table; the deviations may be larger for smaller measurement ranges.

Linearity deviation

≤ 2 % of span

Repeatability

≤ 1 % of span

Zero point drift

≤ 2 % of smallest possible measuring range per week

Sensitivity drift

≤ 0.5 % of the smallest provided measuring range per week

Output fluctuation (2 σ)

≤ 0.5 % of smallest measurement range span at electronic T_{90} time = 0 sec

Detection limit (4 σ)

≤ 1 % of smallest measurement range span at electronic T_{90} time = 0 sec

Influence effects

The following data relate to smallest measurement ranges given in the table. The influence effects will be larger at operating altitudes > 2000 meters.

Flow effect

≤ 0.5 % of span at a flow change of ±10 l/h. At an identical flow rate for test and sample gases the flow rate effect is automatically compensated.

Associated gas effect

The knowledge of the sample gas composition is necessary for the analyzer configuration. If the sample gas contains components in addition to the sample component and associated gas (binary gas mixture), this will result in erroneous measurements.

Temperature effect

Ambient temperature in the permissible range, in any point of the measuring range: ≤ 1 % of span per 10 °C, based on the temperature at the time of calibration
Thermostat temperature = 60 °C

Air pressure effect

≤ 0.25 % of span per 10 hPa for the smallest possible ranges given; for larger spans, the effect is correspondingly lower.

Power supply effect

Voltage and frequency in the permissible range: ≤ 0.2 % of the span

Position effect

< 1 % of span up to 30° deviation from horizontal orientation

... Thermal conductivity analyzer Caldos27

Dynamic response

Warm-up time

Approx. 30 minutes

T₉₀ time

T₉₀ ≤ 2 sec for sample gas flow = 60 l/h and electronic T₉₀ time (static/dynamic) = 0/0 sec

Calibration

Zero-point calibration

With test gas, measurement component-free process gas or substitute gas

End-point calibration

With test gas, process gas having a known sample gas concentration or substitute gas

Single-point calibration

A single-point calibration can be performed with standard gas, since the zero- and end-points will not drift independently due to the sensor principle employed. This technique leaves out safety-related measurements. Depending on the measurement task involved, the zero- and end-points should be verified periodically (recommendation: once a year).

Materials of the wetted parts

Analyzer

Measurement chamber (direct connection): stainless steel 1.4305; sensor: gold, silicon oxo-nitride; gasket: FFKM75 (Perfluoro rubber)

Gas connectors of the solenoid valve (option in model EL3020)

PVDF

Gas connections

See page 40

Sample gas inlet conditions

The analyzer must not be used for measurement of ignitable gas/air or gas/oxygen mixtures.

Temperature

+5...+50 °C

The sample gas dew point should be at least 5 °C below the lowest temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required. Water vapor content variations cause volume errors.

Pressure

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere. Internal pressure drop < 5 hPa with standard flow rate 60 l/h. Permissible absolute pressure range: 800...1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request. Overpressure in the sample chamber max. 100 hPa.

Flow rate

standard 10...90 l/h, min. 1 l/h

Corrosive gases

Consultation with ABB Analytical is required if the sample gas contains Cl₂, HCl, HF, SO₂, NH₃, H₂S or other corrosive components.

Flammable gases

The analyzer is suited for measuring flammable gases in non-explosive environments (see page 23).

Flame-ionization detector Fidas24

Measurement principle

Flame-ionization detector

The analyzer complies with the requirements for measuring instruments with flame ionization detection according to EN 12619.

Sample components and measurement ranges

Sample components

Hydrocarbons (THC). The sample component concentration in the sample gas should not exceed 100 % of the LEL.

Number of sample components

1 sample component

Smallest meas. range

0...5 to 0...1500 mg org. C/m³ or
0...10 to 0...3000 ppm C1

Largest measurement range

0...18 to 0...5000 mg org. C/m³ or
0...35 to 0...10000 ppm C1

Measurement range quantity

2 measurement ranges

Measurement range limits

The measurement range limits can be freely set in the ranges specified above.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant. They apply to measurement ranges ≥ 50 mg org. C/m³, for smaller ranges these only apply if they are factory-set per customer order.

Linearity deviation

≤ 2 % of span to 5000 mg org. C/m³
this value applies in one (calibrated) measuring range

Repeatability

≤ 0.5 % of measurement range

Zero-point and sensitivity drift

≤ 0.5 mg org. C/m³ per week

Output fluctuation (2 σ)

≤ 0.5 % of span at electronic T₉₀ time = 20 sec, not smaller than 10 μ g org. C/m³

Detection limit (4 σ)

≤ 1 % of span at electronic T₉₀ time = 20 sec, not smaller than 20 μ g org. C/m³

Influence effects

Oxygen dependence

≤ 2 % of measured value for 0...21 vol.% O₂ or
 ≤ 0.3 mg org. C/m³, the larger value applies

Temperature effect

Ambient temperature in permissible range at zero-point and on sensitivity: ≤ 2 % per 10 °C
in measuring range 0...15 mg org. C/m³

Pressure effect

No effect of ambient pressure or process pressure fluctuations within the permissible sample gas inlet pressure range

Power supply effect

DC 24 V ± 5 %: ≤ 0.2 % of the span or
AC 230 V ± 10 %: ≤ 0.2 % of the span or
AC 115 V ± 10 %: = 0.2 % of the span

... Flame-ionization detector Fidas24

Dynamic response

Warm-up time

≤ 2 hours

T₉₀ time

T₉₀ < 1.5 sec at sample gas flow = 80 l/h and electronic

T₉₀ time = 1 sec

Calibration

Zero-point calibration

With synthetic air or catalytically purified air or nitrogen, depending on application

Sensitivity calibration

With propane or another hydrocarbon (substitute gas) in air or nitrogen, depending on application

Materials of the wetted parts

Analyzer, gas lines and connectors

Stainless steel 1.4305 (SAE 303) and 1.4571 (SAE 316Ti), FPM, PTFE, FFKM

Gas connections

See page 41

Operating gases and test gases

Instrument air

Quality per ISO 8573-1 class 2 (max. particle size 1 µm, max. particle concentration 1 mg/m³, max. oil content 0.1 mg/m³, pressure dew point at least 10 °C below the lowest foreseeable ambient temperature), inlet pressure p_e = 4000 ± 500 hPa, flow rate typically approx. 1800 l/h (1200 l/h for air injector and approx. 600 l/h for housing purge), maximum approx. 2200 l/h (1500 l/h + 700 l/h)

Combustion air

Synthetic air or catalytically purified air with an organic C content C < 1 % MBU, inlet pressure p_e = 1200 ± 100 hPa, flow rate < 20 l/h

Combustion gas

Hydrogen (H₂), grade 5.0, or H₂/He mixture (40/60 %), inlet pressure p_e = 1200 ± 100 hPa, flow rate ≤ 3 l/h (H₂) or approx. 10 l/h (H₂/He).

A flow limiting device must be provided on the hydrogen supply (see section 'Safe operation of the gas analyzer').

Test gases

Zero point calibration: nitrogen, grade 5.0, or synthetic air or catalytically purified air

Sensitivity calibration: sample component or substitute gas component in nitrogen or air,

inlet pressure p_e = 1000 ± 100 hPa, flow rate 130...250 l/h

Sample gas inlet conditions

The sample gas may not be explosive at any time.

The analyzer must not be used for measurement of gases containing organometallic compounds, e.g. leaded gasoline additives or silicone oils.

Temperature

≤ thermostat temperature

(Thermostat temperature for sample gas path, detector and air injector ≤ 200 °C, factory-set to 180 °C)

Inlet pressure

p_{abs} = 800...1100 hPa

Outlet pressure

Atmospheric pressure

Flow rate

approx. 80...100 l/h at atmospheric pressure (1000 hPa)

Moisture content

≤ 40 % H₂O

Flammable gases

The analyzer can be used for measurement of flammable gases as long as the total flammable portion does not exceed 15 vol.% CH₄ or C1 equivalents.

Note

The analyzer cannot be used in combination with the integral gas feed.

Safe operation of the gas analyzer

The device concept ensures that a concentration of combustible gas or an explosive mixture of combustible gas and ambient air cannot occur in the interior of the gas analyzer during normal operation. The interior of the gas analyzer cannot be allocated to an (explosion protection) zone; an explosive gas mixture cannot escape to the outside.

The end user must make the following provisions to ensure safe operation of the gas analyzer:

- The combustion gas flow rate must be limited to a maximum of 10 l/h of H₂ or 25 l/h of H₂/He mixture. For this purpose, the end user has to provide suitable measures outside the gas analyzer.
- A shut-off valve must be installed in the combustion gas supply line to increase the safety in the following operating states: shutting down the gas analyzer, failure of the instrument air supply, leakage in the combustion gas feed path inside the gas analyzer. This shut-off valve should be installed outside the analyzer house in the vicinity of the combustion gas supply.

Electrochemical oxygen sensor

Measurement principle

Electrochemical oxygen sensor

Sample component and measuring ranges

sample component

Oxygen (O₂)

Smallest meas. range

0...5 vol.% O₂

Measurement range

set at the factory: 0...25 vol. % O₂;
adjustable from 0...5 vol. % O₂ to 0...25 vol. % O₂

Stability

Linearity deviation

Linear in the range > 1 vol.% O₂

Repeatability

≤ 0.5 % of span

Zero point drift

Stable over long-term due to absolute zero point

Sensitivity drift

≤ 1 % of the measurement range per week

Output fluctuation (2 σ)

≤ 0.2 % of the measurement range at electronic T₉₀ time
(static/dynamic) = 5/0 sec

Detection limit (4 σ)

≤ 0.4 % of the measuring range scope with electronic T₉₀ time
(static/dynamic) = 5/0 sec

Influence effects

Flow effect

Flow rate in the 20...100 l/h range:
≤ 2 % of the measuring range scope

Temperature effect

Ambient temperature in the range of +5...+40 °C:
≤ 0.2 vol.% O₂ per 10 °C

Air pressure effect

- at the zero point: no effect
- on sensitivity without pressure correction:
≤ 1 % of the measured value per 1 % of air pressure change
- on sensitivity with pressure correction:
≤ 0.2 % of the measured value per 1 % air pressure change
Pressure correction is only possible if the oxygen sensor is connected to the Uras26 infrared photometer with integrated pressure sensor.

Power supply effect

Voltage and frequency in the permissible range:
≤ 0.2 % of the measuring range scope

Dynamic response

T₉₀ time

T₉₀ ≤ 30 sec for sample gas flow = 60 l/h and electronic T₉₀ time
(static/dynamic) = 5/0 sec

Calibration

Zero-point calibration

The oxygen sensor zero is not calibrated since it is fundamentally stable.

End-point calibration

With ambient air at 20.96 vol.% O₂

Materials of the wetted parts

Sensor: Polystyrol ABS, PTFE, FPM (Fluorocarbon rubber); Housing body: PVC-U, FPM gasket (Fluorocarbon rubber); gas ports: stainless steel 1.4571

Sample gas inlet conditions

The oxygen sensor must not be used for measurement of flammable gases and ignitable gas/air or gas/oxygen mixtures.

Temperature

The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required.

Pressure

The sample gas pressure is determined by the analyzer the oxygen sensor is combined with (see Note below).

Flow rate

20...100 l/h

Moisture content

H₂O dew point ≥ 2 °C

The oxygen sensor should not be used with dry sample gas.

Associated gas

The oxygen sensor may not be used if the associated gas contains the following components: H₂S, chlorine or fluorine compounds, heavy metals, aerosols, mercaptans, and alkaline components.

Note

The oxygen sensor can only be used in combination with Uras26 or Limas23 in the sample gas path. Two oxygen sensors can be used in combination with Uras26 with separate gas paths (only in model EL3020). The oxygen sensor cannot be used when the internal gas lines in the Uras26 are made up of stainless steel or PTFE pipes.

Integral gas feed

Type

The integral gas feed (optional in model EL3020) is available in two versions. It includes

- either the solenoid valve, pump, coarse filter, capillary tube and flow sensor modules
- or the flow sensor module.

Test gas supply

Type

3/2-way solenoid valve

Power consumption

approx. 3 W

Materials of the wetted parts

PVDF, FPM

Gas feed

Type

Magnetic piston pump

Feed rate

Max. 60 l/h, depending on the analyzer type and inlet/outlet pressure

Flow rate

Adjustable

Power consumption

approx. 10 W

Materials of the wetted parts

PVDF, EPDM, stainless steel 1.4571

Flow monitor

Type

Miniature flow sensor

Materials of the wetted parts

Al₂O₃, silicon, gold, GRP

Sample gas inlet conditions

The integral gas feed modules must not be used for measurement of flammable gases and ignitable gas/air or gas/oxygen mixtures.

