ABB MEASUREMENT & ANALYTICS | COMMISSIONING INSTRUCTION | CI/EL3000-EN REV. E

EasyLine EL3000

Continuous gas analyzers

So smart, they're simple

Measurement made easy

EasyLine EL3020
EasyLine EL3040

Introduction

EasyLine is a powerful yet cost-effective line of devices for the measurement of gas concentrations in numerous applications.

Automatic calibration and the use of superior ABB calibration cell technology in the photometer avoids the use of expensive test gas cylinders in most applications.
Zero-point calibration with ambient air

Various analyzer types available:
Combining different analyzers in a single housing enables optimum economy and operational efficiency for your application.

Additional Information

Additional documentation on EasyLine EL3000 is available for download free of charge at www.abb.com/analytical.
Alternatively simply scan this code:

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1 Safety

General information and instructions

These instructions are an important part of the product and must be retained for future reference.
Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.
For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.
The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.
Modifications and repairs to the product may only be performed if expressly permitted by these instructions.
Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times.
The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

⚠ DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

⚠ WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

⚠ CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '***NOTICE***' indicates possible material damage.

Note

'**Note**' indicates useful or important information about the product.

… 1 Safety

Intended use

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

Any other use is not approved.

The intended use also includes taking note of this operating instruction.

Note
The version for the measurement of flammable gases and the explosion-proof design in degree of protection II 3G is designed for various variants of the gas analyzer and for different applications.

Measurement of flammable gases

⚠ DANGER

Explosion hazard
Explosion hazard when operating the gas analyzer in potentially explosive atmospheres.

- Only operate the gas analyzer in the version with stainless steel gas lines and gas connections (models EL3020 and EL3040), for the measurement of flammable gases and vapors, outside hazardous areas.

Observe the following information when measuring flammable gases*:

- The gas analyzer may only be used for the measurement of non-incendive gas / air or gas / oxygen mixtures.
- The special conditions for the measurement of flammable gases (see **Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases** on page 16) must be observed.
- The oxygen sensor, as well as the assemblies of the integral gas feed (option “Integrated gas feed option – only in model EL3020, not for Limas23, ZO23, Fidas24) may not be used for the measurement of flammable gases.

* A flammable gas is a gas that can be ignited by adding air.

Operation in hazardous areas

⚠ DANGER

Explosion hazard
Explosion hazard when measuring flammable gases in hazardous areas.

- The gas analyzer in the explosion-proof design (model EL3040) may only be used for the measurement of **non-flammable** gases and vapors.

The model EL3040 gas analyzer is available in explosion-proof design with degree of protection II 3G (see **Use in potentially explosive atmospheres** on page 10).

Important safety instructions

In accordance with the EU Directive 2014/34/EU and the general requirements for explosion protection and as specified in the IEC 60079-0 standard, the scope of approvals for our explosion-protected apparatus is limited to **atmospheric conditions**, unless expressly stated otherwise in the certificates.

This also includes the sample gas that is fed in.

Definition of atmospheric conditions	
Temperature	–20 to 60 °C
Pressure p_{abs}	80 to 110 kPa (0.8 to 1.1 bar)
Ambient air with standard oxygen content, typically 21% vol.%	

If the **atmospheric conditions are not complied with**, the operator is obliged to guarantee the safe operation of our devices in the absence of the recommended atmospheric conditions, by means of further measures (e.g. evaluation of the gas mixture or explosion pressure) and / or supplementary protective devices.

Improper use

The following are considered to be instances of especially improper use of the device:

- The measurement of gases that attack materials of parts in contact with the sample medium. See the notes in the section **Corrosive gases** of the individual analyzer modules in Preparation for Installation.
- For use as a climbing aid, for example for mounting purposes.
- For use as a bracket for external loads, for example as a support for piping, etc.
- Material application, for example by painting over the housing, name plate or welding/soldering on parts.
- Material removal, for example by spot drilling the housing.

Safety instructions

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 operating instruction,
- 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.

Safety of the equipment and safe operation

The device was built and tested in accordance with EN 61010 Part 1 'Safety regulations for electrical measuring, control and laboratory equipment' and it left the factory in perfect condition.

To maintain this condition and to assure safe operation, read and follow the safety instructions in this operating instruction. 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.

Potential equalization

- The external potential equalization connection of the analyzer housing must be connected to the local potential equalization.
- The local potential equalization must be connected before any other connections are made.
- The connectors have a clamping range of max. 4 mm^2.

Danger of interrupted potential equalization

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

⚠ DANGER

Explosion hazard

Explosion hazard when working on the potential equalization or the potential equalization connection in an existing hazardous atmosphere.

- Work on the potential equalization or the potential equalization connection is prohibited if there is a hazardous atmosphere.

… 1 Safety

… Safety instructions

Stopping the supply of sample gas
In the case of flammable and toxic sample gases, the supply of sample gas must be stopped and the sample gas feed path purged with nitrogen before the device housing is opened.

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.

Comply with the safety regulations
The safety regulations for explosion protection must be complied with without fail before carrying out any work on the device.

⚠ DANGER

Explosion hazard
There is a risk of explosion if the device is opened in a potentially explosive atmosphere.
Please take note of the following information before opening the device:
- A valid fire permit must be present.
- Make sure that there is no explosion hazard.
- Before opening the device, switch off the power supply.

Work prohibited when there is an explosion hazard
Carrying out work on live parts, and with auxiliary equipment which represents a danger of ignition is prohibited if there is a risk of explosion.

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.

Fidas24 – Information for safe operation

⚠ DANGER

Explosion hazard

Explosion hazard due to leaking combustion gas (hydrogen).

- All the information and instructions contained in this Commissioning Instruction must be complied with without fail to guarantee safe operation of the gas analyzer!

Measures of the manufacturer

The following measures ensure that the enrichment of combustion gas or an explosive mixture of combustion gas and ambient air cannot occur inside the gas analyzer during normal operation:

- The tightness of the combustion gas feed path is checked for a leakage rate of $< 1 \times 10^{-4}$ hPa·l/s before delivery.
- The combustion gas/air mixture (before and after the ignition point) is diluted in the detector with compressed air.
- The combustion gas feed is not connected to the supply during commissioning until the internal nominal pressures have been set.
- The combustion gas feed is switched off if the internal nominal pressures cannot be set during the ignition phase (e.g. because of insufficient compressed air or combustion air feed).
- The combustion gas feed is switched off after several unsuccessful ignition attempts.
- If the flame goes out during operation, the combustion gas feed is switched off if the following ignition attempts are unsuccessful.

The interior of the gas analyzer cannot be allocated to an (explosion protection-) zone; an explosive gas mixture cannot escape to the outside.

Conditions to be complied with by the end user

The end user must comply with the following prerequisites and conditions to ensure safe operation of the gas analyzer:

- The gas analyzer may be used for the measurement of flammable gases provided that the flammable portion does not up-scale 15 Vol.-% CH_4 oder C1 equivalents.
- The relevant safety regulations for working with combustion gases must be complied with.
- The gas connection diagram (see **Gas connections and electrical connections Fidas24 (model EL3020)** on page 80 and **Gas connections and electrical connections Fidas24 (model EL3040)** on page 81) must be complied with when connecting the combustion gas and combustion air.
- The combustion gas path in the gas analyzer must not be opened! The combustion gas path can become leaky as a result! Escaping combustion gas can cause fires and explosions, also outside the gas analyzer!
- If the combustion gas path in the gas analyzer has been opened nonetheless, it must be checked for leakage (refer to **Check the integrity of combustion gas path** on page 106), using a leak detector (leak rate $< 1 \times 10^{-4}$ hPa l/s), once it has been closed again.
- The tightness of the combustion gas supply line (see **Combustion gas line** on page 106) outside the gas analyzer as well as the combustion gas path (see **Combustion gas path in the gas analyzer** on page 107) in the gas analyzer must be checked regularly.
- The maximum pressures of combustion gas and combustion air (see **Operational gases** on page 31) may not be up-scaled.
- The maximum combustion gas flow (see **Combustion gas parameter** on page 32) may not be up-scaled.

… 1 Safety

… Fidas24 – Information for safe operation

- The combustion gas flow rate must be limited to a maximum of 10 l/h H_2 or 25 l/h H_2/He mixture. Suited measures (see **Combustion gas parameter** on page 32) outside the gas analyzer must be provided by the operator for this purpose.
- In order to increase the safety level under the following operational conditions, a shut-off valve (refer to **Combustion gas parameter** on page 32) must be installed in the combustion gas supply line:
  - when shutting down the gas analyzer,
  - in case of instrument air supply failure,
  - in case of a leak in the combustion gas path, inside the gas analyzer.

  This shut-off valve should be installed outside the analyzer house in the vicinity of the combustion gas supply (cylinder, line).
- Should the combustion gas supply to the analyzer module not shut off automatically in the event of an instrument air supply failure, an alarm that is visible or audible to the operator must be triggered (refer to **Failure of instrument air supply** on page 109).
- When measuring combustion gases, it must be ensured that if either the instrument air supply or the analyzer module should fail, the sample gas supply to the analyzer module will be shut off and the sample gas path purged with nitrogen.
- The unobstructed exchange of air with the environment must be possible around the gas analyzer. The gas analyzer must not be directly covered. The openings in the housing towards the top and at the side may not be closed. Spacing to adjacent built-in components to the sides must be at least 3 cm.
- If the gas analyzer is installed in a closed cabinet, adequate ventilation of the cabinet must be provided (at least 1 change of air per hour). The distance to adjacent built-in components towards the top and at the side must be at least 3 cm.

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is operator's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be).
Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Software downloads

By visiting the web page indicated below, you will find notifications about newly found software vulnerabilities and options to download the latest software. It is recommended that you visit this web page regularly:
www.abb.com/cybersecurity

Services and ports on the Ethernet interface

Port	Description
22/tcp	Used only for software updates. No direct access to the device.
502/tcp	Used for Modbus/TCP. The device allows connection to any Modbus client. The port needs to be activated using this configuration software: ECT 'EasyLine Configuration Tool'; the port is deactivated upon delivery.
8100/tcp	Used for test and calibration software Optima TCT Light. Binary proprietary protocol. The port is deactivated. It can be activated for TCT access via a secure connection, and deactivated when the TCT access is terminated

Access authorizations

Access to both the calibration functions and those functions used to change the instrument configuration can be restricted by means of password protection.
The password protection is not activated at the factory (except in the case of gas analyzers used for emission monitoring).

It is recommended that the factory-set passwords be changed by the operator, by means of the ECT software tool ECT "EasyLine Configuration Tool", see **Password protection** on page 112. This limits access to both the ECT software tool itself and to the calibration and configuration functions of the device.

Manufacturer's address

ABB AG
Measurement & Analytics
Stierstädter Str. 5
60488 Frankfurt am Main
Germany
Tel: +49 69 7930-4666
Email: cga@de.abb.com

Service address

If the information in this Commissioning Instruction 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:

Customer service center
Tel: +49 180 5 222 580
Email: automation.service@de.abb.com

2 Use in potentially explosive atmospheres

Notes on use in potentially explosive atmospheres

Installation in accordance with IEC/EN 60079-14 (VDE 0165 Part 1)
The electric equipment must be installed in potentially explosive atmospheres in accordance with IEC/EN 60079-14 (VDE 0165 Part 1) “Electric Equipment for Hazardous Gas Areas, Part 14: Electric Systems in Potentially Explosive Atmospheres.”

Potential equalization
With regard to potential equalization, the provisions of IEC/EN 60079-14 as well as DIN VDE 0100 Part 410 “Protection against electric shocks” and Part 540 “Grounding, Protective ground, Potential equalization conductors” must be observed.

Electrostatic charges
Electrostatic charges must be avoided. The professional association rules for the “Prevention of ignition hazards due to electrostatic charges (BGR 132) must be observed here.

Monitoring and review
Electric systems in potentially explosive atmospheres must be monitored for proper condition.
As necessary, but at least every three years, they must be inspected by an electrician, provided they are not constantly monitored under the supervision of a responsible engineer.

Work on electric systems
Before any maintenance work is carried out on electric installations in potentially explosive atmospheres, the installations must be disconnected from the power supply.

The disconnect point must be identified with an appropriate warning sign, for example, "Do not power-up – explosion hazard" This does not apply to devices that may be opened as part of normal operation, such as registration devices, or for which it is expressly noted in the type examination certificate.

Maintenance work on the device where opening the housing or part of the housing is necessary is only permitted in a non-hazardous atmosphere.

⚠ DANGER

Risk of explosion!
There is an explosion hazard if the housing is opened in a potentially explosive atmosphere:
- Before opening the housing, make sure that no flammable or potentially explosive atmospheres are present.

Explosion hazard
Before repairs, the explosion hazard must have been eliminated.

Competent personnel
Repair work may only be performed by competent personnel.

Original spare parts
Only original spare parts may be used for repairs.

Inspection prior to recommissioning
If repair work is carried out on parts of electric equipment on which explosion protection depends, a specialist needs to inspect and certify before recommissioning that the attributes of the equipment in terms of design and version which are essential for explosion protection match the equipment described in the declaration.

Repairs by the manufacturer
Repairs can also be carried out by the manufacturer, for example on-site by an ABB Service employee or at the manufacturing plant.
In this case, a marking showing the performed repairs with subsequent routine testing is affixed to the name plate.
Testing by a specialist is not required then.

Ex marking

Note
All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/analytical

Explosion protection

The gas analyzers are designed for use in potentially explosive atmospheres.
The gas analyzers are certified in accordance with European Directive 2014/34/EU ('ATEX Directive') as well as in accordance with the relevant IEC standards.

Standards and directives

The gas analyzer was designed and manufactured in accordance with the following standards:

- EN/IEC 60079-0
- EN/IEC 60079-7
- EN/IEC 60079-15

The gas analyzer must be designed, installed and operated in accordance with the following standards and directives:

- EN/IEC 60079-14
- EN/IEC 60079-17
- EN/IEC 60079-19

Note
The full designation of the applied standards, including the date of issue, is included in the declaration of conformity supplied with the device.

Certification in accordance with the ATEX directive

Gas analyzer model EL3040	
EC type examination certificate	BVS 16 ATEX E 085 X
Marking	Ex II 3G Ex ec nC IIC T4 Gc

Note
The measuring function in accordance with Directive 2014/34/EU, Annex II, Section 1.5.5 is not the subject of the present EU type examination certificates.

Description

Note
The version for the measurement of flammable gases and the explosion-proof design in degree of protection II 3G is designed for various variants of the gas analyzer and for different applications.

The model EL3040 gas analyzer in degree of protection II 3G is tested for explosion protection and is suited for use in potentially explosive atmospheres, with consideration of the specification and the special conditions (see **Special conditions** on page 12).

The gas analyzer is intended for indoor installation only.

In the gas analyzer, the Uras26, Magnos206, Magnos28 and Caldos27 analyzers can be installed individually and in these combinations: Uras26 with Magnos206 or Magnos28 or Caldos27 or oxygen sensor.

The gas analyzer may be used for measurement of **non-flammable** gases and vapors.

In undisturbed operation there cannot be any sparking, arcing or impermissible temperatures inside the device.

Explosion protection through: increased safety as well as gasketed or encapsulated equipment.

… 2 Use in potentially explosive atmospheres

… Description

Characteristic values

System bus, computer interfaces	
Supply voltage	100 to 240 V AC
Power consumption	Maximum 187 VA

Pneumatic data	
Purge gas	
Inlet pressure	Maximum 1104 hPa
Measured gas	
Non-flammable sample gas	
Inlet pressure	Magnos28: Maximum 1600 hPa absolute pressure
	All other analyzer modules: Maximum 1100 hPa absolute pressure or maximum 100 hPa gauge pressure
Flow rate (gas output atmospheric)	Maximum 100 l/h

Temperature data	
Ambient temperature	5 to 45 °C (41 to 113 °F)

Important safety instructions

In accordance with the EU Directive 2014/34/EU and the general requirements for explosion protection and as specified in the IEC 60079-0 standard, the scope of approvals for our explosion-protected apparatus is limited to **atmospheric conditions**, unless expressly stated otherwise in the certificates.

This also includes the sample gas that is fed in.

Definition of atmospheric conditions	
Temperature	–20 to 60 °C
Pressure p_{abs}	80 to 110 kPa (0.8 to 1.1 bar)
Ambient air with standard oxygen content, typically 21% vol.%	

If the **atmospheric conditions are not complied with**, the operator is obliged to guarantee the safe operation of our devices in the absence of the recommended atmospheric conditions, by means of further measures (e.g. evaluation of the gas mixture or explosion pressure) and / or supplementary protective devices.

Special conditions

- The cables must be inserted into the cable glands properly and gasketed by tightening the screws so that the IP 65 housing protection is maintained.
  Unused cable glands must be sealed with suited sealing plugs, so that the IP 65 housing protection is guaranteed here as well.
- During operation, the unused purge gas connections must be sealed with sealing plugs.
- If there is an explosion hazard at the installation site of the gas analyzer, the housing must not be opened when live and the connectors must not be disconnected when live.
- Due to the low mechanical stability of the viewing glass, the gas analyzer must be designed and operated in such a way that mechanical damage to the viewing glass with an energy greater than 2 J can be excluded. If the viewing glass becomes nevertheless damaged to the point that the IP 65 housing protection is no longer met, the gas analyzer must be decommissioned, secured against recommissioning and repaired.
- Due to the low UV resistance of the plastic parts of the housing, the gas analyzer must be designed and operated in such a way that the effect of UV radiation can be excluded. If the housing is nevertheless damaged by UV radiation to the point that the housing protection IP 65 is no longer maintained, the gas analyzer must decommissioned, secured against recommissioning and repaired.

3 Preparation for Installation

Scope of delivery

- Gas analyzer model EL3020 (19” housing) or model EL3040 (wall housing)
- Screwed fittings with tubing connectors for the connection of flexible tubes
- Power cable, length 5 m, see **Connecting the power supply** on page 98.
- Counter plug (socket housing) for the electrical connection of the I/O modules (plugged into the I/O module connections)
- Screwdriver (required for attaching the electric lines in the counter plugs)
- Fine filtration (pre-assembled), see **Installing the fine filter** on page 83.
- Commissioning Instruction
- Analyzer data sheet

Fidas24

- Power cable, length 5 m, with 4-pin female connector and separate grounding connector for the power supply to the detector heating and the heated sample gas connection. Refer to **Connecting the power supply** on page 98.
- Accessory bag with fittings and O-rings for the connection of the sample gas lines
- Exhaust air pipe with connecting nut and locking ring

Commissioning Instruction

The gas analyzer is delivered with a commissioning manual.

The commissioning instruction is an extract from the operating instruction, and it contains all the information required to install, commission and operate the gas analyzer safely, for its intended purpose.

The commissioning manual does not contain information regarding calibration, configuration and maintenance of the gas analyzer or about the Modbus® and PROFIBUS® interface.

Analyzer data sheet

The design of the gas analyzer that has been supplied is documented in detail in the analyzer data sheet.

Material required for installation

Note

The materials listed below are not included in the scope of delivery of the device, and must be provided by the customer.

Gas connections

For the connection of piping:

Threaded connections with ⅛ NPT thread and PTFE sealing tape.

Fidas24: Gas lines

Process gases, test gases and waste air

- PTFE or stainless steel tubes with 4 mm inside diameter and PTFE or stainless steel tube with min. 10 mm inside diameter for waste air
- Tube fittings
- Pressure regulator
- Flow restrictors in the combustion gas supply line, see **Flow restrictor in the combustion gas supply line** on page 32.
- Shut-off valve in the combustion gas supply line, see **Shut-off valve in the combustion gas supply line** on page 32.

Sample gas

Heated sample gas line (recommended: TBL 01) or unheated sample gas line (PTFE or stainless steel tube with inside/outside diameter 4/6 mm).

The fittings and O-rings required for the connection are included within the scope of delivery of the gas analyzer.

Flowmeter/flow controller

Flowmeters or flow controllers with needle valve for setting and monitoring the sample gas flow as well as purge gas flow, if necessary.

Information for the selection and use of flowmeters:

- Measuring range 7 to 70 l/h
- Pressure drop < 4 hPa
- Needle valve open

Recommendation:

Flowmeter 7 to 70 l/h,
Order number 23151-5-8018474

… 3 Preparation for Installation

… Material required for installation

Shut-off valve
Install a shut-off valve in the sample gas line (recommended when the sample gas is pressurized).

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" housing (model EL3020)

- 4 raised head screws
  (recommendation: M6; this depends on the cabinet/ rack system)
- 1 pair mounting rails (design depending on the cabinet/ frame system), length approx. 240 mm corresponding to approx. ⅔ the housing depth

Wall-mount housing (model EL3040)

4 M8 or M10 screws

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 maximum capacity of terminals for stranded or solid conductors is 1 mm^2 (17 AWG).
- The stranded conductor may be tinned on the tip or twisted for simplified connection.
- When using wire end ferrules the total section must not exceed 1 mm^2, i.e. the maximum stranded conductor section cannot be greater than 0.5 mm^2. The Weidmüller PZ 6/5 crimping tool must be used for crimping the ferrules.

Lengths and types of cables for the RS485 lines

- Maximum 1,200 m (transfer rate, maximum 19,200 bit/s).
- Three-core twisted-pair cable, conductor cross section 0.25 mm^2 (e.g. order number 746620)

Length of the RS232 lines

Maximum 15 m.

Mating connector (socket housing)

The required mating connector (socket housing) for the plug-in terminal strips on the I/O modules is included in the scope of delivery.

Power supply lines

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

Requirements for the installation site

Note
For the analyzers ZO23 and Fidas24, the instructions specified in **ZO23** on page 26 or **Fidas24** on page 31 must be observed.

- The gas analyzer is intended for indoor installation only.
- The mounting surface must be sufficiently stable to support the weight of the gas analyzer!
- For safe installation and disassembly, we recommend supporting the 19" housing in the cabinet or rack with slide rails!

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.

Model EL3020 – 19" housing
With the EL3020 in the 19" housing, the distance from neighboring housings must be at least 1RU (rack unit) upwards and downwards and 3 cm to the rear.

Model EL3040 – wall-mounted enclosure
With the EL3040 in the wall housing, the distance to the neighboring housings must be at least 3 cm.

Installation in closed cabinets
When a gas analyzer is installed in a closed cabinet, the cabinet must be sufficiently ventilated (at least 1 x air change per hour).

