Data Sheet 10/24-4.12 EN Rev. 2

EasyLine EL3060 Series Continuous Gas Analyzers in Category II 2G Version

Proven measuring technology from Advance Optima, operator-friendliness and functional capabilities of EasyLine

Flameproof Enclosure, therefore safe and uncomplicated explosion protection

Category II 2G, hence suitable for use in hazardous areas of Zone 1 and Zone 2

Rugged field housing with degree of protection IP65

Safe terminal box with Increased Safety for the electrical connections on the user side

Combinable analyzers with up to five sample components and two measuring ranges

Automatic calibration, simplified calibration with calibration cells and with single-point calibration

Simple menu-driven operator interface

Output of measured values, alarm value and status signals via individually configurable analog and digital outputs

Modbus and Profibus interfaces

Simple installation

Contents

Overview of the Gas Analyzers

Application

The Category II 2G gas analyzers of the EL3060 series are suitable for measuring flammable and non-flammable gases under atmospheric conditions which may occasionally be potentially explosive (Zone 1).

Gas Analyzers of the EL3060 Series

The EL3060 series includes the following analyzers

- Uras26 infrared photometer
- Magnos206 oxygen analyzer
- Caldos27 thermal conductivity analyzer
- Caldos25 thermal conductivity analyzer

as well as the

- EL3060-CU control unit

An EL3060 gas analyzer consists of the control unit and one or two analyzers.

The analyzers Magnos206, Caldos27 and Caldos25 are installed in the housing of the control unit. The analyzer Uras26 is installed in a separate housing; it is connected to the control unit via a data transmission cable and a power supply cable.

The analyzers Magnos206, Caldos27 and Caldos25 can also be used in combination with the analyzer Uras26.

Housing – Explosion Protection

The housing of the EL3060-CU control unit is designed as a field housing of die-cast aluminum in the type of protection “Flameproof Enclosure ‘d’” to EN 60079-1 and in the degree of protection for the housing of IP65. The display and operator control unit is installed behind a glass viewing window on the front of the housing.

A terminal housing in the type of protection “Increased Safety ‘e’” to EN 60079-7, in which the terminal strip for the electrical connections is installed, is flange-mounted on the underside of the explosion-proof housing. Certified electrical conductor bushings in increased safety are installed between the interior of the explosion housing and the terminal housing.

The housing of the Uras26 analyzer is executed as a cylindrical field housing of die-cast aluminum in the type of protection “Flameproof Enclosure ‘d’” to EN 60079-1 and in the degree of protection of housing of IP54. The data transmission cable and the power supply cable for connection to the control unit are permanently connected at the factory and led through flameproof cable glands on the underside of the housing.

The housings of the gas analyzers comply with the requirements of the explosion group IIC. As a result, the gas analyzers can also be used in hydrogen- or acetylene-containing atmospheres.

The housing can be purged with air from the non-hazardous area or with inert gas to protect the gas analyzers in a corrosive environment or with corrosive sample or associated gases.

All gas connections are led through flame barriers.

Overview of the Gas Analyzers

Analyzers – Measuring Technology

The Uras26 infrared photometer operates according to the NDIR process (Non-Dispersive Infrared-Absorption).

The measurement technique of the Magnos206 oxygen analyzer is based on the specific paramagnetic behavior of oxygen.

The thermal conductivity analyzers Caldos27 and Caldos25 make use of the differing thermal conductivity of the individual gases. The Caldos25 analyzer is especially suitable for the measurement of corrosive gases.

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.

The performance characteristics of the analyzers have been determined according to the international standard IEC 1207-1: 1994 “Expression of performance of gas analyzers”. They are based on N_2 as the associated gas. Compliance with these characteristics when measuring other gas mixtures can only be assured if their composition is known.

Calibration

The Uras26 infrared photometer can be equipped with gas-filled calibration cells as an option; this allows test gas cylinders to be dispensed with to a large extent.

Owing to its very low sensitivity drift, the Magnos206 oxygen analyzer can be routinely calibrated solely at the zero point by means of single-point calibration, provided that the measuring range is more than 0–5 % Vol. of O_2; nitrogen or ambient air is used for this purpose.

Calibration can be performed automatically or manually. 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.

Control Unit

The EL3060-CU control unit performs the following functions:

- Processing and transmitting measured values provided by the analyzer’s sensor electronics,
- Correcting measured values, e.g. cross-sensitivity correction,
- Controlling device functions, e.g. calibration,
- Display and control functions,
- Communicating with external systems.

Operation

Five touch screen fields accessible through the control unit viewing glass allow safe operation of the gas analyzer without opening the housing.

The menu-driven control system is uniform for all 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 configuration and software update)

as well as the I/O modules

- Analog output module with four analog outputs,
- Digital I/O module with four digital inputs and four digital outputs,
- Modbus module with one RS485 and one RS232 interface,
- Profibus module with one RS485 and one MBP interface.