Temperature

+5...+45 °C

The sample gas dew point should be at least 5 °C below the lowest temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required.

Flow rate

30...60 l/h

Corrosive gases

Corrosive associated gas components and aerosols must be cooled or undergo prior absorption.

Note

The integral gas feed cannot be used when the internal gas lines are made up of stainless steel or PTFE pipes. It cannot be used in combination with Limas23, Magnos27, ZO23 or Fidas24.

Special versions

Version for measurement of flammable gases

In the version with gas lines and connectors made of stainless steel the gas analyzer (models EL3020 and EL3040) with Uras26, Magnos206, Magnos28 (model EL3020 only), Caldos27 and ZO23 (concentration max. 100 ppm) is suitable for measuring flammable gases in non-explosive environments.

In model EL3040, housing purge with nitrogen (ZO23: with air) must be provided.

The positive pressure in the sample gas feed path may not exceed a maximum value of 100 hPa in normal operation and a maximum value of 500 hPa in the event of a fault.


The gas analyzer with Magnos28 can be used up to an absolute pressure of 1200 hPa.

The special requirements must be observed (see operating instruction).

Version with IP rating II 3G for installation in potentially explosive atmospheres for measurement of non-flammable gases and vapors

The gas analyzer (model EL3040) with Uras26, Magnos206, Magnos28, Caldos27 and oxygen sensor is approved for explosion protection and suited for use in potentially explosive atmospheres when in compliance with the specification.

The gas analyzer may be used for measurement of non-flammable gases and vapors. It is marked according to the European directive 2014/34/EU with

 II 3G Ex nA nC IIC T4 Gc

In undisturbed operation there cannot be any sparking, arcing or impermissible temperatures inside the device. Explosion protection guaranteed by: non-sparking instruments and equipment with low power consumption; sealed or encapsulated devices.

The gas analyzer with Magnos28 can be used for non-flammable sample gas up to an absolute pressure of 1600 hPa.

Type Examination Certificate No. BVS 16 ATEX E 085 X

Housing protection IP65

The special requirements must be observed (see operating instruction).

General data

Display and operation

Display

Backlit graphics display, 240 x 160-pixel resolution

Measured value display

- Numerical value with physical unit, also with bargraph indication in single display
- Resolution better than 0.2 % of the measurement span
- Simultaneous display of up to 5 measured values
- Flow: bar graph indication

Status indication

Symbols in the display; the active status messages can be accessed directly from the measured value display

Operation

5 keys (cursor cross and OK); menu-assisted operation

Measuring range switchover and measuring range feedback

The measuring range can be switched over either manually on the gas analyzer or automatically ("autorange") by means of appropriately configured switch-over thresholds or externally controlled via appropriately configured digital inputs. The measuring range feedback can be implemented via appropriately configured digital outputs; it is independent of the selected type of measuring range switch-over. The gas analyzer is set ex works to measuring range 2 and to manual measuring range switch-over.

Limit value monitoring

Limit values can be set using the configuration software ECT ('EasyLine Configuration Tool' on the enclosed DVD-ROM). The limit value signals (alarms) are output via digital outputs.

Housing

	Model EL3020	Model EL3040
Type	19-inch housing	Wall-mount housing
Protection type	IP20 (IP40 ¹⁾)	IP65
Materials		
Housing	Galvanized sheet steel	Stainless steel 1.4016 (SAE 430)
Outer surfaces varnished		
Analyzer rear panel	Aluminum, PVC-C	Aluminum, PVC-C
Keypad sheet	Polyester	Polyester
Colors	Light gray (RAL 7035), basalt gray (RAL 7012)	
Weight	approx. 7...15 kg	approx. 13...21 kg
Dimensions	See page 42	See page 43

1) with version for emissions measurement

Housing purge

Possible only with model EL3040 (wall-mount housing).

Housing purge is mandatory when measuring flammable gases (see page 23). Purge gas flow during operation min. 10 l/h, max. 20 l/h; purge gas pressure $p_e = 2...4$ hPa.

... General data

Pressure sensor

Use

Standard in Uras26, Limas23, Caldos27;
Optional in Magnos206, Magnos28 and Magnos27

Working range

$p_{abs} = 600 \dots 1250 \text{ hPa}$

Materials of the wetted parts

Silicone gel, plastics, FPM (Fluorocarbon rubber)

Sample gas composition

The pressure sensor must not be connected to the sample gas path when the sample gas is corrosive, flammable or explosive.

Fine filtration

Type

Disposable filter with borosilicate glass microfiber filter element (supplied as accessory)

Retention rate

99.99 % for particles > 0.1 μm

Materials of the wetted parts

Polyamide, borosilicate glass with PVDF binder

Safety

Tested to EN 61010-1:2010

Protection class I

Overvoltage category/pollution degree

Power supply: II/2, other power circuits: II/2

Safe isolation

The power supply is galvanically isolated from other circuits by means of reinforced or double insulation. Protective extra-low voltage (PELV) on low-voltage side

Electromagnetic compatibility

Noise immunity

Tested to EN 61326-1:2013. Inspection level: industrial area, fulfills at least the evaluation criteria in accordance with Table 2 of EN 61326.

Emitted interference

Tested to EN 61326-1:2013. Limit value class B for interference field strength and interference voltage is met.

Mechanical stress

Operation

Vibration test to EN 60068-2-6:1996 In Uras26, slight transient effects on the measured value can occur in the region of the modulation frequency.

Transport

Vibration test per EN 60068-2-6:1996. Shock test per EN 60068-2-27:1995. In its original packaging, the gas analyzer will withstand normal shipping conditions.

Installation site requirements

Installation location

The gas analyzer is intended for indoor installation only. Installation location altitude max. 2000 m above sea level (over 2000 m on request)

Ambient temperature

During operation: +5...+45 °C, Uras26 in combination with another analyzer, Limas23, Fidas24: +5...+40 °C; during storage and transport: -25...+65 °C

Relative humidity

< 75 %, no condensation

Air circulation

For sufficient air circulation, multiple housings in a 19-inch rack must be installed with a separation of at least 1 HU between housings.

Power supply

Input voltage

AC 100...240 V, - 15/+ 10 %, 50...60 Hz \pm 3 Hz

Power consumption

Max. 187 VA

Connection

3-pin grounded instrument connector in accordance with EN 60320-1/C14; connection cable supplied. See page 25 for connection drawing.

Analyzers

Input voltage

DC 24 V \pm 5 %

Power consumption

Uras26:	max. 95 W	Magnos27:	max. 35 W
Limas23:	max. 100 W	ZO23:	max. 35 W
Magnos206:	max. 50 W	Caldos27:	max. 17 W
Magnos28:	max. 50 W	Fidas24:	max. 40 W

Fidas24: Heating of detector and sample gas inlet

Input voltage

AC 115 V or 230 V, \pm 15 % (max. 250 V), 47...63 Hz

Power consumption

125 VA for detector heating,
125 VA for heated sample gas inlet (option)

Connection

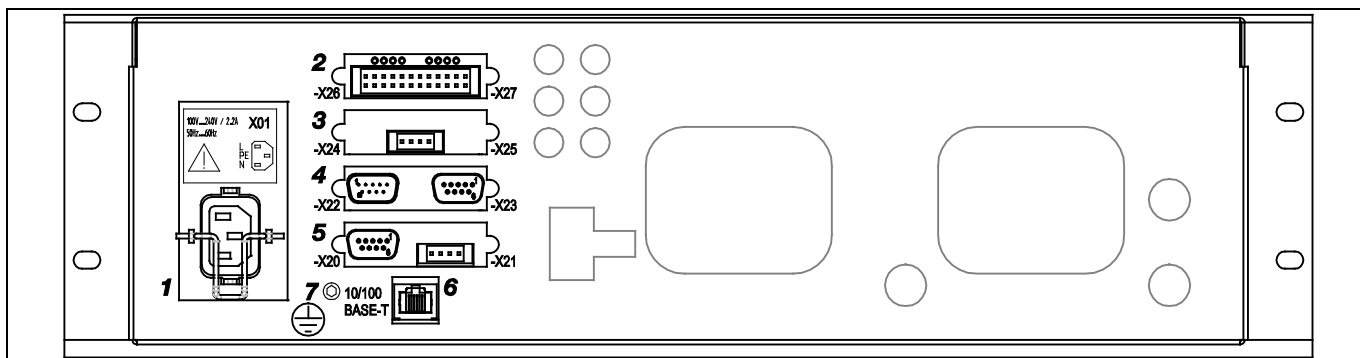
4-pin male connector, connection cable included in scope of supply. See page 41 for connection drawing.

Note regarding the analyzers performance characteristics

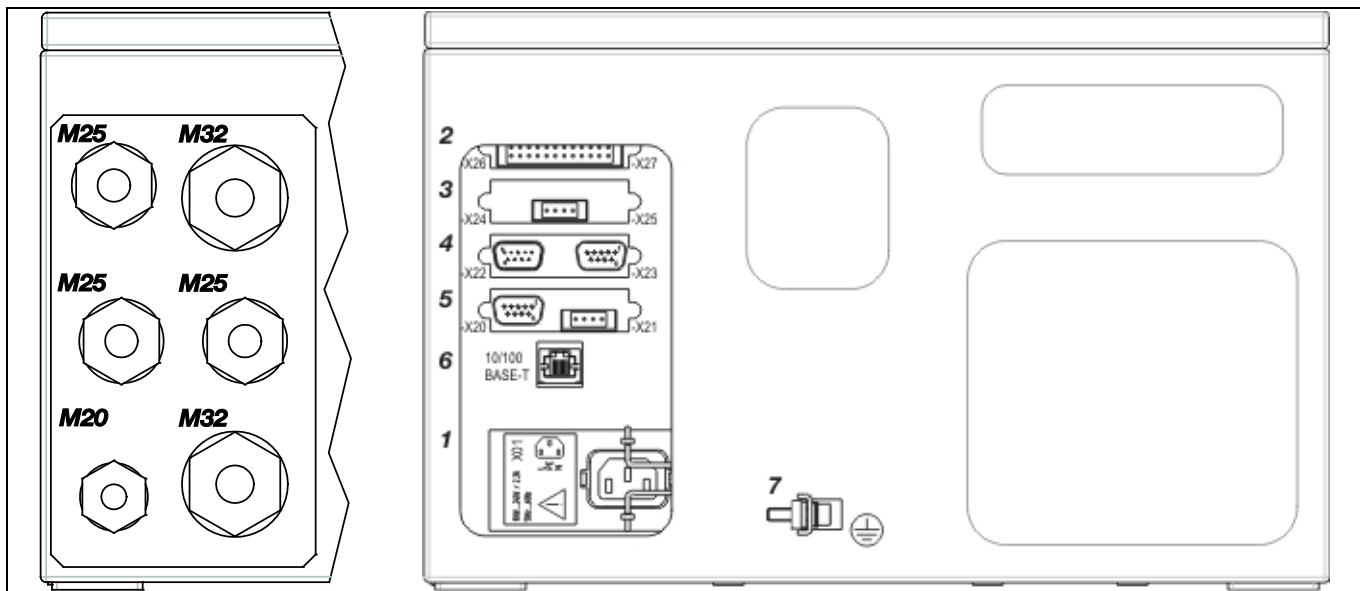
The measurement-related data of the analyzers has been determined in accordance with IEC 61207-1:2010 'Expression of performance of gas analyzers – Part 1: General'. They are based on operation at atmospheric pressure (1013 hPa) and nitrogen as the associated gas. Compliance with these characteristics when measuring other gas mixtures can only be assured if their composition is known. The physical detection limit is the lower limit of the measurement-related data relative to the measuring range span.

Electrical connections

Power supply and signal lines model EL3020 (view from behind)



Power supply and signal lines model EL3040 (view from behind)



- 1 Power supply connection
(3-pin grounded-instrument connector in accordance with EN 60320-1/C14, connection cable included in scope of supply)
- 2 Digital I/O module (max. 3 modules, see page 27)
- 3 Analog output module (max. 2 modules, see page 26)
- 4 Modbus module (RS232 and RS485 interface, see page 26)
- 5 Profibus module (RS485 and MBP interface, see page 26)
- 6 Ethernet-10/100BASE-T interface
(8-pin RJ45 female connector)
- 7 Potential compensation connection
(terminal capacity max. 4 mm²)

Screwed cable glands for cable diameter:

M20	Power supply	5...13 mm
M25	Modbus/Profibus	8...17 mm
M25	Network	8...17 mm
M25	Analog outputs	8...17 mm
M32	Digital input/outputs	12...21 mm
M32	Digital input/outputs	12...21 mm

Note

Both drawings show examples for equipment with I/O-modules.

