EasyLine Continuous Gas Analyzers

Models EL3020, EL3040

Software Version 3.2

Instructions for Installation, Start-up and Operation

41/24-400 EN Rev. 4

Contents

Preface

Content of the Operator's Manual

These instructions in brief for installation, start-up and operation contain all the information necessary for the safe and compliant installation, start-up and operation of the gas analyzer.

Information on calibration, configuration and maintenance of the gas analyzer and the Modbus and Profibus is documented in the on-line help file of the operator's manual; the on-line help file can be found on the CD-ROM "Software Tools and Technical Documentation", which is supplied with the gas analyzer (see below).

Further Information

Analyzer Data Sheet

The design of the supplied gas analyzer is documented in detail in the "Analyzer data sheet".

CD-ROM "Software Tools and Technical Documentation"

The CD-ROM "Software Tools and Technical Documentation" with the following contents is supplied with the gas analyzer:

- Software Tools
- Operator's Manuals
- Data Sheets
- Technical Information
- Certificates

CD-ROM "Spare Parts Analytical"

Information on spare parts can be found on the CD-ROM "Spare Parts Analytical", which is enclosed with the gas analyzer.

Internet

You will find additional information on ABB Analytical products and services on the Internet at "http://www.abb.com/analytical".

Service

If the information in this operator's manual does not cover a particular situation, ABB Service will be pleased to supply additional information as required.

Please contact your local service representative. For emergencies, please contact

ABB Service,
Telephone: +49-(0)180-5-222580, Telefax: +49-(0)621-38193129031,
E-mail: automation.service@de.abb.com mailto:automation.service@de.abb.com

Symbols and Typefaces in the Operator's Manual

ATTENTION identifies safety information to be heeded during gas analyzer operation, in order to avoid risks to the user.

NOTE identifies specific information on the operation of the gas analyzer as well as on the use of this manual.

1, ***2***, ***3***, ...	Identifies reference numbers in figures.
`Display`	Identifies a display on the screen.
▲▶▼◀OK	Identifies function keys.

Guideline for Installation and Commissioning

Basic Steps

The following basic steps should be followed for the installation and commissioning of the gas analyzer:

1. Note the information on the intended application (see page 8).
2. Follow the safety information (see page 9).
3. Prepare for the installation, provide the requisite material (see page 11).
4. Unpack the gas analyzer (see page 31).
5. Check the seal integrity of the sample gas feed path (see online help file).
6. Install the gas analyzer (see page 54).
7. Connect the gas lines (see page 56).
8. Connect the electrical leads (see page 57).
9. Check the installation (see page 68).
10. Purge the sample gas feed path (see page 69).
11. Start up the gas analyzer (see page 70).
12. Configure the gas analyzer (see online help file).

Intended Application

Intended Application of the Gas Analyzer

The gas analyzer is designed for continuous measurement of the concentration of individual components in gases or vapors.

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

The gas analyzer version with stainless steel gas lines and gas connections (models EL3020 and EL3040) may be used for the measurement of flammable gases[1] and vapors in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 17) have to be observed. The oxygen sensor and the modules of the integrated gas feed (Option "Integrated Gas Feed" – only in the EL3020 model, not for Limas23) must not be used for the measurement of flammable gases.

The explosion-proof version of the gas analyzer with degree of protection II 3G (see page 18) (model EL3040) may be used for the measurement of non-flammable gases and vapors in a hazardous environment.

NOTE
The version for the measurement of flammable gases and vapors and the explosion-proof version with degree of protection II 3G are different versions of the gas analyzer and designed for different applications.

[1] A flammable gas is a gas that can be ignited by exposure to air.

Safety Information

Requirements for Safe Operation

In order to operate in a safe and efficient manner the device should be properly handled and stored, correctly installed and set-up, properly operated and correctly maintained.

Personnel Qualifications

Only persons familiar with the installation, set-up, operation and maintenance of comparable devices and certified as being capable of such work should work on the device.

Special Information and Precautions

These include

- The content of this operator's manual,
- The safety information affixed to the device,
- The applicable safety precautions for installing and operating electrical devices,
- Safety precautions for working with gases, acids, condensates, etc.

National Regulations

The regulations, standards and guidelines cited in this operator's manual are applicable in the Federal Republic of Germany. The applicable national regulations should be followed when the device is used in other countries.

Device Safety and Safe Operation

The device is designed and tested in accordance with EN 61010 Part 1, "Safety Provisions for Electrical Measuring, Control, Regulation and Laboratory Instruments" and has been shipped ready for safe operation. To maintain this condition and to assure safe operation, read and follow the safety information in this manual. Failure to do so can put persons at risk and can lead to device damage as well as damage to other systems and devices.

Protective Lead Connection

The protective lead (ground) should be attached to the protective lead connector before any other connection is made.

Risks of a Disconnected Protective Lead

The device can be hazardous if the protective lead is interrupted inside or outside the device or if the protective lead is disconnected.

Risks Involved in Opening the Covers

Current-bearing components can be exposed when the covers or parts are removed, even if this can be done without tools. Current can be present at some connection points.

Risks Involved in Working with an Open Device

All work on a device that is open and connected to power should only be performed by trained personnel who are familiar with the risks involved.

When Safe Operation can no Longer be Assured

If it is apparent that safe operation is no longer possible, the device should be taken out of operation and secured against unauthorized use.

The possibility of safe operation is excluded:

- If the device is visibly damaged,
- If the device no longer operates,
- After prolonged storage under adverse conditions,
- After severe transport stresses.

CHAPTER 1

Preparation for Installation

Requirements for the Installation Site, Power Supply

NOTE
The gas analyzer is only intended for installation indoors.

Short Gas Paths

Install the gas analyzer as close as possible to the sampling location.

Install the gas conditioning and calibration modules as close as possible to the gas analyzer.

Adequate Air Circulation

Provide for adequate natural air circulation around the gas analyzer. Avoid heat build-up.

Mount (see page 54) several 19-inch cases with a minimum spacing of 1 height unit between cases.

Protection from Adverse Conditions

Protect the gas analyzer from

- Cold,
- Exposure to heat from e.g. the sun, furnaces, boilers
- Temperature variations
- Strong air currents
- Accumulation of dust and ingress of dust
- Corrosive atmosphere
- Vibration.

Climatic Conditions

Atmospheric Pressure	600...1250 hPa
Relative humidity	max. 75 %, slight condensation permissible
Ambient temperature	
for storage and transport	–25...+65 °C
during operation	+5...+45 °C
Uras26 in combination with another analyzer	+5...+40 °C
Limas23	+5...+40 °C

Altitude of the Installation Site

The maximum altitude of the installation site is 2000 m above sea level.

Stability of the Installation Site

The installation site must be stable enough to bear the weight of the gas analyzer. To ensure safe installation and removal, we recommend that the 19-inch case is supported in a cabinet or rack with slide rails!

Special requirements for the gas analyzer Model EL3020 for the measurement of flammable gases

An unimpeded exchange of air with the surroundings must be possible around the gas analyzer from beneath (base plate) and from behind (gas connections). The gas analyzer must not be put directly on a table. The case apertures must not be closed. The distance to adjacent, built-in components on the side must be at least 3 cm.

For installations in a closed cabinet, the cabinet must have adequate ventilation (at least 1 air change per hour). The distance to adjacent, built-in components underneath (floor plate) and behind (gas connections) must be at least 3 cm.

Special requirements for the gas analyzer Model EL3040 in degree of protection II 3G

Due to the low mechanical stability of the display window, the gas analyzer has to be installed and operated in such a way that mechanical damage to the display window is ruled out.

Case Style

Model	Case Style	Degree of protection	Weight
EL3020	19-inch case	IP20	approx. 7...15 kg
EL3040	Wall-mounting case	IP65	approx. 13...21 kg

Power Supply

Input voltage	100...240 V AC (– 15 %, + 10 %), 50...60 Hz (± 3 Hz)
Power consumption	max. 187 VA
Connection	3-pole grounded-instrument connector to EN 60320-1/C14 (Mains lead supplied)
Battery	Lithium button-cell 3 V CR2032, for supply of the integrated clock during a power failure

Electrical Safety

Test	Tested to EN 61010-1:2001
Class of protection	I
Overvoltage category/ degree of pollution	Power supply: III/2 Signal inputs and outputs: II/2
Safe isolation	Electrical isolation of the power supply from the other circuits through increased or double insulation. Functional extra-low voltage (PELV) on the low-voltage side.

Electromagnetic Compatibility

Interference immunity	Tested to EN 61326-1:2006. Inspection severity: Industrial area, complies with 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, EN 61000-3-3:1995 + A1:2001 + A2:2005. Threshold class B for interference field strength and interference voltages is complied with.

Sample Gas Inlet and Outlet Conditions

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

Uras26

Sample Gas Inlet Conditions

The dew point of the sample gas must be at least 5 °C lower than the lowest ambient temperature in the overall sample gas path. Otherwise, a sample gas cooler or condensate trap is required.

Positive pressure	2...500 hPa
Flow	20...100 l/h

Flammable Gases

The analyzer version with stainless steel gas lines and gas connections is suitable for the measurement of flammable gases in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 17) have to be observed.

Corrosive Gases

The analyzer may not be used for the measurement of corrosive gases. Associated gases such as chlorine (Cl_2) or hydrogen chloride (e.g. wet HCl) as well as gases or aerosols containing chlorine must be cooled or pre-absorbed.

Limas23

Sample Gas Inlet Conditions

The dew point of the sample gas must be at least 5 °C lower than the lowest ambient temperature in the overall sample gas path. Otherwise, a sample gas cooler or condensate trap is required.

Positive pressure	2...500 hPa
Flow	20...100 l/h

Flammable Gases

The analyzer may not be used for the measurement of flammable gases.

Corrosive Gases

The analyzer may not be used for the measurement of corrosive gases. Associated gases such as chlorine (Cl_2) or hydrogen chloride (e.g. wet HCl) as well as gases or aerosols containing chlorine must be cooled or pre-absorbed.

Magnos206

Sample Gas Inlet Conditions

Temperature	+5...+50 °C
Positive pressure	2...100 hPa
Flow	30...90 l/h

Flammable Gases

The analyzer is suitable for the measurement of flammable gases in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 17) have to be observed.

Corrosive Gases

If the sample gas contains Cl_2, HCl, HF or other corrosive components, the analyzer may only be used if the sample gas composition has been taken into account by the manufacturer for the configuration of the analyzer.

Caldos27

Sample Gas Inlet Conditions

Temperature	+5...+50 °C
Positive pressure	2...100 hPa
Flow	10...90 l/h, min. 1 l/h
Pressure drop	< 2 hPa at 60 l/h N_2

Flammable Gases

The analyzer is suitable for the measurement of flammable gases in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 17) have to be observed.

Corrosive Gases

If the sample gas contains Cl_2, HCl, HF, SO_2, NH_3, H_2S or other corrosive components, the analyzer may only be used if the sample gas composition has been taken into account by the manufacturer for the configuration of the analyzer.

Oxygen Sensor

Flammable Gases

The oxygen sensor may not be used for the measurement of flammable gases.

Other Requirements

The H_2O dew point of the sample gas must be ≥ 2 °C. The oxygen sensor may not be used, if the sample gas contains the following components: H_2S, compounds containing chlorine or fluorine, heavy metals, aerosols, mercaptans, alkaline components.

Integrated Gas Feed

Flammable Gases

If the gas analyzer is equipped with integrated gas feed the gas it may not be used for the measurement of flammable gases.

Note: The integrated gas feed can be installed in model EL3020 as an option. It cannot be used in the EL3040 model or in conjunction with the Limas23 analyzer.

Sample Gas Dew Point

The dew point of the sample gas must be at least 5 °C lower than the lowest ambient temperature in the overall sample gas path. Otherwise, a sample gas cooler or condensate trap is required. Fluctuations in water vapor content cause volume errors.

Outlet Pressure

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

Special Requirements for the Measurement of Flammable Gases

NOTE
The version for the measurement of flammable gases and vapors and the explosion-proof version with degree of protection II 3G are different versions of the gas analyzer and designed for different applications.

Installation of the Gas Analyzer

- Model EL3020 only: An unimpeded exchange of air with the surroundings must be possible around the gas analyzer from beneath (base plate) and from behind (gas connections). The gas analyzer must not be put directly on a table. The case apertures must not be closed. The distance to adjacent, built-in components on the side must be at least 3 cm.
- Model EL3020 only: For installations in a closed cabinet, the cabinet must have adequate ventilation (at least 1 air change per hour). The distance to adjacent, built-in components underneath (floor plate) and behind (gas connections) must be at least 3 cm.
- The connection of the pressure sensor (see page 23) must not be connected to the sample gas feed path.
- The sample gas lines and connections have to be made in stainless steel.
- Prior to using the gas analyzer the corrosion resistance against the present sample gas must be tested.

Commissioning of the Gas Analyzer

- The sample gas feed path must be purged (see page 69) with inert gas, before the gas analyzer is commissioned.

Operation and Maintenance of the Gas Analyzer

- Model EL3040 only: The case must be purged with nitrogen. Purge gas flow 1 to 20 l/h. The purge gas flow must be monitored at the purge gas outlet.
- 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 seal integrity of the sample gas feed path should be checked regularly.
- After the sample gas feed path inside the gas analyzer has been opened, the following measures are required:
  - The seal integrity of the sample gas feed path should be checked.
  - The sample gas feed path must be purged with inert gas, before the power supply is switched on.

Explosion-proof Design in Degree of Protection II 3G

NOTE
The version for the measurement of flammable gases and vapors and the explosion-proof version with degree of protection II 3G are different versions of the gas analyzer and designed for different applications.