A maximum of three I/O modules can be integrated in the gas analyzer. The following combinations of I/O modules are allowed, depending on the functional range and order:

- 1 analog output module and 1 digital I/O module (standard),
- 1 analog output module and 2 digital I/O modules,
- 1 analog output module, 1 digital I/O module and either 1 Modbus module or 1 Profibus module,
- 1 Modbus module,
- 1 Profibus module.

Measurement Principle

Non-dispersive infrared absorption

Sample Components and Measurement Ranges

Sample Component [1]	Class 1 Range	Class 2 Range	Class 2 Range with Calibration Cell	Gas Group [2]
CO	0–50 ppm	0–10 ppm	0–50 ppm [3]	A
CO_2	0–50 ppm	0–5 ppm	0–25 ppm [3]	A
NO	0–150 ppm	0–75 ppm	0–75 ppm [3]	A
SO_2	0–100 ppm	0–25 ppm	0–25 ppm [3]	A
N_2O	0–50 ppm	0–20 ppm	0–50 ppm [3]	A
CH_4	0–100 ppm	0–50 ppm	0–50 ppm [3]	A
NH_3	0–500 ppm	0–30 ppm	–	B
C_2H_2	0–200 ppm	0–100 ppm	0–100 ppm	B
C_2H_4	0–500 ppm	0–300 ppm	0–300 ppm	B
C_2H_6	0–100 ppm	0–50 ppm	0–50 ppm [3]	B
C_3H_6	0–250 ppm	0–100 ppm	0–100 ppm [3]	B
C_3H_8	0–100 ppm	0–50 ppm	0–50 ppm [3]	B
C_4H_{10}	0–100 ppm	0–50 ppm	0–50 ppm [3]	B
C_6H_{14}	0–500 ppm	0–100 ppm	0–100 ppm [3]	B
R 134a	0–100 ppm	0–50 ppm	0–50 ppm [3]	B
SF_6	0–2000 ppm	0–1900 ppm	0–2000 ppm	B
H_2O	0–1000 ppm	0–500 ppm	0–500 ppm	C

The smallest measurement ranges shown in the table are based on the first sample component in a beam path.

1) Other sample components on request
2) See price information
3) The smallest measurement range 1 is shown.

Number of Sample Components
1 to 4 components with 1 or 2 beam paths and 1 or 2 receivers in each beam path

Number of Measurement Ranges
2 ranges per sample component

Largest Measurement Range
0 to 100 Vol.-% or 0 Vol.-% to saturation or 0 Vol.-% to LEL
Measurement ranges within ignition limits cannot be provided.

Measurement Range Ratio
≤ 1:10 to 1:20 depending on measurement range

The following data apply to measurement range 1 in a delivered analyzer.

Stability

The following data apply only if all influence factors (e.g. flow rate, temperature, atmospheric pressure) are constant.

Linearity Deviation
≤ 1 % of span

Repeatability
≤ 0.5 % of span

Zero Drift
≤ 1 % of span per week; for ranges smaller than Class 1 to Class 2: ≤ 3 % of span per week

Sensitivity Drift
≤ 1 % of measured value per week

Output Fluctuation (2 σ)
≤ 0.2 % of span at electronic T90 time = 5 sec (Class 1) or = 15 sec (Class 2)

Detection Limit (4 σ)
≤ 0.4 % of span at electronic T90 time = 5 sec (Class 1) or = 15 sec (Class 2)

Influence Effects

Flow Effect
Flow rate in the 20–100 l/h range: ≤ 1 % of span at a flow rate change of ±10 l/h

Associated Gas Effect / Cross Sensitivity
The knowledge of the sample gas composition is necessary for the analyzer configuration.
Selectivity measures to reduce associated gas effect (optional): Incorporation of interference filters or filter cells, internal electronic cross-sensitivity correction for one sample component by other sample components measured with the Uras26.

Temperature Effect
Ambient temperature in permissible range
- At zero-point: ≤ 1 % of span per 10 °C; for ranges smaller than Class 1 to Class 2: ≤ 2 % of span
- On sensitivity with temperature compensation: ≤ 3 % of measured value per 10 °C
- On sensitivity with thermostat (optional): ≤ 2 % of measured value per 10 °C

Air Pressure Effect
- At zero-point: No effect
- On sensitivity with pressure correction by means of integral pressure sensor: ≤ 0.2 % of measured value per 1 % barometric pressure change

Dynamic Response

Warm-Up Time
Approx. 30 minutes without thermostat; approx. 2.5 hours with thermostat

90% Response Time
T_{90} = 2.5 sec for measurement cell length = 200 mm, sample gas flow = 60 l/h, electronic T90 time = 0 sec

Calibration

Zero-Point Calibration
With inert gas, e.g. N_2, 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.
During calibration of a multi-component analyzer, possible cross-sensitivity and/or carrier gas corrections by internal or external measurement components are switched off.
Therefore, corrected measurement components should be calibrated only using a test gas consisting of the measurement component and an inert gas like N_2.