Notes for I/O module connection

- The maximum capacity of terminals for stranded or solid conductors is 1 mm² (17 AWG).
- The stranded conductor may be tinned on the tip or twisted for simplified connection.
- When using wire end ferrules the total section should not exceed 1 mm², i.e. the maximum stranded conductor section cannot be greater than 0.5 mm². The Weidmüller PZ 6/5 crimping tool must be used for crimping the ferrules.

I/O modules

Profibus module

Electrical connections

RS485 interface:

- 1 – not used
- 2 M24 24 V output ground, max. 0.2 A
- 3 RxD/TxD-P Receive/transmit data plus, B-line
- 4 – not used
- 5 DGND Data transmission potential (reference pot. for VP)
- 6 VP Supply voltage plus (5 V)
- 7 P24 24 V output voltage plus
- 8 RxD/TxD-N Receive/transmit data N, A-line
- 9 – not used

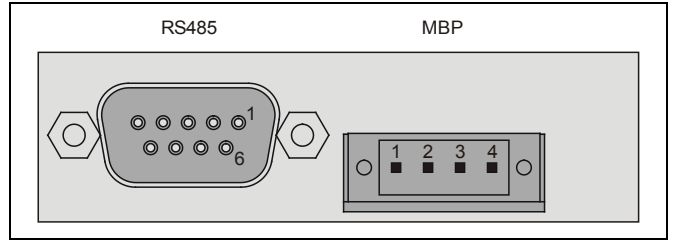
Design: 9-pin sub-D female connector

MBP interface (non-intrinsically safe):

- 1 +
- 2 Shield
- 3 -
- 4 not used

Design: 4-pin terminal strip. Observe the notes regarding I/O module connection (see page 25)!

Connection diagrams



Modbus module

Electrical connections

RS232 Interface:

- 2 RxD
- 3 TxD
- 5 GND

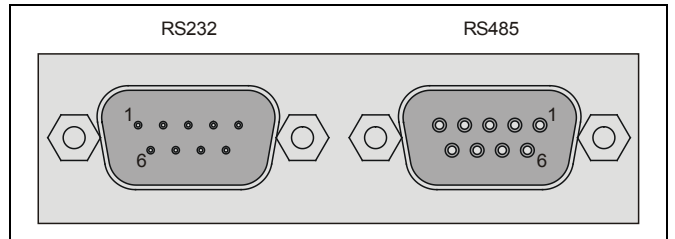
Design: 9-pin sub-D female connector

RS485 interface:

- 2 RTxD-
- 3 RTxD+
- 5 GND

Design: 9-pin sub-D female connector

Connection diagrams



Analog output modules

Analog outputs (AO1...AO4)

0/4...20 mA (configurable, factory-set to 4...20 mA), common negative pole, electrically isolated from ground, freely connectible to ground, max. gain relative to protective ground potential 50 V, max. load 750 Ω. Resolution 16 bit. The output signal cannot be lower than 0 mA.

Terminal assignment

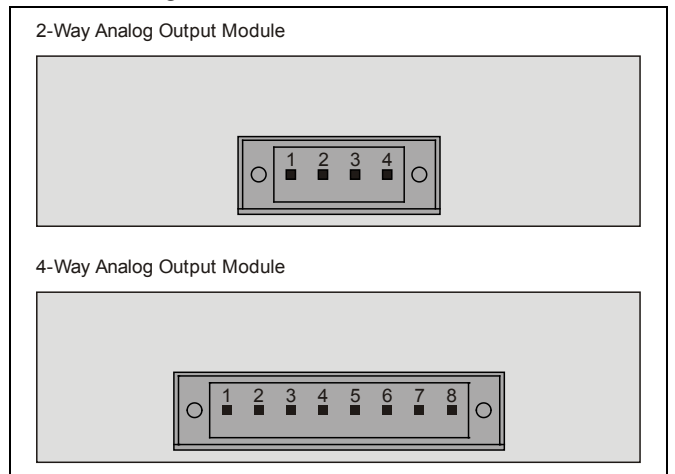
An analog output is allocated in the sequence of the sample components for each sample component. The sequence of the sample components is documented in the analyzer data sheet and on the type plate.

Electrical connections

- 1 AO1+ } with 2-way analog output module and
- 2 AO1- | 4-way analog output module
- 3 AO2+ } with 2-way analog output module and
- 4 AO2- | 4-way analog output module
- 5 AO3+ } only with
- 6 AO3- | 4-way analog output module
- 7 AO4+ } with 2-way analog output module and
- 8 AO4- | 4-way analog output module

Design: 4-pin or 8-pin terminal strip. Observe the notes regarding I/O module connection (see page 25)!

Connection diagrams



Digital I/O module

Digital inputs (DI1...DI4)

Optocouplers with internal DC 24 V power supply, jointly electrically isolated from ground. Control with floating contacts, with external voltage DC 12...24 V or with open collector drivers PNP or NPN.

Digital outputs (DO1...DO4)

Floating double-throw contacts, max. contact load rating DC 30 V/1 A, electrically isolated from ground. Relays must at all times be operated within the specified data range. Inductive or capacitive loads are to be connected with suitable protective measures (self-induction recuperation diodes for inductive loads and series resistors for capacitive loads).

Terminal assignment

Digital input and output signals	Standard assignment ¹⁾	Digital I/O module
	1	2
Failure		
Maintenance required		
Function check		
Overall status	DO1	
Start automatic calibration	DI1	
Stop automatic calibration		
Disable automatic calibration	DI2	
Sample gas valve	DO4	
Zero point gas valve		
Span gas valves 1-5		
Pump on/off 2)		
Limit 1	DO2	
Limit 2	DO3	
Limit 3		DO1
Limit 4		DO2
Limit 5		DO3
Limit 6		DO4
Limit 7		
Limit 8		
Limit 9		
Limit 10		
Measuring range switch-over		
Measuring range feedback		
Measuring component switch-over		
Measuring component feedback		
Bus-DI 1-8		
External failure 3)	DI3	
External maintenance request 3)	DI4	

- 1) factory-set, can be reconfigured during operation
- 2) if a pump (integrated gas feed) is installed
- 3) multiple external status signals can be configured depending on the number of free digital inputs.

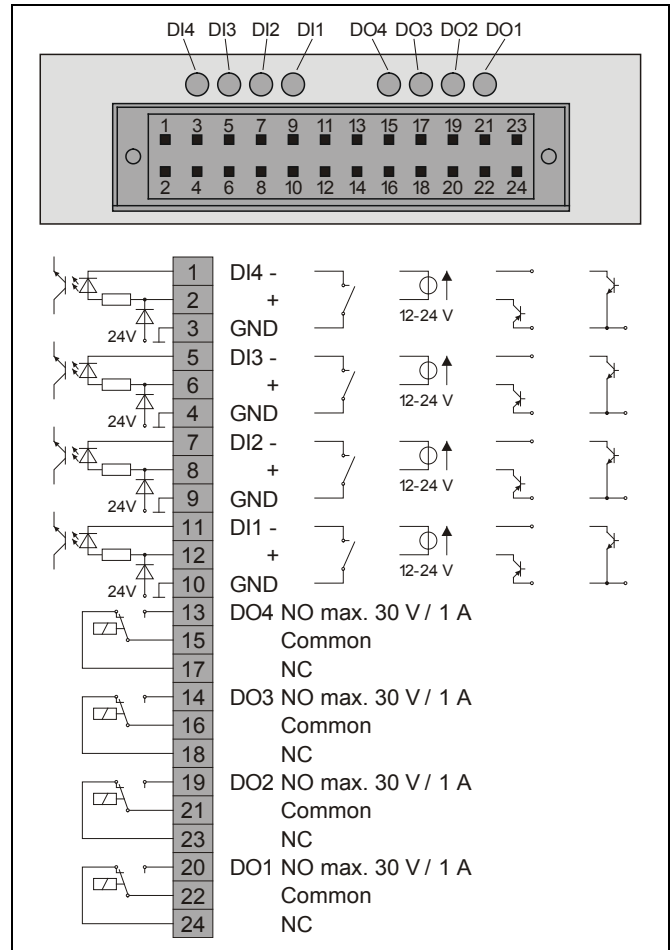
Electrical connections

See connection diagram

Version: 2x12-pin terminal strip. Observe the notes regarding I/O module connection (see page 25)!

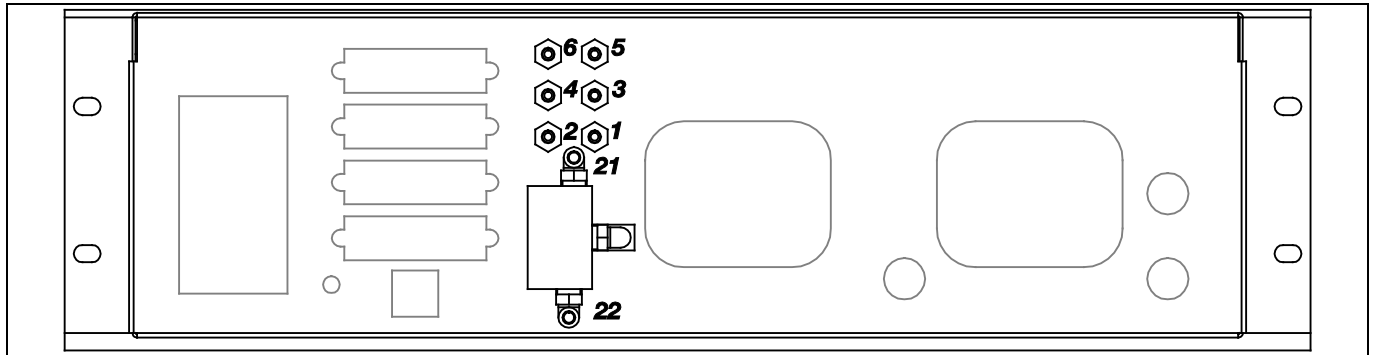
Relays are shown in the unpowered state. The unpowered state is the failure mode.

Connection diagrams



Gas connections Uras26

Model EL3020 (internal gas lines: FPM hoses)



- 1 Sample gas inlet gas path 1 without 'Integrated gas feed' option
- 2 Sample gas outlet gas path 1 connected to sample gas inlet of Magnos206, Magnos28 or Caldos27 if applicable
- 3 Sample gas outlet for 'Integrated gas feed' option, factory-connected to sample gas inlet gas path 1
- 4 Sample gas inlet for 'Integrated gas feed' option with flow sensor only (without solenoid valve) or pressure sensor (option)
- 5 Sample gas inlet gas path 2 or flowing reference gas inlet (option)
- 6 Sample gas outlet gas path 2 or flowing reference gas outlet (option)

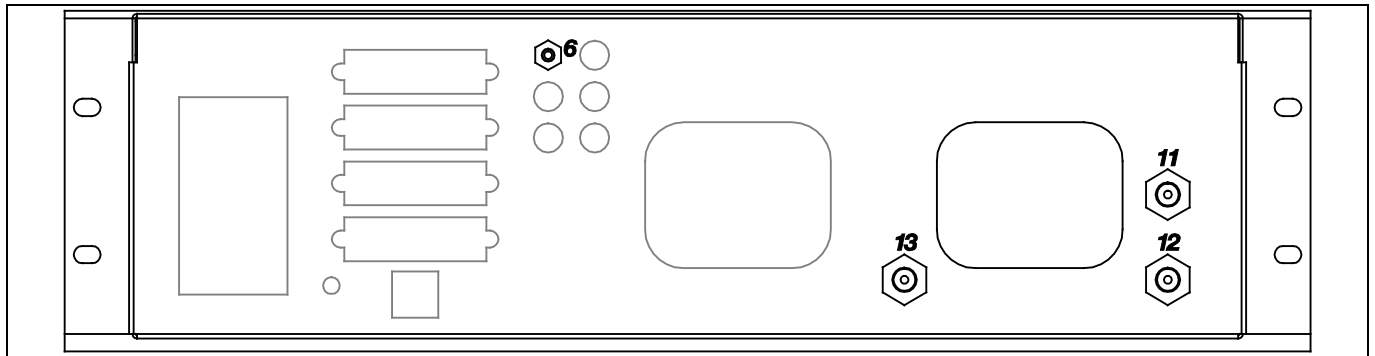
Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner \varnothing (included in scope of supply)

- 21 Sample gas inlet at solenoid valve } for 'Integral gas feed' option with
- 22 Sample gas inlet at solenoid valve } solenoid valve, pump, filter, capillaries and flow sensor

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner \varnothing (included in scope of supply)

Note: Pressure sensor (standard) and O₂ sensor (optional) are connected internally as follows:
 downstream of sample cell 1 outlet for one sample cell or for two separate gas paths,
 downstream of sample cell 2 outlet for two sample cells in series.
 The second O₂ sensor (option for version with two separate gas paths) is connected downstream of the sample cell 2 outlet.
 The pressure sensor can be directly connected to inlet 4 as an option.