Description

The gas analyzer model EL3040 in degree of protection II 3G has been tested for explosion protection and is suitable for use in hazardous areas in compliance with the technical data and the special conditions (see below). It may be used for the measurement of non-flammable gases and vapors and is designated pursuant to European Directive 94/9/EEC with: Ⓔx II 3G Ex nAC II T4 X

Operating the instrument under regular conditions cannot cause any ignitable sparks, arcs or impermissible temperatures inside the instrument. Explosion-proof with: Spark-free instruments and devices with low power consumption; sealed or enclosed instruments

Evaluation based on 60079-15:2005 "Electric Apparatuses for Potentially Explosive Gas Atmospheres" Part 15: Protection Type "n", sections 1…16, 19, 20, 22, 23, 29. Identification based on EN 60079-15:2005, section 35. Degree of case protection IP65

Special Requirements

- The cables have to be properly inserted in the screwed cable glands and sealed by screwing the nut firmly in order to comply with degree of case protection IP65. Cable connectors not in use have to be closed with suitable vent plugs in order to ensure degree of case protection IP65 here as well.
- If the installation site of the gas analyzer is hazardous, the case must not be opened live.
- Purging gas connections not in use during operation have to be closed with vent plugs.
- Due to the high surface resistance of the keyboard overlay ($R > 1\ G\Omega$) the gas analyzer has to be operated and maintained in such a way that the risk of a hazardous electrical discharge is ruled out (e.g. using only suitable cloth for cleaning).
- Due to the low mechanical stability of the display window, the gas analyzer has to be installed and operated in such a way that mechanical damage to the display window is ruled out. In the event that the display window is still damaged making it impossible to comply with degree of case protection IP65, the gas analyzer has to be shut down, secured against re-starts and it has to be repaired.

Test Gases for the Calibration

Analyzer(s)	Test gas for the zero-point calibration and the single-point calibration	Test gas for the end-point calibration
Uras26 with calibration cells (automatic calibration)	N_2 or air or IR sample component-free gas	– (calibration cells)
Uras26 without calibration cells (automatic calibration)	N_2 or air	Span gas*
Uras26 without calibration cells (manual calibration)	N_2 or air	Test gas for each sample component
Uras26 + Magnos206 (automatic calibration, i.e. Magnos206 with single-point calibration)	IR sample component-free test gas with $_{O2}$ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Calibration cells or span gas*
Uras26 + Magnos206 (manual calibration)	Zero gas for Uras26, respectively Magnos206 or IR sample component-free test gas with O_2 concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Span gas for all sample components in the Uras26 and Magnos206 (possibly only for the Uras26 if a single-point calibration is carried out for the Magnos206)
Uras26 + Caldos27 (automatic calibration, i.e. Caldos27 with single-point calibration)	IR sample component-free test gas with a known and constant rTC value (possibly also dried room air)	Calibration cells or span gas*
Uras26 + Caldos27 manual calibration)	Zero gas for Uras26, respectively Caldos27, or IR sample component-free test gas with a known rTC value	Span gas for all sample components in the Uras26 and Caldos27 (possibly only for the Uras26 if a single-point calibration is carried out for the Caldos27)
Uras26 + oxygen sensor (automatic calibration)	IR sample component-free test gas with O_2 concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Calibration cells or span gas*
Uras26 + oxygen sensor (manual calibration)	IR sample component-free test gas with O_2 concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Span gas for all sample components in the Uras26
Limas23 with calibration cells (automatic calibration)	N_2 or air or UV sample component-free gas	Calibration cells or test gas for each sample component
Limas23 without calibration cells (automatic calibration)	N_2 or air or UV sample component-free gas	Test gas for each sample component
Limas23 without calibration cells (manual calibration)	N_2 or air or UV sample component-free gas	Test gas for each sample component

Limas23 + Magnos206 or **oxygen sensor** with calibration cells (automatic calibration, i.e. Magnos206 with single-point calibration)	N_2 or oxygen- and UV sample component-free gas	Either calibration cells and test gas for oxygen detector or test gas for each sample component, respectively for each detector
Limas23 + Magnos206 or oxygen sensor without calibration cells (automatic calibration)	N_2 or oxygen- and UV sample component-free gas	Test gas for each sample component, respectively for each detector
Limas23 + Magnos206 or oxygen sensor without calibration cells (manual calibration)	N_2 or oxygen- and UV sample component-free gas	Test gas for each sample component, respectively for each detector
Magnos206	Oxygen-free process gas	Process gas with a known O_2 concentration
Magnos206 with a suppressed measuring range	Test gas with O_2 concentration near the starting point of the measuring range	Test gas with O_2 concentration near the end point of the measuring range
Magnos206 with single-point calibration	Test gas with O_2 concentration in an existing measuring range or ambient air. Same moisture content as process gas.	–
Magnos206 with substitute gas calibration	Oxygen-free process gas or substitute gas (O_2 in N_2)	Substitute gas, e.g. dried air
Caldos27	Sample component-free test gas or process gas	Test gas or process gas with a known sample gas concentration
Caldos27 with suppressed measuring Range	Test gas with a sample component concentration near the starting point of the measuring range	Test gas with a sample component concentration near the end point of the measuring range
Caldos27 with single-point calibration	Test gas with a known and constant rTC value (standard gas; possibly also dried room air)	–

* Test gas mixture for multiple sample components possible if no cross-sensitivity is present

Case Purging

Case Style

Case purging is only possible with the wall-mounting case (Model EL3040). The purging gas connectors (1/8-NPT female thread) are factory-installed based on orders.

When does case purging become necessary?

Case purging becomes necessary when the sample gas contains flammable (see page 17), corrosive or toxic components.

Purge Gas

The following is to be used as purging gas:

- Nitrogen for measuring flammable gases and
- nitrogen or instrument air for measuring corrosive or toxic gases (Quality of instrument air in conformity with ISO 8573-1 Category 3, i.e. particle size max. 40 µm, oil content max. 1 mg/m³, pressure dew point max. +3 °C).

NOTE
When Uras26 is applied, the purging gas must not contain any constituents of the sample components! Sample component constituents in the purging gas can falsify the measurement result.

ATTENTION
Leaks may cause the purging gas to escape from the case. When applying nitrogen as purging gas, appropriate precautionary measures must be taken against asphyxiation!
The purging gas flow always has to be throttled before the purging gas inlet! If the purging gas flow is not throttled until after the purging gas outlet, the full pressure of the purging gas will affect the case seals, which can destroy the operator panel keyboard!

Initial Purging for Start-up

Purging of the gas feed path:	Purge gas flow max. 100 l/h, duration approx. 20 s
Purging of the wall-mounting case:	Purge gas flow max. 200 l/h, duration approx. 1 h

If the purge gas flow is lower than specified, the duration of the purging must be extended accordingly.

Case Purging During Operation

Purge gas flow: max. 20 l/h (constant) at the instrument inlet

Positive pressure of purging gas: p_e = 2 to 4 hPa

With a purge gas flow of 20 l/h at the instrument inlet, the purge gas flow at the instrument outlet due to leakage will amount to approx. 5 to 10 l/h.

Case Purging During Operation when Measuring Flammable Gases

The case must be purged with nitrogen. Purge gas flow 1 to 20 l/h. The purge gas flow must be monitored at the purge gas outlet.

Pressure Sensor

Uras26

The pressure sensor is installed in the gas analyzer as standard. Depending on the design of the gas analyzer, it is internally connected as follows (see also gas connections for the models EL3020 (see page 34) and EL3040 (see page 36)):

- Internal gas lines executed as flexible tubes:
  - Pressure sensor in the outlet of sample cell 1 with one sample cell and with separate gas feed paths
  - Pressure sensor in the outlet of sample cell 2 with two sample cells in tandem
- Internal gas lines are executed as stainless steel pipes:
  - Pressure sensor is connected to a gas port via an FPM hose

The connection of the pressure sensor is also documented in the pneumatic diagram contained in the analyzer data sheet.

Limas23

The pressure sensor is installed in the gas analyzer as standard. It is internally connected in the outlet of the sample cell (see also Gas Connections for the models EL3020 (see page 46) and EL3040 (see page 47)).

Magnos206

The pressure sensor is installed in the gas analyzer as an option. It is connected to a gas port via an FPM hose (see also gas connections for the models EL3020 (see page 50) and EL3040 (see page 51)).

With measurements in suppressed measuring ranges the connection of the pressure sensor and the sample gas outlet are to be connected to each other via a T-joint and short lines.

Attention should be paid in particular that the gas discharge line is as short as possible or if they are longer, have a sufficiently wide internal diameter (≥ 10 mm).

Caldos27

The pressure sensor is installed in the gas analyzer as standard. It is connected to a gas port via an FPM hose (see also gas connections for the models EL3020 (see page 52) and EL3040 (see page 53)).

Information for the Proper Operation of the Pressure Sensor

- Prior to the commissioning of the gas analyzer, the yellow plastic screw cap has to be screwed out of the connectors of the pressure sensor.
- For a precise pressure correction the connection of the pressure sensor and sample gas outlet have to be connected to each other via a T-piece and short lines. The lines must be as short as possible or – in the case of a greater length – have an adequate internal diameter ≥ 10 mm) so that the flow effect is minimized.
- If the pressure sensor is connected to the sample gas feed path, the sample gas must not contain any corrosive, flammable or ignitable components.
- If the pressure sensor connection is not connected to the sample gas outlet, an exact pressure correction is required so that the pressure sensor and the sample gas outlet are on the same pressure level.

Material Required for the Installation (not supplied)

Gas Connections

- For the connection of pipelines: Threaded connections with a 1/8 NPT thread and PTFE sealing tape

Flow Meter/Flow Monitor

- Flow meter or flow monitor with a needle valve for adjustment and monitoring of the sample gas flow rate and purge gas flow rate if required
- Information for the selection and use of flow meters:
  - Measuring range 7 to 70 l/h
  - Pressure drop < 4 hPa
  - Needle valve open

  Recommendation: Flow meter 7 to 70 l/h, Order no. 23151-5-8018474

Shut-off Valve

- Install a shut-off valve in the sample gas line (definitely recommended with pressurized sample gas).

Purging of the Gas Line System

- Provide a means for purging the gas line system by feeding in an inert gas, e.g. nitrogen, from the gas sampling point.

Installation Material

19-inch Case (Model EL3020)

- 4 oval head screws (Recommendation: M6; this depends on the cabinet/rack system)
- 1 pair of mounting rails (Design depends on the cabinet/rack system), length approx. 240 mm corresponding to approx. 2/3 of the case depth

Wall-mounting Case (Model EL3040)

- 4 screws M8 or M10

Signal Lines

- Select conductive material which is appropriate for the length of the lines and the predictable current load.
- Notes concerning the cable cross-section for connection of the I/O modules:
  - The max. capacity of terminals for stranded wire and solid wire is 1 mm^2 (17 AWG).
  - The stranded wire can be tinned on the tip or twisted to simplify the assembly.
  - When using wire end ferrules, the total cross-section may not be more than 1 mm^2, i.e. the cross-section of the stranded wire may not be more than 0.5 mm^2. The PZ 6/5 crimping tool of Weidmüller & Co. must be used for crimping the ferrules.
- Max. length of the RS485 leads (Modbus) 1200 m (max. transmission rate 19200 bit/s). Cable type: 3-core twisted-pair cable, cable cross-section 0.25 mm^2 (e.g. Thomas & Betts, Type LiYCY)
- Max. length of the RS232 leads 15 m.

Power Supply Lines

- If the supplied mains lead is not used, select conductive material which is appropriate for the length of the lines and the predictable current load.
- Provide a mains isolator or a switched socket-outlet, in order to be able to disconnect all the power from the gas analyzer if required.

Scope of Supply and Delivery

Scope of Supply and Delivery

Scope of Supply and Delivery

- Gas analyzer Model EL3020 (19-inch case) or Model EL3040 (wall-mounting case)
- Screwed fittings with nozzles for the connection of flexible tubes
- Mains lead (see page 67), length 5 m
- Mating plugs (socket housing) for the electrical connection of the I/O modules (attached to the terminals of the I/O modules)
- Screwdriver (required for attaching the electric lines in the mating plugs)
- Micro-porous filter (see page 56) (pre-assembled)
- CD-ROM (see page 5) with software tools and technical documentation
- Instructions in Brief for Installation, Start-up and Operation
- Analyzer Data Sheet (see page 28)

Analyzer Data Sheet

Contents of the Analyzer Data Sheet

The analyzer data sheet contains the following information:

- Order number (A-No.)
- Part number (P-No.)
- Production number (F-No.)
- Date of manufacture
- Power supply (voltage, frequency, power consumption)
- Sample components and measuring ranges
- Serial numbers of the installed modules.

The analyzer data sheet is in a protective sleeve, which is attached

- on the left-hand side panel inside the 19-inch case (model EL3020) and
- on the inside of the door of the wall-mounting case (model EL3040).

NOTES
Keep the analyzer data sheet in the gas analyzer, so that it is always available, especially in case of service (see page **Fehler! Textmarke nicht definiert.**). Take note of the specifications in the analyzer data sheet when commissioning the analyzer. They may deviate from the general specifications in the present Operator's Manual.