Protection from adverse ambient conditions
Protect the gas analyzer from the following influences:
- 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

Relative humidity
Maximum 75 %, no condensation

Air Pressure
Atmospheric conditions

Installation location altitude
Maximum 2000 m (6560 ft) above sea level (over 2000 m (6560 ft) on request)

Ambient temperature
- During operation:
  5 to 45 °C
- Uras26 in combination with another analyzer, Limas23, Fidas24:
  5 to 40 °C

Transport-/Storage temperature
–25 to 65 °C

Housing protection (IP rating)

Model EL3020 (19" housing)
IP 20, IP 40 (with version for emissions measurement)

Model EL3040 (wall-mounted enclosure)
IP 65

Housing design

Model	Housing design	IP rating	Weight
EL3020	19" housing	IP 20	approx. 7 to 15 kg
EL3040	Wall-mount housing	IP 65	approx. 13 to 21 kg

… 3 Preparation for Installation

… Requirements for the installation site

Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases

Unrestricted exchange of air with the environment must be provided around the gas analyzer from the bottom (floor plate) and from the rear (gas connections).
The gas analyzer may not be placed directly on a table.
The housing openings may not be closed.

Special conditions for the model EL3040 gas analyzer in degree of protection II 3G

Protection against mechanical influences

Due to the low mechanical stability of the viewing glass, the gas analyzer must be designed and operated in such a way that mechanical damage to the viewing glass is excluded with an energy greater than 2 J.

UV radiation protection

Due to the low UV resistance of the plastic parts of the housing, the gas analyzer must be designed and operated in such a way that the effect of UV radiation can be excluded.

Power supply

Electric information (entire device)

The power supply built into the system housing is used to supply 24 V DC to the analyzer module and the associated electronics.

Input voltage

100 to 240 V AC, −15/+10 %;
50 to 60 Hz, ±3 Hz

Power

Maximum 187 VA (without heaters from Fidas24)

Connection

3-pole cold device plug in accordance with EN 60320-1/C14
(Power cable included in scope of supply)

Battery

Application

Supply to the built-in clock in case of a voltage failure.

Type

- Varta CR 2032 type no. 6032 or
- Renata type no. CR2032 MFR

Note

Only the original types specified above may be used as a spare part.

Electric information (analyzer modules)

Input voltage

24 V DC, ±5 %

Power consumption analyzer modules (DC)			
Uras26:	Max. 95 W	Magnos206:	max. 50 W
Limas23:	max. 100 W	ZO23:	max. 35 W
Magnos28:	max. 50 W	Caldos27:	max. 17 W
Magnos27:	max. 35 W	Fidas24:	max. 50 W

Fidas24 Analyzer Module (AC)	
Detector and Sample Gas Inlet Heaters	
Input voltage	115 V AC or 230 V AC, ±15 % (max. 250 V AC), 50 to 60 Hz, ±3 Hz
Power consumption	125 VA for detector 125 VA for sample gas inlet (option)
Connection	4-pin male connector (connection cable included in scope of supply)

Uras26

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring ignitable gas / air or gas / oxygen mixtures

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

Uras26 – sample gas input conditions	
Temperature	
If the sample gas taken from the process is hotter than the coldest point in the sample gas path, there may be condensation at this point, if the gas contains components that can condense. The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path.	
Designation of gas connections	
The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere.	
Internal pressure drop:	< 5 hPa at standard flow rate of 60 l/h
Permissible absolute pressure range:	800 to 1250 hPa Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request
Gauge pressure in the sample cell:	max. 500 hPa
Flow rate	20 to 100 l/h

Corrosive gases

The analyzer may not be used for measurement in corrosive gases. Associated gases, such as chlorine (Cl_2) or hydrogen chlorides (such as wet HCl) as well as gases or aerosols containing chlorine must be cooled or pre-absorbed.

Flammable gases

In the version with gas lines and gas connectors made of stainless steel, the analyzer is suited for the measurement of flammable gases in non-explosive environments.

The notes on measuring flammable gases must be observed, see **Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases** on page 16.

Flowing reference gas

Gas inlet conditions as for sample gas

Pressure sensor

The pressure sensor is installed in the gas analyzer as standard, see **Pressure sensor** on page 34.

The pressure sensor is connected to the sample gas path or a connection socket at different positions depending on the design of the gas analyzer, see **Position and design of the gas connections** on page 42.

The connection of the pressure sensor is also documented in the pneumatic diagram included in the device data sheet.

Gas connections

See **Gas connections Uras26 (model EL3020)** on page 43 and **Gas connections Uras26 (model EL3040)** on page 45.

… 3 Preparation for Installation

… Uras26

Test gases – Uras26

Analyzer(s)	Test gas for the zero calibration	Test gas for the end-point calibration
Uras26 with calibration cells (automatic calibration)	N_2 or air or 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 / Magnos28 (automatic calibration, i.e. Magnos206 / Magnos28 with single-point calibration)	IR sample component-free test gas with O_2 concentration in an existing measuring range or ambient air.	Calibration cells or span gas*
Uras26 + Magnos206 / Magnos28 (manual calibration)	Zero point gas for Uras26 or Magnos206 / Magnos28, or for single-point calibration for Magnos206 / Magnos28, IR sample component-free test gas with O_2concentration in an existing measuring range or ambient air.	Span gas for all sample components in the Uras26 and in the Magnos206 / Magnos28 (possibly only for the Uras26 if a single-point calibration is carried out for the Magnos206 / Magnos28)
Uras26 + Magnos27 (automatic calibration)	IR sample component-free test gas with O_2 concentration in an existing measuring range or ambient air.	Calibration cells or span gas*
Uras26 + Magnos27 (manual calibration)	Zero point gas for Uras26 or Magnos27, or IR sample component-free test gas with O_2-concentration in an existing measuring range or ambient air.	Span gas for all sample components in Uras26 and Magnos27
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 reference gas for Uras26 or 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.	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.	Span gas for all sample components in Uras26

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

Dew point
The dew point of the test gases must be approximately equal to the dew point of the sample gas.

Note
The instructions for calibration must be observed, see Operating instruction.

Limas23

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring flammable gases and ignitable gas / air or gas / oxygen mixtures

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

Limas23 – sample gas input conditions	
Temperature	
If the sample gas taken from the process is hotter than the coldest point in the sample gas path, there may be condensation at this point, if the gas contains components that can condense. The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path.	
Designation of gas connections	
The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere.	
Internal pressure drop:	< 5 hPa at standard flow rate of 60 l/h
Permissible absolute pressure range:	800 to 1250 hPa Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request
Gauge pressure in the sample cell:	max. 500 hPa
Flow rate	20 to 100 l/h

Corrosive gases

The analyzer may not be used for measurement in corrosive gases. Associated gases, such as chlorine (Cl_2) or hydrogen chlorides (such as wet HCl) as well as gases or aerosols containing chlorine must be cooled or pre-absorbed.

Pressure sensor

The pressure sensor is installed in the gas analyzer as standard, see **Pressure sensor** on page 34.

The pressure sensor is connected to the sample gas path or a connection socket at different positions depending on the design of the gas analyzer, see **Position and design of the gas connections** on page 42.

The connection of the pressure sensor is also documented in the pneumatic diagram included in the device data sheet.

Gas connections

See **Gas connections Limas23 (model EL3020)** on page 58 and **Gas connections Limas23 (model EL3040)** on page 59.

… 3 Preparation for Installation

… Limas23

Test gases – Limas23

Analyzer(s)	Test gas for the zero calibration	Test gas for the end-point calibration
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 / Magnos28 or **oxygen sensor** with calibration cells (automatic calibration, i.e. Magnos206 / Magnos28 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 or for each detector
Limas23 + Magnos206 / Magnos28 or **oxygen sensor** without calibration cells (automatic calibration)	N_2 or oxygen and UV sample component-free gas	Test gas for each sample component or for each detector
Limas23 + Magnos206 / Magnos28 or **oxygen sensor** without calibration cells (manual calibration)	N_2 or oxygen and UV sample component-free gas	Test gas for each sample component or for each detector

Dew point
The dew point of the test gases must be approximately equal to the dew point of the sample gas.

Note
The instructions for calibration must be observed, see Operating instruction.

Magnos206

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring ignitable gas / air or gas / oxygen mixtures

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

Magnos206 – sample gas input conditions

Temperature

- If the sample gas taken from the process is hotter than the coldest point in the sample gas path, there may be condensation at this point, if the gas contains components that can condense. The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path.
- When there is a direct connection to the sample chamber, the maximum sample gas dew point is 55 °C.
- Water vapor content variations cause volume errors.

Designation of gas connections

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere.

Internal pressure drop:	< 5 hPa at standard flow rate of 60 l/h.
Permissible absolute pressure range:	800 to 1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request.
Operation under higher pressure:	A pressure sensor is required to compensate for pressure influences.
Absolute pressure ≤ 1250 hPa:	An optional internal pressure sensor can be connected to the sample gas path.
Absolute pressure ≥ 1250 hPa:	An external pressure sensor must be connected to the sample gas path. The pressure compensation must be calculated externally.
The analyzer module is function-tested for 5000 hPa internal pressure without damage.	
Flow rate	30 bis 90 l/h Abrupt changes in the sample gas flow rate should be avoided when using highly suppressed measurement ranges.

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.

Flammable gases

The analyzer is suited for measuring flammable gases in a non-explosive environment.

The notes on measuring flammable gases must be observed, see **Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases** on page 16.

Pressure sensor

The pressure sensor is optionally installed in the gas analyzer, see **Pressure sensor** on page 34.

The pressure sensor is connected to a connection socket, see **Position and design of the gas connections** on page 42.

Gas connections

See **Gas connections Magnos206 (model EL3020)** on page 66 and **Gas connections Magnos206 (model EL3040)** on page 67.

… 3 Preparation for Installation

… Magnos206

Test gases – Magnos206

Analyzer	Test gas for zero point calibration and single-point calibration	Test gas for the end-point calibration
Magnos206	Oxygen-free process gas	Process gas with a known O_2 concentration
Magnos206 suppressed measuring range	• Zero point calibration: pure nitrogen or hydrogen-free operating gas • Single-point calibration: 100 Vol.-% O_2 or test gas with O_2concentration in 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.	—
Magnos206 with substitute gas calibration	Oxygen-free process gas or substitute gas (O_2 in N_2)	Substitute gas, for example dried air

Dew point
The dew point of the test gases must be approximately equal to the dew point of the sample gas.

Note
The instructions for calibration must be observed, see Operating instruction.

Magnos28

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring ignitable gas / air or gas / oxygen mixtures

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

Magnos28 – sample gas input conditions

Temperature

- If the sample gas taken from the process is hotter than the coldest point in the sample gas path, there may be condensation at this point, if the gas contains components that can condense. The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path.
- When there is a direct connection to the sample chamber, the maximum sample gas dew point is 55 °C.
- Water vapor content variations cause volume errors.

Designation of gas connections

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere.

Internal pressure drop:	< 5 hPa at standard flow rate of 60 l/h
Permissible absolute pressure range:	800 to 1600 hPa Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request
Operation under higher pressure:	A pressure sensor is required to compensate for pressure influences.
Absolute pressure ≤ 1250 hPa:	An optional internal pressure sensor can be connected to the sample gas path.
Absolute pressure ≥ 1250 hPa:	An external pressure sensor must be connected to the sample gas path. The pressure compensation must be calculated externally.

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

Flow rate	30 bis 90 l/h Measuring ranges ≤ 0 to 3 vol % O_2: 60l/h For highly suppressed measuring ranges and measuring ranges of ≤ 0 to 3 vol % O_2, changes of the sample gas flow should be avoided.

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. If the sample gas contains NH_3, FFKM75 gaskets must be used; in this case, the integral gas feed cannot be connected to the analyzer. The pressure sensor must not be connected to the sample gas path.

Flammable gases

The analyzer is suited for measuring flammable gases in a non-explosive environment.

The notes on measuring flammable gases must be observed, see **Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases** on page 16.

Pressure sensor

The pressure sensor is optionally installed in the gas analyzer, see **Pressure sensor** on page 34.

The pressure sensor is connected to a connection socket, see **Position and design of the gas connections** on page 42.

Gas connections

See **Gas connections Magnos28 (model EL3020)** on page 68 and **Gas connections Magnos28 (model EL3040)** on page 72.

… 3 Preparation for Installation

… Magnos28

Test gases – Magnos28

Analyzer	Test gas for zero point calibration and single-point calibration	Test gas for the end-point calibration
Magnos28	Oxygen-free process gas	Process gas with a known O_2 concentration
Magnos28 with a suppressed measuring range	• Zero point calibration: pure nitrogen or hydrogen-free operating gas • Single-point calibration: 100 Vol.-% O_2 or test gas with O_2concentration in the measuring range	Test gas with O_2 concentration near the end point of the measuring range, or pure oxygen
Magnos28 with single-point calibration	Test gas with O_2 concentration in an existing measuring range or ambient air.	—
Magnos28 with substitute gas calibration	Oxygen-free process gas or substitute gas (O_2 in N_2)	Substitute gas, for example dried air
Magnos28 + Caldos27 (manual calibration)	In addition to the above mentioned test gases for Magnos28, additional test gases are needed for the calibration of Caldos27. The requirements are shown in the table in section **Test gases – Caldos27** on page 30.	
Magnos28 + Caldos27 (automatic calibration)	See the table in section **Test gases – Caldos27** on page 30 for instructions on test gases and possible limitations in automatic calibration.	

Dew point
The dew point of the test gases must be approximately equal to the dew point of the sample gas.

Note
The instructions for calibration must be observed, see **Calibration** in the operating instruction.

Magnos27

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring flammable gases and ignitable gas / air or gas / oxygen mixtures

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

Magnos27 – sample gas input conditions

Temperature

- If the sample gas taken from the process is hotter than the coldest point in the sample gas path, there may be condensation at this point, if the gas contains components that can condense. The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path.
- When there is a direct connection to the sample chamber, the maximum sample gas dew point is 55 °C.
- Water vapor content variations cause volume errors.

Designation of gas connections

The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere.

Internal pressure drop:	< 5 hPa at standard flow rate of 60 l/h.
Permissible absolute pressure range:	800 to 1250 hPa. Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request.
Gauge pressure in the measuring chamber:	max. 500 hPa.
Flow rate	20 bis 90 l/h

Pressure sensor

The pressure sensor is optionally installed in the gas analyzer (see **Pressure sensor** on page 34).

The pressure sensor is connected to a connection socket via an FPM tube.

Gas connections

See **Magnos27: Gas Connections** on page 73 and **Gas connections Magnos27 with Uras26 (model EL3020)** on page 74.

Tests gases – Magnos27

Analyzer	Test gas for the zero calibration	Test gas for the end-point calibration
Magnos27	Oxygen-free process gas	Process gas with a known O_2 concentration
Magnos27 with substitute gas calibration	Oxygen-free process gas or substitute gas (O_2 in N_2)	Substitute gas, for example dried air

Dew point

The dew point of the test gases must be approximately equal to the dew point of the sample gas.

Note

The instructions for calibration must be observed, see Operating instruction.

… 3 Preparation for Installation

ZO23

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring ignitable gas / air or gas / oxygen mixtures

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

ZO23 – sample gas input conditions	
Temperature	5 to 50 °C
Inlet pressure	$p_e \leq 70$ hPa
Flow rate	4 to 20 l/h

- The sample gas flow rate must be kept constant within the specified range at ±0.2 l/h.
- The sample gas must be taken unpressurized from a bypass. If the sample gas flow is too low, contamination effects from the gas lines (leaks, permeability, de-sorption) will lead to inaccuracies in the measurement result.

If the sample gas flow is too high, asymmetrical cooling of the sensor may cause measurement errors. This can also cause quicker aging or damage to the measuring cell.

Note

The temperature, pressure and flow of the sample gas must be kept constant, to such an extent that the influence of variations on the measuring accuracy is acceptable, refer to **Specification** on page 120.

Corrosive gases

The presence of corrosive gases and catalyst poisons, such as halogens, gases containing sulfur and heavy-metal dust, leads to quicker aging and / or the destruction of the ZrO_2 cell.

Flammable gases

The analyzer module is suitable for measuring flammable gases in a non-explosive environment. The concentration of flammable gases in the sample gas must not exceed 100 ppm.

Associated gas effect

Inert gases (Ar, N_2) have no effect. Flammable gases (CO, H_2, CH_4) in stoichiometric concentrations to the oxygen content: conversion O_2 < 20 % of the stoichiometric conversion. If higher concentrations of flammable gases are present, higher O_2 conversions must be expected.

Requirements for the sample gas outlet

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

Test gases

Reference point (electric zero point)

Clean ambient air;
its oxygen concentration is obtained from the dry air value and the factor for consideration of the water vapor content.

Example:

Water vapor content at 25 °C and 50 % relative humidity = 1.56 Vol.-% H_2O ⇨ Factor 0.98
Oxygen concentration =
20.93 vol. % O_2 × 0.98 = 20.6 Vol.-% O_2

End position

Test gas with oxygen concentration in the smallest measurement range (for example, 2 ppm O_2 in N_2).

Note

The pressure conditions at the reference point and the end point must be identical.
The instructions for checking the reference point and the end point (see Operating instruction) must be observed.

Purge gas

If housing purging is selected (for IP65 design only), the purging may only be carried out using air (not with nitrogen), since the ambient air is used as a reference gas.

Gas connections

See sections **Gas connections ZO23 (model EL3020)** on page 75and **Gas connections ZO23 (model EL3040)** on page 76.

Installation and sample handling

NOTICE

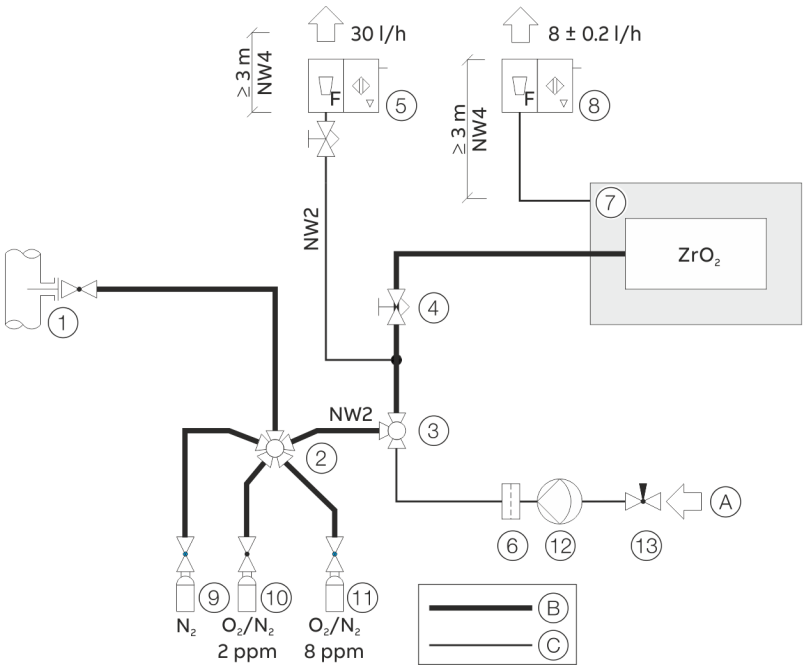
Damage to the measuring cell

The ingress of liquids into the analyzer module can cause serious damage including destruction of the sample cell.

Note

The following information on installation and the sample handling must be considered for the measurement and the execution of controlled calibrations (manual, automatic and externally controlled calibration).

Manually operated cocks and valves must be replaced by controlled valves suitable for the oxygen trace measurement, as required.



(A) Reference air
(B) Stainless steel pipe
(C) FPM hose

(1) Sampling point with primary shut-off valve
(2) Multi-way ball valve
(3) 3/2-way ball valve*
(4) Fine-control and shut-off valve
(5) Flowmeter with needle valve and fault-signalling contact
(6) Air filter*
(7) Gas analyzer
(8) Flowmeter without needle valve, with fault-signalling contact
(9) Purge gas cylinder N_2*
(10) Test gas cylinder with for example 2 ppm O_2 in N_2**
(11) Test gas cylinder with 8 ppm O_2 in N_2*
(12) Pump*
(13) Needle valve*

* Option

** A hard-mounted test gas cylinder is normally adequate.
The annual check of the reference point can also be carried out with a non-stationary air supply.

Figure 1: Sample handling example

… 3 Preparation for Installation

… ZO23

Gas sampling
The nominal diameter of the line from the sampling point to the first switch-over valve should be 4 mm.
A bypass can be positioned upstream of the first switch-over valve, in order to obtain a faster analysis.
With a nominal diameter of 4 mm, the bypass should be longer than 3 m, in order to prevent back diffusion from the ambient air.
The sample gas pressure must be reduced at the sampling point. An evaporating pressure regulator must be provided for sampling from liquid gas lines.

Sample gas feed
The sample gas supply line must consist of stainless steel tubing, be as short as possible and have as few transitions as possible.

The diameter of tube from the beginning of the first switch-over valve should be 3 mm on the outside and 2 mm on the inside.
The sample gas connection on the gas analyzer is intended for a pipe with a 3 mm outside diameter.
The connectors should be made as Swagelok® fittings.
The ZO23 oxygen trace analyzer module may not be connected in series with other ZO23 analyzer modules or other gas analyzers.

Gas outlet line
The gas outlet line can be executed as a flexible tube.
With a nominal diameter of 4 mm, its length should be more than 3 m, in order to prevent back diffusion from the ambient air.

Bypass
The gas analyzer is connected to a gas flow in the bypass at a constant flow rate (approx. 30 l/h).
The needle valve is installed upstream of the branch to the gas analyzer and the bypass flowmeter downstream of the branch to the gas analyzer.

The gas analyzer draws gas flow 8 l/h. An excess of approx. 20 l/h remains. If several ZO23 analyzer modules are supplied with gas in parallel (redundant measurement), the flow must be set so large that the bypass has an excess of 20 l/h.

With a nominal diameter of 4 mm, the bypass from the outlet of the gas analyzer should be longer than 3 m, in order to prevent back diffusion from the ambient air.

On account of possible leaks, the flowmeters are always placed in the bypass feed path downstream of the branch to the gas analyzer, respectively, downstream of the gas analyzer; they may on no account be installed in the sample gas supply line upstream of the sample cell.