Materials in Contact with the Sample Medium

Analyzer (Sample Cells)
Tubing: Aluminum or gold-plated aluminum;
Window: CaF_2, Option: BaF_2;
Connectors: Rust- and acid-resistant steel 1.4571 (SAE 316Ti)

Gas Lines, Connectors and Flame Barriers
Rust- and acid-resistant steel 1.4571 (SAE 316Ti)

Measurement Principle

Paramagnetic behavior of oxygen

Magnetomechanical oxygen analyzer; short 90% response time

Sample Component and Measurement Ranges

Sample Component
Oxygen (O_2)

Smallest Measurement Range
0–0.5 Vol.-% O_2

Quantity and Measurement Range Limits
2 measurement ranges
Measurement ranges are freely adjustable; they are factory-set to 0–25/100 Vol.-% O_2 or per order.

Largest Measurement Range
0–100 Vol.-% O_2
Measurement ranges within ignition limits cannot be provided.

Measurement Ranges with Suppressed Zero-Point
Suppression ratio max. 1:10, e.g. 19–21 Vol.-% O_2.
Pressure correction with pressure sensor is required.

Stability

The following data apply only if all influence factors (e.g. flow rate, temperature, atmospheric pressure) are constant.

Linearity Deviation
≤ 50 ppm O_2

Repeatability
≤ 50 ppm O_2 (time base for gas exchange ≥ 5 minutes)

Zero Drift
≤ 0.03 Vol.-% O_2 per week; following prolonged transport and storage time the drift can be higher during the first weeks of operation.

Sensitivity Drift
≤ 0.1 Vol.-% O_2 per week or ≤ 1 % of measured value per week (not cumulative), whichever is smaller.
≤ 0.25 % of measured value per year

Output Fluctuation (2 σ)
≤ 25 ppm O_2 at electronic T90 time (static/dynamic) = 3/0 sec

Detection Limit (4 σ)
≤ 50 ppm O_2 at electronic T90 time (static/dynamic) = 3/0 sec

Influence Effects

Flow Effect
Sample gas air: 0.1 Vol.-% O_2 at a flow rate change of ±10 l/h; sample gas N_2: ≤ 0.1 Vol.-% O_2 in permissible range

Associated Gas Effect
The effect of associated gases as a shift of the zero-point – expressed in Vol.-% O_2 – can be estimated using the approximate values in the following table:

Associated Gas Concentration 100 Vol.-%		Zero-Point Shift in Vol.-% O_2
Hydrogen	H_2	+0.28
Hydrogen Sulfide	H_2S	–0.45
Argon	Ar	–0.26
Helium	He	+0.30
Neon	Ne	+0.13
Nitrogen	N_2	0
Nitrogen Oxide	NO	+43
Nitrogen Dioxide	NO_2	+28
Nitrous Oxide	N_2O	–0.20
Carbon Monoxide	CO	–0.01
Carbon Dioxide	CO_2	–0.32
Carbon Oxysulfide	COS	–0.90
Ethane	C_2H_6	–0.46
Ethylene	C_2H_4	–0.29
Methane	CH_4	–0.24
Propane	C_3H_8	–0.98
Propylene	C_3H_6	–0.55
Trichloroethane	C_2HCl_3	–2.17
Vinyl Chloride	CH_2CHCl	–0.75

For further associated gases refer to EN 61207-3

Temperature Effect
Ambient temperature in the permissible range
– At zero-point: ≤ 0.02 Vol.-% O_2 per 10 °C
– On sensitivity: ≤ 0.1 % of measured value per 10 °C

Air Pressure Effect
– At zero-point: No effect
– On sensitivity with no pressure correction: ≤ 1 % of measured value per 1 % air pressure change
– On sensitivity with pressure correction using integrated pressure sensor (optional): ≤ 0.1 % of measured value per 1 % pressure change

Position Effect
Zero-point shift ≤ 0.05 Vol.-% O_2 per 1° deviation from horizontal orientation. Position has no effect on the hard-mounted unit.

Dynamic Response

Warm-Up Time
< 2 hours

90% Response Time
$T_{90} \leq 4$ sec at a sample gas flow of 90 l/h and electronic T90 time (static/dynamic) = 3/0 sec, gas change from N_2 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
For measurement ranges from 0 to 5 Vol.-% O_2 to 0 to 25 Vol.-% O_2
Zero-point calibration with any oxygen concentration, e.g. with nitrogen (N_2) or ambient air, processed through a cooler or H_2O 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
Single-point calibration is possible for suppressed measurement ranges with a suppression ratio ≤ 1:5. The oxygen concentration of the test gas must be within the measurement range.

Materials in Contact with the Sample Medium

Analyzer (Sample Chamber)
Rust- and acid-resistant steel 1.4305 (SAE 303), glass, platinum, rhodium, epoxy resin;
Seals: FPM (Fluorocarbon rubber), Option: FFKM75

Gas Lines, Connectors and Flame Barriers
Rust- and acid-resistant steel 1.4305 (SAE 303), 1.4571 (SAE 316Ti)

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 Meas. Range with Suppr. 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.-%	–
Air 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	0–3 Vol.-%	99–100 Vol.-%
H_2 in CH_4	0–1 Vol.-%	97–100 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.-%

Other sample components on request.