Type Plate

Contents of the Type Plate

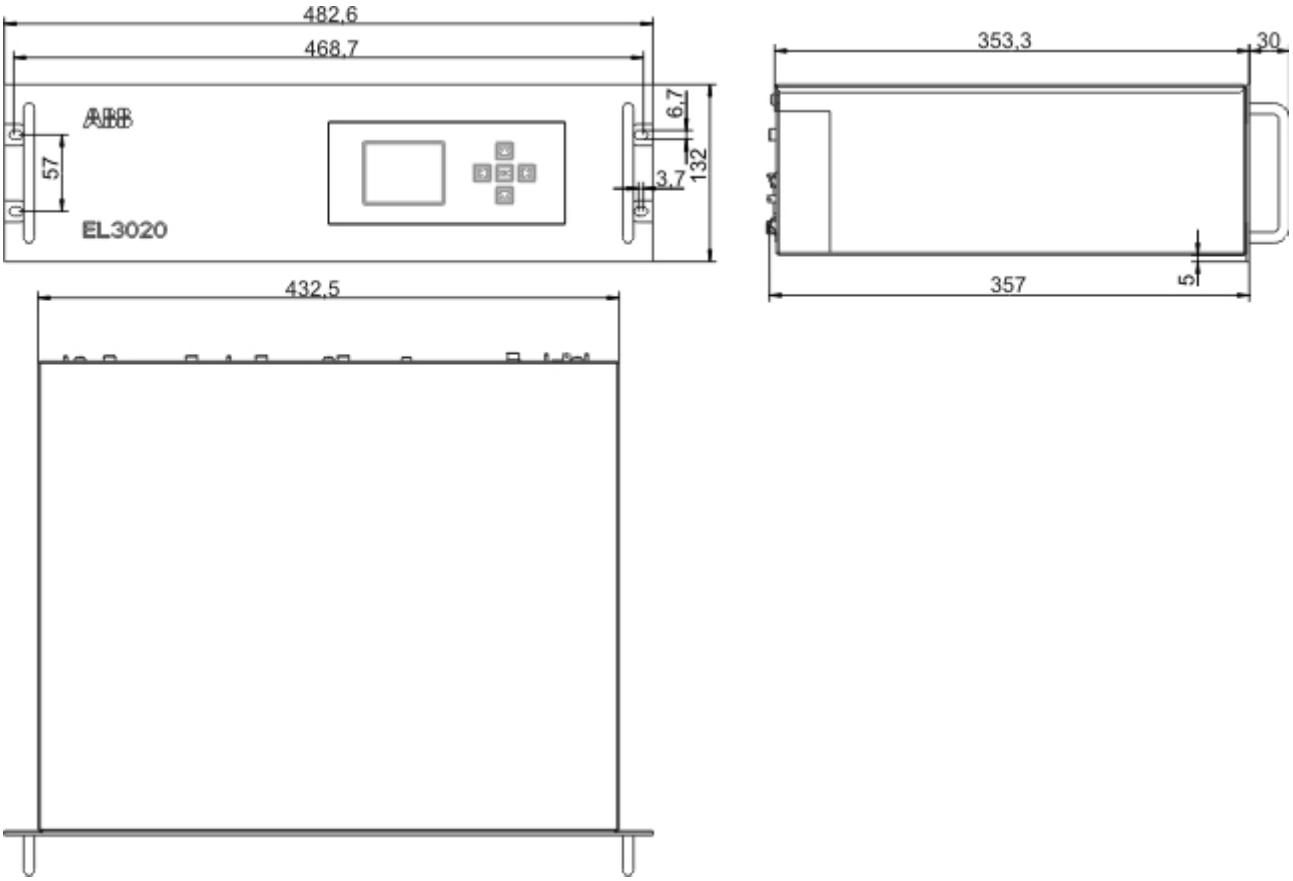
The type plate contains the following information:

- Production number (F-No.)
- Order number (A-No.)
- Power supply (voltage, frequency, max. power consumption)
- Installed analyzers with sample components and measuring ranges

Dimensional Drawings

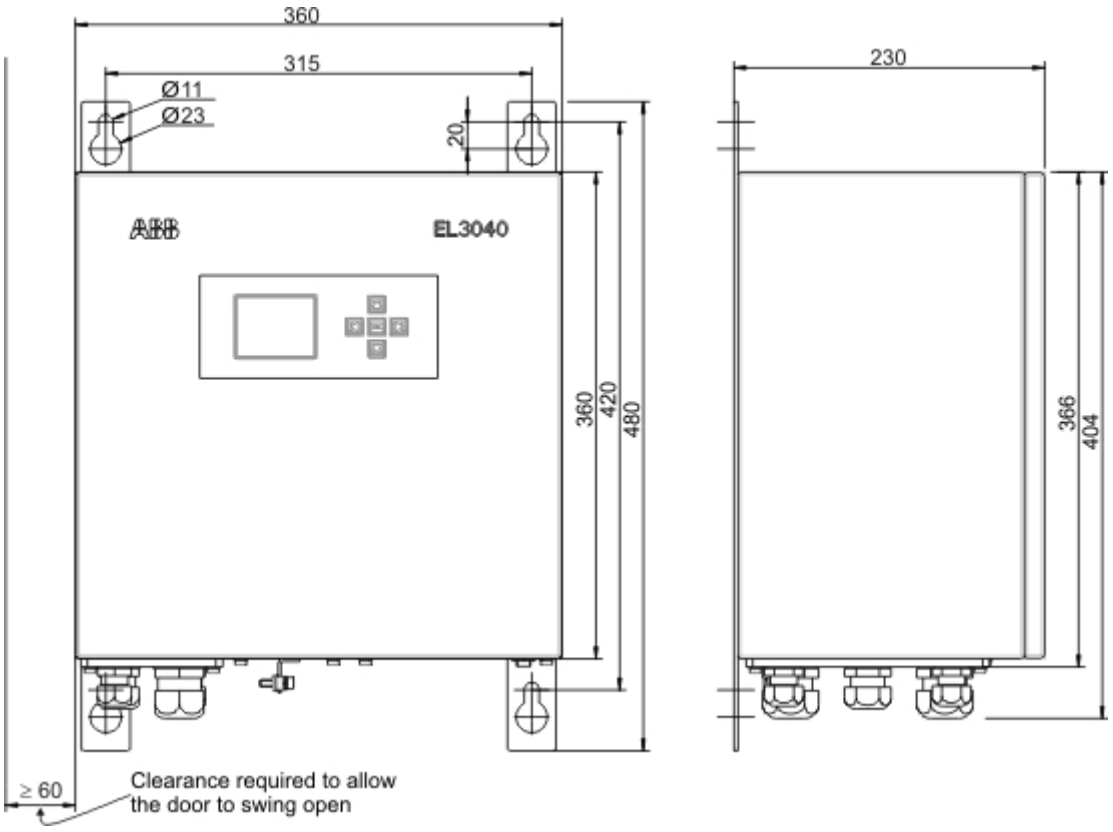
19-inch Case (Model EL3020)

Dimensions in mm



Wall-mounting Case (Model EL3040)

Dimensions in mm



CHAPTER 2

Installing the Gas Analyzer

Unpacking the Gas Analyzer

ATTENTION
Depending on its design, the gas analyzer weighs 7 to 15 kg (19-inch case – Model EL3020) and 13 to 21 kg (wall-mounting case – Model EL3040)! Unpacking and transporting requires two persons!

Unpacking the Gas Analyzer

1. Remove the accessories (see scope of supply and delivery (see page 27)) from the shipping box.
   Ensure that the accessories do not get lost.
2. Remove the gas analyzer from the shipping box together with the respective protective packaging.
3. Remove the protective packaging and place the gas analyzer in a clean location.
4. Remove the adhesive packaging residues from the gas analyzer.

NOTE
Keep the shipping box and the protective packaging for future shipping needs. If there is shipping damage which indicates improper handling, file a damage claim with the shipper (rail, mail or freight carrier) within seven days.

Installing the Gas Connections

NOTES
We strongly recommend that you install the gas connections before the gas analyzer is installed, since the gas ports are now easily accessible.
The fittings must be clean and free of residue! Contaminants can enter the analyzer and damage it or lead to false measurement results!
Do not use sealing compound to seal the gas connections! Constituents of the sealing compound can lead to false measurement results! Use PTFE sealing tape!
Follow the manufacturer's installation instructions for the fittings!

Position and Layout of the Gas Connections

Uras26	Model EL3020 (see p. 34)	Model EL3040 (see p. 36)
Uras26 with Magnos206	Model EL3020 (see p. 38)	Model EL3040 (see p. 40)
Uras26 with Caldos27	Model EL3020 (see p. 42)	Model EL3040 (see p. 44)
Limas23	Model EL3020 (see p. 46)	Model EL3040 (see p. 47)
Limas23 with Magnos206	Model EL3020 (see p. 48)	Model EL3040 (see p. 49)
Magnos206	Model EL3020 (see p. 50)	Model EL3040 (see p. 51)
Caldos27	Model EL3020 (see p. 52)	Model EL3040 (see p. 53)

Requisite Material

Screwed fittings with nozzles (supplied) or threaded connections with 1/8 NPT threads and PTFE sealing tape

Installing the Gas Connections

Screw out the yellow plastic screwing caps (5 mm hexagon socket) from the connectors. Tightly wind two layers of PTFE sealing tape around the thread of the screwed fittings or threaded connections in a clockwise direction and screw into the gas ports. Approx. 2 threads usually remain visible after the assembly.

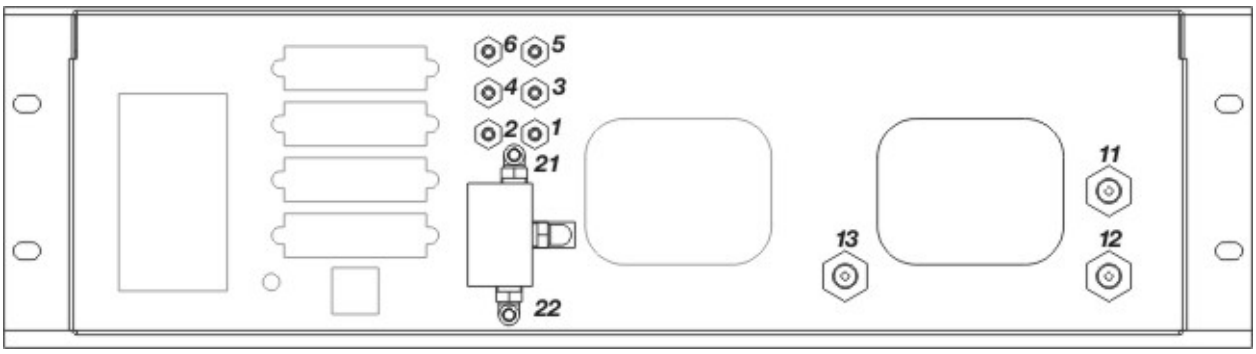
NOTE
Screw in the fittings carefully and not too tightly!

Checking the Seal Integrity of the Sample Gas Feed Path

The tightness of the sample gas feed path was checked in the factory. However since it may have been affected during transport of the gas analyzer (e.g. by strong vibrations), we recommend that it is checked before the instrument is commissioned at the installation site.

NOTE
We strongly recommend that the tightness of the sample gas feed path is checked before the gas analyzer is assembled, since the case must be opened in the event of a leak.

Gas Connections for Uras26 (Model EL3020)



Uras26: Gas Connections for Flexible Tubes

(internal gas lines executed as flexible tubes)

1	Sample gas inlet	Gas feed path 1	without option "Integrated gas feed"
2	Sample gas outlet	Gas feed path 1	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to ***1*** Sample gas inlet Gas feed path 1	
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)	
5	Sample gas inlet	Gas feed path 2	with separate gas feed paths for (NOx measurement with upstream converter)
6	Sample gas outlet	Gas feed path 2	
21	Sample gas inlet	on the solenoid valve with the option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor	
22	Test gas inlet		

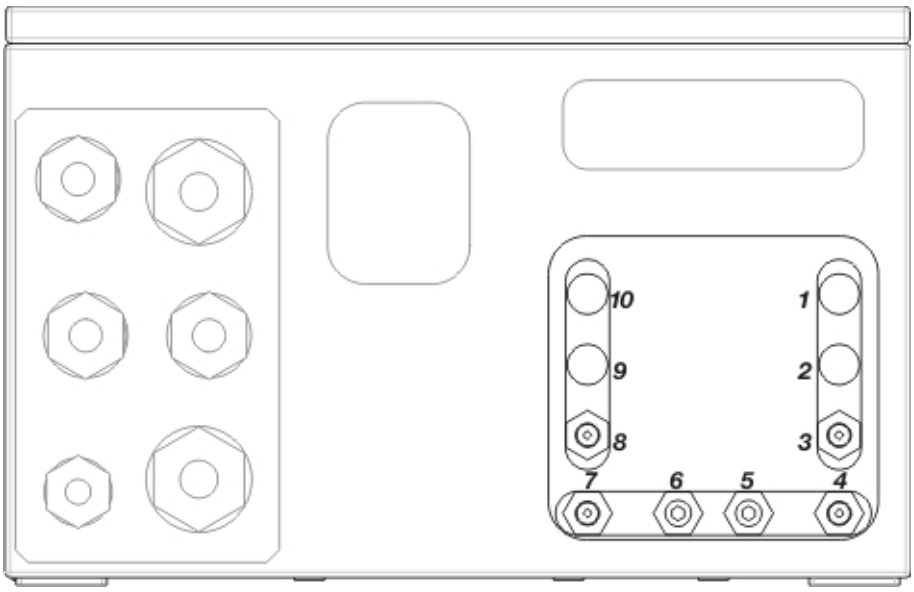
Design:	Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm
Note:	The pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows: in the outlet of sample cell 1 with one sample cell and with separate gas feed paths, in the outlet of sample cell 2 with two sample cells in tandem.

Uras26: Gas Connections for Pipelines

(internal gas lines executed as stainless steel pipes)

6	Pressure sensor	
Design:		Nozzle (PVDF) for flexible tube with inside diameter = 4 mm
11	Sample gas inlet	
12	Sample gas outlet	with one sample cell
13	Sample gas outlet	with two sample cells in tandem
Design:		1/8 NPT female thread for threaded connections (not supplied)
Note:		The oxygen sensor, the option "Integrated gas feed" and the version with separate gas feed paths are not possible.