Waste gas
The sample gas and the bypass must be conducted into the atmosphere or into an unpressurized waste gas collecting system at an adequate distance from the gas analyzer.
Long line runs and pressure variations must be avoided.
For metrological and technical safety reasons, sample gas and bypass may not be discharged into the atmosphere in the vicinity of the gas analyzer, since the ambient air serves as reference air and also to exclude suffocation through a lack of oxygen.

It must be ensured that the waste gas only reaches respiratory air when adequately diluted.

Caldos27

Sample gas

Sample gas inlet conditions

⚠ DANGER

Explosion hazard

Explosion hazard when measuring ignitable gas / air or gas / oxygen mixtures

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

Caldos27 – sample gas input conditions	
Temperature	
• If the sample gas taken from the process is hotter than the coldest point in the sample gas path, there may be condensation at this point, if the gas contains components that can condense. The sample gas dew point should be at least 5 °C below the temperature throughout the sample gas path. • Water vapor content variations cause volume errors	
Designation of gas connections	
The analyzer is operated under atmospheric pressure; the sample gas outlet is open to atmosphere.	
Internal pressure drop:	< 5 hPa at standard flow rate of 60 l/h.
Permissible absolute pressure range:	800 to 1250 hPa Operation under lower absolute pressure (e.g. at altitudes above 2000 m) on request
Gauge pressure in the measuring chamber:	max. 100 hPa
Flow rate	Typically 10 to 90 l/h, minimum 1 l/h

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.

Flammable gases

The analyzer is suited for measuring flammable gases in a non-explosive environment.

The notes on measuring flammable gases must be observed, see **Special conditions for the measurement of flammable gases** on page 39.

Pressure sensor

The pressure sensor is installed in the gas analyzer at the factory, see **Pressure sensor** on page 34.
The pressure sensor is connected to a connection socket via an FPM tube.

Gas connections

See sections **Gas connections Caldos27 (model EL3020)** on page 77and **Gas connections Caldos27 (model EL3040)** on page 79.

… 3 Preparation for Installation

… Caldos27

Test gases – Caldos27

Analyzer	Test gas for zero point calibration and single-point calibration	Test gas for the end-point calibration
Caldos27	Sample component-free test gas or process gas	Test gas or process gas with a known sample component concentration
Caldos27 with a 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)	—
Caldos27 + Magnos28 (manual calibration)	In addition to the above mentioned test gases for Caldos27, additional test gases are needed to calibrate Magnos28. The requirements are provided in the table in **Test gases – Magnos28** on page 24.	
Caldos27 + Magnos28 (automatic calibration)	Same as manual calibration, with the following limitation: Zero point and single point calibrations are performed for all sample components simultaneously, since for thid purpose, only one common digital output can be used for valve control (unlike with end point calibration) for this purpose (**Calibration** in the operating instruction). This results in limitations with regard to the possible test gases, which in particular depend on the configuration of the • Measurement components • Measuring ranges • Gas paths (series or isolated) Depending on these conditions, certain automatic calibration methods cannot be performed in a practical sense.	As in the case with manual calibration, a separate end point gas valve must be available for each sample component without a single point calibration, which is controlled via a correspondingly configured digital output (**Calibration** in the operating instruction).

Dew point
The dew point of the test gases must be approximately equal to the dew point of the sample gas.

Note
The instructions for calibration must be observed, see Operating instruction.

Fidas24

Sample gas

Sample components

Hydrocarbons. The concentration of the gas components in the sample gas path must not exceed the temperature-dependent lower explosion limit.

Sample gas inlet conditions

Fidas24 – sample gas input conditions	
Temperature	≤ Thermostat temperature (thermostat temperature for sample gas path, detector and air injector ≤ 200 °C, factory-set at180 °C)
Inlet pressure	p_{abs} = 800 to 1100 hPa
Outlet pressure	The outlet pressure must be the same as the atmospheric pressure.
Flow rate	approx. 80 to 100 l/h at atmospheric pressure (1000 hPa)
Humidity	≤ 40 % H_2O

Note

The temperature, pressure and flow of the sample gas must be kept constant, to such an extent that the influence of variations on the measuring accuracy is acceptable.

Refer to **Specification** on page 120.

Flammable gases

The gas analyzer may be used for the measurement of flammable gases provided that the flammable portion does not up-scale 15 Vol.-% CH_4 or does not up-scale C1 equivalents.

Further properties of the sample gas

The sample gas must not be explosive at any time.

The analyzer module must not be used for the measurement of gases containing organometallic compounds, e.g. lead-containing fuel additives or silicone oils.

Operational gases

Instrument air

Parameter	**Value/Description**
Quality	According to ISO 8573-1 Class 2 Particle size: max. 1 µm, Particle density: max. 1 mg/m^3, Oil content: max. 0.1 mg/m^3, Dew point: At least 10 °C below the lowest expected ambient temperature
Inlet pressure p_e	4000 hPa, ±500 hPa
Flow rate	Typically approx. 1800 l/h (1200 l/h for the air jet injector and approx. 600 l/h for the housing purge), max. approx. 2200 l/h (1500 l/h + 700 l/h)

Combustion air

Parameter	**Value/Description**
Quality	• Synthetic air or catalytically purified air • Organic hydrocarbon content: < 1 % of the measuring range
Inlet pressure p_e	1200 hPa, ±100 hPa
Flow rate	< 20 l/h

… 3 Preparation for Installation

… Fidas24

Combustion gas

⚠ DANGER

Explosion hazard

Explosion hazard due to high combustion gas flow rate.

- The maximum combustion gas flow rate specified in the following table **Combustion gas parameter** on page 32 must not be up-scaled.
- For this purpose, the operator must install a suited flow restrictor and a shut-off valve in the combustion gas line.

NOTICE

Destruction of the detector

Destruction of the detector due to overheating caused by incorrect combustion gas.

- For a design for H_2/He mix as a combustion gas, never use H_2 as a combustion gas!

Note

An H_2/He mixture may only be used if the gas analyzer has been ordered and delivered in the intended version.

Combustion gas parameter		
Quality	Hydrogen (H_2), Quality 5.0	H_2/He mix (40 %/60 %) Quality 5.0
Inlet pressure p_e	1200 hPa, ±100 hPa	1200 hPa, ±100 hPa
Maximum combustion gas flow	approx. 3 l/h	approx. 10 l/h

Flow restrictor in the combustion gas supply line

The combustion gas flow rate must be limited to a maximum of 10 l/h H_2 or 25 l/h H_2/He mixture.
For this purpose, the operator has to provide suited measures outside the gas analyzer.

ABB recommends using a bulkhead fitting with an integrated flow restrictor to be installed in the combustion gas supply line.

This bulkhead fitting can be supplied by ABB.

- Combustion gas H_2: order number 8329303,
- Combustion gas H_2/He mix: order number 0769359.

Shut-off valve in the combustion gas supply line

A shut-off valve must be installed in the combustion gas supply line to increase safety in the following operating conditions:

- when shutting down the gas analyzer,
- in case of instrument air supply failure,
- in case of a leak in the combustion gas path, inside the gas analyzer.

This shut-off valve should be installed outside the analyzer house in the vicinity of the combustion gas supply (cylinder, line), see **Connection of process gases and test gases** on page 84.

ABB recommends the use of a pneumatic shut-off valve that is actuated by the instrument air. This shut-off valve can be supplied by ABB.

Order number 0769440.

If such a pneumatic shut-off valve cannot be installed, precautions must be taken to monitor the overall status or the “failure” status of the gas analyzer, see **Failure of instrument air supply** on page 109.

Test gases

Test Gases for Zero Calibration	
Quality	Nitrogen, Quality 5.0, synthetic air or catalytically cleaned air with an organic C < 1 % MBU
Inlet pressure p_e	Depressurized
Flow rate	At least 20 l/h more than the sample gas flow

Test gases for endpoint calibration	
Quality	Test gas in nitrogen or synthetic air with concentration adjusted to the measuring range
Inlet pressure p_e	Depressurized
Flow rate	At least 20 l/h more than the sample gas flow

Zero point offset

If the zero point gas is not completely free of hydrocarbons (even purified nitrogen contains fractions of hydrocarbons), negative measured values may be displayed in small measuring ranges.
In this case, the sample gas contains a lower proportion of hydrocarbons than the zero point gas.

Note
The calibration information under **Calibration** in the operating instruction must be taken into account.

Gas connections

See sections **Gas connections and electrical connections Fidas24 (model EL3020)** on page 80 and **Gas connections and electrical connections Fidas24 (model EL3040)** on page 81.

Sample gas input and output conditions

Analyzers

Analyzer	Additional Information
Uras26	See **Uras26** on page 17
Limas23	See **Limas23** on page 19
Magnos206	See **Magnos206** on page 21
Magnos28	See **Magnos28** on page 23
Magnos27	See **Magnos27** on page 25
ZO23	See **ZO23** on page 26
Caldos27	See **Caldos27** on page 29
Fidas24	See **Fidas24** on page 31

Oxygen sensor

Flammable gases

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

Additional conditions

The H_2O dew point of the sample gas must be at least 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 the integrated gas feed, it must not be used for the measurement of flammable gases.

Note
Integrated gas feed can be used as an option in the EL3020 model. It cannot be used in the EL3040 model and not together with the Limas23, ZO23 and Fidas24 analyzers.

… 3 Preparation for Installation

… Sample gas input and output conditions

Special conditions for the model EL3040 gas analyzer in degree of protection II 3G

Flammable gases

The gas analyzer in explosion-proof design may be used for measurement of non-flammable gases and vapors.

Sample gas input pressure

Magnos28:

Absolute pressure: Maximum 1600 hPa
Gauge pressure: Maximum 600 hPa

All other analyzer modules:

Absolute pressure: Maximum 1100 hPa
Gauge pressure: Maximum 100 hPa

Pressure sensor

In which analyzer modules is a pressure sensor installed?

Gas analyzer	Pressure sensor
Uras26, Limas23, Caldos27	Factory-installed as standard
Magnos206, Magnos28, Magnos27	Factory-installed as an option
Fidas24, ZO23	Not required

Information for the safe and correct operation of the pressure sensor

⚠ DANGER

Explosion hazard

Explosion hazard when measuring flammable or ignitable gases with the pressure sensor.

- The pressure sensor must not be connected to the sample gas path if the sample gas contains flammable or ignitable components.

NOTICE

Damage to the pressure sensor

Damage to the pressure sensor by corrosive gases.

- For the measurement of corrosive gases, the terminal of the pressure sensor must not be connected to the sample gas path.

- Prior to the commissioning of the gas analyzer, the yellow plastic screw plug 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 should be connected with 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 a sufficiently large inside diameter (min. 10 mm) so that the flow effect is minimized.
  If the pressure sensor is not connected to the sample gas output, the pressure sensor and sample gas output must be at the same level of pressure.
- Pressure sensor working range:
  p_{abs} = 600 to 1250 hPa.

Housing purge

Housing design

Housing purging is only possible with the wall-mounted housing (model EL3040). The purge gas connectors (⅛ NPT female thread) are factory-installed in accordance with the order.

Note

Housing purging in combination with Fidas24 is described separately, see **Housing purge with Fidas24** on page 35.

When is a housing purge necessary?

A housing purge is necessary when the sample gas contains flammable, corrosive or toxic components, see **Special conditions for the measurement of flammable gases** on page 39.

Purge gas

⚠ DANGER

Risk of suffocation

Risk of suffocation due to leaking purge gas. Purge gas can escape from the housing if there are any leak points.

- When using nitrogen as the purge gas, take all required precautions against suffocation.

NOTICE

Damage to the device

If the purge gas flow is not restricted until after the purge gas outlet, the full pressure of the purge gas will affect the housing seals which can destroy the operator panel keypad!

- The purge gas flow must always be restricted upstream of the purge gas inlet!

Suited purge gases

- Nitrogen for the measurement of flammable gases and
- Nitrogen or instrument air for the measurement of corrosive or toxic gases
  (Instrument air quality, based on ISO 8573-1 Class 3, i.e. particle size max. 40 µm, oil content max. 1 mg/m^3, dew point max. +3° C).

Note

For Uras26, the purge gas must not contain any fractions of the sample components!
Any sample components in the purge gas can cause false readings.

Initial purging upon commissioning

Housing purge*	
Purge gas	Nitrogen
Purge gas flow	Maximum 200 l/h
Purge time	Approx. 1 hour

* Not for Fidas24, see for a separate description at **Housing purge with Fidas24** on page 35.

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

Housing purge during operation

Purge gas flow	At the device input max. 20 l/h (constant)
Purge gas overpressure	p_e = 2 to 4 hPa

For a purge gas flow rate of 20 l/h at the device inlet, the purge gas flow rate at the device outlet is approx. 5 to 10 l/h.

Housing purge during operation when measuring flammable gases

The housing must be purged using nitrogen. Purge gas flow rate 1 to 20 l/h. The purge gas flow must be monitored at the purge gas output.

Housing purge with Fidas24

In the Fidas24 gas analyzer, the housing purge is provided in such a way that a part (approx. 600 to 700 l/h) of the instrument air is conducted continuously through the housing as purge air.

Thus it is guaranteed that no ignitable gas mixture can form within the housing in case of a leak in the combustion gas path. The housing purge is always active when pressurized air is on, that is also when the instrument air valve is closed.

… 3 Preparation for Installation

Dimensions

19” housing (model EL3020)

Dimensions in mm (in)

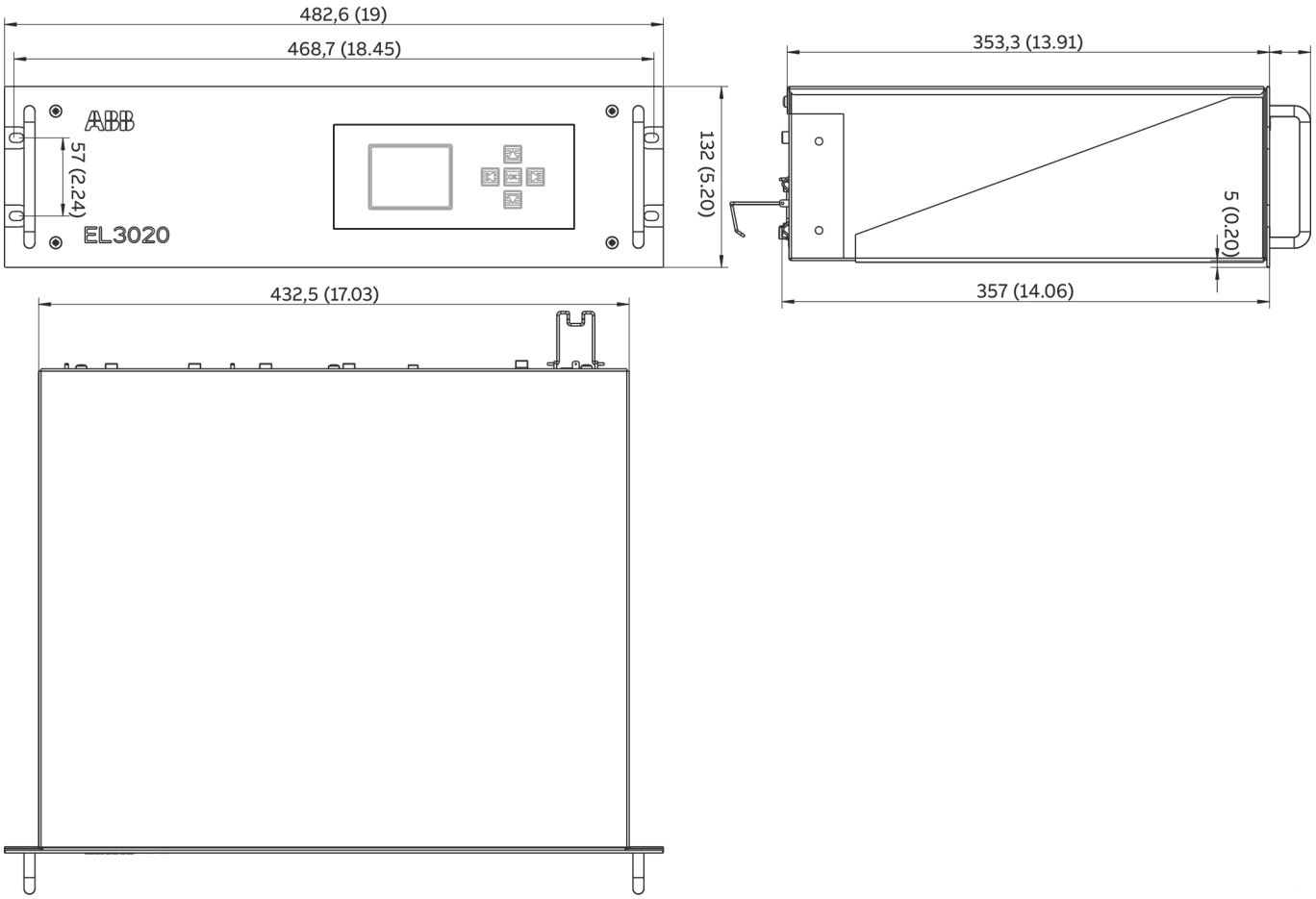


Figure 2: 19” housing (model EL3020)

19” housing (model EL3020 with Magnos27)

Dimensions in mm (in)

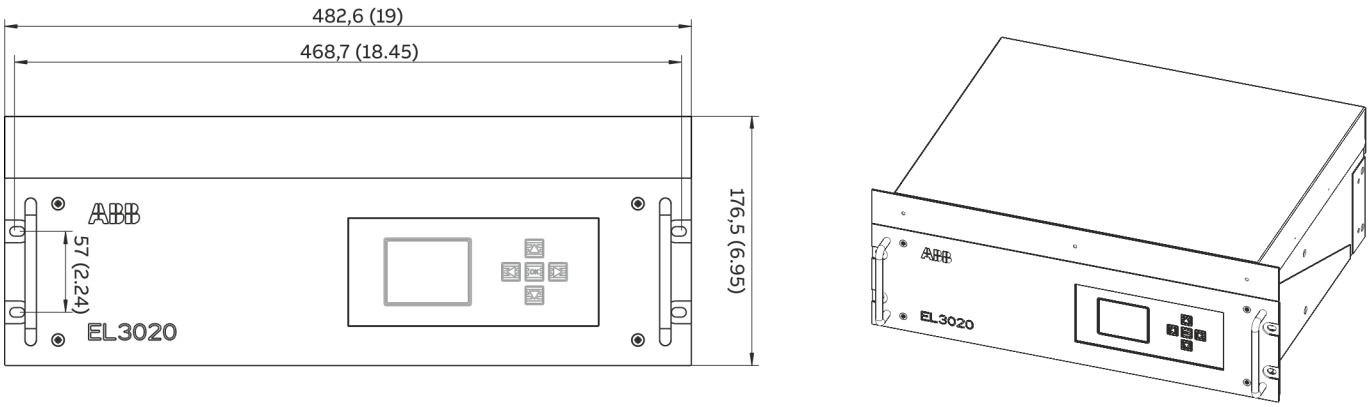


Figure 3: 19”housing (model EL3020 with Magnos27)

Note

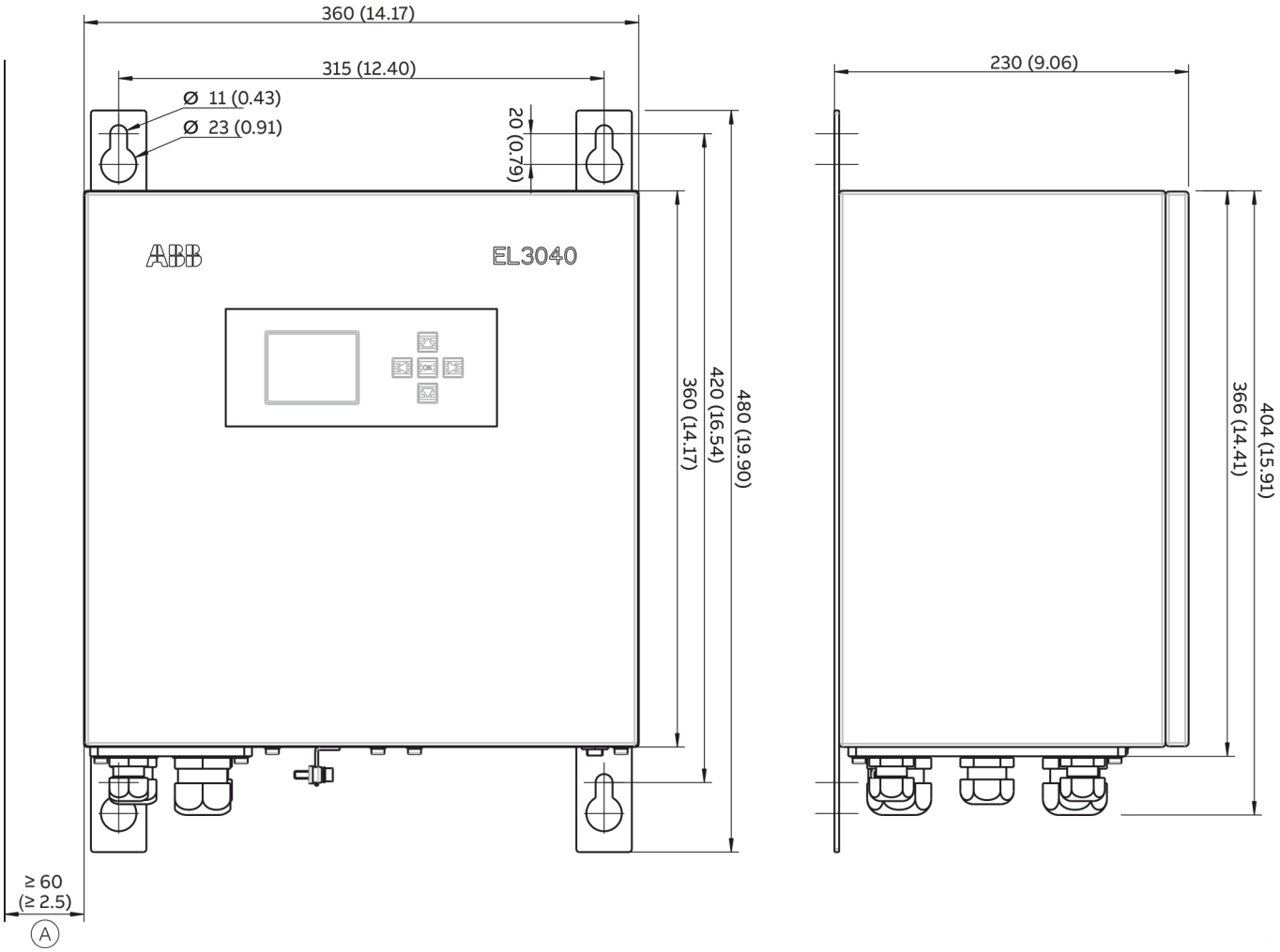
Only the front view of the housing (with its height differing from the standard dimension) is depicted in this dimensional drawing. Additional views and dimensions of the 19” housing are shown in Figure 2.