Special Version with Sample Components and Measurement Ranges for Monitoring Hydrogen-Cooled Turbo Generators

Sample Component and Associated Gas	Measurement Range
CO_2 in air	0–100 Vol.-%
H_2 in CO_2	100–0 Vol.-%
H_2 in air	100–80/90 Vol.-%

Number of Sample Components
1–4 sample components, manual switchover

Quantity and Measurement Range Limits
2 measurement ranges per sample component
Measurement ranges are freely adjustable within the limits shown in the table. They are factory-calibrated for the largest possible measurement range.

Largest Measurement Range
0–100 Vol.-% or 0 Vol.-% to saturation
Measurement ranges within ignition limits cannot be provided.

Measurement Ranges with Suppressed Zero-Point
See the adjacent table for spans

Stability

The following data apply only if all influence factors (e.g. flow rate, temperature, atmospheric pressure) are constant. They relate to smallest measurement ranges given in the table. The deviations may be larger for smaller measurement ranges.

Linearity Deviation
≤ 2 % of span

Repeatability
≤ 1 % of span

Zero Drift
≤ 2 % of smallest possible measurement range per week

Sensitivity Drift
≤ 0.5 % of smallest possible measurement range 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
≤ 0.5 to 2.5 % 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
at each point in the measurement range: ≤ 1 % of span per 10 °C, based on temperature at the time of calibration

Air Pressure Effect
≤ 0.25 % of span per 10 hPa for the smallest possible ranges given; for larger spans the effect is correspondingly lower.
Option: Operating altitude over 2000 m

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

Dynamic Response

Warm-Up Time
Approx. 30 minutes

90% Response Time
$T_{90} \leq 2$ sec at sample gas flow of 60 l/h

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 in Contact with the Sample Medium

Analyzer
Sensor: Gold, silicon oxi-nitride; Sample chamber: Rust- and acid-resistant steel 1.4305 (SAE 303); Seal: FFKM75 (Perfluoro rubber)

Gas Lines, Connectors and Flame Barriers
Rust- and acid-resistant steel 1.4305 (SAE 303), 1.4571 (SAE 316Ti)

Thermal Conductivity Analyzer Caldos25

Measurement Principle

Difference in thermal conductivity of various gases

Thermal conductivity analyzer, sample cells embedded in glass

Sample Components and Measurement Ranges

Component and Associated Gas	Smallest Measurement Range	Reference Gas
H_2 in N_2 or air	0–0.5 Vol.-%	Air (sealed)
SO_2 in N_2 or air	0–1.5 Vol.-%	Air (sealed)

Other sample components on request.

Number of Sample Components
1–3 sample components, manual switchover

Number of Measurement Ranges
1 measurement range per sample component
The measurement range is factory-set per order and cannot be changed.

Largest Measurement Range
0–100 Vol.-% or 0 Vol.-% to saturation
Measurement ranges within ignition limits cannot be provided.

Measurement Ranges with Suppressed Zero-Point
Span at least 2 Vol.-%, depending on application

Stability

The following data apply only if all influence factors (e.g. flow rate, temperature, atmospheric pressure) are constant.

Linearity Deviation
≤ 2 % of span

Repeatability
≤ 1 % of span

Zero Drift
≤ 1 % of span per week

Sensitivity Drift
≤ 1 % 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 to 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 permissible range
at each point in the measurement range: ≤ 1 % of span per 10 °C, based on temperature at the time of calibration

Position Effect
< 1 % of span up to 10° deviation from horizontal orientation

Dynamic Response

Warm-Up Time
2–4 hours, depending on measurement range

90% Response Time
T_{90} = 10–20 sec; optional: T_{90} < 6 sec

Calibration

Zero-Point Calibration
With sample component-free process gas or substitute gas

End-Point Calibration
With process gas having a known sample gas concentration or with substitute gas

Materials in Contact with the Sample Medium

Analyzer
Rust- and acid-resistant steel 1.4305 (SAE 303), glass

Gas Lines, Connectors and Flame Barriers
Rust- and acid-resistant steel 1.4305 (SAE 303), 1.4571 (SAE 316Ti)

Housing – Explosion Protection

Control Unit
(With or without Magnos206, Caldos25 or Caldos27 analyzer)

Version
Flameproof enclosure with a glass viewing window and a flange-mounted terminal housing

Type of Protection
Housing: Flameproof Enclosure “d” per EN 60079-1,
Junction Box: Increased Safety “e” per EN 60079-7

Designation
⟨Ex⟩ II 2G Ex de IIC T4

EC Type Examination Certificate
BVS 08 ATEX E 048 X

Housing Protection Type
IP65 per EN 60529

Materials
Aluminum, Glass

Color
Light gray (RAL 7035)

Weight
Approx. 20 kg

Dimensions
Dimensional drawing see page 14

Uras26 Analyzer Unit

Version
Flameproof enclosure (cylinder)

Type of Protection
Flameproof enclosure “d” per EN 60079-1

Designation
⟨Ex⟩ II 2G Ex d IIC T4

EC Type Examination Certificate
BVS 08 ATEX E 055 X

Housing Protection Type
IP54 per EN 60529 (O-ring seals required when mounted horizontally)

Material
Aluminum

Color
Light gray (RAL 7035)

Weight
Approx. 25 kg

Dimensions
Dimensional drawing see page 15

Housing Purge

Use
To protect the gas analyzers in corrosive environments or when using corrosive sample or associated gases an option is available to allow the housings of the central unit and the Uras26 analyzer unit to be purged.