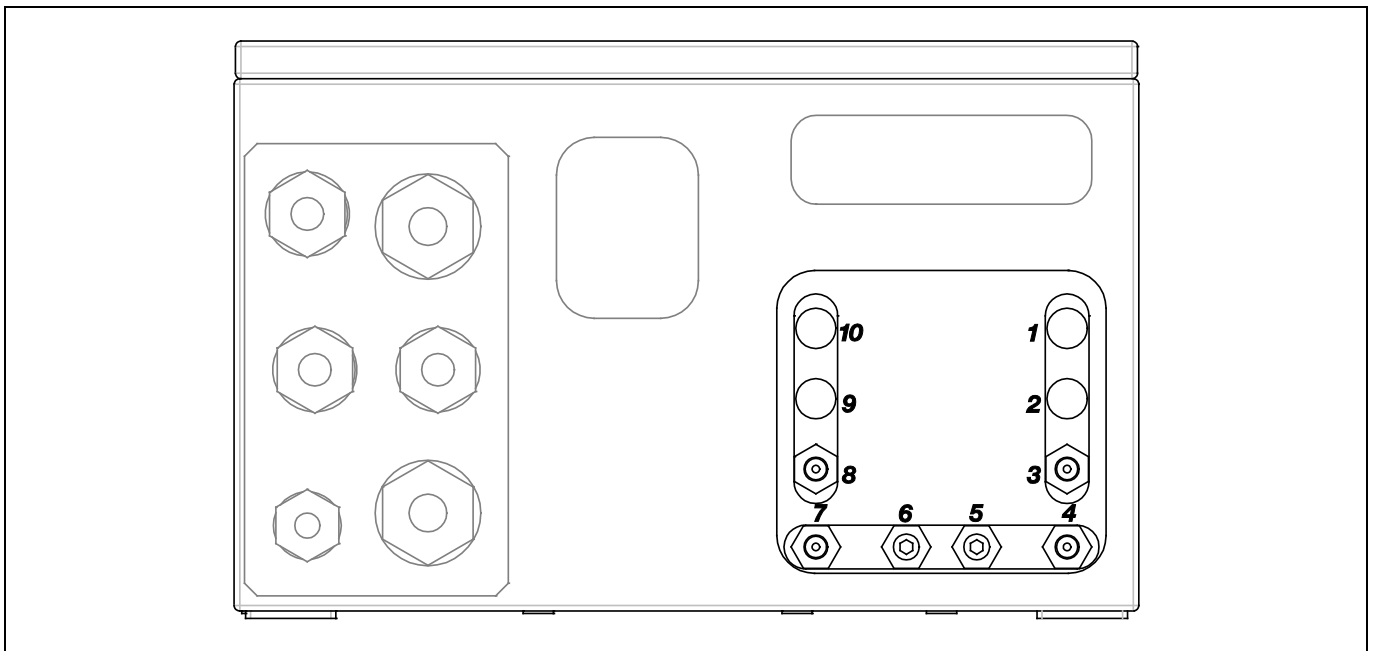
Model EL3020 (internal gas lines: PTFE tubes or stainless steel pipes)



- 6 Pressure sensor
- 11 Sample gas inlet
- 12 Sample gas outlet for one sample cell } connected to sample gas inlet as needed
- 13 Sample gas outlet for two sample cells in series } of Magnos206, Magnos28 or Caldos27

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply)

Note: O₂ sensor, 'Integrated gas feed' and 'Flowing reference gas' options and version with two separate gas paths are not possible.

Model EL3040 (internal gas lines: FPM hoses or PTFE tubes or stainless steel pipes)**One gas path with one sample cell or two sample cells in series**

- 1 Pressure sensor (option)
- 2 not used
- 3 Sample gas inlet
- 4 Sample gas outlet for one sample cell
- 5 Purge gas inlet housing
- 6 Purge gas outlet housing
- 7 not used
- 8 Sample gas outlet for two sample cells in series
- 9 Flowing reference gas inlet (sample cell 1, option)
- 10 Flowing reference gas outlet (sample cell 1, option)

Two separate gas paths with one sample cell each

- 1 Pressure sensor (option)
- 2 not used
- 3 Sample gas inlet gas path 1
- 4 Sample gas outlet gas path 1
- 5 Purge gas inlet housing
- 6 Purge gas outlet housing
- 7 Sample gas inlet gas path 2
- 8 Sample gas outlet gas path 2
- 9 Flowing reference gas inlet (gas path 1, option)
- 10 Flowing reference gas outlet (gas path 1, option)

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply); screwed fittings with hose nozzles (PP) for hoses with 4 mm inner Ø included in the scope of supply for the purge gas connections and the sample gas connections when internal gas paths are made using FPM hoses.)

Note: If the internal gas path are made using FPM hoses, the pressure sensor (standard) and O₂ sensor (optional) are connected internally as follows:

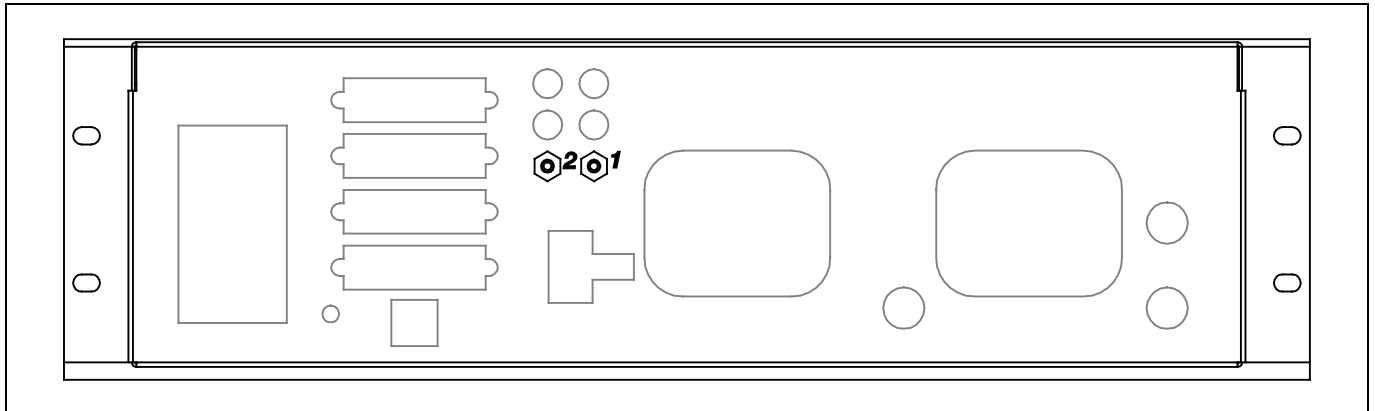
downstream of sample cell 1 outlet for one sample cell,
downstream of sample cell 1 outlet or sample cell 2 outlet for two separate gas paths,
downstream of sample cell 2 outlet for two sample cells in series.

When the internal gas paths are made using PTFE or stainless steel pipes, the O₂ sensor and 'Flowing reference gas' options are not possible.

The pressure sensor can be directly connected to inlet 1 as an option.

Limas23 gas connections

Model EL3020

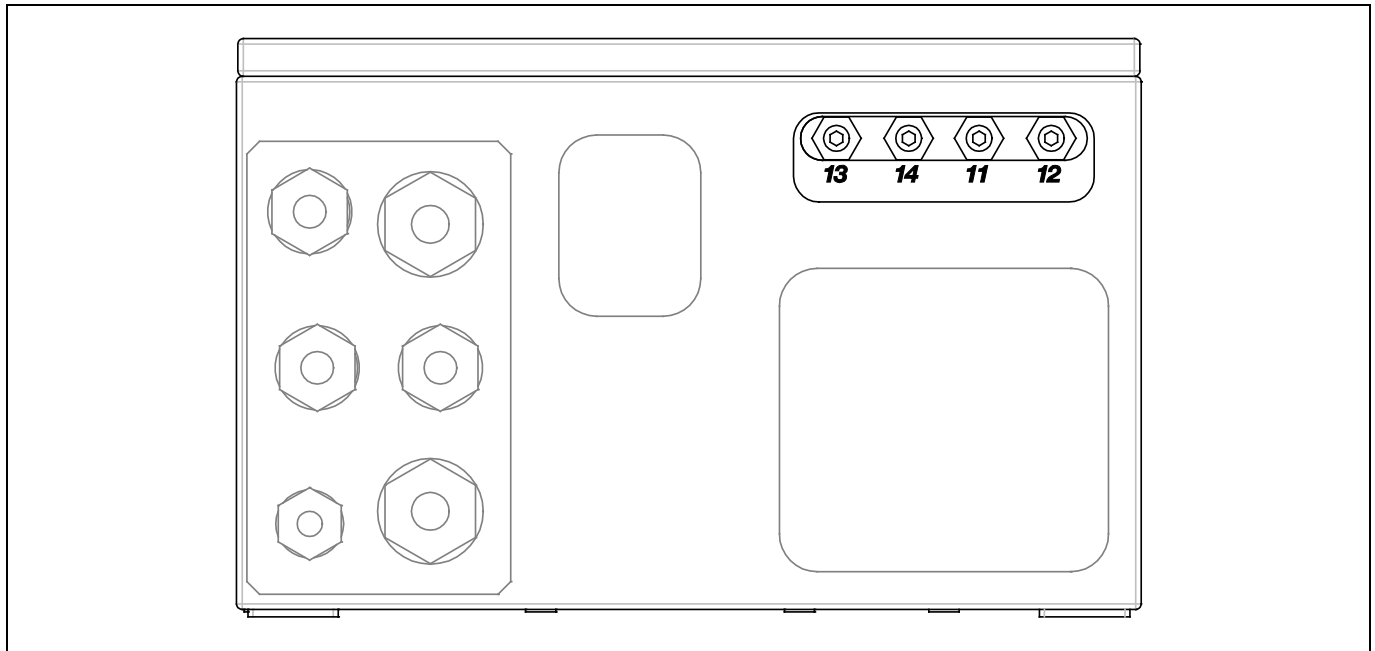


- 1 Sample gas inlet
- 2 Sample gas outlet (connected to sample gas inlet of Magnos206 or Magnos28 if applicable)

Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner Ø (included in scope of supply)

Note: Pressure sensor (standard) and O₂ sensor (option) are connected internally downstream of the sample cell.

Model EL3040



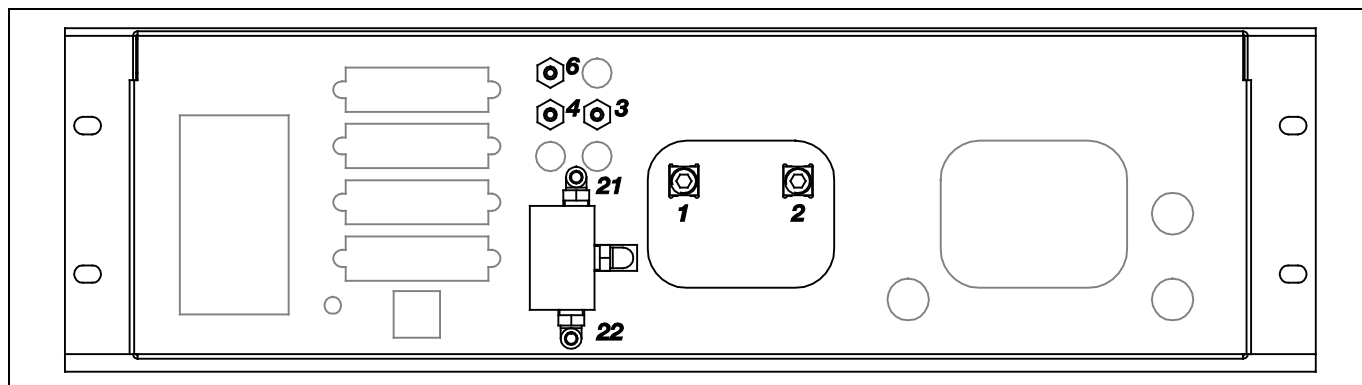
- 11 Purge gas inlet housing
- 12 Purge gas outlet housing
- 13 Sample gas inlet
- 14 Sample gas outlet (connected to sample gas inlet of Magnos206 or Magnos28 if applicable)

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner Ø supplied)

Note: Pressure sensor (standard) and O₂ sensor (option) are connected internally downstream of the sample cell.