… 3 Preparation for Installation

… Dimensions

Wall-mount housing (model EL3040)

Dimensions in mm (in)



Ⓐ Consider free space to swivel the door

Figure 4: Wall-mount housing (model EL3040)

Special conditions for the measurement of flammable gases

⚠ DANGER

Explosion hazard

Explosion hazard due to the formation of explosive gas mixtures when measuring flammable gases and connecting oxygen-containing test gases (such as air).

- Before connecting an oxygen-containing test gas, the gas path must be rinsed with an inert gas, such as nitrogen.
- Observe the following **safety instructions regarding calibration**.

Safety instructions regarding calibration

When measuring flammable gases, observe the following instructions:

- When calibrating the analyzers, air must not directly be connected as a test gas after operation with flammable gases.
- Alternatively, where possible, use nitrogen as test gas for calibration instead of air (for example, for zero point calibration of Uras26 or single point calibration of Magnos206 and Magnos28).
  This must be particularly considered for automatically controlled calibration processes, since no automatic purging with an inert gas is possible.

Note

The version for the measurement of flammable gases and the explosion-proof design in degree of protection II 3G (see **Use in potentially explosive atmospheres** on page 10) are designed for various variants of the gas analyzer and for different applications.

Installation of the gas analyzer

- The pressure sensor must not be connected to the sample gas path.
- The sample gas lines and connections must be made of stainless steel.
- Before using the gas analyzer, corrosion resistance against the specific sample gas must be checked.
- Adequate air circulation must be ensured by observation of the minimum distances to neighboring housings, see **Adequate air circulation** on page 15.
- The **Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases** on page 16 and **Special conditions for the model EL3040 gas analyzer in degree of protection II 3G** on page 16 must be observed.

Commissioning of the gas analyzer

- The sample gas path must be purged with inert gas before the gas analyzer is commissioned (see **Purge sample gas path and analyzer housing** on page 101).

Operation and Maintenance of the Gas Analyzer

- Only model EL3040:
  - The housing must be purged using nitrogen.
  - Purge gas flow rate 1 to 20 l/h.
  - The purge gas flow must be monitored at the purge gas output.
- The gauge pressure in the sample gas feed path may not up-scale the maximum value of 100 hPa in standard operation and a maximum value of 500 hPa in the event of a fault.
  - The gas analyzer with Uras26 or Caldos27 can be used up to an absolute pressure of 1100 hPa.
  - The gas analyzer with Magnos28 can be used up to an absolute pressure of 1200 hPa.
- The leak tightness of the sample gas path must be checked regularly (see **Checking gas path leak tightness** on page 106).
- After the sample gas path within the gas analyzer has been opened, the following measures (see **Measures to take after each opening of the gas paths within the gas analyzer** on page 108) must be taken:
  - The leak tightness of the sample gas path must be checked.
  - The sample gas path must be purged with inert gas before the power supply is switched on.

4 Installation

Unpacking the Gas Analyzer

⚠ CAUTION

Injury hazard due to heavy weight

Depending on the version, the gas analyzer weighs7 to 15 kg (19" housing – model EL3020) or 13 to 21 kg (wall-mounted housing – model EL3040)!

- Two persons are required for unpacking and transportation!

Check the devices immediately after unpacking for possible damage that may have occurred from improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents.
All claims for damages must be submitted to the shipper without delay and before installation.

1. Remove the accessories (refer to **Scope of delivery** on page 13) from the transport carton.
   Take care not to lose any of the accessories.
2. Remove the gas analyzer from the carton, together with the padding material.
3. Remove the padding material and place the gas analyzer in a clean area.
4. Clean the adhesive packaging residue from the gas analyzer.

Note

Keep the shipping carton and cushioning material for future transportation.

Name plate

Contents of the name plate

The name plate contains the following information:

- Production Number (P-No.),
- Order Number (O-No.),
- Power supply (voltage, frequency, max. power consumption),
- Installed analyzers with measurement components and measuring ranges.

Analyzer data sheet

Contents

The analyzer data sheet contains the following information:

- Order Number (O-No.),
- Job number (J-No.)
- Production Number (P-No.),
- Production Date,
- Power supply
  (voltage, frequency, max. power consumption),
- Measuring components and measuring ranges,
- Serial numbers of the installed modules.

Storage of the Analyzer Data Sheet

- on the left-hand side panel inside the 19"-housing (model EL3020) and
- on the door glued inside the wall-mount housing (model EL3040).

Note

- Keep the analyzer data sheet in the gas analyzer so that it is always at hand, especially in case of service/maintenance, refer to **Service address** on page 9.
- During commissioning, observe the information in the analyzer data sheet. The information given in the analyzer data sheet may differ from the general information in this regard Commissioning Instruction.

Mounting the fittings on the gas analyzer

General information

To connect the gas lines to the gas analyzer, screw-in sockets (fittings) are used in different designs.

Depending on the design, the fittings are included in the scope of delivery or must be provided during the assembly.

The different designs of gas connections are listed in Table Position and design of the gas connections.

Note

It is recommended that the fittings be installed on the analyzer module before the gas analyzer is mounted, as the connection ports are still easily accessible before the analyzer is mounted.

Fittings

- The fittings used must be clean and free of grease and residue!
  - Impurities from the fittings can enter the analyzer and damage it. They could also falsify the measurement result.
- Observe the installation instructions provided by the manufacturers of the fittings!
- Hold back the screw connections when connecting the gas lines!

Gaskets

- Do not use sealing compound to seal the fittings!
  - Components of the sealing compound could falsify the measurement results.
- The sealing material must be free of grease.

Requisite Material

Screw-in spud with hose nozzles (supplied) or screw-in fittings with ⅛ NPT thread and PTFE sealing tape.

Installing the fittings

1. Screw out the yellow plastic screwing caps (5 mm hexagon socket) from the connection ports.
2. Wrap PTFE sealing tape tightly around the thread of the screw-in fitting twice, clockwise, and screw it into the connection socket.
   After mounting, approx. 2 threads usually remain visible

Note

Screw the fittings in carefully, and not too tightly!

Checking gas path leak tightness

The leak tightness of the sample gas path and the reference gas path, if applicable, is factory-tested with a helium leak test for a leak rate of $< 1 \times 10^{-4}$ hPa·l/s.

However, since the leak tightness may be impaired when transporting the gas analyzer (for example due to severe vibrations), we recommend that you check it prior to commissioning at the installation site.
Refer to **Checking gas path leak tightness** on page 106.

Note

We strongly recommend checking the tightness of the gas feed paths before the gas analyzer is assembled, since the housing must be opened in the event of a leak.

… 4 Installation

Position and design of the gas connections

The following pages list the location and execution of the gas connections of the individual analyzer modules and their combinations. The table below is used as an aid in navigating the connection descriptions.

Position and design of the gas connections

Analyzer module	Model EL3020	Model EL3040
Uras26	see page 43	see page 45
Uras26 with Magnos206	see page 46	see page 48
Uras26 with Magnos28	see page 50	see page 52
Uras26 with Caldos27	see page 54	see page 56
Limas23	see page 58	see page 59
Limas23 with Magnos206	see page 60	see page 61
Limas23 with Magnos28	see page 63	see page 64
Magnos206	see page 66	see page 67
Magnos28	see page 68	see page 72
Magnos28 with Magnos28	see page 69	—
Magnos28 with Caldos27	see page 70	—
Magnos27	see page 73	—
Magnos27 with Uras26	see page 74	—
ZO23	see page 75	see page 76
Caldos27	see page 77	see page 79
Caldos27 with Caldos27	see page 78	—
Fidas24	see page 80	see page 81

Gas connections Uras26 (model EL3020)

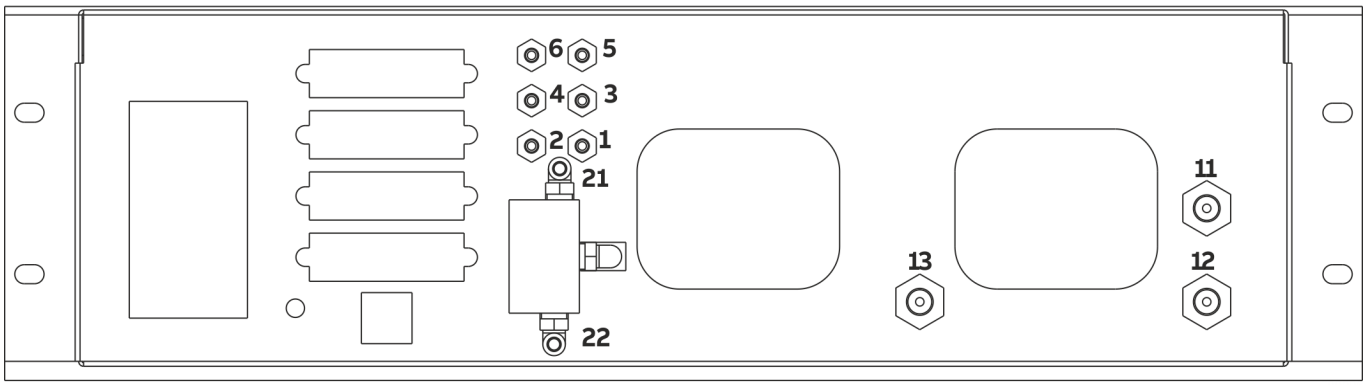


Figure 5: Gas connections Uras26 (EL3020)

Uras26: Gas connections for hose lines

(internal gas lines made using hoses)

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet (gas path 1)	Without 'integrated gas feed' option	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet (gas path 1)	—	
3	Sample gas outlet (gas path 1)	For 'Integrated gas feed' option, factory-connected to sample gas inlet Pos. **1** (gas path 1)	
4	Sample gas inlet (gas path 1)	For 'Integrated gas feed' option with flow sensor only (without solenoid valve)	
	Pressure sensor	For 'Pressure sensor connected to the outside by hose' option	
5	Sample gas inlet (gas path 2)	For second sample gas or flowing reference gas, sample cell 1 (depending on the design of the analyzer)	
6	Sample gas outlet (gas path 2)		
21	Sample gas inlet (gas path 1)	On solenoid valve with 'integral gas feed' option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet (gas path 1)		

Note

The pressure sensor (standard, not for the 'pressure sensor connected to outside by hose' option), and the oxygen sensor (option) are internally connected as follows:

- In the output of the measuring cell 1, with a measuring cell and in the case of separate gas paths.
- In the output of measuring cells 2 for two measuring cells in series.
- The second O2 sensor (option for version with separate gas paths) is connected downstream of the sample cell 2 outlet.

… 4 Installation

… Position and design of the gas connections

Uras26: Gas connections for pipelines
(internal gas lines made stainless steel pipes)

Pos.	Connection	Supplementary information	Version
6	Pressure sensor	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
11	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply)
12	Sample gas outlet	For a sample cell	
13	Sample gas outlet	For two sample cells in series	

Note
The oxygen sensor, the ‘integrated gas feed’ option and the version with separated gas paths are not possible.

Gas connections Uras26 (model EL3040)

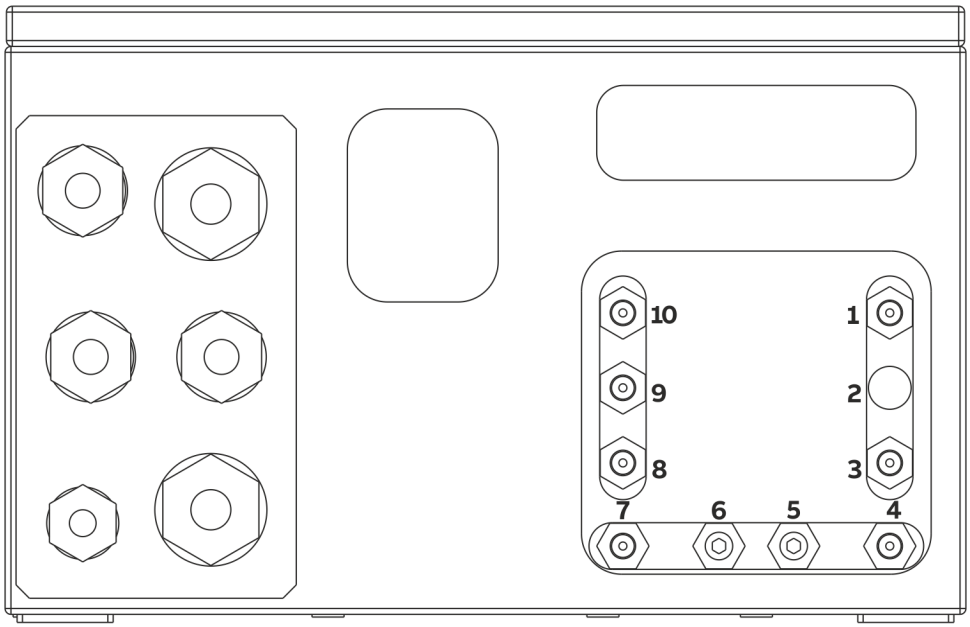


Figure 6: Gas connections Uras26 (model EL3040)

Uras26: Gas connections

Pos.	Connection	Supplementary information	Version
1	Pressure sensor	The pressure sensor is connected to the **Pos. 1** terminal if the internal gas lines are designed as stainless steel pipes, or if the 'Pressure sensor connected outside by hose' option is ordered.	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Not assigned	—	
3	Sample gas inlet (gas path 1)	—	
4	Sample gas outlet (gas path 1)	For a measuring cell and for two measuring cells with separate gas paths	
5	Purge gas inlet (housing)	—	
6	Purge gas outlet (housing)	—	
7	Sample gas inlet (gas path 2)	—	
8	Sample gas outlet (gas path 2)	—	
	Sample gas outlet (gas path 1)	For two sample cells in series	
9	Reference gas inlet	Sample cell 1 flowing reference gas	
10	Reference gas outlet		

Note

- If the internal gas lines ares designed as hoses, the pressure sensor (standard, not for the 'pressure sensor connected to outside by hose' option), and the oxygen sensor (option) are internally connected as follows:
  - In the output of measuring cell 1, for one measuring cell and for two measuring cells with separate gas paths.
  - In the output of measuring cell 2 for two measuring cells in a series.
  - The second oxygen sensor (option for version with separate gas paths) is connected in the outlet of sample cell 2.
- If the internal gas lines are designed as stainless steel pipes, the oxygen sensor and the version with separated gas paths are not possible.

… 4 Installation

… Position and design of the gas connections

Gas connections Uras26 with Magnos206 (model EL3020)

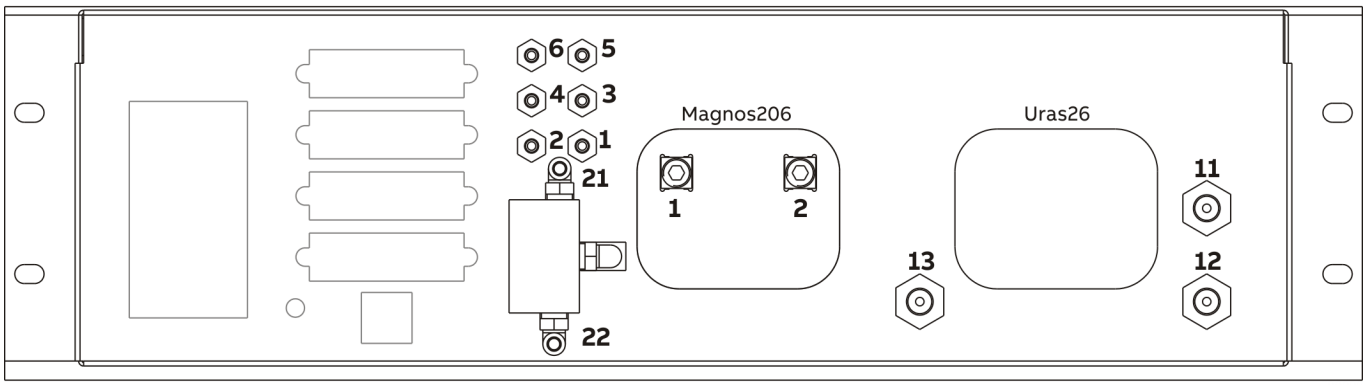


Figure 7: Gas connections Uras26 with Magnos206 (model EL3020)

Uras26: Gas connections for hose lines
(internal gas lines made using hoses)

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet (gas path 1)	Without ‘integrated gas feed’ option	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet (gas path 1)	—	
3	Sample gas outlet (gas path 1)	For ‘Integrated gas feed’ option, factory-connected to sample gas inlet **Pos. 1** (gas path 1)	
4	Sample gas inlet (gas path 1)	For ‘Integrated gas feed’ option with flow sensor only (without solenoid valve)	
	Pressure sensor	For ‘Pressure sensor connected to the outside by hose’ option	
5	Sample gas inlet (gas path 2)	For second sample gas or flowing reference gas, sample cell 1 (depending on the design of the analyzer)	
6	Sample gas outlet (gas path 2)		
21	Sample gas inlet (gas path 1)	On solenoid valve with ‘integral gas feed’ option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet (gas path 1)		

Note

- The oxygen sensor is not possible in combination with Magnos206
- The pressure sensor (standard, not for the ‘pressure sensor connected to outside by hose’ option) are internally connected as follows:
  - In the output of the measuring cell 1, with a measuring cell and in the case of separate gas paths.
  - In the output of measuring cell 2 for two measuring cells in a series.

Uras26: Gas connections for pipelines
(internal gas lines made stainless steel pipes)

Pos.	Connection	Supplementary information	Version
6	Pressure sensor	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
11	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply)
12	Sample gas outlet	For a sample cell	
13	Sample gas outlet	For two sample cells in series	

Note
The oxygen sensor, the 'integrated gas feed' option and the version with separated gas paths are not possible.

Magnos206: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)

Note
The sample gas inlet of Magnos206 can be connected to the sample gas output (gas path 1) of Uras26 at the factory or have a separate sample gas path without connection to Uras26.

… 4 Installation

… Position and design of the gas connections

Gas connections Uras26 with Magnos206 (model EL3040)

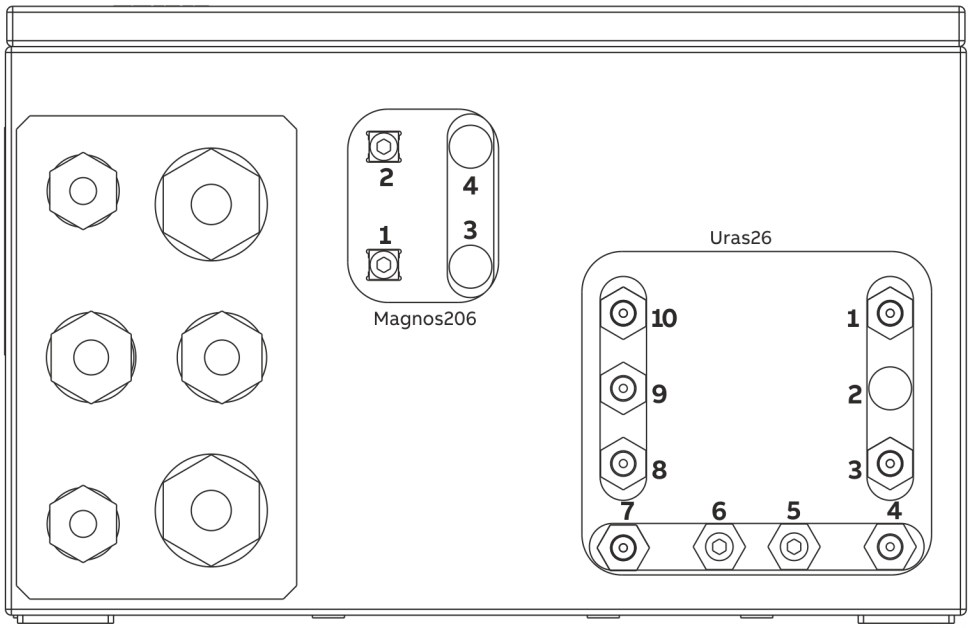


Figure 8: Gas connections Uras26 with Magnos206 (model EL3040)

Uras26: Gas connections

Pos.	Connection	Supplementary information	Version
1	Pressure sensor	The pressure sensor is connected to the **Pos. 1** terminal if the internal gas lines are designed as stainless steel pipes, or if the 'Pressure sensor connected outside by hose' option is ordered.	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Not assigned	—	
3	Sample gas inlet (gas path 1)	—	
4	Sample gas outlet (gas path 1)	For a measuring cell and for two measuring cells with separate gas paths	
5	Purge gas inlet (housing)	—	
6	Purge gas outlet (housing)	—	
7	Sample gas inlet (gas path 2)	—	
8	Sample gas outlet (gas path 2)	—	
	Sample gas outlet (gas path 1)	For two sample cells in series	
9	Reference gas inlet	Sample cell 1 flowing reference gas	
10	Reference gas inlet		

Note

- The oxygen sensor is not possible in combination with Magnos206
- If the internal gas lines ares designed as hoses, the pressure sensor (standard, not for the 'pressure sensor connected to outside by hose' option), and the oxygen sensor (option) are internally connected as follows:
  - In the output of measuring cell 1, for one measuring cell and for two measuring cells with separate gas paths.
  - In the output of measuring cells 2 for two measuring cells in series.
- If the internal gas lines are designed as stainless steel pipes, the version with separate gas paths is not possible.

Magnos206: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
3	Not assigned	—	
4	Not assigned	—	

Note

The sample gas inlet of Magnos206 can be connected to the sample gas output (gas path 1) of Uras26 at the factory or have a separate sample gas path without connection to Uras26.