Gas Connections for Uras26 (Model EL3040)



Uras26: Gas Connections with 1 Gas Feed Path

(internal gas lines executed as flexible tubes or stainless steel pipes)

1	not assigned
2	not assigned
3	Sample gas inlet
4	Sample gas outlet with one sample cell
5	Purge gas inlet for case
6	Purge gas outlet for case
7	not assigned
8	Sample gas outlet with two sample cells in tandem
9	Pressure sensor (if internal gas lines are executed as stainless steel pipes)
10	not assigned

Uras26: Gas Connections with 2 Separate Gas Feed Paths

(internal gas lines executed as flexible tubes)

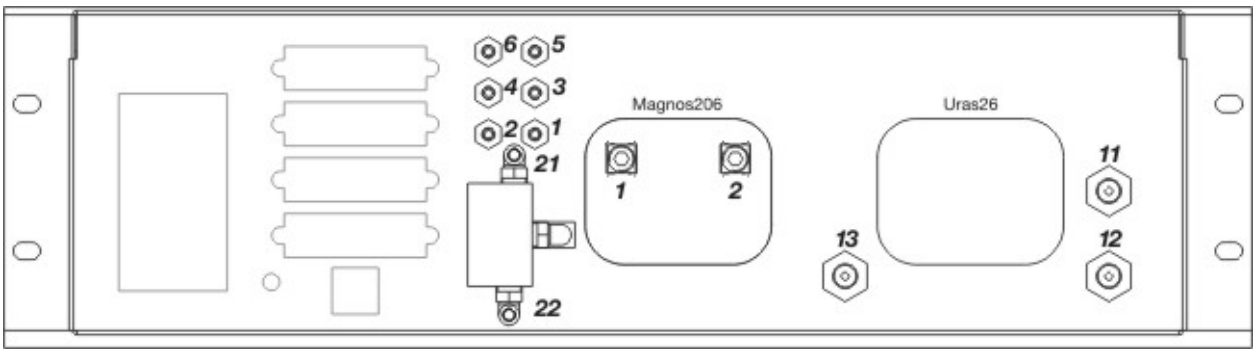
1	not assigned
2	not assigned
3	Sample gas inlet gas feed path 1
4	Sample gas outlet gas feed path 1
5	Purge gas inlet for case
6	Purge gas outlet for case
7	Sample gas inlet gas feed path 2
8	Sample gas outlet gas feed path 2
9	not assigned
10	not assigned

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Notes: If the internal gas lines are flexible tubes, the pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
in the outlet of sample cell 1 for a sample cell and two separate feed paths
in the outlet of sample cell 2 with two sample cells in tandem.

If the internal gas lines are stain steel pipes, the oxygen sensor and the version with separate gas feed paths are not possible.

Gas Connections for Uras26 with Magnos206 (Model EL3020)



Uras26: Gas Connections for Flexible Tubes

(internal gas lines executed as flexible tubes)

1	Sample gas inlet	Gas feed path 1	without option "Integrated gas feed"
2	Sample gas outlet	Gas feed path 1	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to ***1*** Sample gas inlet Gas feed path 1	
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)	
5	Sample gas inlet	Gas feed path 2	with separate gas feed paths for (NOx measurement with upstream converter)
6	Sample gas outlet	Gas feed path 2	
21	Sample gas inlet	on the solenoid valve with the option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor	
22	Test gas inlet		

Design:	Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm
Note:	The pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows: in the outlet of sample cell 1 with one sample cell and with separate gas feed paths, in the outlet of sample cell 2 with two sample cells in tandem.

Uras26: Gas Connections for Pipelines

(internal gas lines executed as stainless steel pipes)

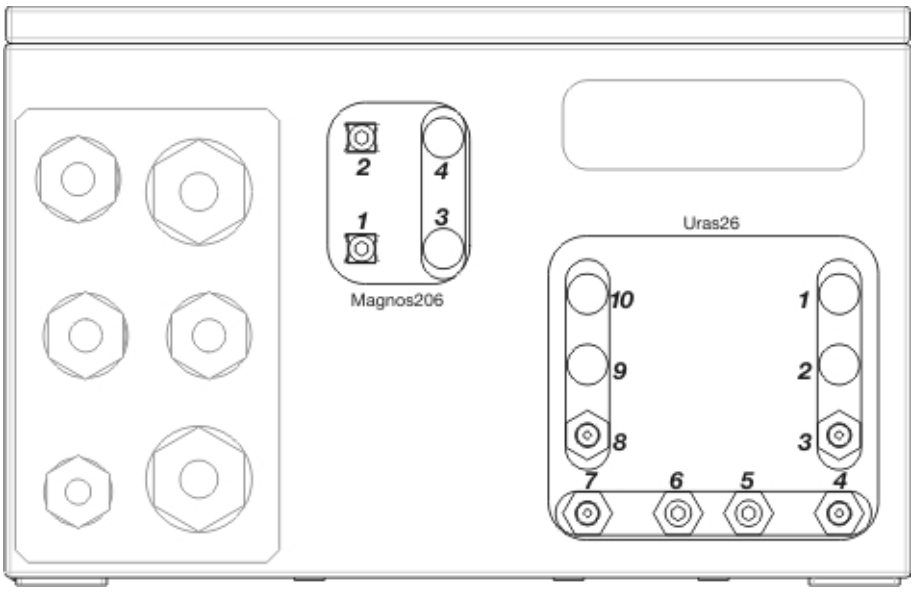
6	Pressure sensor	
Design:		Nozzle (PVDF) for flexible tube with inside diameter = 4 mm
11	Sample gas inlet	
12	Sample gas outlet	with one sample cell
13	Sample gas outlet	with two sample cells in tandem
Design:		1/8 NPT female thread for threaded connections (not supplied)
Note:		The oxygen sensor, the option "Integrated gas feed" and the version with separate gas feed paths are not possible.

Magnos206: Gas Connections

1	Sample gas inlet
2	Sample gas outlet

Design:	1/8 NPT female thread Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)
Note:	The sample gas outlet gas feed path 1 of the Uras26 is connected ex works to the sample gas inlet of the Magnos206.

Gas Connections for Uras26 with Magnos206 (Model EL3040)



Uras26: Gas Connections with 1 Gas Feed Path

(internal gas lines executed as flexible tubes or stainless steel pipes)

1	not assigned
2	not assigned
3	Sample gas inlet
4	Sample gas outlet with one sample cell
5	Purge gas inlet for case
6	Purge gas outlet for case
7	not assigned
8	Sample gas outlet with two sample cells in tandem
9	Pressure sensor (if internal gas lines are executed as stainless steel pipes)
10	not assigned

Uras26: Gas Connections with 2 Separate Gas Feed Paths

(internal gas lines executed as flexible tubes)

1	not assigned
2	not assigned
3	Sample gas inlet gas feed path 1
4	Sample gas outlet gas feed path 1
5	Purge gas inlet for case
6	Purge gas outlet for case
7	Sample gas inlet gas feed path 2
8	Sample gas outlet gas feed path 2
9	not assigned
10	not assigned

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Notes: If the internal gas lines are flexible tubes, the pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
in the outlet of sample cell 1 for a sample cell and two separate feed paths
in the outlet of sample cell 2 with two sample cells in tandem.

If the internal gas lines are stain steel pipes, the oxygen sensor and the version with separate gas feed paths are not possible.

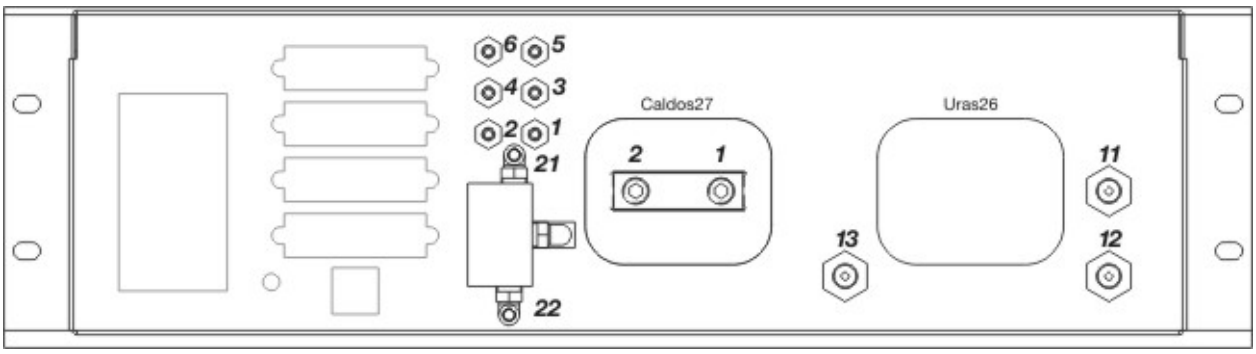
Magnos206: Gas Connections

1	Sample gas inlet
2	Sample gas outlet
3	not assigned
4	not assigned

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Note: The sample gas outlet gas path 1 of the Uras26 is connected ex works to the sample gas inlet of the Magnos206.

Gas Connections for Uras26 with Caldos27 (Model EL3020)



Uras26: Gas Connections for Flexible Tubes

(internal gas lines executed as flexible tubes)

1	Sample gas inlet	Gas feed path 1	without option "Integrated gas feed"
2	Sample gas outlet	Gas feed path 1	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to ***1*** Sample gas inlet Gas feed path 1	
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)	
5	Sample gas inlet	Gas feed path 2	with separate gas feed paths for (NOx measurement with upstream converter)
6	Sample gas outlet	Gas feed path 2	
21	Sample gas inlet	on the solenoid valve with the option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor	
22	Test gas inlet		

Design:	Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm
Note:	The pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows: in the outlet of sample cell 1 with one sample cell and with separate gas feed paths, in the outlet of sample cell 2 with two sample cells in tandem.

Uras26: Gas Connections for Pipelines

(internal gas lines executed as stainless steel pipes)

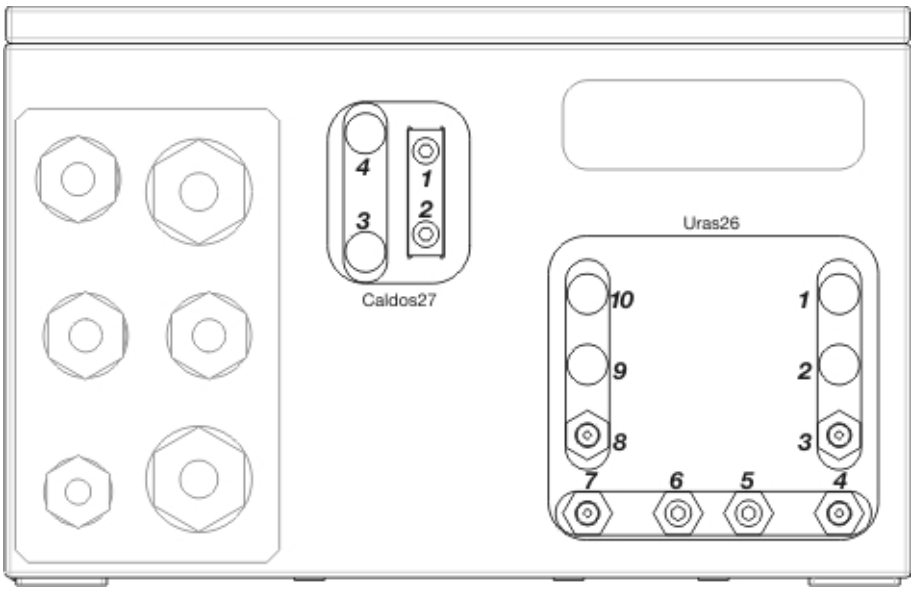
6	Pressure sensor	
Design:		Nozzle (PVDF) for flexible tube with inside diameter = 4 mm
11	Sample gas inlet	
12	Sample gas outlet	with one sample cell
13	Sample gas outlet	with two sample cells in tandem
Design:		1/8 NPT female thread for threaded connections (not supplied)
Note:		The oxygen sensor, the option "Integrated gas feed" and the version with separate gas feed paths are not possible.

Caldos27: Gas Connections

1	Sample gas inlet
2	Sample gas outlet

Design:	1/8 NPT female thread Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)
Note:	The sample gas outlet gas path 1 of the Uras26 is connected ex works to the sample gas inlet of the Caldos27.

Gas Connections for Uras26 with Caldos27 (Model EL3040)



Uras26: Gas Connections with 1 Gas Feed Path

(internal gas lines executed as flexible tubes or stainless steel pipes)

1	not assigned
2	not assigned
3	Sample gas inlet
4	Sample gas outlet with one sample cell
5	Purge gas inlet for case
6	Purge gas outlet for case
7	not assigned
8	Sample gas outlet with two sample cells in tandem
9	Pressure sensor (if internal gas lines are executed as stainless steel pipes)
10	not assigned

Uras26: Gas Connections with 2 Separate Gas Feed Paths

(internal gas lines executed as flexible tubes)

1	not assigned
2	not assigned
3	Sample gas inlet gas feed path 1
4	Sample gas outlet gas feed path 1
5	Purge gas inlet for case
6	Purge gas outlet for case
7	Sample gas inlet gas feed path 2
8	Sample gas outlet gas feed path 2
9	not assigned
10	not assigned

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Notes: If the internal gas lines are flexible tubes, the pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
in the outlet of sample cell 1 for a sample cell and two separate feed paths
in the outlet of sample cell 2 with two sample cells in tandem.

If the internal gas lines are stain steel pipes, the oxygen sensor and the version with separate gas feed paths are not possible.