Magnos206 gas connections

Model EL3020



- 1 Sample gas inlet
- 2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner Ø supplied)

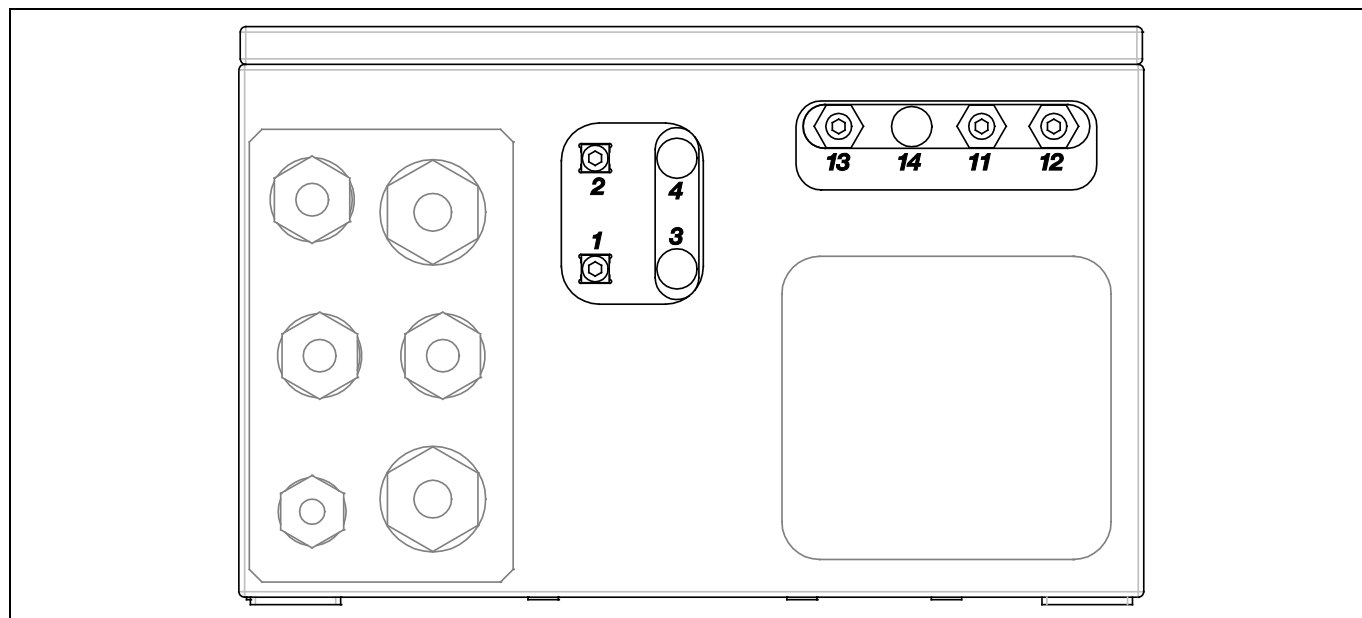
- 3 Sample gas outlet for 'Integrated gas feed' option, factory-connected to sample gas inlet gas path 1
- 4 Sample gas inlet for 'Integrated gas feed' option with flow sensor only (without solenoid valve)
- 6 Pressure sensor (option)

Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner Ø (included in scope of supply)

- 21 Sample gas inlet at solenoid valve } for 'Integral gas feed' option with
- 22 Sample gas inlet at solenoid valve } solenoid valve, pump, filter, capillaries and flow sensor

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner Ø (included in scope of supply)

Model EL3040

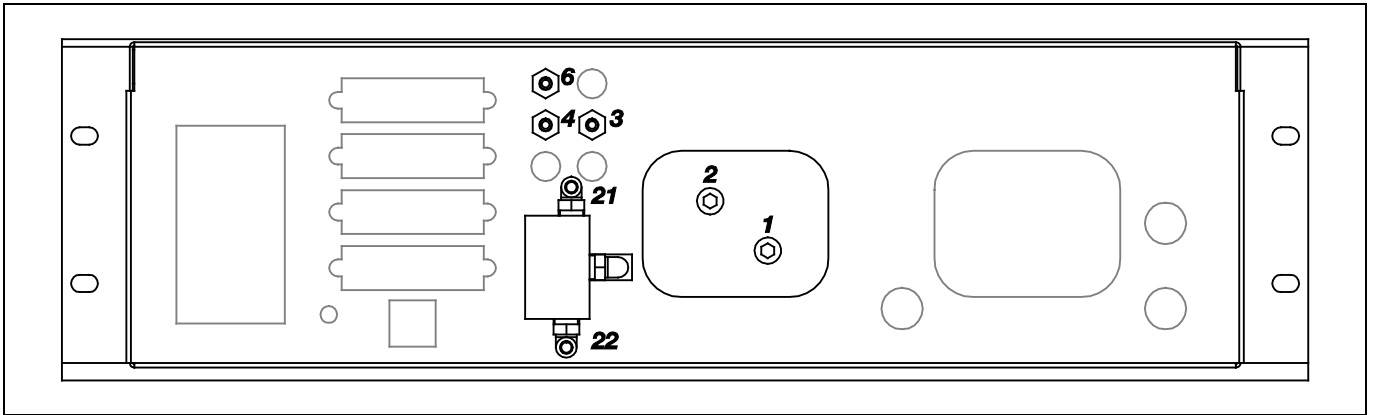


- 1 Sample gas inlet
- 2 Sample gas outlet
- 3 not used
- 4 not used
- 11 Purge gas inlet housing
- 12 Purge gas outlet housing
- 13 Pressure sensor (option)
- 14 not used

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner Ø supplied)

Magnos28 gas connections

Model EL3020



- 1 Sample gas inlet
- 2 Sample gas outlet

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

- 3 Sample gas outlet for 'Integrated gas feed' option, factory-connected to sample gas inlet gas path 1
- 4 Sample gas inlet for 'Integrated gas feed' option with flow sensor only (without solenoid valve)
- 6 Pressure sensor (option)

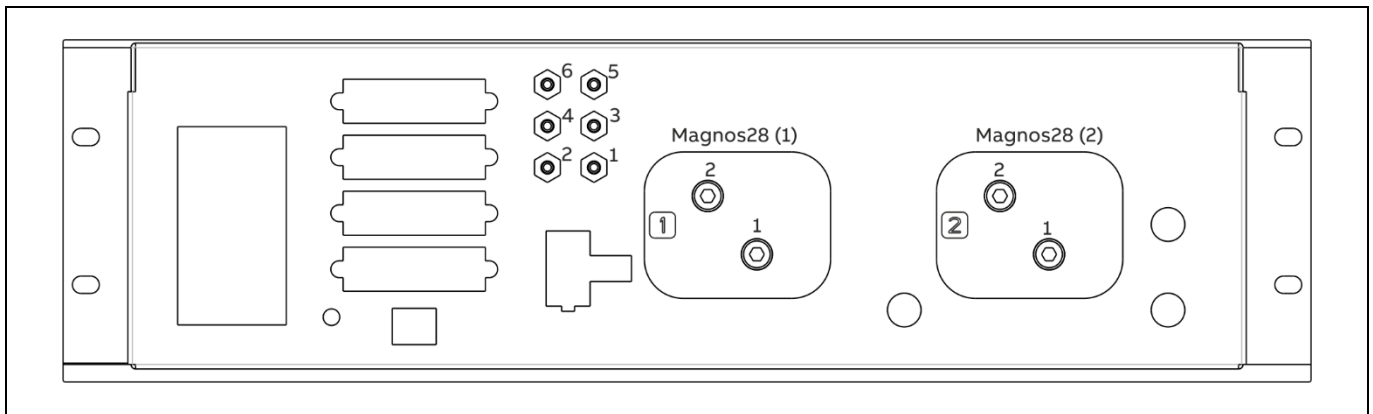
Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner \varnothing (included in scope of supply)

- 21 Sample gas inlet at solenoid valve } for 'Integral gas feed' option with
- 22 Sample gas inlet at solenoid valve } solenoid valve, pump, filter, capillaries and flow sensor

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner \varnothing (included in scope of supply)

Magnos28 with Magnos 28 gas connections

Model EL3020



(internal gas lines made using hoses)

- 1 Sample gas outlet gas path 1 / module (1) for 'Integrated gas feed' option with flow sensor, factory connected with module (1) sample gas inlet 1
- 2 Sample gas inlet gas path 1 / module (1) for 'Integrated gas feed' option with flow sensor
- 3 Sample gas outlet gas path 2 / module (2) for 'Integrated gas feed' option with flow sensor, factory connected with module (2) sample gas inlet 1
- 4 Sample gas inlet gas path 1 / module (2) for 'Integrated gas feed' option with flow sensor
- 5 Pressure sensor (option) for module (2), not for flammable sample gases
- 6 Pressure sensor (option) for module (1), for flammable sample gases

Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner \varnothing (included in scope of supply)

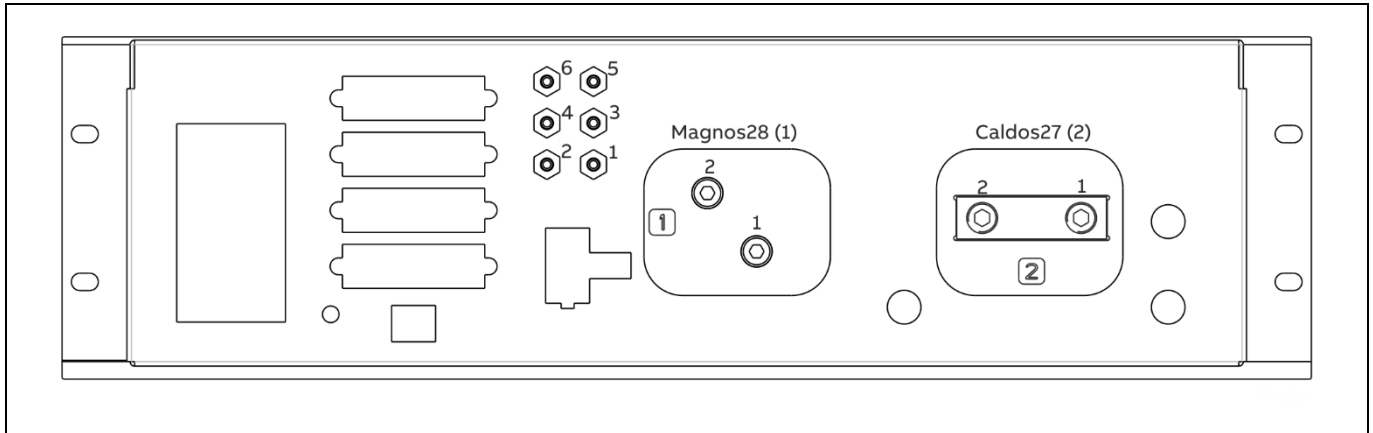
Magnos28: Gas connections (applies for both modules)

- 1 Sample gas inlet
- 2 Sample gas outlet

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

Magnos28 with Caldos27 gas connections

Model EL3020



(internal gas lines made using hoses)

- 1 Sample gas outlet gas path 1 / module (1) for 'Integrated gas feed' option with flow sensor, factory connected with module (1) sample gas inlet 1
- 2 Sample gas inlet gas path 1 / module (1) for 'Integrated gas feed' option with flow sensor
- 3 Sample gas outlet gas path 2 / module (2) for 'Integrated gas feed' option with flow sensor, factory connected with module (2) sample gas inlet 1
- 4 Sample gas inlet gas path 1 / module (2) for 'Integrated gas feed' option with flow sensor
- 5 Pressure sensor for module (2), not for flammable sample gases
- 6 Pressure sensor (option) for module (1), for flammable sample gases

Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner \varnothing (included in scope of supply)