… 4 Installation

… Position and design of the gas connections

Gas connections Uras26 with Magnos28 (model EL3020)

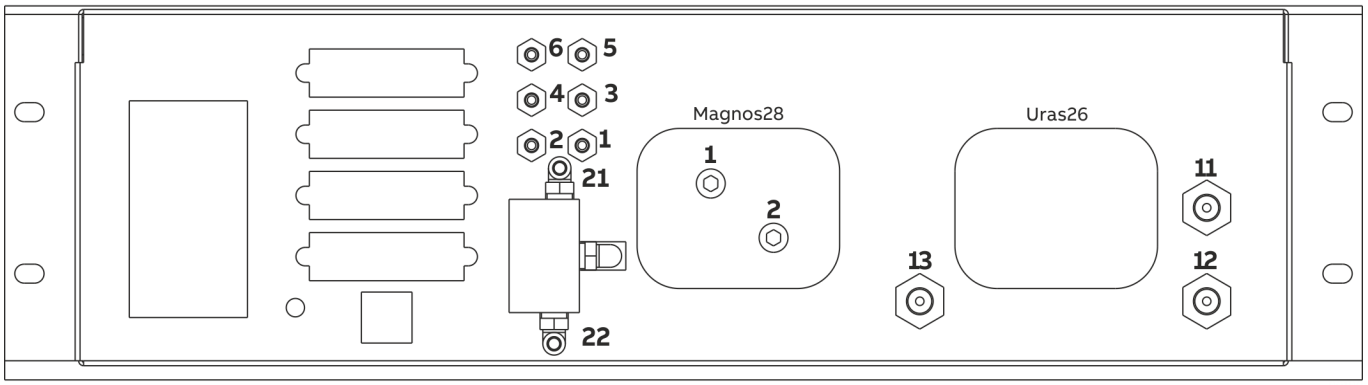


Figure 9: Gas connections Uras26 with Magnos28 (EL3020)

Uras26: Gas connections for hose lines
(internal gas lines made using hoses)

Pos.	Connection	Supplementary information	Design
1	Sample gas inlet (gas path 1)	Without ‘integrated gas feed’ option	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet (gas path 1)	—	
3	Sample gas outlet (gas path 1)	For ‘Integrated gas feed’ option, factory-connected to sample gas inlet Pos.**1** (gas path 1)	
4	Sample gas inlet (gas path 1)	For ‘Integrated gas feed’ option with flow sensor only (without solenoid valve)	
	Pressure sensor	For ‘Pressure sensor connected to the outside by hose’ option	
5	Sample gas inlet (gas path 2)	For second sample gas or flowing reference gas, sample cell 1 (depending on the design of the analyzer)	
6	Sample gas outlet (gas path 2)		
21	Sample gas inlet (gas path 1)	On solenoid valve with ‘integral gas feed’ option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet (gas path 1)		

Note

- The oxygen sensor is not possible in combination with Magnos28
- The pressure sensor (standard, not for the ‘pressure sensor connected to outside by hose’ option) are internally connected as follows:
  - In the output of the measuring cell 1, with a measuring cell and in the case of separate gas paths.
  - In the output of measuring cell 2 for two measuring cells in a series.

Uras26: Gas connections for pipelines
(internal gas lines made stainless steel pipes)

Pos.	Connection	Supplementary information	Version
6	Pressure sensor	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
11	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply)
12	Sample gas outlet	For a sample cell	
13	Sample gas outlet	For two sample cells in series	

Note
The oxygen sensor, the 'integrated gas feed' option and the version with separated gas paths are not possible.

Magnos28: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)

Note
The sample gas inlet of Magnos28 can be optionally connected at the factory to the sample gas output (gas path 1) of Uras26 or have a separate sample gas path without connection to Uras26.

… 4 Installation

… Position and design of the gas connections

Gas connections Uras26 with Magnos28 (model EL3040)

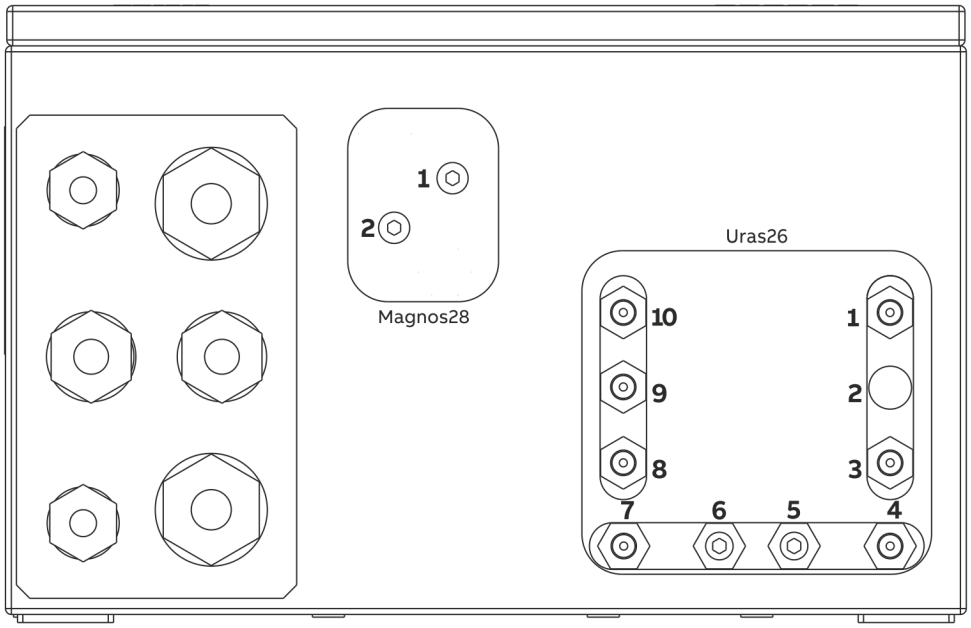


Figure 10: Gas connections Uras26 with Magnos28 (model EL3040)

Uras26: Gas connections
(internal gas lines made using hoses or stainless steel pipes)

Pos.	Connection	Supplementary information	Version
1	Pressure sensor	The pressure sensor is connected to the **Pos. 1** terminal if the internal gas lines are designed as stainless steel pipes, or if the 'Pressure sensor connected outside by hose' option is ordered.	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Not assigned	—	
3	Sample gas inlet (gas path 1)	—	
4	Sample gas outlet (gas path 1)	For a measuring cell and for two measuring cells with separate gas paths	
5	Purge gas inlet (housing)	—	
6	Purge gas outlet (housing)	—	
7	Sample gas inlet (gas path 2)	—	
8	Sample gas outlet (gas path 2)	—	
	Sample gas outlet (gas path 1)	For two sample cells in series	
9	Reference gas inlet	Sample cell 1 flowing reference gas	
10	Reference gas inlet		

Note

- The oxygen sensor is not possible in combination with Magnos28
- If the internal gas lines ares designed as hoses, the pressure sensor (standard, not for the 'pressure sensor connected to outside by hose' option), and the oxygen sensor (option) are internally connected as follows:
  - In the output of measuring cell 1, for one measuring cell and for two measuring cells with separate gas paths.
  - In the output of measuring cells 2 for two measuring cells in series.
- If the internal gas lines are designed as stainless steel pipes, the version with separate gas paths is not possible.

Magnos28: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)

Note

The sample gas inlet of Magnos28 can be optionally connected at the factory to the sample gas output (gas path 1) of Uras26 or have a separate sample gas path without connection to Uras26.

… 4 Installation

… Position and design of the gas connections

Gas connections Uras26 with Caldos27 (model EL3020)

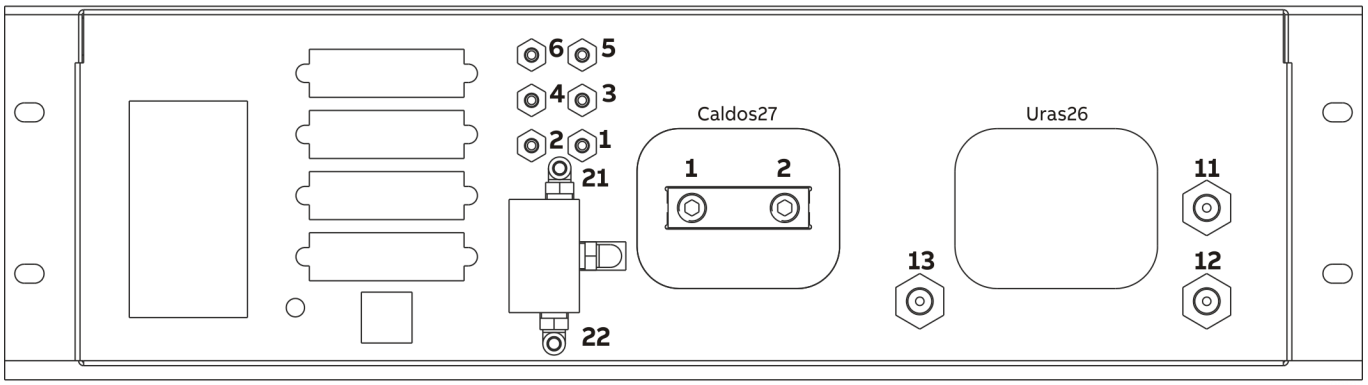


Figure 11: Gas connections Uras26 with Caldos27 (model EL3020)

Uras26: Gas connections for hose lines
(internal gas lines made using hoses)

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet (gas path 1)	Without ‘integrated gas feed’ option	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet (gas path 1)	—	
3	Sample gas outlet (gas path 1)	For ‘Integrated gas feed’ option, factory-connected to sample gas inlet **Pos. 1** (gas path 1)	
4	Sample gas inlet (gas path 1)	For ‘Integrated gas feed’ option with flow sensor only (without solenoid valve)	
	Pressure sensor	For ‘Pressure sensor connected to the outside by hose’ option	
5	Sample gas inlet (gas path 2)	For second sample gas or flowing reference gas, sample cell 1 (depending on the design of the analyzer)	
6	Sample gas outlet (gas path 2)		
21	Sample gas inlet (gas path 1)	On solenoid valve with ‘integral gas feed’ option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet (gas path 1)		

Note

- The oxygen sensor is not possible in combination with Caldos27
- The pressure sensor (standard, not for the ‘pressure sensor connected to outside by hose’ option) are internally connected as follows:
  - In the output of the measuring cell 1, with a measuring cell and in the case of separate gas paths.
  - In the output of measuring cell 2 for two measuring cells in a series.

Uras26: Gas connections for pipelines
(internal gas lines made stainless steel pipes)

Pos.	Connection	Supplementary information	Version
6	Pressure sensor	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
11	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) for threaded connections (not included in scope of supply)
12	Sample gas outlet	For a sample cell	
13	Sample gas outlet	For two sample cells in series	

Note
The oxygen sensor, the 'integrated gas feed' option and the version with separated gas paths are not possible.

Caldos27: gas connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Sample gas outlet	—	

Note
The sample gas inlet of Caldos27 can be connected to the sample gas output (gas path 1) of Uras26 at the factory or have a separate sample gas path without connection to Uras26.

… 4 Installation

… Position and design of the gas connections

Gas connections Uras26 with Caldos27 (model EL3040)

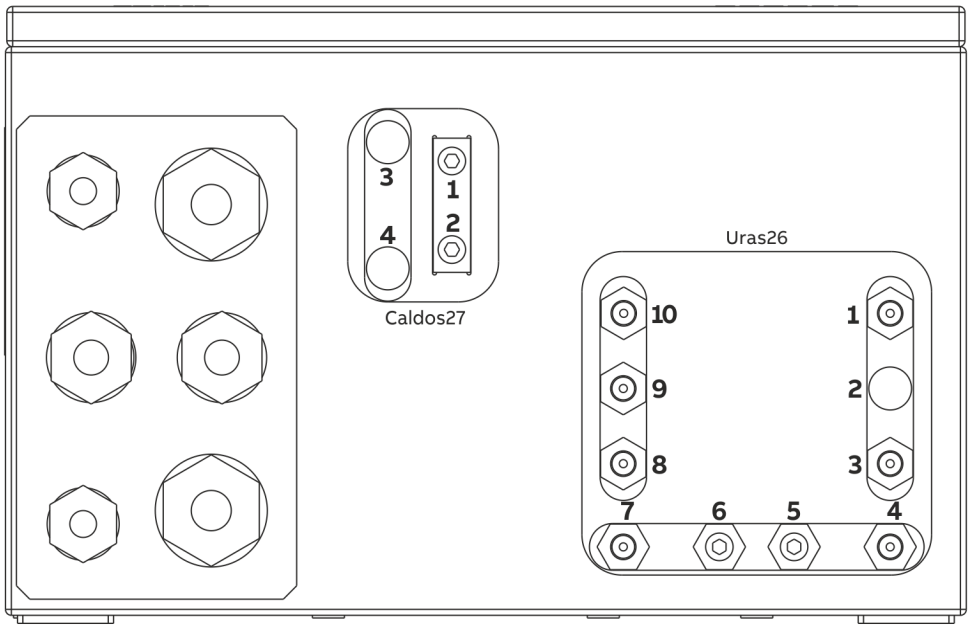


Figure 12: Gas connections Uras26 with Caldos27 (model EL3040)

Uras26: Gas connections

Pos.	Connection	Supplementary information	Version
1	Pressure sensor	The pressure sensor is connected to the **Pos. 1** terminal if the internal gas lines are designed as stainless steel pipes, or if the 'Pressure sensor connected outside by hose' option is ordered.	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Not assigned	—	
3	Sample gas inlet (gas path 1)	—	
4	Sample gas outlet (gas path 1)	For a measuring cell and for two measuring cells with separate gas paths	
5	Purge gas inlet (housing)	—	
6	Purge gas outlet (housing)	—	
7	Sample gas inlet (gas path 2)	—	
8	Sample gas outlet (gas path 2)	—	
	Sample gas outlet (gas path 1)	For two sample cells in series	
9	Reference gas inlet	Sample cell 1 flowing reference gas	
10	Reference gas inlet		

Note

- The oxygen sensor is not possible in combination with Caldos27
- If the internal gas lines ares designed as hoses, the pressure sensor (standard, not for the 'pressure sensor connected to outside by hose' option), and the oxygen sensor (option) are internally connected as follows:
  - In the output of measuring cell 1, for one measuring cell and for two measuring cells with separate gas paths.
  - In the output of measuring cells 2 for two measuring cells in series.
- If the internal gas lines are designed as stainless steel pipes, the version with separate gas paths is not possible.

Caldos27: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
3	not used	—	
4	not used	—	

Note
The sample gas inlet of Caldos27 can be connected to the sample gas output (gas path 1) of Uras26 at the factory or have a separate sample gas path without connection to Uras26.

… 4 Installation

… Position and design of the gas connections

Gas connections Limas23 (model EL3020)

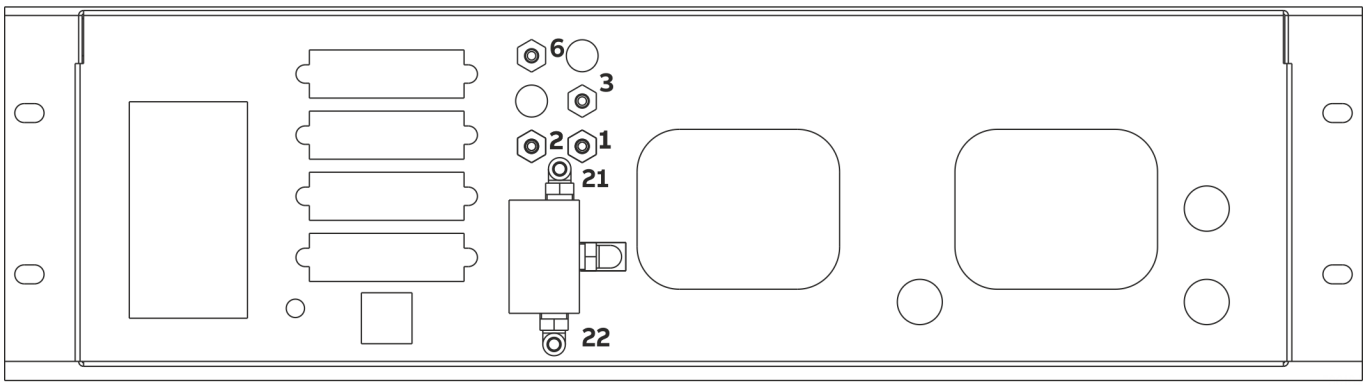


Figure 13: Gas connections Limas23 (model EL3020)

Limas23: Gas connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	Without optional solenoid valve	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet	—	
3	Sample gas outlet	With optional solenoid valve, factory-connected to sample gas input **Pos. 1**	
6	Pressure sensor	For ‘Pressure sensor connected to the outside by hose’ option	
21	Sample gas inlet	With optional solenoid valve	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet		

Note

The pressure sensor (standard, not for the ‘pressure sensor connected to outside by hose’ option), and the oxygen sensor (option) are internally connected in the outlet of the sample cell.

Gas connections Limas23 (model EL3040)

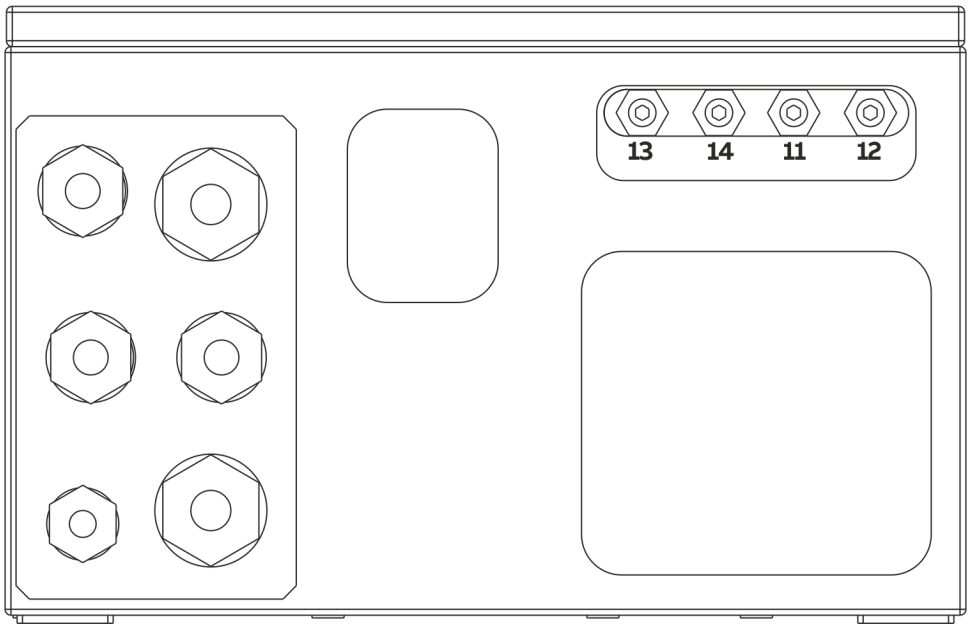


Figure 14: Gas connections Limas23 (model EL3040)

Limas23: Gas connections

Pos.	Connection	Supplementary information	Version
13	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
14	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
11	Pressure sensor	For ‘Pressure sensor connected to the outside by hose’ option	
	Purge gas inlet (housing)	Not for ‘Pressure sensor connected to the outside by hose’ option	
12	Purge gas outlet (housing)	Not for ‘Pressure sensor connected to the outside by hose’ option	

Note

The pressure sensor (standard, not for the ‘pressure sensor connected to outside by hose’ option), and the oxygen sensor (option) are internally connected in the outlet of the sample cell.

… 4 Installation

… Position and design of the gas connections

Gas connections Limas23 with Magnos206 (model EL3020)

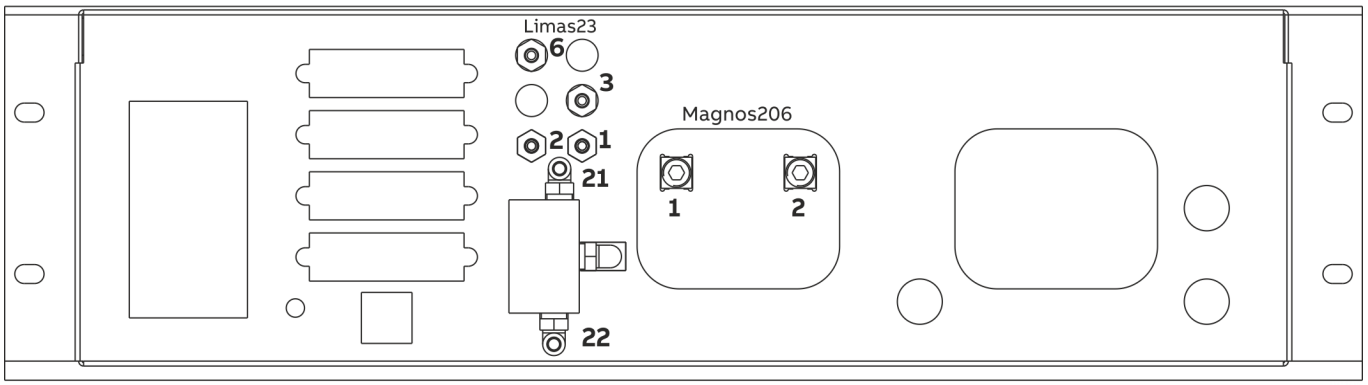


Figure 15: Gas connections Limas23 with Magnos206 (model EL3020)

Limas23: Gas connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	Without optional solenoid valve	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet	—	
3	Sample gas outlet	With optional solenoid valve, factory-connected to sample gas inlet Pos. **1**	
6	Pressure sensor	For 'Pressure sensor connected to the outside by hose' option	
21	Sample gas inlet	With optional solenoid valve	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet		

Note

- The oxygen sensor is not possible in combination with Magnos206
- The pressure sensor (default, not used with the "pressure sensor outwards" option is internally connected at the output of the sample cell.

Magnos206: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)

Note

The sample gas inlet of Magnos206 can be connected to the sample gas output of Limas23 at the factory or have a separate sample gas path without connection to Limas23.