Purge Gas
Clean instrument air from non-explosive areas or inert gas. The purge gas for purging the Uras26 analyzer unit must not contain any sample gas components.

Purge Gas Pressure
$p_{abs} \leq 1080$ hPa

Purge Gas Flow
During operation ≤ 10 l/h

Pressure Drop at Flame Barriers
Approx. 20 hPa at a flow rate of 10 l/h

Display and Operation

Display
Backlit graphics display with 240 x 160-pixel resolution

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

Status Display
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

Concept of Operation
The functions required in normal operation are operated and configured directly on the gas analyzer. The functions which are only seldom required, e.g. during start-up, are configured offline using the software tool ECT (“EasyLine Configuration Tool” on the enclosed CD-ROM) and then loaded into the gas analyzer.

Measuring Range Switch-Over and Feedback
There are three ways of executing the measuring range switch-over:
- Manually on the gas analyzer
- Automatically (autorange) by means of appropriate configured switch-over thresholds
- 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 software tool ECT. The limit value signals (alarms) are output via digital outputs.

Pressure Sensor

Use

Standard equipment in the Uras26 and Caldos27, optional in the Magnos206. The pressure sensor measures the air pressure inside the housing as standard. As an option, the connection of the pressure sensor is led outside to a flame barrier; it may not be connected to the sample gas feed path when measuring flammable gases.

Pressure sensor working range: p_{abs} = 600–1250 hPa

Materials in Contact with the Sample Medium

Silicon gel, plastics, FPM (Fluorocarbon rubber);
Flame barrier: Rust- and acid-resistant steel 1.4571 (SAE 316Ti)

Gas Inlet Conditions

Flammable Gases

The gas analyzers are capable of measuring flammable and non-flammable gases under atmospheric conditions which can form an explosive environment.

The maximum oxygen content of the sample gas mixture should be 21 Vol.-%, corresponding to atmospheric conditions.

If the sample gas is a mixture only of oxygen and flammable gases and vapors, it must not be explosive under any conditions. As a rule this can be achieved by limiting the oxygen content to a maximum of 2 Vol.-%.

Flammable gases that are explosive under the conditions encountered in analysis even when oxygen is excluded should be present in the mixture only in concentrations that are not critical to safety.

Corrosive Gases

The gas analyzers must not be used to measure gases which attack the materials in contact with the sample medium (e.g. chlorine-containing gases).

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.

Inlet Pressure

$p_e \leq 100$ hPa / $p_{abs} \leq 1100$ hPa

Flow Rate

Uras26	20–100 l/h
Magnos206	30–90 l/h
Caldos25	max. 100 l/h
Caldos27	max. 100 l/h

Pressure Drop at Flame Barriers

Approx. 40 hPa at a flow rate of 50 l/h

Outlet Pressure

The outlet pressure must be the same as the atmospheric pressure.

Power Supply

Input Voltage

100–240 V AC, 50–60 Hz ± 3 Hz

Power Consumption

Max. 187 VA

Electromagnetic Compatibility

Noise Immunity

Tested to EN 61326-1:2006. Inspection severity: Industrial area, fulfills at least the rating “continuously monitored operation” to Table 2 of EN 61326.

Emitted Interference

Tested to EN 61326-1:2006, EN 61000-3-2:2006 and EN 61000-3-3:1995 + A1:2001 + A2:2005. Limit value class B for interference field strength and interference voltage is met.

Electrical Safety

Tested per EN 61010-1:2001

Protection Class I

Overload Category/Pollution Level

Power supply, signal inputs and outputs: III/2

Safe Isolation

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

Mechanical Stress

Operation

Vibration test to EN 60068-2-6:1996
Vibrations up to 0.5g/150 Hz have no influence on the measured value. In Uras26, slight transient effects on the measured value can occur in the region of the modulation frequency.

Transport

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

Ambient Conditions

The gas analyzer is intended for indoor installation only.

Ambient Temperature

Control Unit with or without built-in analyzer	+5 to +50 °C
Uras26 with or without another analyzer:	+5 to +45 °C
Storage and transport:	–25 to +65 °C

The explosion protection is not impaired if the gas analyzer is operated at temperatures less than +5 °C and down to –20 °C. However in this temperature range the compliance with the metrological data cannot be guaranteed.