Magnos28: Gas Connections

- 1 Sample gas inlet
- 2 Sample gas outlet

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

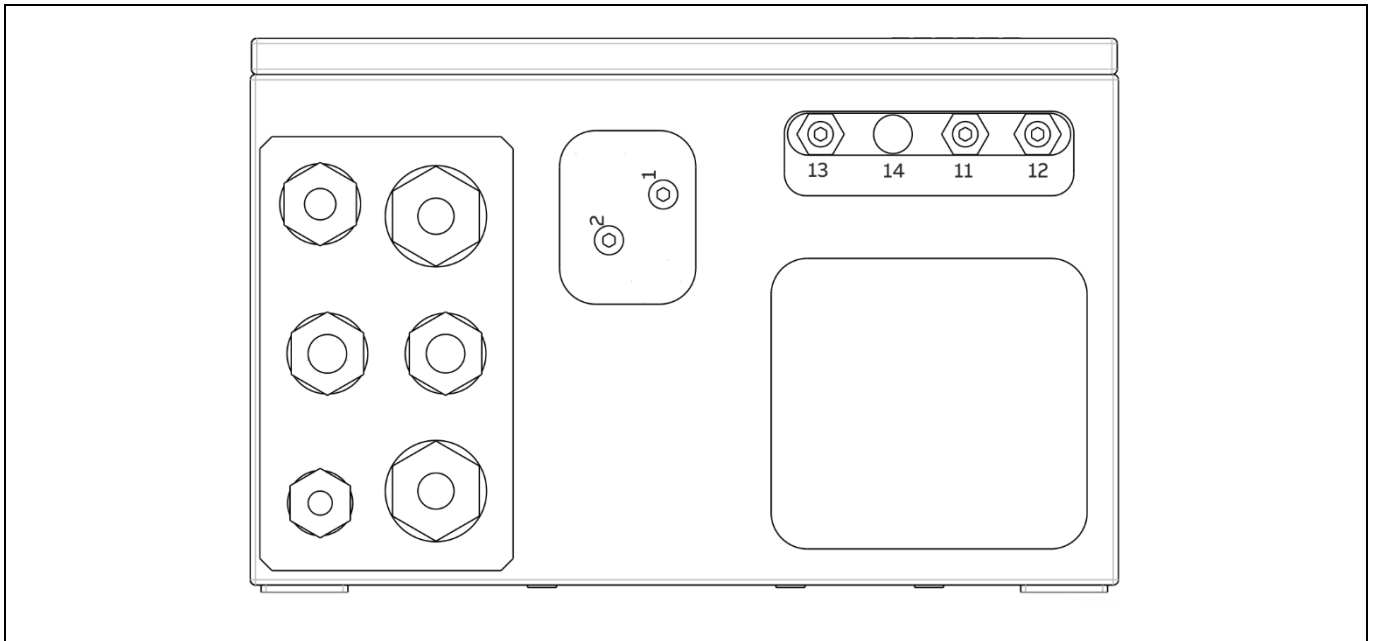
Caldos27: Gas Connections

- 1 Sample gas inlet
- 2 Sample gas outlet

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

Magnos28 gas connections

Model EL3040

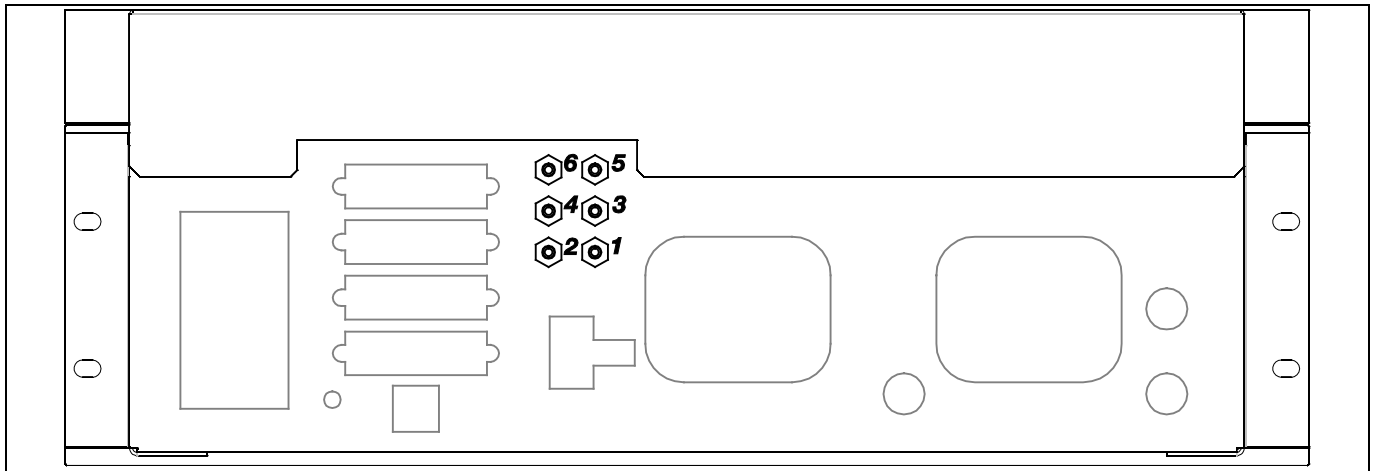


- | | | |
|----------------------------|------------------------------------|------------------------------------|
| 1 Sample gas inlet | 11 Purge gas inlet housing | 13 Pressure sensor (option) |
| 2 Sample gas outlet | 12 Purge gas outlet housing | 14 not used |

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

Gas connections and dimensions Magnos27

Gas connections



Magnos27

- 1 Pressure sensor (option)
- 2 not used
- 3 Sample gas inlet
- 4 Sample gas outlet
- 5 Purge gas inlet analyzer
- 6 Purge gas outlet analyzer

Magnos27 in combination with Uras26 (one gas path, internal gas lines: FPM hoses)

- 1 Sample gas inlet Uras26
- 2 Sample gas outlet Uras26
- 3 Sample gas inlet Magnos27
- 4 Sample gas outlet Magnos27
- 5 Purge gas inlet Magnos27
- 6 Purge gas outlet Magnos27

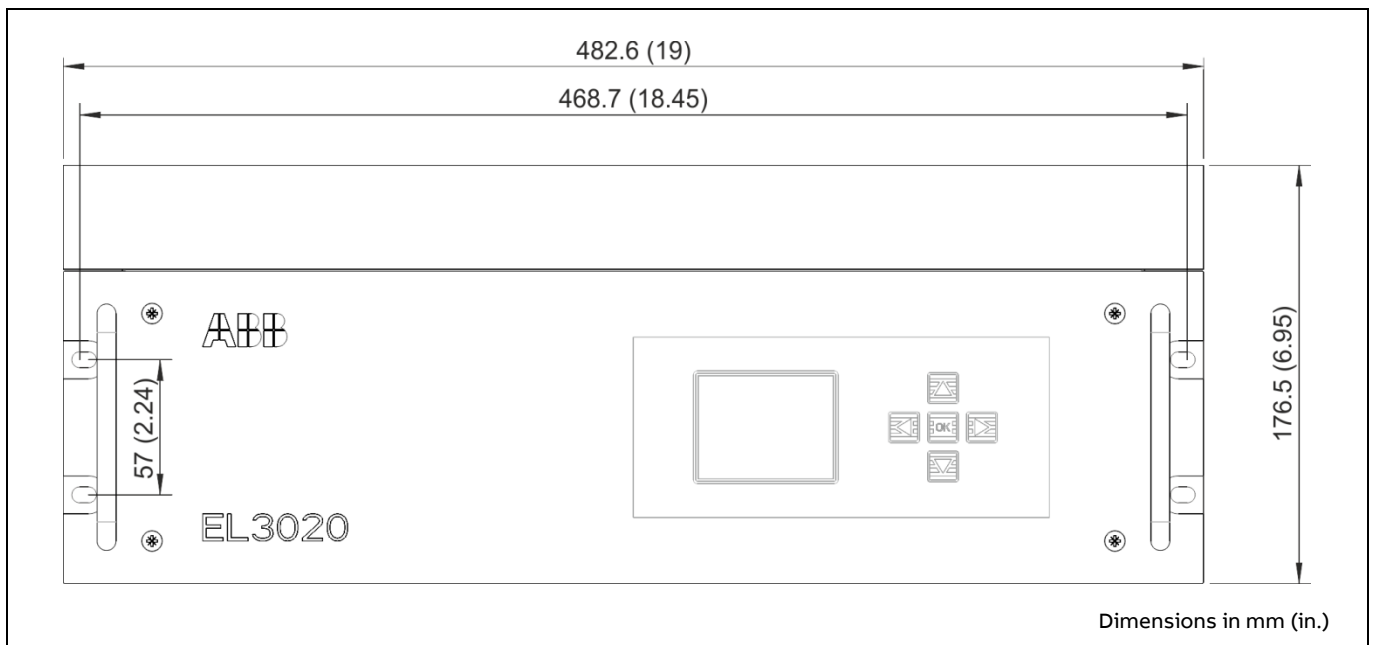
Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner \varnothing (included in scope of supply)

Note: (for Magnos27 design together with Uras26)

The pressure sensor (standard) is connected internally on the Uras26 sample gas outlet.

The pressure sensor can optionally be directly connected to inlet 6 (Magnos27 without sample chamber purging).

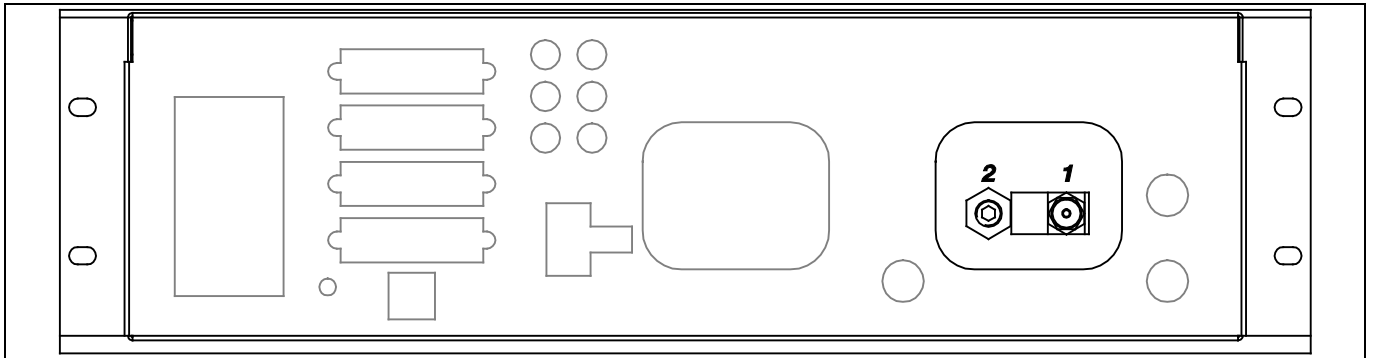
Dimensions



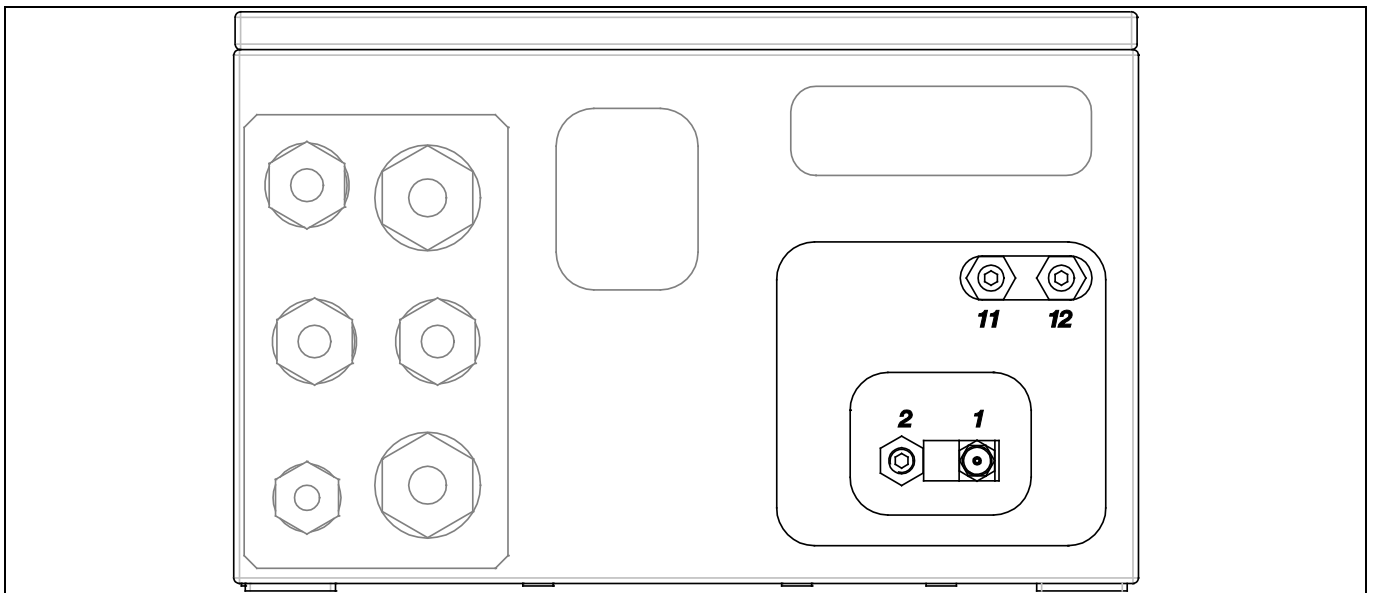
Note: Only the front view of the housing (with its height differing from the standard dimension) is depicted in this dimensional drawing. Refer to the dimensional drawing on page 42 for other views and dimensions of the 19-inch housing.