Gas connections Limas23 with Magnos206 (model EL3040)

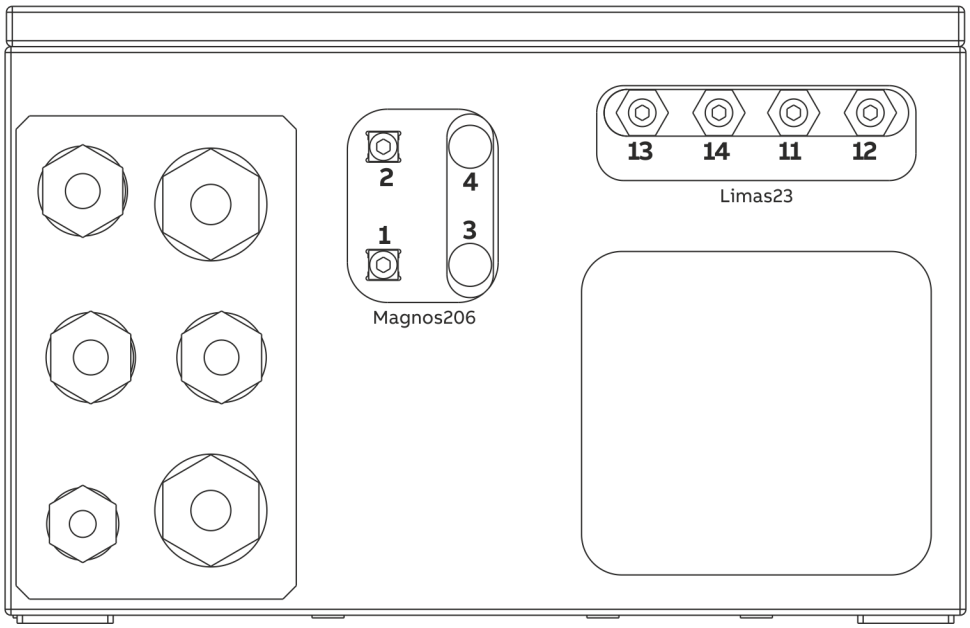


Figure 16: Gas connections Limas23 with Magnos206 (model EL3040)

Limas23: Gas connections

Pos.	Connection	Supplementary information	Version
13	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
14	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
11	Pressure sensor	For 'Pressure sensor connected to the outside by hose' option	
	Purge gas inlet (housing)	Not for 'Pressure sensor connected to the outside by hose' option	
12	Purge gas outlet (housing)		

Note

- The oxygen sensor is not possible in combination with Magnos206
- The pressure sensor (default, not used with the "pressure sensor outwards" option is internally connected at the output of the sample cell.

… 4 Installation

… Position and design of the gas connections

Magnos206: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
3	Not assigned	—	
4	Not assigned	—	

Note
The sample gas inlet of Magnos206 can be connected to the sample gas output of Limas23 at the factory or have a separate sample gas path without connection to Limas23.

Gas connections Limas23 with Magnos28 (model EL3020)

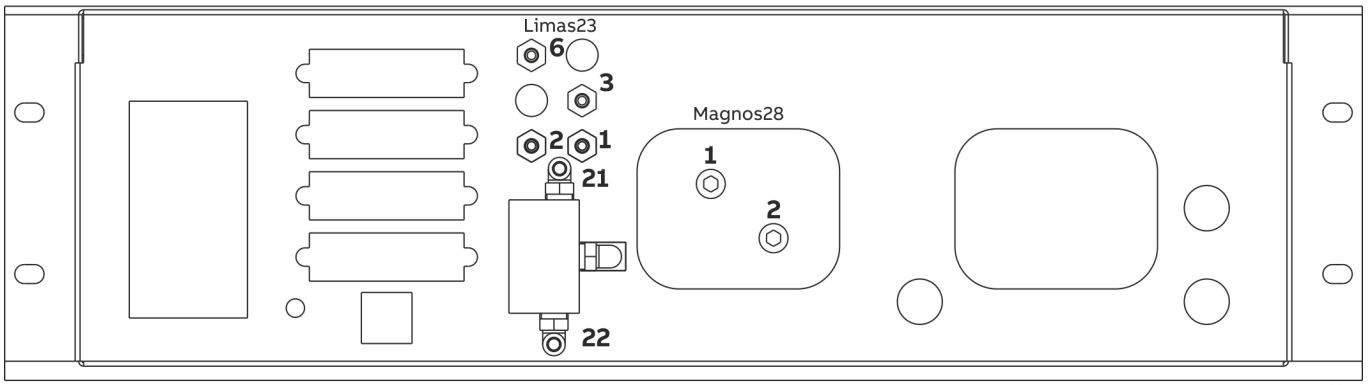


Figure 17: Gas connections Limas23 with Magnos28 (model EL3020)

Limas23: Gas Connections

Pos.	Connection	Supplementary information	Design
1	Sample gas inlet	Without optional solenoid valve	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet	—	
3	Sample gas outlet	With optional solenoid valve, factory-connected to sample gas inlet Pos. **1**	
6	Pressure sensor	For 'Pressure sensor connected to the outside by hose' option	
21	Sample gas inlet	With optional solenoid valve	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet		

Note

- The oxygen sensor is not possible in combination with Magnos28
- The pressure sensor (default, not used with the "pressure sensor outwards" option is internally connected at the output of the sample cell.

Magnos28: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Sample gas outlet	—	

Note

The sample gas inlet of Magnos28 can be connected to the sample gas output of Limas23 at the factory or have a separate sample gas path without connection to Limas23.

… 4 Installation

… Position and design of the gas connections

Gas connections Limas23 with Magnos28 (model EL3040)

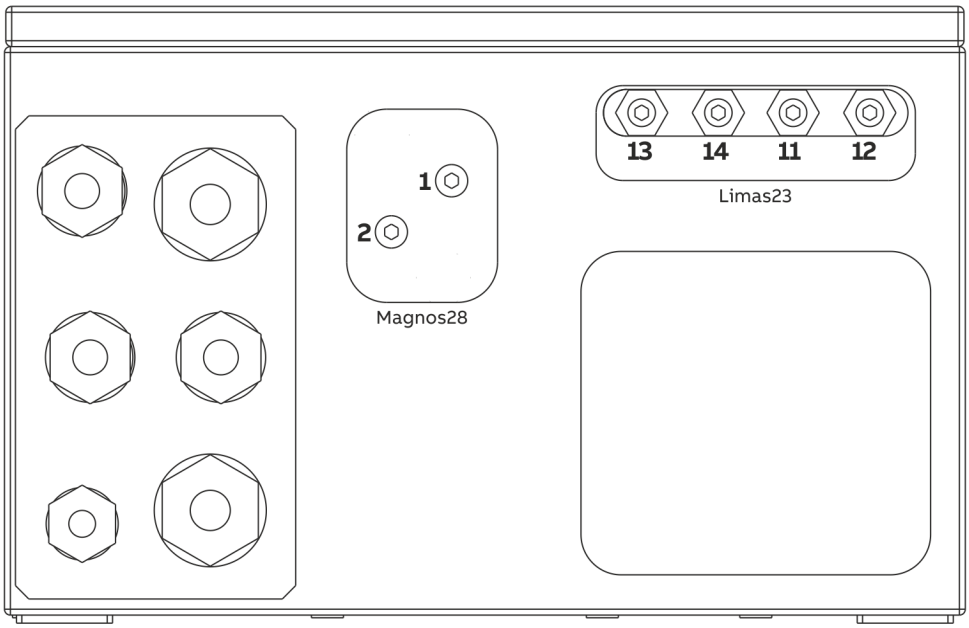


Figure 18: Gas connections Limas23 with Magnos28 (model EL3040)

Limas23: Gas connections

Pos.	Connection	Supplementary information	Version
13	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
14	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
11	Pressure sensor	For ‘Pressure sensor connected to the outside by hose’ option	
	Purge gas inlet (housing)	Not for ‘Pressure sensor connected to the outside by hose’ option	
12	Purge gas outlet (housing)		

Note

- The oxygen sensor is not possible in combination with Magnos28
- The pressure sensor (default, not used with the "pressure sensor outwards" option is internally connected at the output of the sample cell.

Magnos28: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)

Note

The sample gas inlet of Magnos28 can be connected to the sample gas output of Limas23 at the factory or have a separate sample gas path without connection to Limas23.

… 4 Installation

… Position and design of the gas connections

Gas connections Magnos206 (model EL3020)

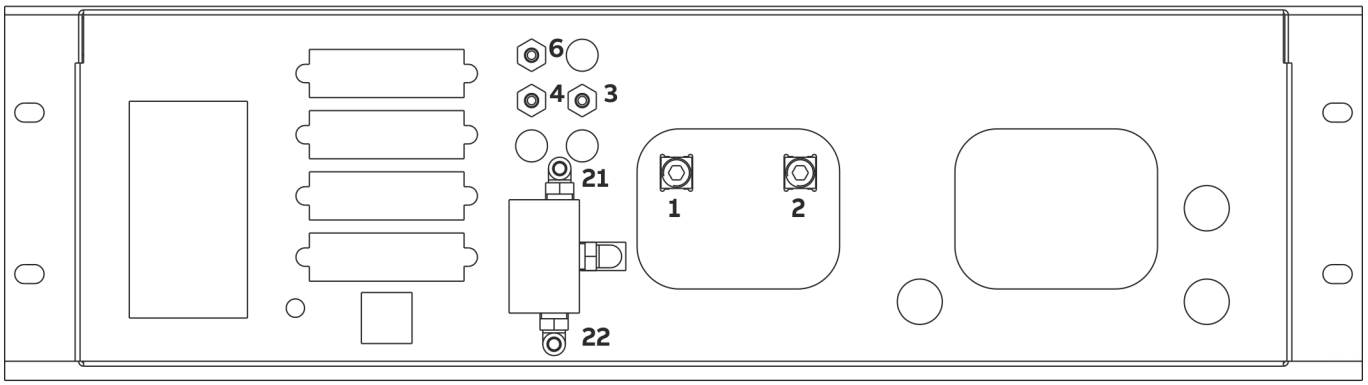


Figure 19: Gas connections Magnos206 (model EL3020)

Magnos206: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Sample gas outlet	—	
3	Sample gas outlet	For ‘Integrated gas feed’ option, factory-connected to **1** sample gas inlet	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
4	Sample gas inlet	For ‘Integrated gas feed’ option with flow sensor only (without solenoid valve)	
6	Pressure sensor	—	
21	Sample gas inlet	On solenoid valve with ‘integral gas feed’ option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet		

Note

The pressure sensor (see **Pressure sensor** on page 34) is installed as an option.

For a precise pressure correction as well as for measurements in suppressed measuring ranges, the sensor and sample gas outlet have to be connected to each other via a T-piece and with the use of short conductors.

The lines must be as short as possible or – in the case of a greater length – have a sufficiently large inside diameter (min. 10 mm) so that the flow effect is minimized.

Gas connections Magnos206 (model EL3040)

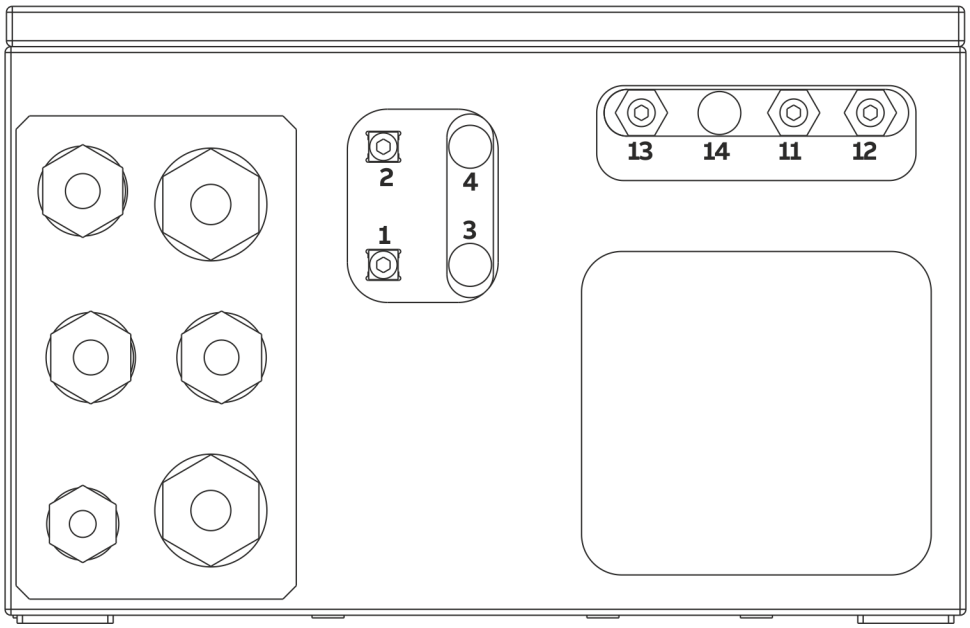


Figure 20: Gas connections Magnos206 (model EL3040)

Magnos206: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
3	Not assigned	—	
4	Not assigned	—	
11	Purge gas inlet (housing)	—	
12	Purge gas outlet (housing)	—	
13	Pressure sensor	—	
14	Not assigned	—	

Note

The pressure sensor (see **Pressure sensor** on page 34) is installed as an option.

For a precise pressure correction as well as for measurements in suppressed measuring ranges, the sensor and sample gas outlet have to be connected to each other via a T-piece and with the use of short conductors.

The lines must be as short as possible or – in the case of a greater length – have a sufficiently large inside diameter (min. 10 mm) so that the flow effect is minimized.

… 4 Installation

… Position and design of the gas connections

Gas connections Magnos28 (model EL3020)

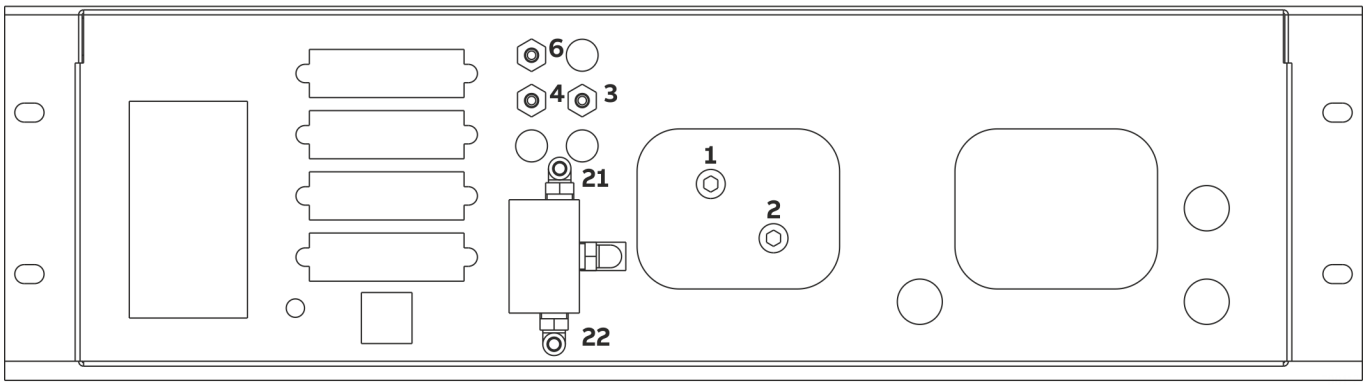


Figure 21: Gas connections Magnos28 (model EL3020)

Magnos28: Gas Connections

Pos.	Connection	Supplementary information	Design
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
3	Sample gas outlet	For ‘Integrated gas feed’ option, factory-connected to sample gas inlet Pos. **1**	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
4	Sample gas inlet	For ‘Integrated gas feed’ option with flow sensor only (without solenoid valve)	
6	Pressure sensor	—	
21	Sample gas inlet	On solenoid valve with ‘integral gas feed’ option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet		

Note

The pressure sensor (see **Pressure sensor** on page 34) is installed as an option.

For a precise pressure correction as well as for measurements in suppressed measuring ranges, the sensor and sample gas outlet have to be connected to each other via a T-piece and with the use of short conductors.

The lines must be as short as possible or – in the case of a greater length – have a sufficiently large inside diameter (min. 10 mm) so that the flow effect is minimized.

Gas connections Magnos28 with Magnos28 (model EL3020)

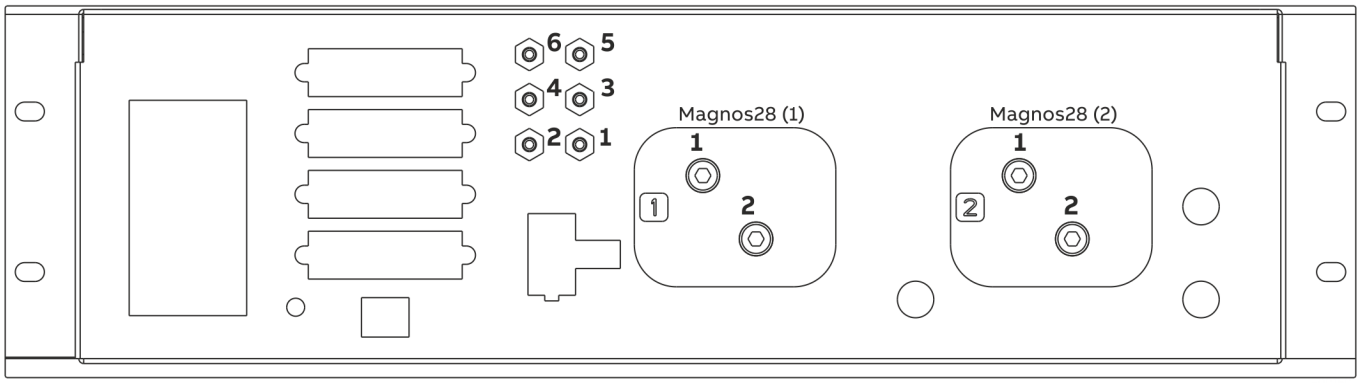


Figure 22: Gas connections Magnos28 with Magnos28 (model EL3020)

Magnos28 – gas connections for direct connection (applies to both analyzer modules)

Pos.	Connection	Supplementary information	Design
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery)
5	Pressure sensor (option)	For analyzer module (2), not for flammable sample gases	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
6	Pressure sensor (option)	For analyzer module (1). For flammable sample gases: Common sensor for analyzer module (1) and analyzer module (2). **Caution** Do not connect the pressure sensor in the sample gas path!	

Magnos28 with Magnos28 – gas connections with 'Integral gas feed' option with flow sensor

Pos.	Connection	Supplementary information	Design
1	Sample gas output (gas path 1 / module 1)	Factory-connected to analyzer module (1) sample gas inlet **1**	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas inlet (gas path 1 / module 1)	—	
3	Sample gas output (gas path 2 / module 2)	Factory-connected to analyzer module (2) sample gas inlet **1**	
4	Sample gas inlet (gas path 2 / module 2)	—	
5	Pressure sensor (option)	For analyzer module (2)	
6	Pressure sensor (option)	For analyzer module (1)	

… 4 Installation

… Position and design of the gas connections

Gas connections Magnos28 with Caldos27 (model EL3020)

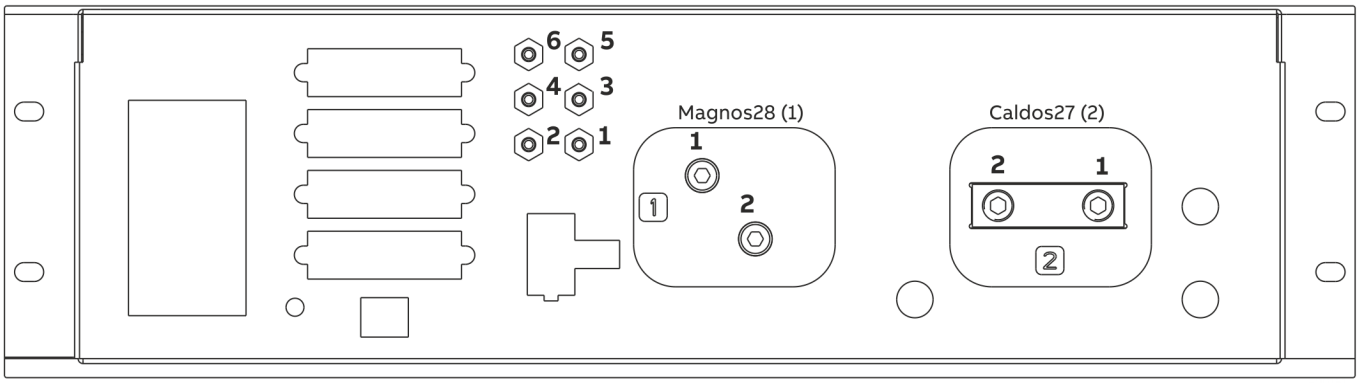


Figure 23: Gas connections Magnos28 with Caldos27 (model EL3020)

Magnos28 – gas connections for direct connection

Pos.	Connection	Supplementary information	Design
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery)
6	Pressure sensor (option)	For flammable sample gases: common sensor for Magnos28 and Caldos27. **Caution** Do not connect the pressure sensor in the sample gas path!	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)

Caldos27 – gas connections for direct connection

Pos.	Connection	Supplementary information	Design
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery)
5	Pressure sensor	Not for flammable sample gases	
6	Pressure sensor	For flammable sample gases: common sensor for Magnos28 and Caldos27. **Caution** Do not connect the pressure sensor in the sample gas path!	