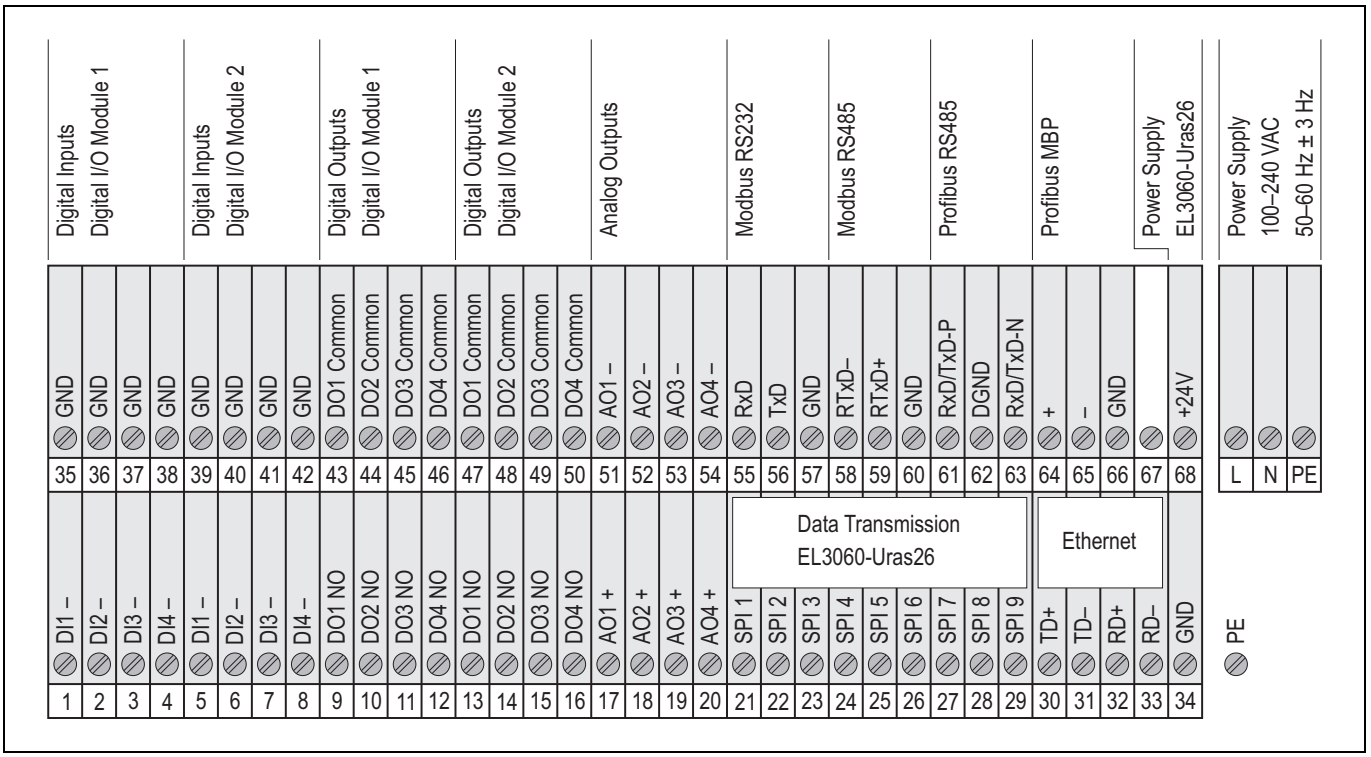
Relative Humidity

< 75 %, slight condensation allowed

Installation Location Altitude

Max. 2000 m above sea level (over 2000 m on request)

Power Supply and Signal Lines



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

Digital Inputs
Optocouplers with internal 24 VDC power supply. Control with floating contacts or with open collector drivers NPN.

Digital Outputs
Floating double-throw contacts, max. contact load rating 30 VDC/1 A. 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).

Modbus, Profibus
Either the Modbus module or the Profibus module can be installed in the gas analyzer as an option.

Ethernet Interface
- For communication with configuration software ECT for gas analyzer configuration and software update and
- For QAL3 data transfer if the QAL3 monitoring option is integrated in the gas analyzer.

Design of the Electrical Connections
Terminal blocks with screw connection, conductor size single-core 0.2–4 mm², stranded 0.22–2.5 mm² (22–12 AWG)