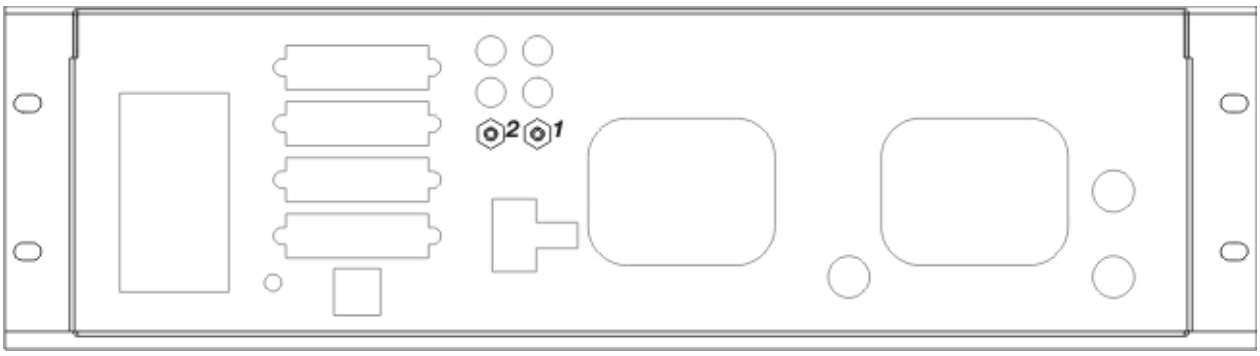
Caldos27: Gas Connections

1	Sample gas inlet
2	Sample gas outlet
3	not assigned
4	not assigned

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Note: The sample gas outlet gas path 1 of the Uras26 is connected ex works to the sample gas inlet of the Caldos27.

Gas Connections for Limas23 (Model EL3020)



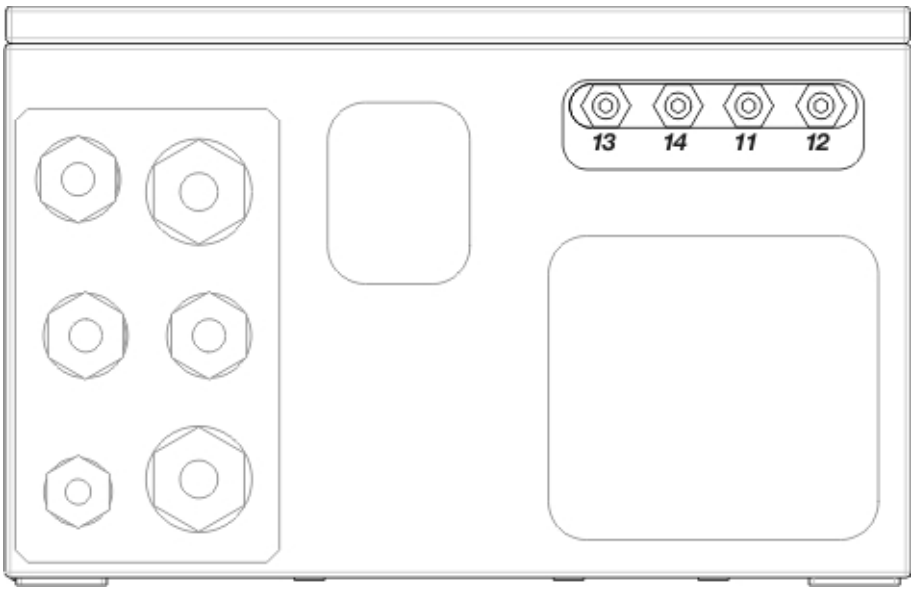
Limas23: Gas Connections

1	Sample gas inlet
2	Sample gas outlet

Design: Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm

Note: The pressure sensor (standard) and the oxygen sensor (option) are connected internally in the outlet of the sample cell.

Gas Connections for Limas23 (Model EL3040)

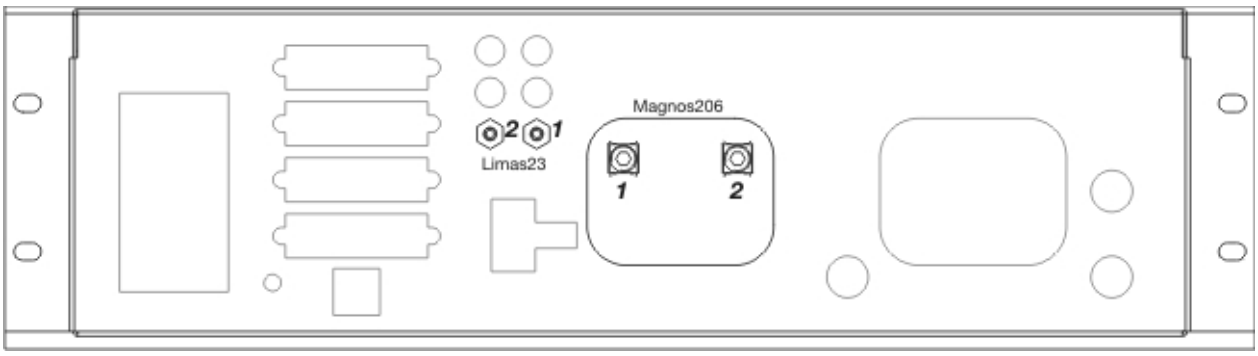


Limas23: Gas Connections

13	Sample gas inlet
14	Sample gas outlet
11	Purge gas inlet for case
12	Purge gas outlet for case

Design:	1/8 NPT female thread Connection of flexible tubes: Straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)
Note:	The pressure sensor (standard) and the oxygen sensor (option) are connected internally in the outlet of the sample cell.

Gas Connections for Limas23 with Magnos206 (Model EL3020)



Limas23: Gas Connections

1	Sample gas inlet
2	Sample gas outlet

Design: Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm

Note: The pressure sensor is connected internally in the outlet of the sample cell.

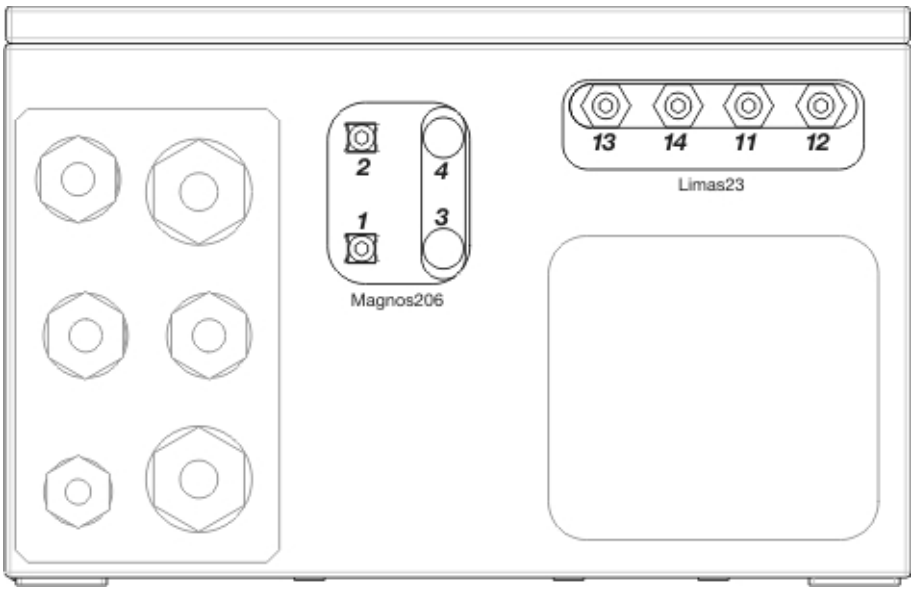
Magnos206: Gas Connections

1	Sample gas inlet
2	Sample gas outlet

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Note: The sample gas inlet of the Limas23 is connected ex works to the sample gas inlet of the Magnos206.

Gas Connections for Limas23 with Magnos206 (Model EL3040)



Limas23: Gas Connections

13	Sample gas inlet
14	Sample gas outlet
11	Purge gas inlet for case
12	Purge gas outlet for case

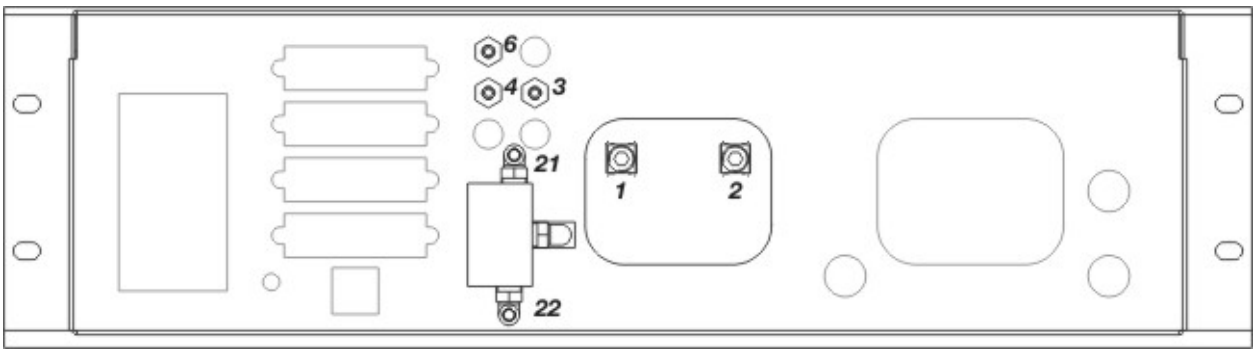
Design:	1/8 NPT female thread. Connection of flexible tubes: Straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied). Connection of pipelines: Threaded connections (not supplied)
Note:	The pressure sensor is connected internally in the outlet of the sample cell.

Magnos206: Gas Connections

1	Sample gas inlet
2	Sample gas outlet
3	not assigned
4	not assigned

Design:	1/8 NPT female thread. Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied). Connection of pipelines: Threaded connections (not supplied)
Note:	The sample gas inlet of the Limas23 is connected ex works to the sample gas inlet of the Magnos206.

Gas Connections for Magnos206 (Model EL3020)

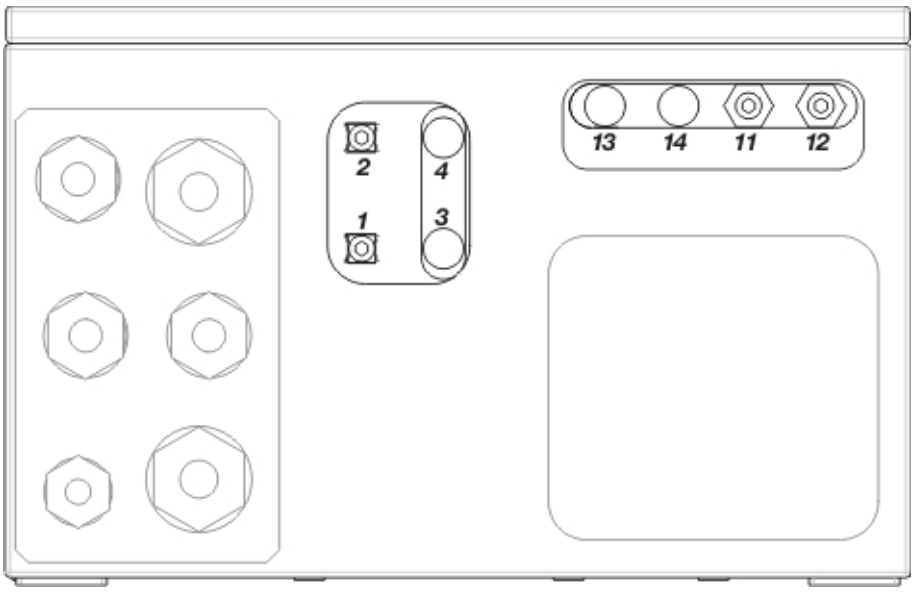


Magnos206: Gas Connections

1	Sample gas inlet	
2	Sample gas outlet	
Design:	1/8 NPT female thread Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to ***1*** Sample gas inlet
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)
6	Pressure sensor	
21	Sample gas inlet	on the solenoid valve with option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor
22	Test gas inlet	
Design:	Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm	

Note: The pressure sensor is installed as an option.

Gas Connections for Magnos206 (Model EL3040)

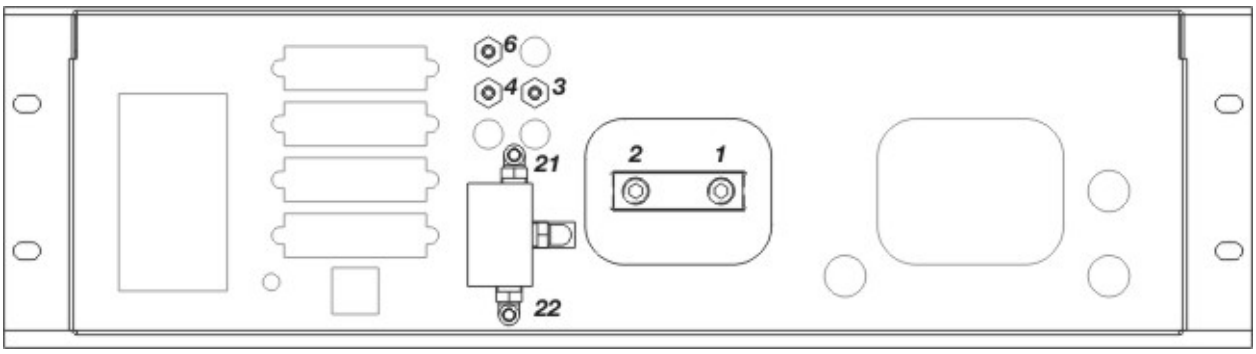


Magnos206: Gas Connections

1	Sample gas inlet
2	Sample gas outlet
3	not assigned
4	not assigned
11	Purge gas inlet for case
12	Purge gas outlet for case
13	Pressure sensor

Design:	1/8 NPT female thread Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)
Note:	The pressure sensor is installed as an option.