Magnos28 with Caldos27 – gas connections for 'Integral gas feed' option with flow sensor

Pos.	Connection	Supplementary information	Design
1	Sample gas outlet (gas path 1 / Magnos28)	Factory-connected to Magnos28 sample gas inlet **1**	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas inlet (gas path 1 / Magnos28)	—	
3	Sample gas outlet (gas path 2 / Caldos27)	Factory-connected to Caldos27 sample gas inlet **1**	
4	Sample gas inlet (gas path 2 / Caldos27)	—	
5	Pressure sensor	For Caldos27	
6	Pressure sensor (option)	For Magnos28	

… 4 Installation

… Position and design of the gas connections

Gas connections Magnos28 (model EL3040)

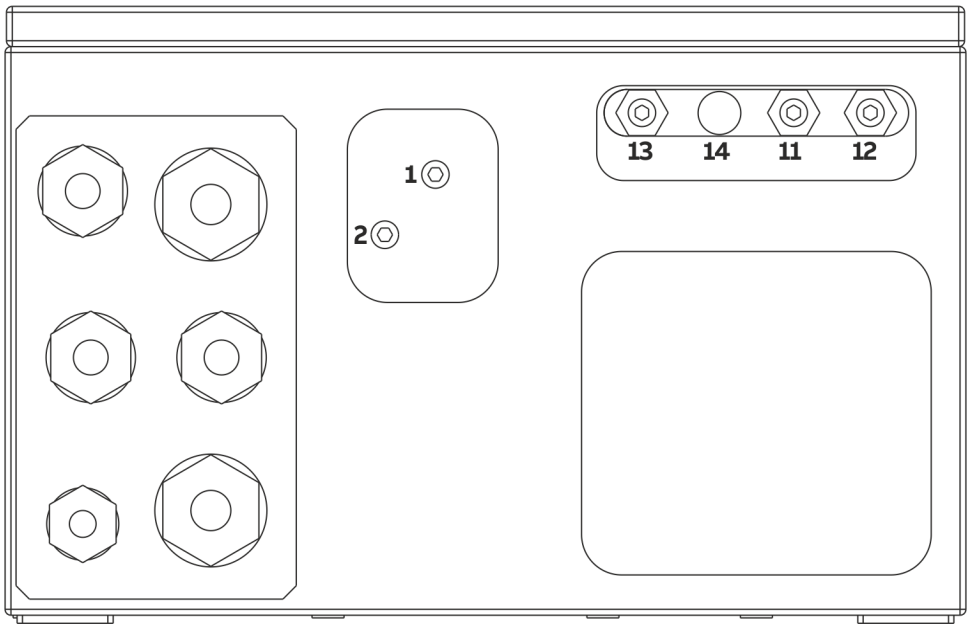


Figure 24: Gas connections Magnos28 (model EL3040)

Magnos28: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305)
2	Sample gas outlet	—	• Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery)
11	Purge gas inlet (housing)	—	
12	Purge gas outlet (housing)	—	
13	Pressure sensor	—	
14	Not assigned	—	• Connection of piping: screw-in fittings (not included in scope of delivery)

Note

The pressure sensor (see **Pressure sensor** on page 34) is installed as an option.

For a precise pressure correction as well as for measurements in suppressed measuring ranges, the sensor and sample gas outlet have to be connected to each other via a T-piece and with the use of short conductors.

The lines must be as short as possible or – in the case of a greater length – have a sufficiently large inside diameter (min. 10 mm) so that the flow effect is minimized.

Gas connections Magnos27 (model EL3020)

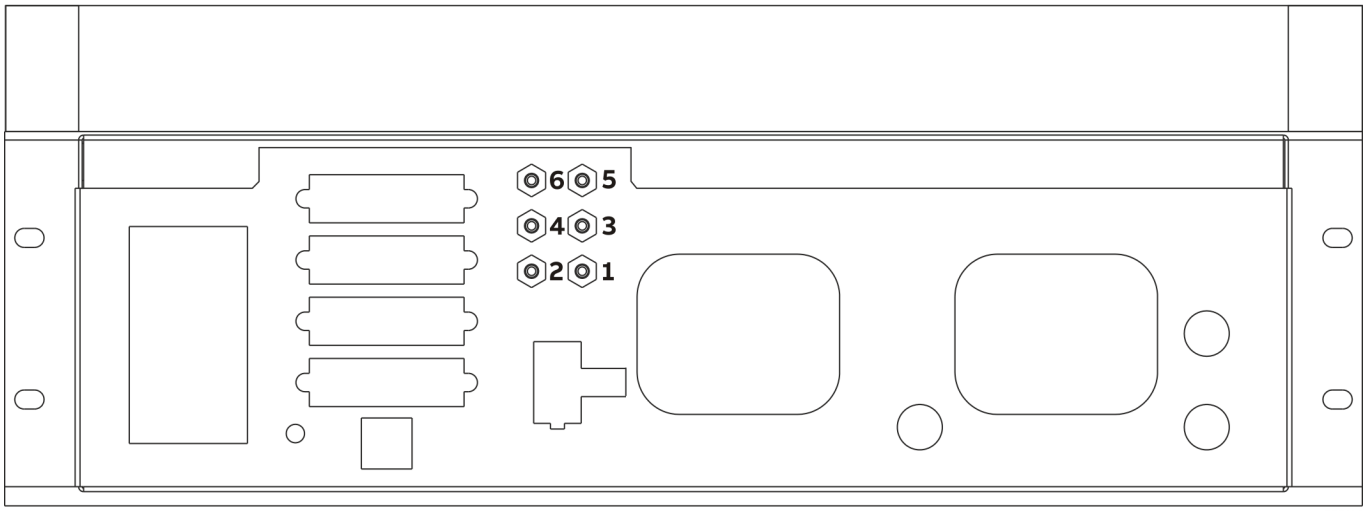


Figure 25: Gas connections Magnos27 (model EL3020)

Magnos27: Gas Connections

Pos.	Connection	Supplementary information	Version
1	Pressure sensor	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Not assigned	—	
3	Sample gas inlet	—	
4	Sample gas outlet	—	
5	Purge gas inlet analyzer	—	
6	Purge gas outlet analyzer	—	

Note

The pressure sensor (see **Pressure sensor** on page 34) is installed as an option.

For a precise pressure correction as well as for measurements in suppressed measuring ranges, the sensor and sample gas outlet have to be connected to each other via a T-piece and with the use of short conductors.

The lines must be as short as possible or – in the case of a greater length – have a sufficiently large inside diameter (min. 10 mm) so that the flow effect is minimized.

… 4 Installation

… Position and design of the gas connections

Gas connections Magnos27 with Uras26 (model EL3020)

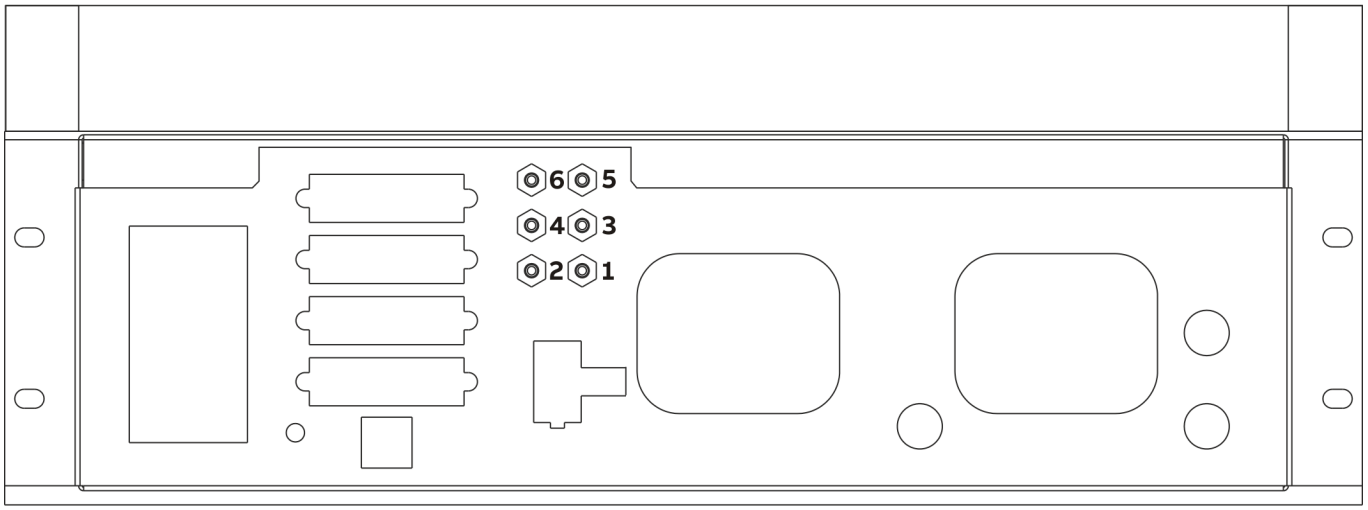


Figure 26: Gas connections Magnos27 with Uras26 (model EL3020)

Magnos27: Gas Connections

Pos.	Connection	Supplementary information	Version
3	Sample gas inlet	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
4	Sample gas outlet	—	
5	Purge gas inlet analyzer	Not for the 'pressure sensor connected to the outside by hose' option, not in combination with Uras26 with two cells and separate gas paths	
6	Purge gas outlet analyzer		
	Pressure sensor	For the 'pressure sensor connected to the outside by hose' option, not in combination with Uras26 with two cells and separate gas paths	

Uras26: Gas connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet (gas path 1)	—	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas outlet (gas path 1)	—	
5	Sample gas outlet (gas path 2)	For optional second sample gas for Uras26 with two cells and separate gas paths	
6	Sample gas inlet (gas path 2)		

Note

The pressure sensor (standard, not for the 'pressure sensor connected to outside by hose' option) is internally connected as follows:

- In the output of the sample cell 1, for a sample cell and for two sample cells with separate gas paths.
- In the output of sample cell 2 for two sample cells in series.

Gas connections ZO23 (model EL3020)

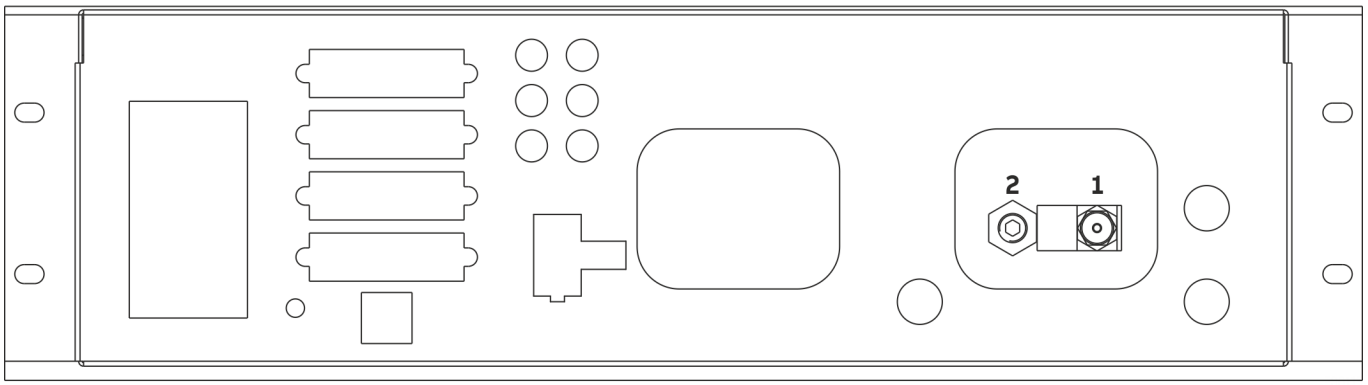


Figure 27: Gas connections ZO23 (Model EL3020)

ZO23: Gas Connections

The measuring chamber is connected to the sample gas inlet connection via a stainless steel tube (inlet side) and to the sample gas outlet connection via a FPM hose (outlet side).

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	3 mm Swagelok®
2	Sample gas outlet	—	⅛ NPT female thread for threaded connections (not included in scope of supply)

… 4 Installation

… Position and design of the gas connections

Gas connections ZO23 (model EL3040)

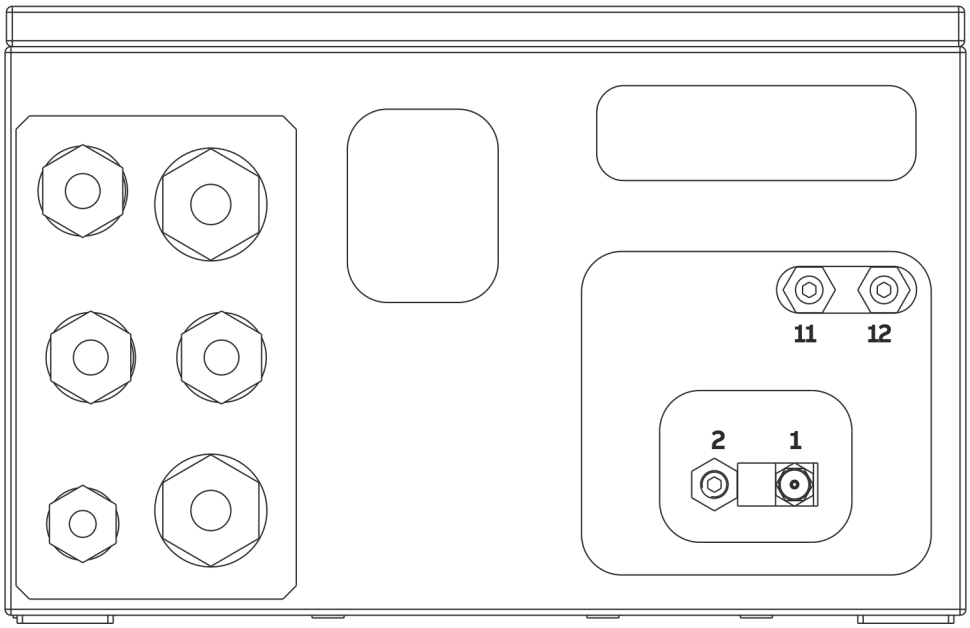


Figure 28: Gas connections ZO23 (model EL3040)

ZO23: Gas Connections

The measuring chamber is connected to the sample gas inlet connection via a stainless steel tube (inlet side) and to the sample gas outlet connection via a FPM hose (outlet side).

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	3 mm Swagelok®
2	Sample gas outlet	—	⅛ NPT female thread for threaded connections
11	Purge gas inlet (housing)	—	(not included in scope of supply)
12	Purge gas outlet (housing)	—	

Gas connections Caldos27 (model EL3020)

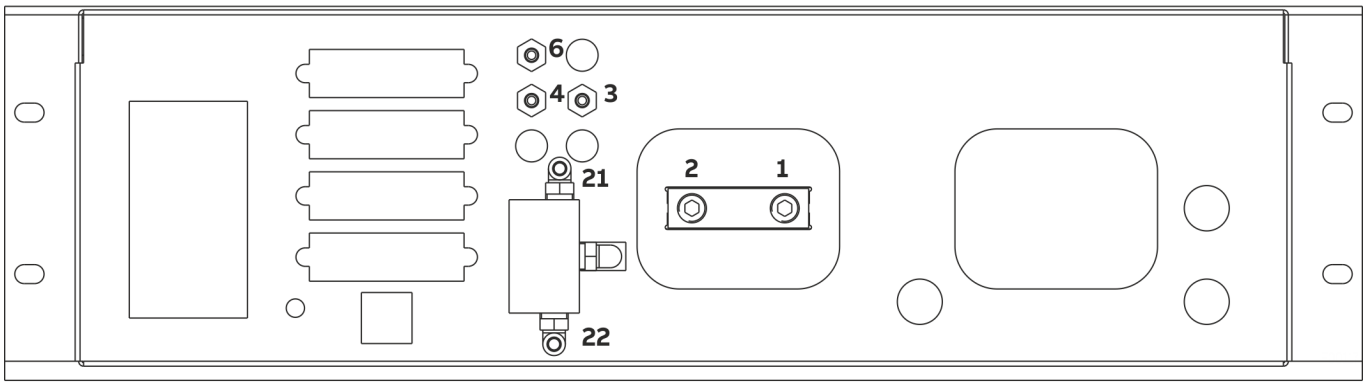


Figure 29: Gas connections Caldos27 (model EL3020)

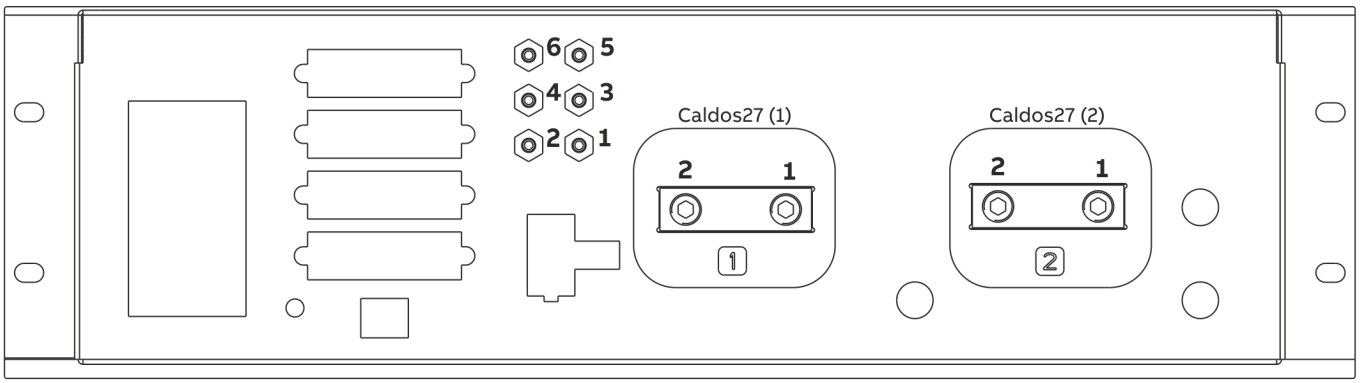
Caldos27: gas connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Sample gas outlet	—	
3	Sample gas outlet	For ‘Integrated gas feed’ option, factory-connected to **1** sample gas inlet	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
4	Sample gas inlet	For ‘Integrated gas feed’ option with flow sensor only (without solenoid valve)	
6	Pressure sensor	—	
21	Sample gas inlet	On solenoid valve with ‘integral gas feed’ option with solenoid valve, pump, filter, capillary and flow sensor	Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inside diameter (included in scope of supply)
22	Test gas inlet		

… 4 Installation

… Position and design of the gas connections

Gas connections Caldos27 with Caldos27 (model EL3020)



Figures 30: Gas connections Caldos27 with Caldos27 (model EL3020)

Caldos27 – gas connections for direct connection (applicable for both analyzer modules)

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) Connection of hose lines:
2	Sample gas outlet	—	straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery)
5	Pressure sensor	For analyzer module (2), not for flammable sample gases	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
6	Pressure sensor	For analyzer module (1), for flammable sample gases: Common sensor for analyzer module (1) and analyzer module (2). **Caution** Do not connect the pressure sensor in the sample gas path!	

Caldos27 with Caldos27 – gas connections for ‘Integral gas feed’ option with flow sensor

Pos.	Connection	Supplementary information	Version
1	Sample gas output (gas path 1 / module 1)	Factory-connected to analyzer module (1) sample gas inlet **1**	Screwed connections with hose nozzles (stainless steel 1.4305) for hoses with 4 mm inside diameter (included in scope of supply)
2	Sample gas inlet (gas path 1 / module 1)	—	
3	Sample gas output (gas path 2 / module 2)	Factory-connected to analyzer module (2) sample gas inlet **1**	
4	Sample gas inlet (gas path 2 / module 2)	—	
5	Pressure sensor	For analyzer module (2)	
6	Pressure sensor	For analyzer module (1)	

Gas connections Caldos27 (model EL3040)

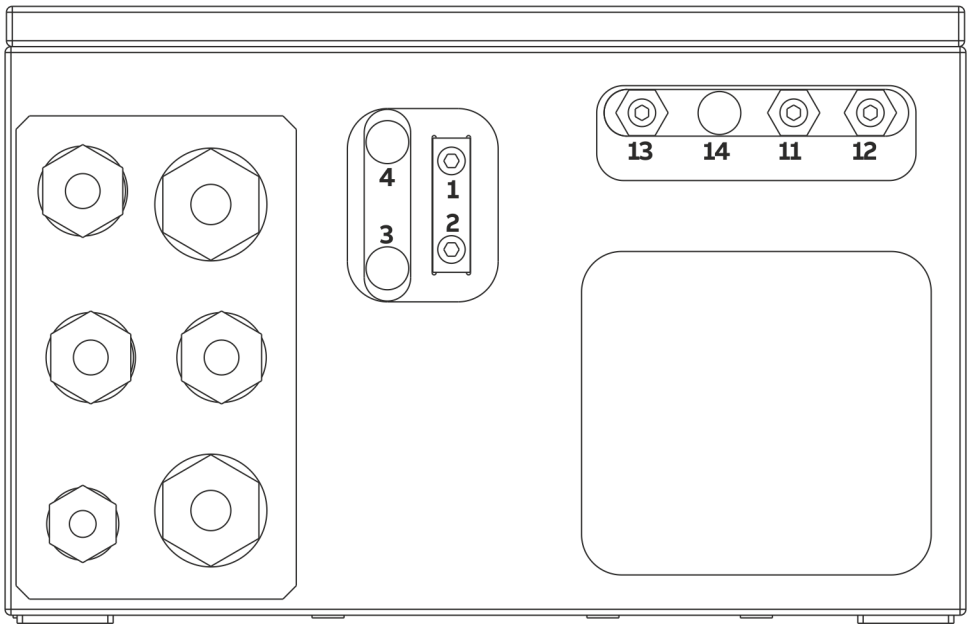


Figure 31: Gas connections Caldos27 (model EL3040)

Caldos27: gas connections

Pos.	Connection	Supplementary information	Version
1	Sample gas inlet	—	⅛ NPT female thread (stainless steel 1.4305) • Connection of hose lines: straight screw-in socket (PP) with hose nozzles for hoses with inside diameter 4 mm (included in scope of delivery) • Connection of piping: screw-in fittings (not included in scope of delivery)
2	Sample gas outlet	—	
3	Not assigned	—	
4	Not assigned	—	
11	Purge gas inlet (housing)	—	
12	Purge gas outlet (housing)	—	
13	Pressure sensor	—	
14	Not assigned	—	

… 4 Installation

… Position and design of the gas connections

Gas connections and electrical connections Fidas24 (model EL3020)

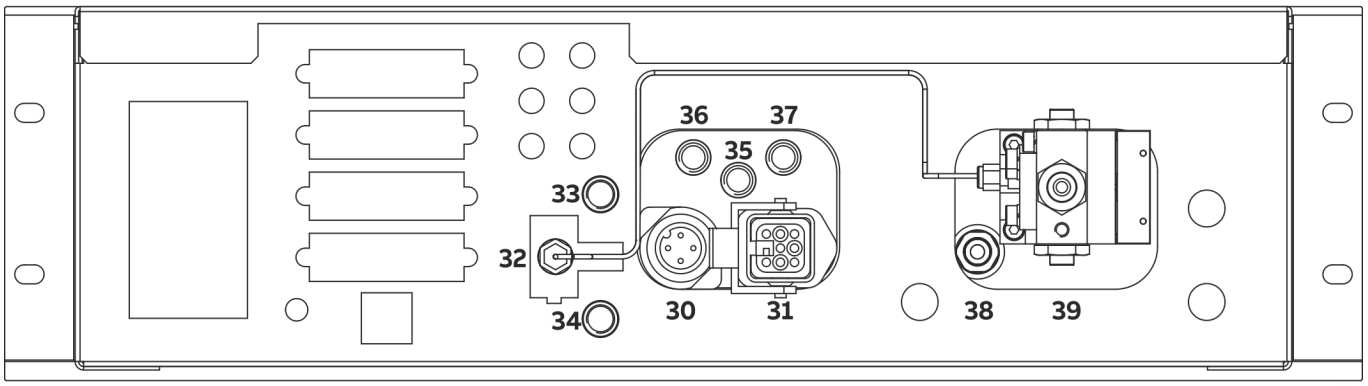


Figure 32: Gas connections and electric connections Fidas24 (model EL3020)