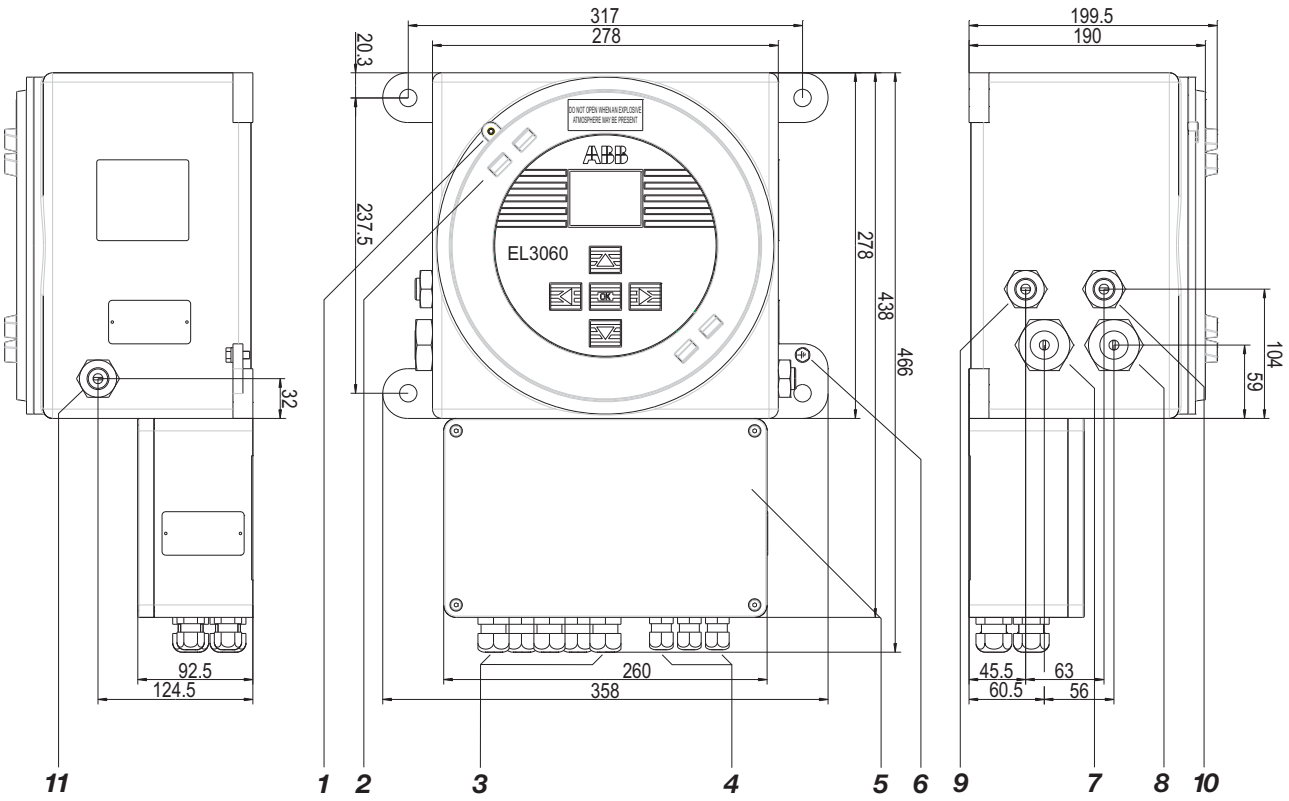
Note: Not all signal inputs and outputs are actually used, depending on the configuration of the gas analyzer.

Digital Input and Output Signals	Standard Assignment [1] Digital I/O Module 1	2 (Option)
Error		
Maintenance request		
Maintenance mode		
Overall status	DO1	
Start automatic calibration	DI1	
Stop automatic calibration		
Disable automatic calibration	DI2	
Sample gas valve	DO4	
Zero gas valve		
Span gas valve		
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 switchover		
Measuring range feedback		
Bus DI 1–8		
External failure [2]	DI3	
External maintenance request [2]	DI4	

1) Factory-set, can be changed by on-site configuration.
2) Multiple external status signals can be configured depending on the number of free digital inputs.

Dimensional Drawings, Gas Connections

Control Unit EL3060-CU



Dimensions in mm

1 Hex Socket Head Screw to Secure the Housing Cover
2 Housing Cover
3 Cable Connections M20: 2 x Metal, 3 x Plastic
4 Cable Connections M16: 2 x Metal, 1 x Plastic
5 Cable Compartment (Junction Box) with Terminal Strip (electrical connections see page 13)
6 Potential Compensation Connection
7 Sample Gas Inlet [1)]
8 Sample Gas Outlet [1)]
9 Purge Gas Inlet [2)]
10 Purge Gas Outlet [2)]
11 Pressure Sensor Port [3)]

1) When an analyzer is installed in the control unit
2) Option
3) Option. The pressure sensor port must not be connected to the sample gas path when measuring flammable gases.