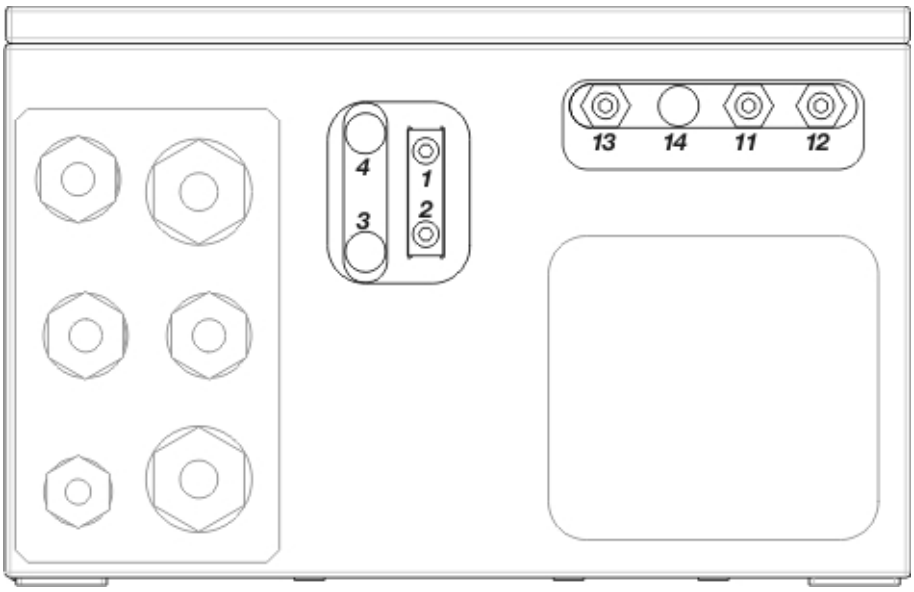
Gas Connections for Caldos27 (Model EL3020)



Caldos27: Gas Connections

1	Sample gas inlet	
2	Sample gas outlet	
Design:	1/8 NPT female thread Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to ***1*** Sample gas inlet
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)
6	Pressure sensor	
21	Sample gas inlet	on the solenoid valve with option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor
22	Test gas inlet	
Design:	Nozzles (PVDF) for flexible tubes with inside diameter = 4 mm	

Gas Connections for Caldos27 (Model EL3040)



Caldos27: Gas Connections

1	Sample gas inlet
2	Sample gas outlet
3	not assigned
4	not assigned
11	Purge gas inlet for case
12	Purge gas outlet for case
13	Pressure sensor

Design: 1/8 NPT female thread
Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
Connection of pipelines: Threaded connections (not supplied)

Installing the Gas Analyzer

ATTENTION
The installation site must be stable enough to bear the weight (see page 11) of the gas analyzer!
The 19-inch case must be supported in the cabinet or the rack with mounting rails!

Requisite Material (not supplied)

19-inch Case (Model EL3020)

- 4 oval head screws (Recommendation: M6; this depends on the cabinet/rack system)
- 1 pair of mounting rails (Design depends on the cabinet/rack system), length approx. 240 mm corresponding to approx. 2/3 of the case depth

Wall-mounting Case (Model EL3040)

- 4 screws M8 or M10

Installing the Gas Analyzer

Install the gas analyzer in the cabinet/rack or on the wall.

Refer to the dimensional drawings (see page 29).

Mount several 19-inch cases with a minimum spacing of 1 height unit between cases.

Special Requirements for the Gas Analyzer Model EL3020 for the Measurement of Flammable Gases

An unimpeded exchange of air with the surroundings must be possible around the gas analyzer from beneath (base plate) and from behind (gas connections). The gas analyzer must not be put directly on a table. The case apertures must not be closed. The distance to adjacent, built-in components on the side must be at least 3 cm.

For installations in a closed cabinet, the cabinet must have adequate ventilation (at least 1 air change per hour). The distance to adjacent, built-in components underneath (floor plate) and behind (gas connections) must be at least 3 cm.

Special Requirements for the Gas Analyzer Model EL3040 in Degree of Protection II 3G

Due to the low mechanical stability of the display window, the gas analyzer has to be installed and operated in such a way that mechanical damage to the display window is ruled out.

Connect the Gas Lines

Connect the Flexible Tubes

Push the flexible tubes with inside diameter = 4 mm onto the nozzles and secure by means of hose clamps.

Connect the Pipelines

Connect the stainless steel pipes to the fittings according to good professional practice and making allowance for the tightness requirements.

Install the Micro-Porous Filter

A pre-assembled micro-porous filter (disposable filter, part no. 769144) is included in the scope of delivery (see page 27).

To install the micro-porous filter, push the short piece of flexible tubing on to the sample gas inlet; connect the sample gas line to the long piece of flexible tubing with the nozzle.

Install the Flow Meter

Install a flow meter or flow monitor with a needle valve before the sample gas inlet and if required before the purge gas inlet in order to be able to adjust and monitor the gas flow rate.

Provide for Gas Line System Flushing

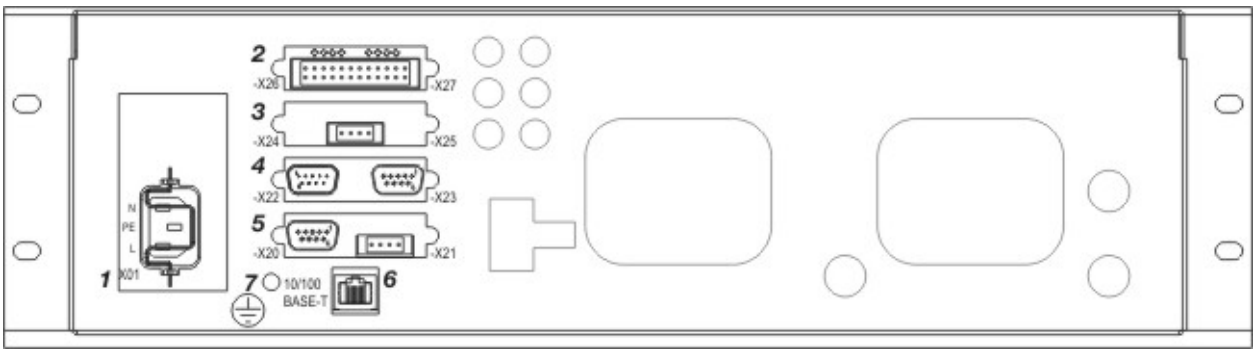
Install a shut-off valve in the sample gas line (definitely recommended with pressurized sample gas), in order to provide a means for purging the gas line system by feeding in an inert gas, e.g. nitrogen, from the gas sampling point.

Evacuate Exhaust Gases

Conduct waste gases directly into the atmosphere or through a line with a large internal diameter which is as short as possible, or into a gas discharge line. Do not conduct waste gases via restrictions or shut-off valves!

NOTES
Dispose of corrosive and toxic waste gases according to the regulations!
Take note of the sample gas inlet conditions (see page 14)!
Purge (see page 69) the sample gas feed path before commissioning.
Do not feed in the sample gas until the gas analyzer has reached room temperature and the warm-up phase (see page 70) has ended! Otherwise, the sample gas could condense in the cold analyzer.

Electrical Connections Model EL3020



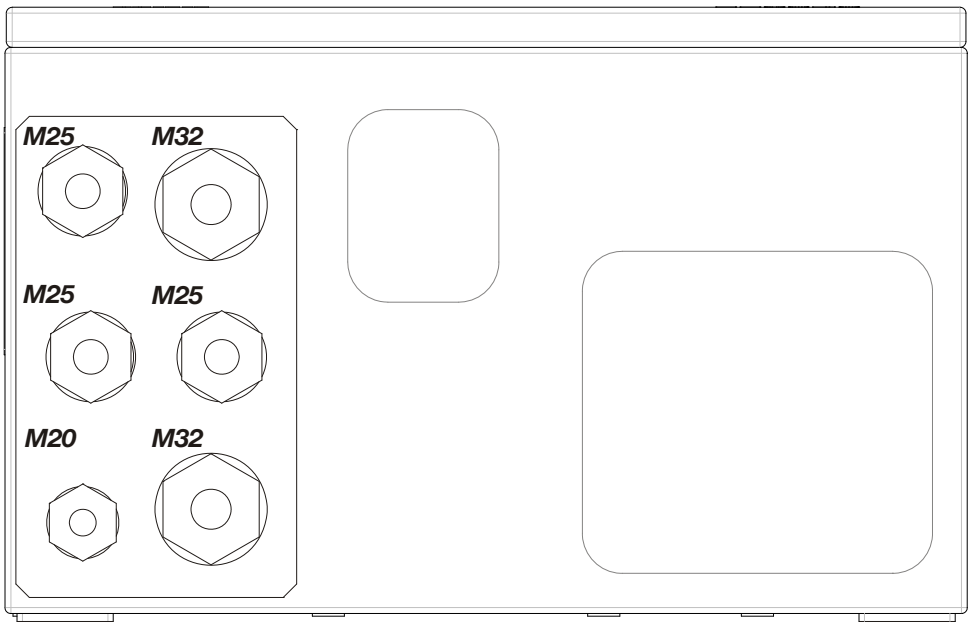
Electrical Connections

1	Power supply connection (see page 67) (3-pole grounded-instrument connector to EN 60320-1/C14, mains lead supplied)
2	Digital I/O module (see page 61)
3	Analog output module (see page 60)
4	Modbus module (see page 64)
5	Profibus module (see page 65)
6	Ethernet-10/100BASE-T interface (for configuration and software update and for transmission of the QAL3 data)
7	Connection for equipotential bonding (see page 67) (capacity of terminal max. 4 mm^2)

NOTE
The illustration shows all the available I/O module types and only represents an example of the I/O modules equipment (max. 4). The actual equipment of the supplied gas analyzer can differ; it is documented in the analyzer data sheet.

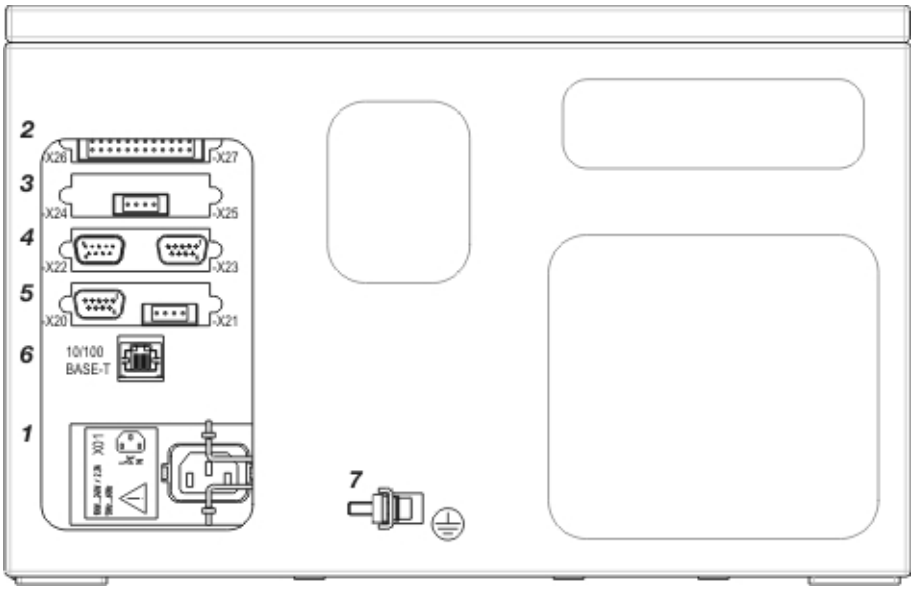
ATTENTION
Follow all applicable national safety regulations for the installation and operation of electrical devices!

Electrical Connections
Model EL3040



Screwed Cable Glands

Type	Use (Recommendation)	Permissible cable diameter
M20	Power supply	5…13 mm
M25	Modbus/Profibus	8…17 mm (insert 5x 4 mm)
M25	Network connections	8…17 mm
M25	3x analog outputs	8…17 mm (insert 3x 7 mm)
M32	Digital inputs/outputs	12…21 mm
M32	Digital inputs/outputs	12…21 mm



Electrical Connections

1	Power supply connection (see page 67) (3-pole grounded-instrument connector to EN 60320-1/C14, mains lead supplied)
2	Digital I/O module (see page 61)
3	Analog output module (see page 60)
4	Modbus module (see page 64)
5	Profibus module (see page 65)
6	Ethernet-10/100BASE-T interface (for configuration and software update and for transmission of the QAL3 data)
7	Connection for equipotential bonding (see page 67) (capacity of terminal max. 4 mm^2)

NOTE
The illustration shows all the available I/O module types and only represents an example of the I/O modules equipment (max. 4). The actual equipment of the supplied gas analyzer can differ; it is documented in the analyzer data sheet.

ATTENTION
Follow all applicable national safety regulations for the installation and operation of electrical devices!

Electrical Connections
Analog Output Modules

2-Way Analog Output Module

4-Way Analog Output Module

Pin	Signal
1	AO1+
2	AO1–
3	AO2+
4	AO2–
5	AO3+
6	AO3–
7	AO4+
8	AO4–

Analog Outputs AO1…AO4

0/4...20 mA (pre-set ex works to 4...20 mA), common negative pole, electrically isolated to ground, can be connected to ground as required, in this regard, max. gain compared to local protective ground potential 50 V, working resistance max. 750 Ω. Resolution 16 bit. The output signal may not be less than 0 mA.

Design

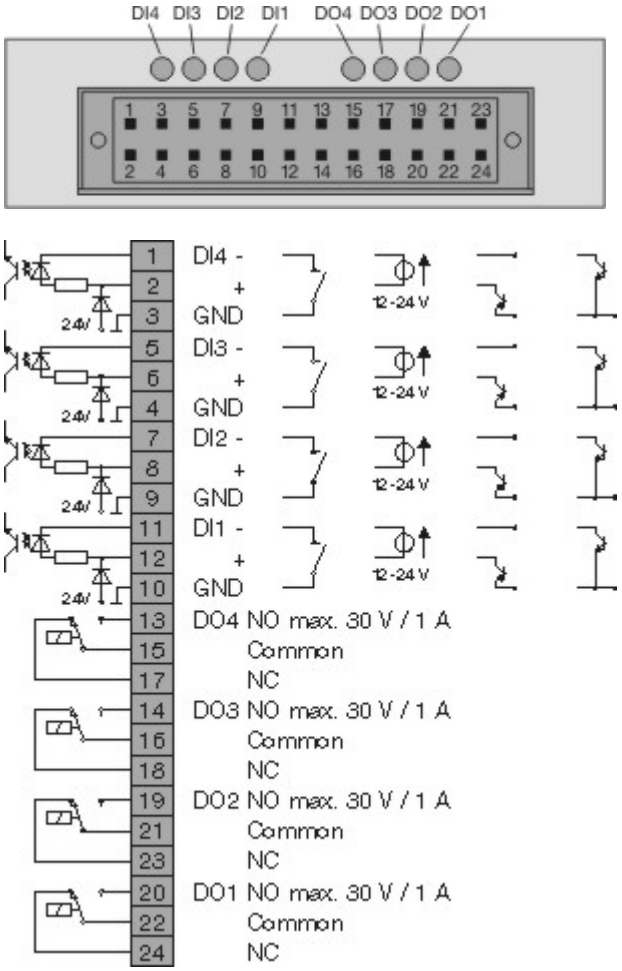
4- or 8-pole plug-in terminal strip. Please refer to the information about the requisite material (see page 66)!