ZO23 gas connections

Model EL3020



Model EL3040

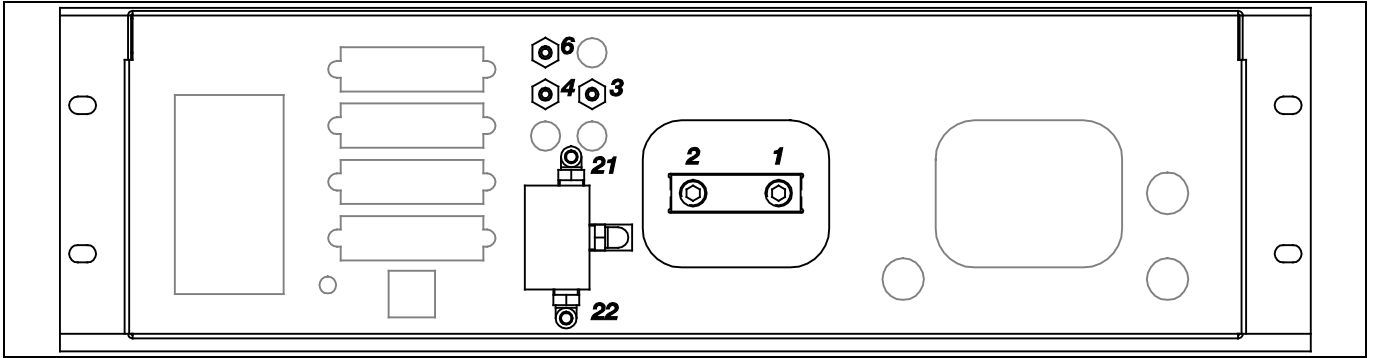


- 1 Sample gas inlet
- 2 Sample gas outlet
- 11 Purge gas inlet housing
- 12 Purge gas outlet housing

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply),
sample gas inlet 3 mm Swagelok® (stainless steel 1.4401)

Caldos27 gas connections

Model EL3020



- 1 Sample gas inlet
- 2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner Ø supplied)

- 3 Sample gas outlet for 'Integrated gas feed' option, factory-connected to sample gas inlet gas path 1
- 4 Sample gas inlet for 'Integrated gas feed' option with flow sensor only (without solenoid valve)
- 6 Pressure sensor

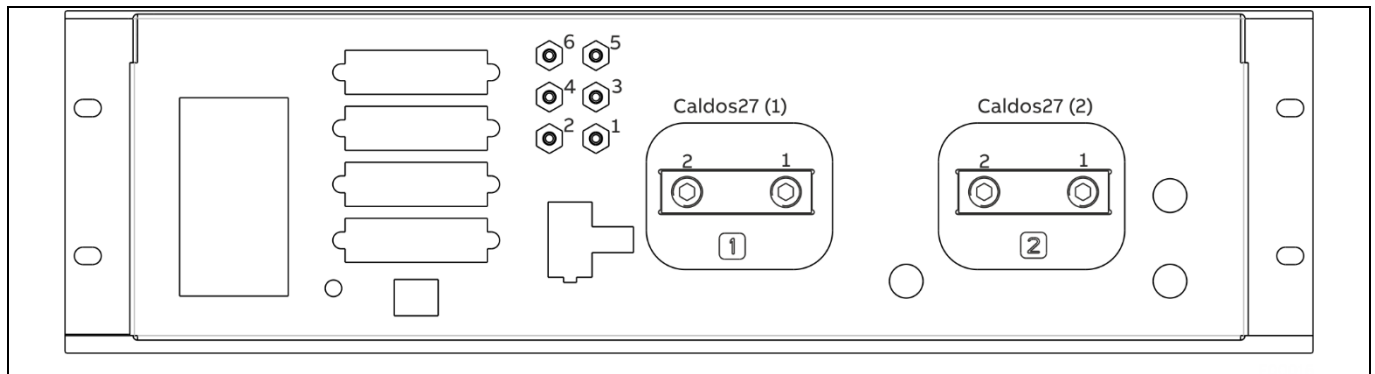
Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner Ø (included in scope of supply)

- 21 Sample gas inlet at solenoid valve } for 'Integral gas feed' option with
- 22 Sample gas inlet at solenoid valve } solenoid valve, pump, filter, capillaries and flow sensor

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner Ø (included in scope of supply)

Caldos27 with Caldos27 gas connections

Model EL3020



(internal gas lines made using hoses)

- 1 Sample gas outlet gas path 1 / module (1) for 'Integrated gas feed' option with flow sensor, factory connected with module (1) sample gas inlet 1
- 2 Sample gas inlet gas path 1 / module (1) for 'Integrated gas feed' option with flow sensor
- 3 Sample gas outlet gas path 2 / module (2) for 'Integrated gas feed' option with flow sensor, factory connected with module (2) sample gas inlet 1
- 4 Sample gas inlet gas path 1 / module (2) for 'Integrated gas feed' option with flow sensor
- 5 Pressure sensor for module (2), not for flammable sample gases
- 6 Pressure sensor for module (1), for flammable sample gases not in sample gas path

Design: Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inner \varnothing (included in scope of supply)

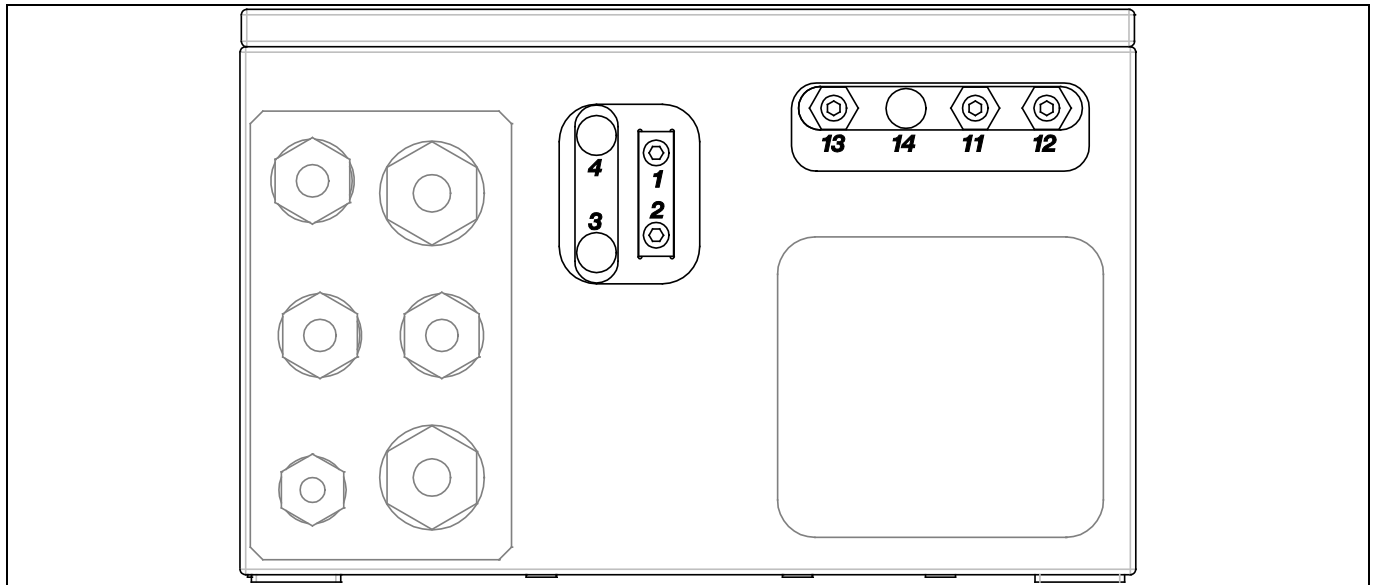
Caldos27: Gas connections (applies for both modules)

- 1 Sample gas inlet
- 2 Sample gas outlet

Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

Caldos27 gas connections

Model EL3040

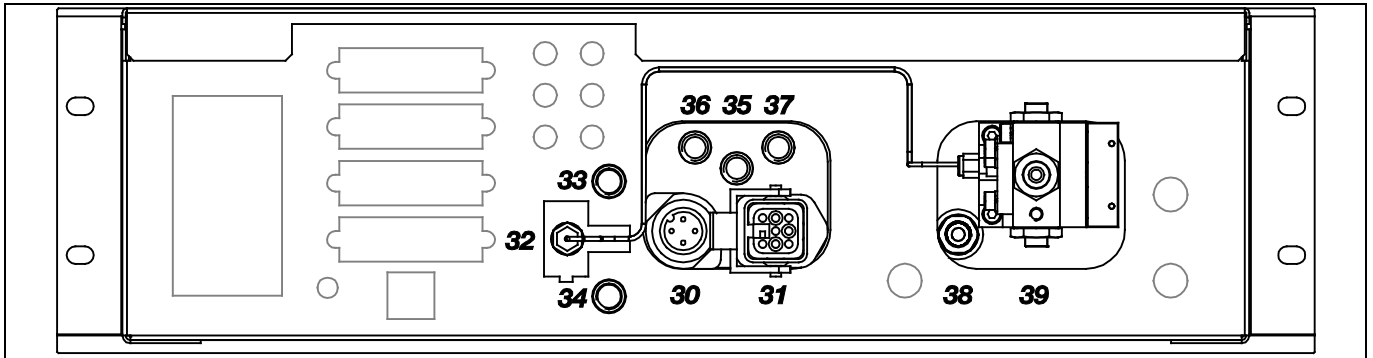


- | | | | |
|----------------------------|-------------------|------------------------------------|---------------------------|
| 1 Sample gas inlet | 3 not used | 11 Purge gas inlet housing | 13 Pressure sensor |
| 2 Sample gas outlet | 4 not used | 12 Purge gas outlet housing | 14 not used |

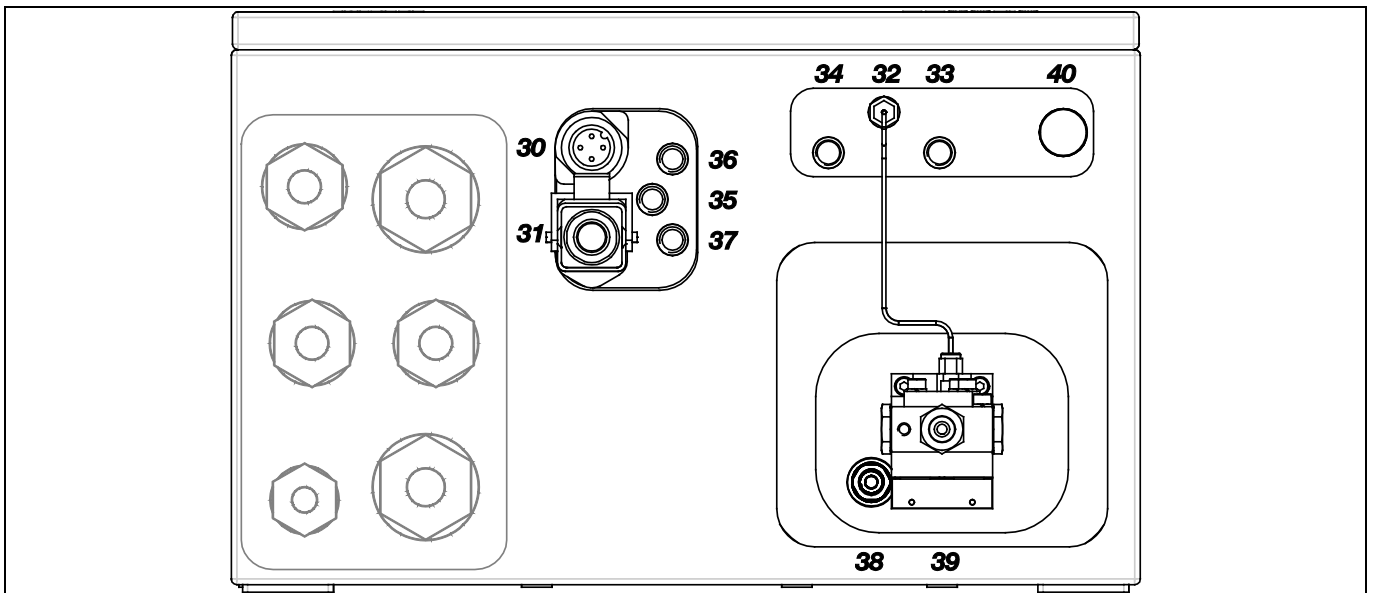
Design: $\frac{1}{8}$ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply);
screwed fittings with hose nozzles (PP) for hoses with 4 mm inner \varnothing supplied)

Gas connections and electrical connections Fidas24

Model EL3020



Model EL3040



30 Power supply AC 115 V or 230 V for heating of detector and sample gas inlet (4-pin male plug, connection cable included in scope of supply)

31 Electrical connection to heated sample gas inlet (fixed)

32 Test gas outlet

33 Zero point gas inlet

34 End-point gas inlet

35 Combustion air inlet

36 Combustion gas inlet

37 Instrument air inlet

Design: 1/8 NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply)

38 Exhaust outlet

Design: Screw connection for tubes with external diameter = 6 mm. The inside diameter of the exhaust line must be increased to \geq 10 mm a maximum of 30 cm downstream of the exhaust outlet.