Design of the Gas Connections

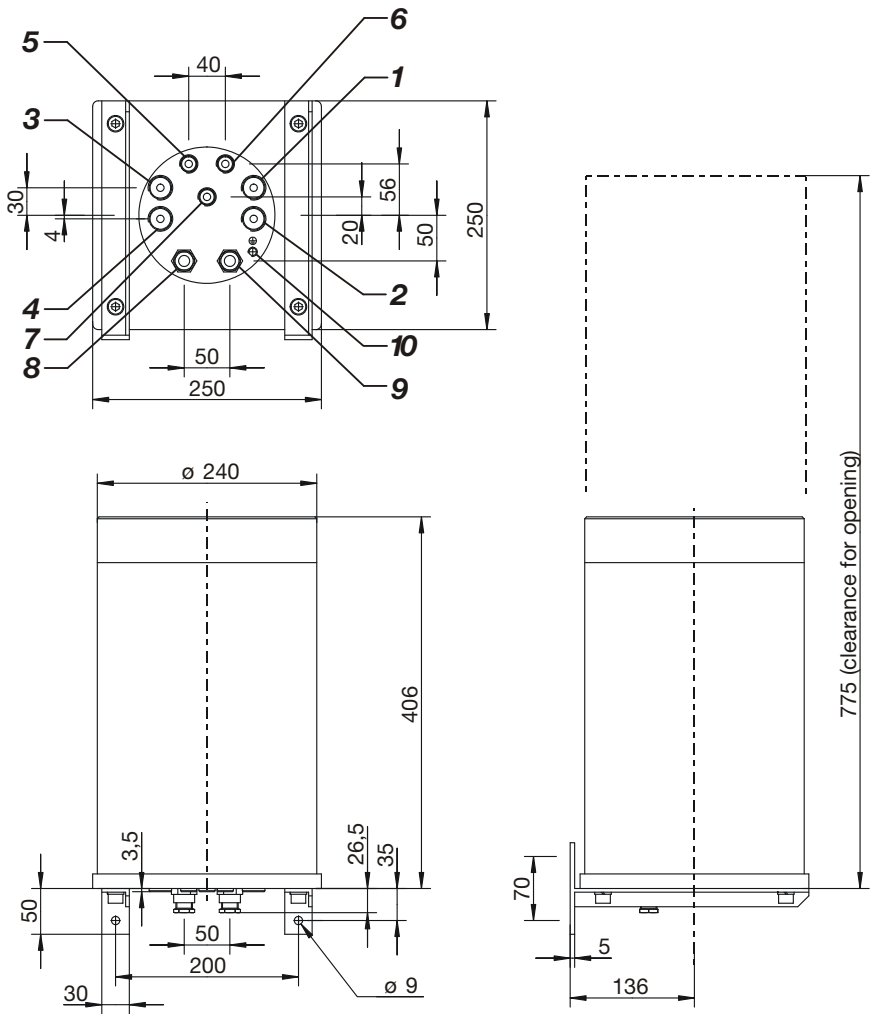
Internal flame barriers of rust- and acid-resistant steel 1.4571 (SAE 316Ti) with 1/8 NPT female thread

Space Requirements

Note the additional space requirements to the left and to the right of the housing as well as beneath the housing for connection lines (each approx. 10 cm).

Dimensional Drawings, Gas Connections

Analyzer Unit Uras26



Dimensions in mm

1 ⎫ Assignment of the
2 ⎪ Gas Connections
3 ⎪ See Analyzer Data Sheet
4 ⎭ (Provided with the Gas Analyzer)
5 Purge Gas Inlet [1)]
6 Purge Gas Outlet [1)]
7 Pressure Sensor Port [1) 2)]
8 Data Transmission Cable Opening
9 24 VDC Connection Cable Opening
10 Potential Compensation Connection

1) Option
2) The pressure sensor port must not be connected to the sample gas path when measuring flammable gases.

Design of the Gas Connections

Internal flame barriers of rust- and acid-resistant steel 1.4571 (SAE 316Ti) with 1/8 NPT female thread

Connecting Cables

The permanently connected connecting cables for data transmission and 24 V DC supply are integral components of the flameproof enclosure of the analyzer unit. Both of them are 10 m long and may not be shortened to a length of less than 1 m.

Space Requirements

Note the additional space requirements beneath the analyzer unit for connection lines (approx. 10 cm) and above the analyzer unit for opening the housing (approx. 40 cm).

Certifications

CE Declaration of Conformity

The EL3060 Series gas analyzers satisfy the provisions of the following European directives:

2006/95/EC Low Voltage Directive
2004/108/EC EMC Directive
94/9/EC ATEX Directive

Compliance with the provisions of directive 2006/95/EC is evidenced by full compliance with European standard:

EN 61010-1:2001

Compliance with the provisions of directive 2004/108/EC is evidenced by full compliance with European standards:

EN 61326-1:2006, EN 61000-3-2:2006 and EN 61000-3-3:1995 + A1:2001 + A2:2005

Compliance with the provisions of directive 94/9/EC is evidenced by full compliance with European standards:

EN 60079-0 General Requirements
EN 60079-1 Flameproof Enclosures “d”
EN 60079-7 Increased Safety “e”

Contact us

ABB Automation GmbH
Process Automation
Stierstaedter Strasse 5
60488 Frankfurt am Main, Germany
Fax: +49 69 7930-4566
E-mail: cga@de.abb.com

ABB Limited
Process Automation
Oldends Lane
GL10 3TA Stonehouse
Gloucestershire, United Kingdom
Phone: +44 1 453 826661
Fax: +44 1 453 829671

ABB Pte. Ltd.
Process Automation
2 Ayer Rajah Crescent
139935 Singapore, Singapore
Phone: +65 6773 5961
Fax: +65 6778 0222

ABB Inc.
Process Automation
3700 W Sam Houston Parkway South,
Suite 600, Houston, TX 77042, USA
Phone: +1 713 587 8000

ABB Ltd.
Process Automation
14 Mathura Road
121003 Faridabad, Haryana, India
Phone: +91 129 2279627
Fax: +91 129 2279692

ABB Australia Pty Limited
Process Automation
Bapaume Road
2170 Moorebank
New South Wales, Australia
Phone: +61 2 9821 0968
Fax: +61 2 9400 7050

ABB Engineering Ltd.
Process Automation
10 Jiuxianqiao Lu
100015 Beijing, China
Phone: +86 10 84566688 Ext. 6217
Fax: +86 10 84567650

www.abb.com/analytical

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