Terminal Layout

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 (see page 28) and on the type plate (see page 28).

NOTE
The assignment of the terminals can be changed in the configurator.

Electrical Connections
Digital I/O Module



Digital Inputs DI1...DI4

Opto-electronic coupler with 24 V DC As an alternative, activation by floating contacts with an external voltage of 12...24 V DC or by Open-Collector drivers PNP or NPN.

Digital Outputs DO1...DO4

Floating double-throw contacts, max. contact load rating 30 V/1 A.
The relays must always be operated within the specified data. Inductive or capacitive loads are to be connected with appropriate protective measures (freewheeling diodes for inductive and series resistors with capacitive loads). Relays are shown in the unpowered state. The unpowered state corresponds to the state in the event of a fault ("fail safe").

Design

2x12-pole plug-in terminal strip. Please refer to the information about the requisite material (see page 66)!

Digital input and output signals	Standard assignment Digital I/O module 1	Standard assignment Digital I/O module 2
Failure		
Maintenance request		
Maintenance mode		
Overall status	DO1	
Start automatic calibration	DI1	
Stop automatic calibration		
Disable automatic calibration	DI2	
Sample gas valve	DO4	
Zero-reference gas valve		
Span reference gas valve 1		
Span reference gas valve 2		
Span reference gas valve 3		
Span reference gas valve 4		
Span reference gas valve 5		
Pump on/off [1)]		
Alarm value 1	DO2	
Alarm value 2	DO3	
Alarm value 3		DO1
Alarm value 4		DO2
Alarm value 5		DO3
Alarm value 6		DO4
Alarm value 7		
Alarm value 8		
Alarm value 9		
Alarm value 10		
Measuring range switch-over		
Measuring range feedback signal		

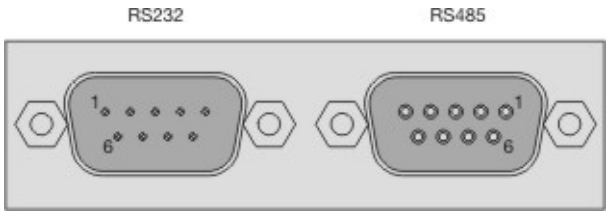
Bus DI 1	
Bus DI 2	
Bus DI 3	
Bus DI 4	
Bus DI 5	
Bus DI 6	
Bus DI 7	
Bus DI 8	
External failure [2)]	DI3
External maintenance request [2)]	DI4

1) if a pump (Option "Integrated Gas Feed" – only in the EL3020 model, not for Limas23) has been installed

2) Depending on the number of available digital inputs several external signals can be configured.

NOTE
The assignment of the terminals can be changed in the configurator.

Electrical Connections Modbus Module



RS232 Interface

Pin	Signal
2	RxD
3	TxD
5	GND

Design: 9 pole male Sub-D plug

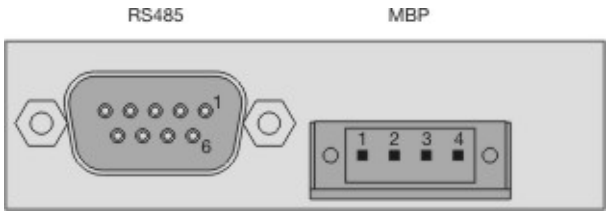
RS485 Interface

Pin	Signal
2	RTxD–
3	RTxD+
5	GND

Design: 9 pole female Sub-D plug

NOTE
Further information about Modbus is included in the "Modbus" chapter (see online help file).

Electrical Connections Profibus Module



RS485 Interface

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

Design: 9-pole female Sub-D plug

MBP Interface (not intrinsically safe)

Pin	Signal
1	+
2	Shield
3	–
4	not assigned

Design: 4 pole plug-in terminal strip. Please refer to the information about the requisite material (see page 66)!

NOTE
Further information on PROFIBUS can be found in the technical information "EL3000 series PROFIBUS DP/PA interface". The technical information sheet can be found on the CD-ROM supplied with the gas analyzer.

Connecting the Signal Lines

NOTE
Lay the signal lines separately from the power supply lines.
Lay analog and digital signal lines separately from each other.
Mark the cables or mating plugs in such a way that they can be clearly assigned to the corresponding I/O modules.

Requisite Material

- Select conductive material which is appropriate for the length of the lines and the predictable current load.
- Notes concerning the cable cross-section for connection of the I/O modules:
  - The max. capacity of terminals for stranded wire and solid wire is 1 mm^2 (17 AWG).
  - The stranded wire can be tinned on the tip or twisted to simplify the assembly.
  - When using wire end ferrules, the total cross-section may not be more than 1 mm^2, i.e. the cross-section of the stranded wire may not be more than 0.5 mm^2. The PZ 6/5 crimping tool of Weidmüller & Co. must be used for crimping the ferrules.
- Max. length of the RS485 leads (Modbus) 1200 m (max. transmission rate 19200 bit/s). Cable type: 3-core twisted-pair cable, cable cross-section 0.25 mm^2 (e.g. Thomas & Betts, Type LiYCY)
- Max. length of the RS232 leads 15 m.
- The mating plugs (socket housing) for the plug-in terminal strips on the I/O modules are supplied.

Connecting the Signal Lines

1 Only for the wall-mounting case (model EL3040): pass the cables through the screwed cable glands (see page 58) and strip to a length of approx. 18 cm.
M20 and M32: Remove the plugs from the insert; and leave the ring in the screwed cable glands for sealing and strain relief.
M25: Remove the plugs from the screwed cable glands. If required, slit open the insert with drill holes from the accessories pack and press over the cable; seal any open drill holes with dowel pins from the accessories pack.

2 Connect the lines to the mating plugs as shown in the connection diagrams of the I/O modules:
Analog output module (see page 60)
Digital I/O module (see page 61)

3 Attach the mating plug to the plug-in terminal strips on the I/O-modules.

Connect the Power Supply Lines

Requisite Material

If the supplied mains lead is not used, select conductive material which is appropriate for the length of the lines and the predictable current load.

Equipotential Bonding

The gas analyzer has a connection marked with the symbol ⏚ for the connecting line to the equipotential bonding on the building side. The capacity of the terminal is max. 4 mm^2.

Connect the Power Supply Cable

1. Ensure that the power supply feeder has an adequately dimensioned protective device (circuit-breaker).
2. Install an easily accessible mains isolator in the power supply feeder near the gas analyzer, or a switched socket-outlet , in order to be able to disconnect all the power from the gas analyzer if required. Mark the mains isolator in such a way that the assignment of the devices to be disconnected can be clearly recognized.
3. Attach the supplied mains lead to the power supply connection of the gas analyzer and fasten the connector by means of the bracket.
4. Connect the other end of the mains lead to the power supply.
5. Connect the gas analyzer to the equipotential bonding on the building side if this is required by the relevant installation regulations.

NOTES
The gas analyzer can be started up after the power supply has been connected. Do not feed in the sample gas until the gas analyzer has reached room temperature and the warm-up phase has ended! Otherwise, the sample gas could condense in the cold analyzer.

CHAPTER 3

Start up the Gas Analyzer

Check the Installation

Check the Installation

1. Is the gas analyzer securely fastened (see page 54)?
2. Are all gas lines (see page 56) including that of the pressure sensor (see page 23) correctly connected and laid?
3. Are all signal lines (see page 66) and power supply lines (see page 67) correctly connected and laid?
4. Are all devices needed for gas conditioning, calibration and waste gas disposal correctly connected and ready for use?
5. When measuring flammable gases: Are the special requirements (see page 17) being observed?
6. When applying the explosion-protected version in the degree of protection II 3G: Are the special requirements (see page 18) being observed?

Purge the Sample Gas Feed Path

Purge before Start-up

Prior to starting the gas analyzer and feeding in the sample gas, the sample gas feed path and, where necessary, the wall-mounting case must be purged (see page 21).

Firstly, this ensures that the gas feed path is free of contaminants, e.g. corrosive gases and accumulation of dust, during the commissioning.

Another reason is to prevent any explosive gas/air formations that may be present in the sample gas feed path or the wall-mounting case from igniting when the power supply is activated.

Purge gas:	Nitrogen
Purging of the gas feed path:	Purge gas flow max. 100 l/h, duration approx. 20 s
Purging of the wall-mounting case:	Purge gas flow max. 200 l/h, duration approx. 1 h

If the purge gas flow is lower than specified, the duration of the purging must be extended accordingly.

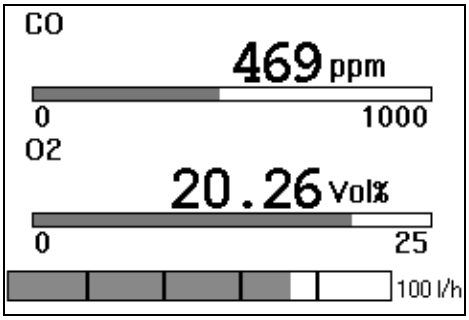
Start-up the Gas Analyzer

Start-up the Gas Analyzer

1 Switch on the power supply of the gas analyzer

2 The name of the gas analyzer and the number of the software version are shown in the display while booting.

3 After the start-up phase has ended, the display switches over to the measured value display.
Example:



4 Check the configuration of the gas analyzer and alter if necessary.

5 After the warm-up phase has ended, the gas analyzer is ready to carry out measurements.
Duration of the warm-up phase:
Uras26: approx. 1/2 hour without thermostat, approx. 2 hours with thermostat
Limas23: approx. 2 hours
Magnos206: approx. 1 hour
Caldos27: approx. 1/2 hour

6 Check the calibration of the gas analyzer.
The gas analyzer is calibrated ex works. However, transport stresses and the pressure and temperature conditions at the installation site may influence the calibration.

7 Feed in the sample gas.

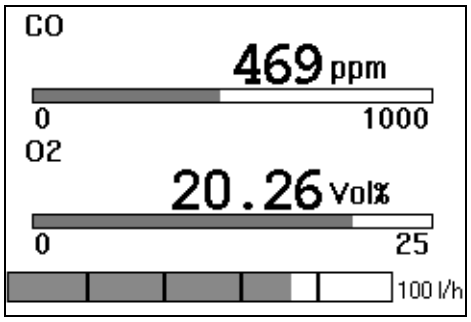
CHAPTER 4

Operating the Gas Analyzer

NOTE
All the illustrations of the displays in this operator's manual are examples. The displays on the instrument will normally differ from these.

Display - Measuring Mode

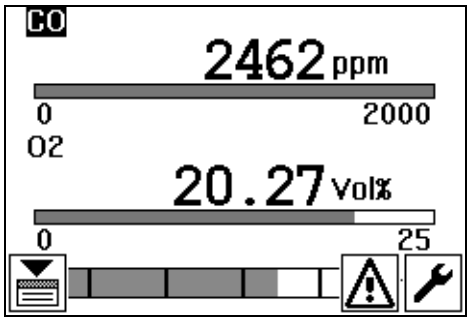
Display in Measuring Mode



In measuring mode, the screen displays the name, the measured value in numerals and the physical unit of the measured value for each sample component.

If the display of the name of the sample components flashes alternately with the inverted display, this signals that the measured value exceeds the measuring range limits.

Status Icons



An automatic calibration will be executed. The icon also appears in the menu title line in menu mode (see page 73).

A status message is active.

The status signal "Maintenance required" is active. The icon also appears in the menu title line in menu mode (see page 73).

The status signal "Error" is active or the maintenance switch has been set to "On". The icon is blinking. The icon also appears in the menu title line in menu mode (see page 73).

The configuration is being saved. The icon is blinking. Do not switch off the power supply of the gas analyzer when the icon is displayed!

Key Functions in Measuring Mode

◀▶ Switch over the display of each individual measured value; in addition to the digital display, an analog bar with information on the range limits is shown in this display.

▼▲ Reduce or increase the contrast of the display.
When a status message is active, press key ▲ first.

OK Switch to menu mode (see page 73).

▼ If a status message is active  : press the key to display the message list.

Number of Decimal Places

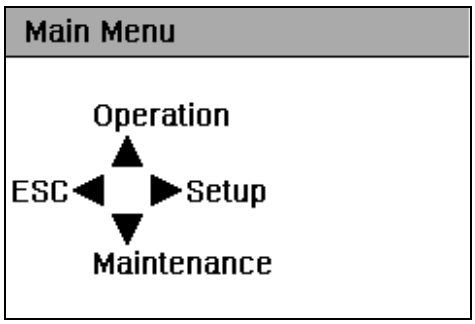
The number of decimal places in the display of the measured value in physical units (e.g. ppm) depends on the span of the measuring range:

Span (in physical units)	≤ 5	> 5…≤ 50	> 50…≤ 500	> 500
Number of decimal places	3	2	1	0

When setting the parameters, the number of decimal places is the same as in the display in measuring mode.