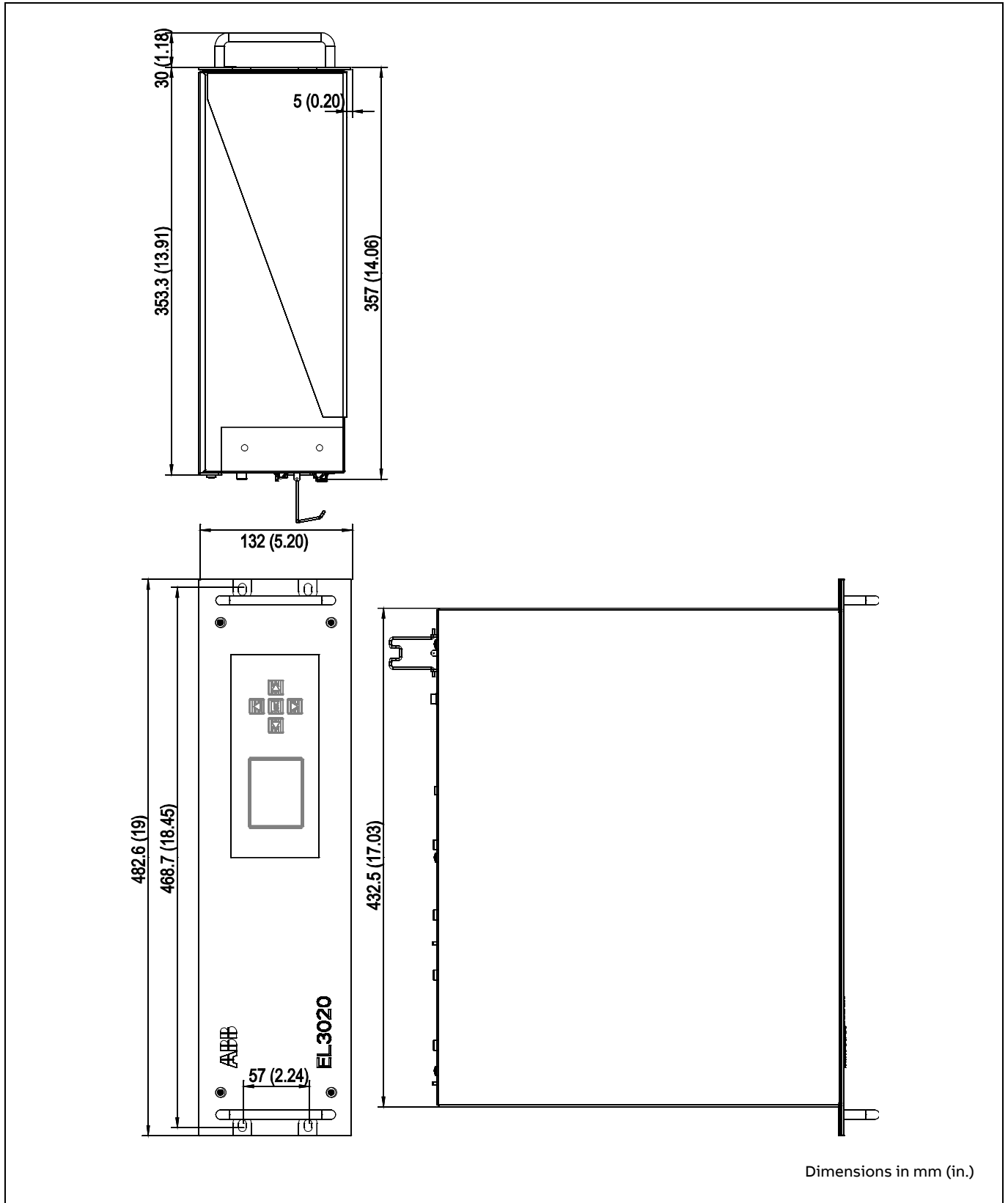
39 Sample gas inlet, heated or unheated

Design: Threaded connection for PTFE or stainless steel tubing with outside diameter = 6 mm

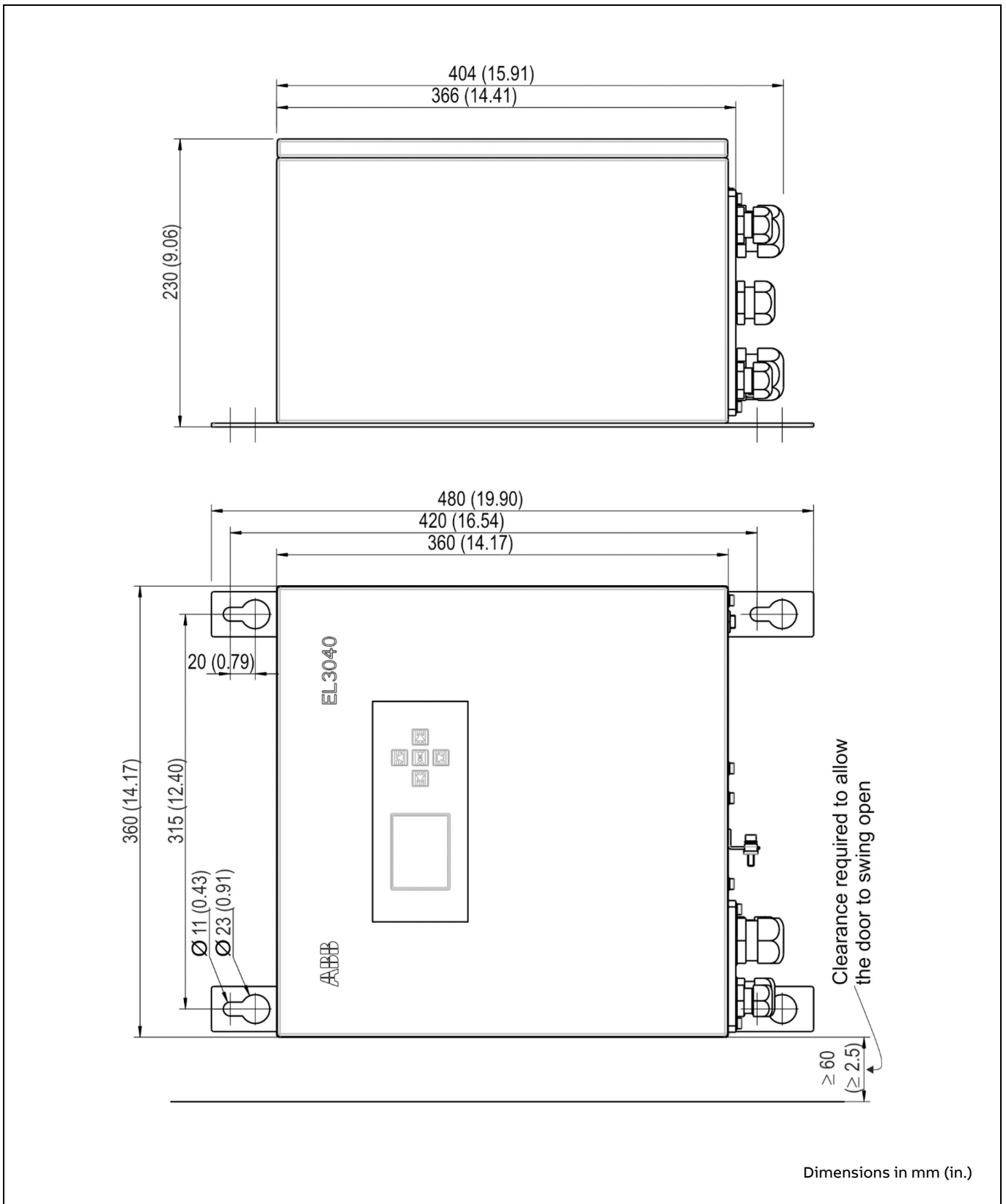
40 Pressure compensation opening with protection filter (only in wall-mount housing)

Dimensions

19-inch housing (model EL3020)



Wall-mount housing (model EL3040)



Certifications

Performance tests

The EL3000 series gas analyzers Uras 26 (sample components CO, NO, SO₂, CO₂, N₂O), Magnos206 (sample component O₂) and electrochemical oxygen sensor (sample component O₂) are suited for use in facilities requiring approval (13th BlmSchV, 17th BlmSchV, 30th BlmSchV, TA-Luft) as well as in facilities in accordance with 27th BlmSchV. The requirements of QAL1 according to EN 15267 and EN 14181 are fulfilled.

Report no. 691317 of 6/30/2006;

Notification: BAnz AT of 10/14/2006, no. 194, page 6715.

Report no. 1669640 of 9/30/2011;

Notification: BAnz AT of 3/2/2012, no. 36, page 925.

Report no. 936/21217137/B of 10/14/2011;

Notification: BAnz AT of 3/2/2012, no. 36, page 924.

The EL3000 Series gas analyzers Uras26 (sample components CO, NO, NO_x, SO₂, N₂O, CO₂), Magnos206 (sample component O₂), Magnos28 (sample component O₂) and electrochemical oxygen sensor (sample component O₂) meet the requirements of the 'MCERTS Performance Standards for Continuous Emission Monitoring Systems, Version 3.5 dated June 2016', EN 15267-3:2007 and QAL 1 in accordance with EN 14181:2014.

Certificate No. Sira MC080122/13 of August 18, 2017

The EL3000 series gas analyzers Limas23 (sample components NO, NO₂, SO₂), and electrochemical oxygen sensor (O₂) are suited for use in facilities requiring approval (13th BlmSchV and 17th BlmSchV) as well as in facilities in accordance with TA-Luft. The requirements of QAL1 according to EN 15267 and EN 14181 are fulfilled.

Report no. 2231669.2 of 9/30/2015;

Notification: BAnz AT of 3/14/2016, no. B7, page 3.

The EL3000 Series Fidas24 gas analyzer (sample component C-total) is suited for use in facilities requiring approval (13th BlmSchV, 17th BlmSchV, 30th BlmSchV, TA-Luft) as well as in facilities in accordance with 27th BlmSchV. The requirements of QAL1 according to EN 15267 and EN 14181 are fulfilled.

Report no. 936/21230981/A of 2/29/2016;

Notification: BAnz AT of 8/1/2016, no. B11, page 2.

CE conformity

The EL3000 series gas analyzers satisfy the requirements of the European directives

2014/35/EU Low Voltage Directive,

2014/30/EU EMC Directive,

2014/34/EU ATEX Directive (only version in category 3G

for measuring non-flammable gases and vapors

and

2011/65/EU RoHS Directive

SIL conformity

The EL3000 series gas analyzer Magnos206 and Magnos28 without flow and pressure sensor meets the requirements of the European standard for functional safety EN 61508:2010 Part 2 (identical to IEC 61508:2010)

Approval for USA and Canada – CSA

The EL3000 series gas analyzers are certified for use in 'general purpose' environments, evidenced by full compliance with standards CAN/CSA-C22.2 no. 61010-1-12 and UL Std. no. 61010-1 (Third Edition).

Certificate No. 70012655

Approval for the customs union of Russia, Belarus and Kazakhstan – GOST TR CU

The EL3000 Series gas analyzers are certified for use in general purpose environment.

GOST TR CU certificate No. TC N RU Д-DE.AB72.B.02310

Pattern approval certificate for Russia No. DE.C.31.004.A

No. 37984

Explosion protection to European standards

The gas analyzer (model EL3040) with Uras26, Magnos206, Magnos28, Caldos27 and oxygen sensor in category 3G for measurement of non-flammable gases satisfies the European standards EN 60079-0:2012 + A11:2013 and EN 60079-15:2010.

Marking:  II 3G Ex nA nC IIC T4 Gc

Type Examination Certificate No. BVS 16 ATEX E 085 X

Sales



Service



Notes



Notes

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