Operation - Menu Mode

Display in Menu Mode



Structure of the Menus

Starting from the main menu (see page 75), each menu contains a maximum of three menu items ("3-point menu"). Each menu item is assigned to one of the three buttons ▲, ▶ and ▼. Each menu item can therefore be selected directly. The button ◀ is used to return to the next higher menu.

The functions which are normally most frequently required are arranged in the menu in such a way that they can be called by repeatedly pressing the same button:

▲ Operation ▲ Calibration ▲ Manual Calibration
▲ Zero Point / Single Point

▶ Setup ▶ Calibration Data ▶ Test Gas Set Points

▼ Maintenance ▼ Diagnosis ▼ Device Status
▼ Status Messages

Key Functions in Menu Mode

3-point menu

▲▶▼	Select menu item
◀	Return to the next higher menu
OK	Return to the measuring mode

Component list

▲▼	Select component
▶ or **OK**	Call up selected component for processing

Parameter list ("Selector")

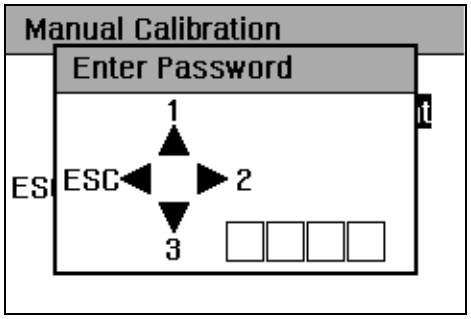
▲▼	Select parameters
▶	Call up change in value
OK	Accept all displayed values and return to the next higher menu
◀	Discard all displayed values and return to the next higher menu

Change in value

▲▼	Change selected position
▶	Select position to be changed
OK	Confirm altered value and return to the parameter list
◀	Discard altered value and return to the parameter list

Entering the Password

As soon as the user wishes to access a password-protected menu or a password-protected value change, he is requested to enter the password.



In this respect, the numbers 1, 2 and 3 are assigned to the three keys ▲, ▶ and ▼, as shown in the illustration.
Example: If the password "1213" has been configured, the user has to press the keys ▲, ▶, ▲ and ▼. Each key stroke is acknowledged by display of the character *.

The entered password remains active until the user returns to the measuring mode or the gas analyzer automatically switches over to the measuring mode through the time-out function (see page 73).

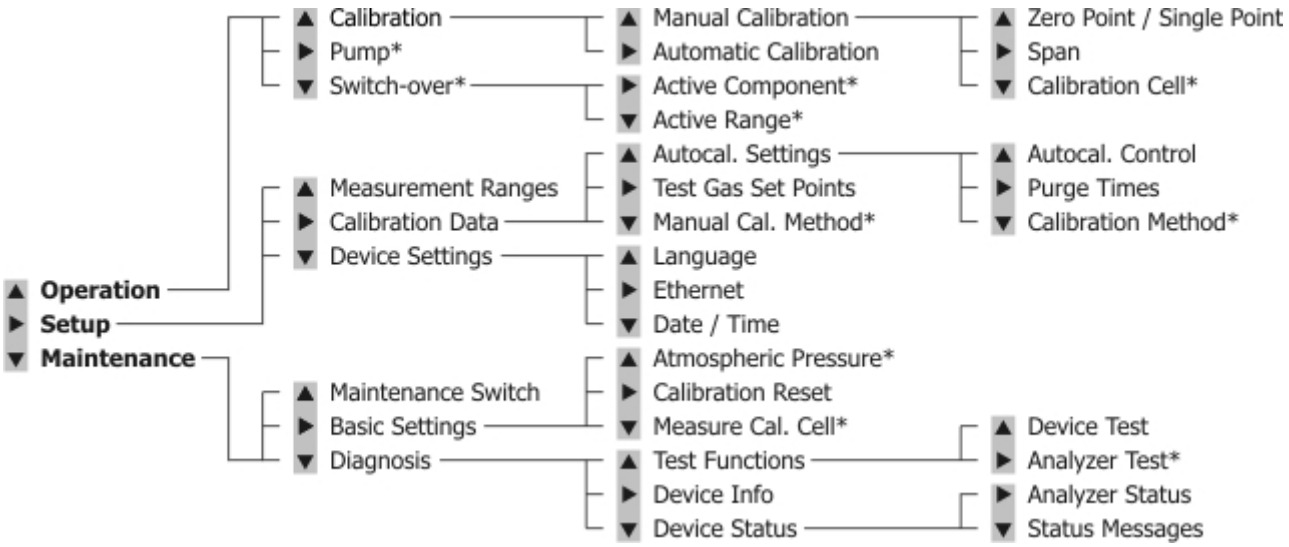
Time-out Function

If the user does not press a key for more than approx. 5 minutes during the selection of menu items, the gas analyzer will automatically return to the measuring mode (time-out function).

The time-out function is deactivated as soon as the user changes the value of a parameter or starts a calibration.

Menu

Overview of the Menu



* This menu depends on the configuration of the gas analyzer.

Information on the Concept of Operation

Concept of Operation

The concept of operation of the gas analyzer is designed in such a way that the functions required in normal operation are operated and configured directly on the instrument. On the other hand, the functions which are only seldom required, e.g. during the commissioning of the instrument, are configured offline using the software tool ECT ("EasyLine Configuration Tool" on the enclosed CD-ROM, also referred to as "configurator" in this manual) and then loaded into the gas analyzer.

Overview of the Functions

Function	Device	Configurator	Modbus
Automatic calibration:			
Start/cancel automatic calibration (also possible via digital inputs)	X		X
Activate/deactivate cyclically time-controlled automatic calibration	X	X	X
Cycle time of the automatic calibration		X	
End-point calibration together with zero-point calibration		X	X
Date and time of the next automatic calibration (start of the cycle)	X	X	
Test gas concentration	X	X	X
Purging times	X	X	
Output current response (for automatic and manual calibration)		X	
Calibration method (Magnos206)	X	X	
Pump on during calibration		X	
Manual calibration:			
Calibration method	X	X	
Test gas concentration	X	X	
Execute calibration	X		
Maintenance functions:			
Pump control	X	X	
Calibration reset	X		
Calibration of the pressure sensor / Set air pressure value	X		
Measuring calibration cell (Uras26, Limas23)	X		
Drift, delta drift (display)	X		X
Software version	X	X	
Status information	X		X

Component parameters:				
Measuring range parameters	X	X		
Alarm value parameters		X		
Low pass time constant (T90 time, filter)		X		X
Active component	X	X		X
Modbus parameters		X		
Ethernet parameters	X	X		
Signal inputs and outputs (I/O connections)		X		

Communication between the Gas Analyzer and the Computer

Communication via Ethernet

Communication between the gas analyzer and the computer on which the Configurator (see page 76) is installed is executed via an Ethernet connection, either as a point-to-point connection or via a network.

Setting up the Communication between the Gas Analyzer and the Computer

Basically, the following steps are required to set up the communication between the gas analyzer and the computer:

1. Check and set the TCP/IP parameters in the gas analyzer and the computer.
2. Establish and test the Ethernet connection.
3. Start the communication between the gas analyzer and the computer.

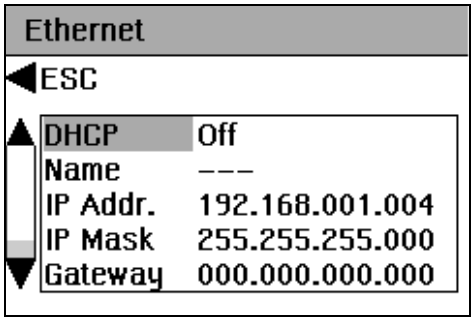
Check the TCP/IP Parameters in the Gas Analyzer and the Computer

The TCP/IP parameters in the gas analyzer and the computer must be checked and changed if necessary for operation of the configurator. In the case of a point-to-point connection, the IP addresses in the gas analyzer and the computer must be carefully matched.

Example: gas analyzer: 192.168.1.4, computer: 192.168.1.2

Set the IP Address in the Gas Analyzer

▶ Setup ▼ Device Settings ▶ Ethernet



Parameters

The parameters which have to be input depend on the DHCP setting:

DHCP on: DHCP on: Network name (max. 20 characters, no blanks and special characters),

DHCP off: IP address, IP address mask and IP gateway address.

The network name can only be altered in the configurator (see page 76). The default network name consists of "EL3K" and the last six positions of the MAC address (example: "EL3KFF579A").

Addresses

The IP address, IP address mask and IP gateway address must be obtained from the system administrator.

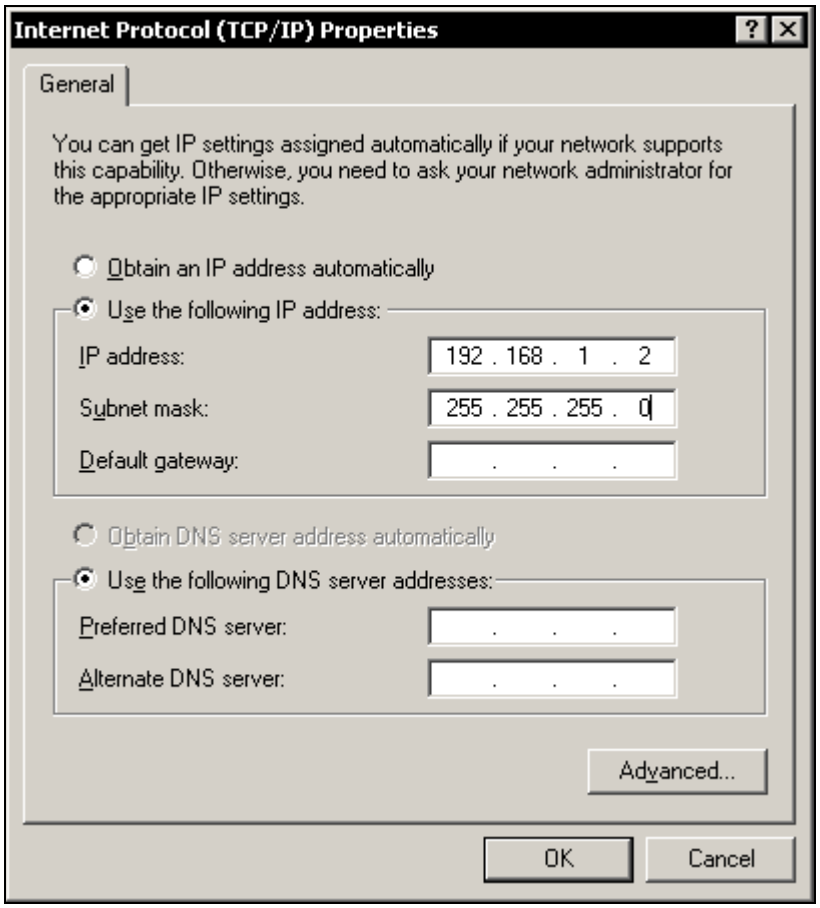
NOTE
The address bits that can be varied in the address mask may not all be set to 0 or 1 (broadcast addresses).

MAC Address

The 12-digit MAC address is unique and stored in each device during manufacture. It cannot be altered.

Set the IP Address in the Computer

Start – Settings – Network connections – Local Area Connection – Tab "General": Properties – Tab "General": Select Internet Protocol (TCP/IP), Properties – Tab "General": Use the following IP address: – Enter IP address (see the following example).



Establish and Test the Ethernet Connection

Cables

Point-to-point connection: Twisted-pair cable with RJ45 connectors, terminal layout: 1–3, 3–1, 2–6, 6–2
Connection via an Ethernet network: twisted-pair cable with RJ45 connectors

The cables are standard Ethernet cables and are not part of the scope of supply and delivery of the gas analyzer.

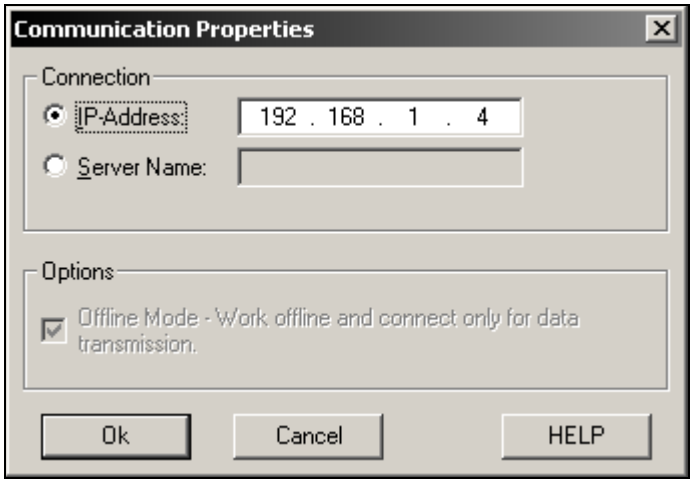
Test the Ethernet Connection

To test the Ethernet connection, enter the following in the computer in "Start..." – Execute..." input: "ping *IP address*" (with *IP address* = IP address of the gas analyzer). If the connection is OK, the gas analyzer reports "Answer from *IP address*: Bytes=32 time<10ms. TTL=255" (The numbers are instrument-specific). In the case of the message "Request timed-out", the connection is not OK.

The network name can also be entered instead of the IP address.

Start the Communication between the Gas Analyzer and the Computer

Communication between the configurator and the gas analyzer is started in the menu "Options..." – Communication Properties..." or by clicking the symbol  . Input either the IP address or the network name (server name) of the gas analyzer (see example for a point-to-point connection below).



Receiving Configuration Data

After communication has been started, the configuration data can be received from the gas analyzer.

Menu "File – Receive Data" or  .

Sending Configuration Data

After the configuration data been has edited, it can be sent to the gas analyzer. The configuration mode is active after an automatic cold restart of the gas analyzer.

Menu "File – Send Data" or  .

Saving Configuration Data

The configuration data of the gas analyzer can be stored in the computer. The stored configuration file can be edited at a later date and sent to the gas analyzer.

Menu "File – Save As..." or  .

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