Fidas24: Gas and electrical connections

Pos.	Connection	Supplementary information	Version
30	Power supply (input)	115 V AC or 230 V AC for heating the detector and sample gas inlet	4-pin male connector, connection cable included in scope of supply
31	Power supply (output)	Electrical connection to the heated sample gas connection	Permanently connected
32	Test gas outlet	—	⅛ NPT female thread for threaded connections (not included in scope of supply)
33	Zero-point gas inlet	—	
34	End-point gas inlet	—	
35	Combustion air inlet	—	
36	Combustion gas inlet	—	
37	Instrument air inlet	—	
38	Exhaust outlet	—	Male thread for connection of the exhaust air pipe (stainless steel tube with an outside diameter of 6 mm, included in the scope of supply of the gas analyzer)
39	Sample gas inlet	Heated or unheated	Threaded connection for PTFE or stainless steel tubing with a 6 mm outer diameter

Gas connections and electrical connections Fidas24 (model EL3040)

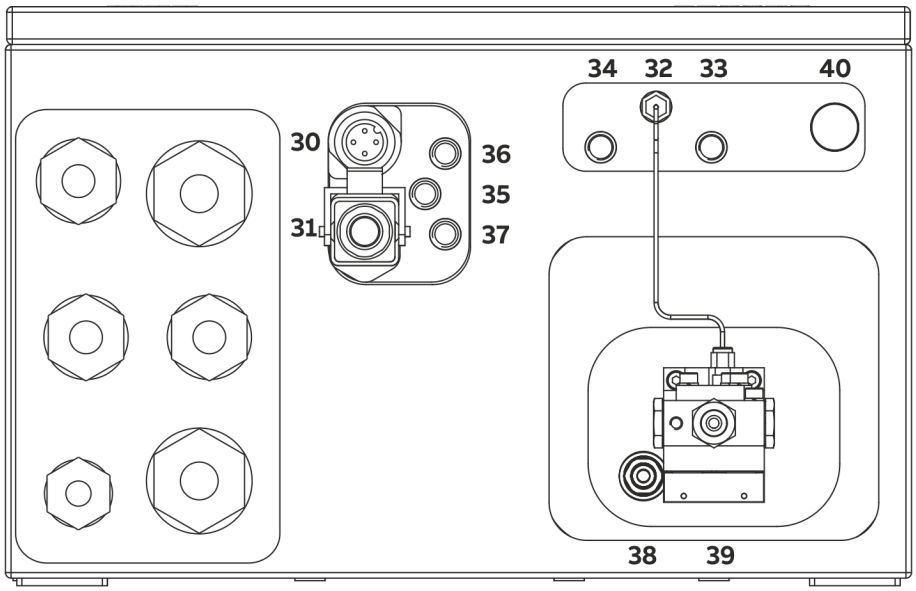


Figure 33: Gas connections and electrical connections Fidas24 (model EL3040)

Fidas24: Gas and electrical connections

Pos.	Connection	Supplementary information	Version
30	Power supply (input)	115 V AC or 230 V AC for heating the detector and sample gas inlet	4-pin male connector, connection cable included in scope of supply
31	Power supply (output)	Electrical connection to the heated sample gas connection	Permanently connected
32	Test gas outlet	—	⅛ NPT female thread for threaded connections (not included in scope of supply)
33	Zero-point gas inlet	—	
34	End-point gas inlet	—	
35	Combustion air inlet	—	
36	Combustion gas inlet	—	
37	Instrument air inlet	—	
38	Exhaust outlet	—	Male thread for connection of the exhaust air pipe (stainless steel tube with an outside diameter of 6 mm, included in the scope of supply of the gas analyzer)
39	Sample gas inlet	Heated or unheated	Threaded connection for PTFE or stainless steel tubing with a 6 mm outer diameter
40	Pressure equalizing opening	With protective filter (the protective filter must be protected against humidity)	—

… 4 Installation

Gas Analyzer Installation

NOTICE

Damage to the device due to unsuited installation site

- The installation site must be sufficiently stable to support the weight of the gas analyzer (see **Housing design** on page 15)
- The 19” housing must be supported in the cabinet or on the rack with mounting rails!

⚠ CAUTION

Injury hazard due to heavy weight

Depending on the version, the gas analyzer weighs7 to 15 kg (19” housing – model EL3020) or 13 to 21 kg (wall-mounted housing – model EL3040)!

- Two persons are required for unpacking and transportation!

Materials required (not included in the scope of delivery)

19” housing (model EL3020)

- 4 raised head screws (recommendation: M6; this depends on the cabinet/rack system)
- 1 pair mounting rails (design depending on the cabinet/ frame system), length approx. 240 mm corresponding to approx. ⅔ of the housing depth

Wall-mount housing (model EL3040)

- 4 screws M8 or M10

Gas Analyzer Installation

Mount the gas analyzer in the cabinet / rack or on the wall. Observe the dimension diagram (see **Dimensions** on page 36). Mount several 19” housings with a minimum distance of 1 HE between each housing,

Special conditions for the Fidas24 gas analyzer

The notes under **Fidas24 – Information for safe operation** on page 7 should be observed.

Special conditions for the model EL3020 gas analyzer for the measurement of flammable gases

Unrestricted exchange of air with the environment must be provided around the gas analyzer from the bottom (floor plate) and from the rear (gas connections).
The gas analyzer may not be placed directly on a table.
The housing openings may not be closed.

Special conditions for the model EL3040 gas analyzer in degree of protection II 3G

Protection against mechanical influences

Due to the low mechanical stability of the viewing glass, the gas analyzer must be designed and operated in such a way that mechanical damage to the viewing glass is excluded with an energy greater than 2 J.

UV radiation protection

Due to the low UV resistance of the plastic parts of the housing, the gas analyzer must be designed and operated in such a way that the effect of UV radiation can be excluded.

Connecting the gas lines

NOTICE

Potential adverse effect on the IP rating

Yellow sealing plugs (transport protection) are applied to the gas connections on the analyzer and housing to secure them during transport. The yellow sealing plugs do not guarantee a sufficient IP rating.

- Remove the yellow sealing plugs before commissioning.
- Close unused gas connections with suited sealing plugs to guarantee the IP rating.

NOTICE

Damage to the gas analyzer

Damage to the gas analyzer due to condensing sample gas during commissioning.

- Observe the condition of the sample gas inlet of the analyzer modules.
- Purge the sample gas path before commissioning, see **Purge sample gas path and analyzer housing** on page 101.
- Do not connect the sample gas until the gas analyzer has reached room temperature and after the warm-up phase has elapsed, see **Duration of the Warm-up Phase** on page 101.

Connecting the hose lines

Slide the hoses with an inside diameter of 4 mm onto the hose nozzles and fasten with hose clamps.

Connecting the piping

Connect stainless steel pipes professionally to the screwed connection, taking into account the tightness requirements.

Installing the fine filter

A preinstalled fine filter is Included in the scope of delivery (see **Scope of delivery** on page 13) of the gas analyzer (one-way filter, order number 769144 – not for Fidas24).

When installing the fine filter, attach the short hose piece to the sample gas inlet; connect the sample gas line to the long hose piece with the hose nozzle.

Installing the flowmeter

Install a flowmeter or flow monitor with needle valve before the sample gas inlet and if necessary before the purge gas inlet to be able to adjust and monitor the gas flow.

Provide for sample gas line purging

Install a shut-off valve in the sample gas line (highly recommended for pressurized sample gas) and provide the option of introducing an inert gas, such as nitrogen, from the gas sampling point, for purging of the sample gas line.

Exhaust gas lines

The exhaust gases of the gas analyzers are dissipated via the sample gas outlets. The exhaust gases can be discharged into the atmosphere via a common exhaust gas line.

Note

Dispose of corrosive, toxic or combustion exhaust gases according to the regulations!

Observe the following points when connecting the exhaust gas lines:

- Guide the exhaust gases from the gas analyzer directly into the atmosphere or in depressurized state through the shortest possible line with a large inside diameter, or into an exhaust pipe.
- Do not install any throttle sections or shut-off valves in the exhaust gas line!
- For Fidas24, also observe the information in **Connecting the exhaust air line** on page 85!

… 4 Installation

Fidas24 – Connect gas lines

Safety instructions

DANGER

Explosion hazard

Explosion hazard due to leaking combustion gas in the gas analyzer.

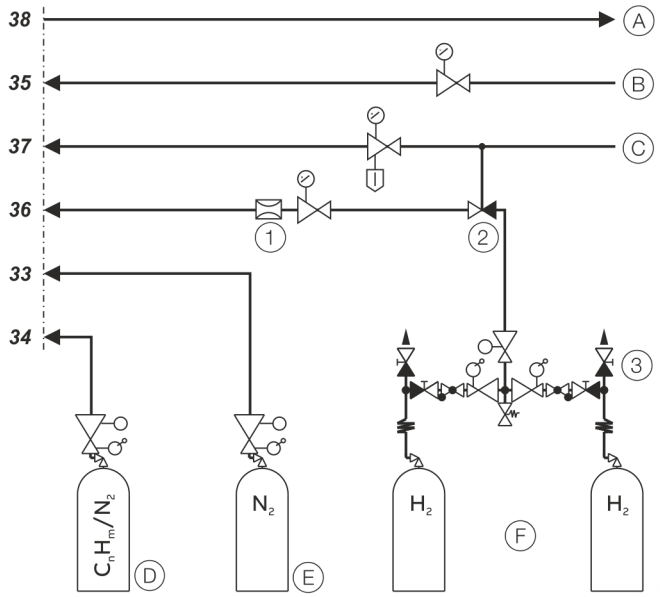
- The leak tightness of the combustion gas supply line outside the gas analyzer as well as the combustion gas path in the gas analyzer must be checked regularly.

- The relevant safety regulations for working with combustion gases must be complied with!
- The screwed connections of the gas paths in the gas analyzer may not be opened! The gas paths can become leaky as a result.
  - However, if the screwed connections of the gas paths in the gas analyzer have been opened (only by trained personnel), a leak tightness test must be performed using a hydrogen detector (for example, based on thermal conductivity) must always be carried out after they have been sealed again. The leakage rate must not exceed 10^{-4} hPa·l/s.
- The lines and fittings must be clean and free of any residues (for example, particles left from manufacturing)!
  - Contaminants can enter the analyzer and damage it or lead to false measurement results!

Notes

- The installation of gas connections is described in **Mounting the fittings on the gas analyzer** on page 41.
- Follow the manufacturer's installation instructions for the fittings! In particular, hold the male fittings (gas connections) in place when connecting the gas lines.
- When laying and connecting the gas lines, adhere to the installation instructions provided by the manufacturers of the piping!
- If gas lines made of stainless steel are connected to the analyzer modules, the lines must be connected to the building-side potential equalization.
- Never connect more than three analyzer modules in a series!

Connection of process gases and test gases



(1) Flow restrictor
(2) Pneumatic shutoff valve
(3) Switching station with safety valve
(A) Exhaust air
(B) Combustion air
pe = 1200 hPa, ±100 hPa
(C) Instrument air
pe = 4000 hPa, ±500 hPa
(D) Span gas
pe = Depressurized
(E) Zero point gas
p_e = Depressurized
(F) Switching station with safety valve
combustion gas pe = 1200 hPa, ±100 hPa

Figure 34: Connection of process gases and test gases

The numbering of the gas connections corresponds to the numbering in Figure 32 and Figure 33 as well as the labeling on the rear of the gas analyzer.

Instrument Air Connection

The instrument air is used as propulsion air for the air jet injector, and as purging air for the housing purging, see **Housing purge** on page 35.

Connect the instrument air line to the instrument air inlet **37** of the gas analyzer via a pressure reducer (0 to 6 bar).

Combustion air connection

Connect the combustion air line to the combustion air inlet **35** of the gas analyzer via a pressure reducer (0 to 1.6 bar).

Combustion gas connection

See section **Combustion gas connection** on page 84.

Test gas connection

The test gas outlet is connected to the sample gas connection at the factory.

If the test gases are to be fed directly at the gas sampling point, the connection between the test gas outlet and the test gas inlet at the sample gas connection should be removed, and the corresponding opening at the sample gas connection is to be sealed gas-tight with an M6 screw.

Connecting the exhaust air line

Observe the following points when connecting the exhaust air pipe:

- Conduct exhaust gases from the gas analyzer directly into the atmosphere or through a de-pressurized pipe with a large inside diameter which is as short as possible, or into an exhaust pipe.
- Use PTFE or stainless steel as the material for the exhaust air line!
  The temperature of the exhaust air can be up to 200 °C!
- Install the exhaust air line at a gradient, leading away from the gas analyzer.
- At a maximum of 30 cm after the exhaust air outlet, the exhaust air pipe must have an inside diameter of ≥ 10 mm!
  If the exhaust air pipe is very long, its inside diameter must be much larger than 10 mm, otherwise you might have problems with pressure control in the gas analyzer.
- Do not install any throttle sections or shut-off valves in the exhaust air line!

Note

Dispose of corrosive, toxic or combustion exhaust gases according to the regulations!

Fidas24 – Connecting the combustion gas line

Clean combustion gas line.

1. Pump a cleaning agent (alkaline cleaner, stainless steel pickling solution) through the stainless steel pipe.
2. Rinse the pipe thoroughly with distilled water.
3. Purge the pipe with synthetic air or nitrogen, at a > 100 °C, for several hours (10 bis 20 l/h).
4. Seal the ends of the pipe.

Connect combustion gas pipe

See also **Connection of process gases and test gases** on page 84.

1. Connect a two-stage cylinder pressure reducer (a model suitable for high purity gases) to the combustion gas cylinder.
2. Connect the combustion gas pipe to the cylinder pressure reducer.
3. Install a flow restrictor in the combustion gas supply line which limits the combustion gas flow to 10 l/h H_2 or 25 l/h H_2/He mixture, see **Flow restrictor in the combustion gas supply line** on page 32. This means that the operation of the gas analyzer is safe even in the event of a fault in the combustion gas path (such as leakage).
4. Install a shut-off valve in the combustion gas supply line.
   – It is recommended that a pneumatic shut-off valve be installed.
   – The pneumatic shut-off valve must be controlled by the instrument air supply, so that the combustion gas supply is interrupted in the event of a failure of the instrument air supply.
   – See also **Shut-off valve in the combustion gas supply line** on page 32.
5. Connect the combustion gas line to the combustion gas inlet **36** of the analyzer module , via a pressure reducer (0 to 1.6 bar) refer to **Position and design of the gas connections** on page 42.

Check the tightness of the combustion gas line

Check the combustion gas line for tightness , refer to **Combustion gas line** on page 106.

… 4 Installation

Fidas24 – Connecting the sample gas line to the heated sample gas connection

NOTE

Damage to the gas analyzer

Damage to the gas analyzer, due to melting of the factory-mounted plastic plugs in the sample gas inlets.

- Remove the plastic plugs from the sample gas inlets before commissioning.

Material of the sample gas line

Use a PTFE or stainless steel sample gas line! (Recommended: use heated sample gas line TBL 01) The medium temperature can be up to 200 °C!

Sample gas line connection

The heated sample gas line must be connected directly to the sample gas inlet. Make sure that the O-rings are seated correctly and that the sample gas pipe has been inserted into the sample gas connection until it stops.

Unused sample gas inlets

- When the analyzer draws in the sample gas through the sample gas line, the unused sample gas inlets must be sealed using appropriate screw plugs.
- When the sample gas is under gauge pressure, a sample gas inlet must be open and connected to an exhaust gas line so that there is no gauge pressure in the analyzer.

Screwed connections and O-rings

The required screwed connections and o-rings are included in the supplied accessories bag.

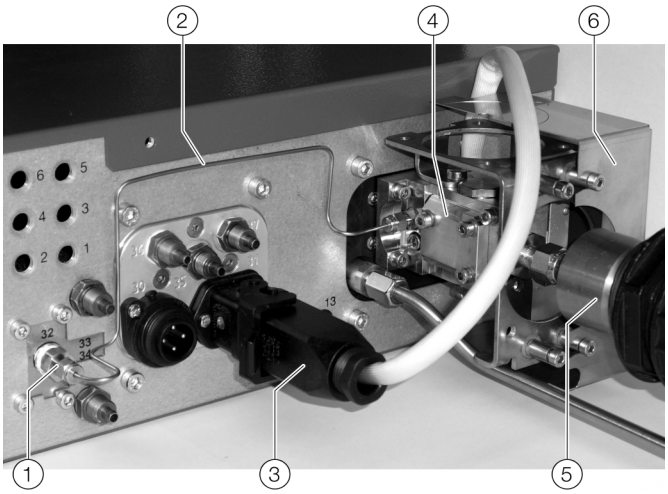
Maximum length of the sample gas line

The maximum length of a heated sample gas line (inner diameter 4 mm) is 60 m.

Provide for Sample Gas Line Purging

Install a shut-off valve in the sample gas line (highly recommended for pressurized sample gas) and provide the option of introducing an inert gas, e.g. nitrogen, from the gas sampling point, for purging of the sample gas line.

Heated sample gas connection



1. Test gas outlet
2. Connection of test gas outlet–sample gas connection
3. Electrical connection to the heated sample gas connection
4. Heated sample gas connection
5. Heated sample gas line (example)
6. Sample gas connection cover*

* Only half of the sample gas connection cover is shown in the figure.

Figure 35: Heated sample gas connection

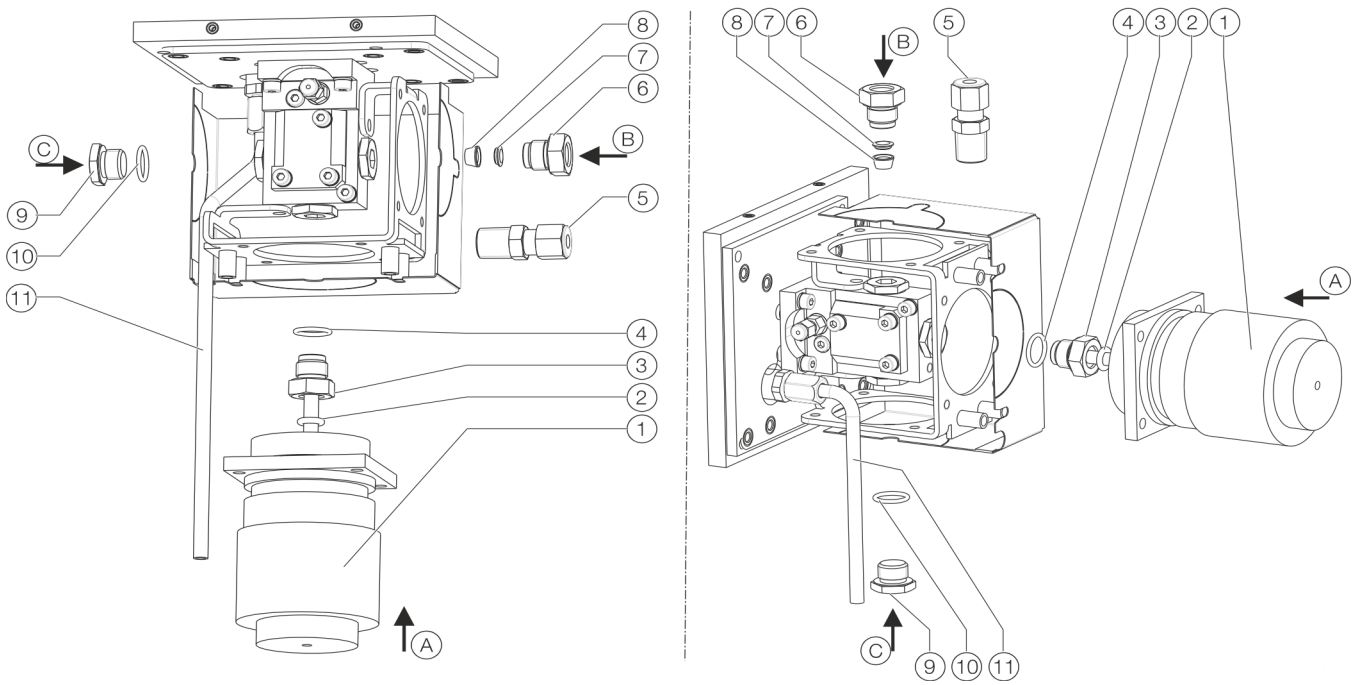
… 4 Installation

… Fidas24 – Connecting the sample gas line to the heated sample gas connection

Connection of the sample gas line to the heated sample gas connection

Wall-mount housing (view from bottom right)

19” housing (view from top left)



① Heated sample gas line
(tube with inside/outside diameter 4 / 6 mm)

② O-ring 6.02 × 2.62

③ Socket

④ O-ring 12.42 × 1.78

Connection of an additional sample gas line

(tube with outside diameter 6 mm) either with:

⑤ Screw-in connector G¼”

Alternatively, with:

⑥ Socket

⑦ Wedge ring

⑧ Clamping ring

Closure:

⑨ Screw plug

⑩ O-ring 12.42 × 1.78

⑪ Waste gas tube

Figure 36: Connecting the sample gas line

Sample gas inlets	Sample gas line connection	
	on 19” housing	**on wall-mount housing**
Ⓐ	from the rear	from below
Ⓑ	from above	from the right
Ⓒ	from below	Not possible – the sample gas inlet must always be closed

… 4 Installation

Fidas24 – Connecting the sample gas line to the unheated sample gas connection

NOTE

Damage to the gas analyzer

Damage to the gas analyzer, due to melting of the factory-mounted plastic plugs in the sample gas inlets.

- Remove the plastic plugs from the sample gas inlets before commissioning.

Sample gas line connection

The unheated sample gas connection has only one sample gas inlet.

If the sample gas is under positive pressure, a T-piece must be connected between the sample gas line and the sample gas inlet. The free connection of the T-piece must be connected to an exhaust gas discharge line, so that no positive pressure builds up in the analyzer module.

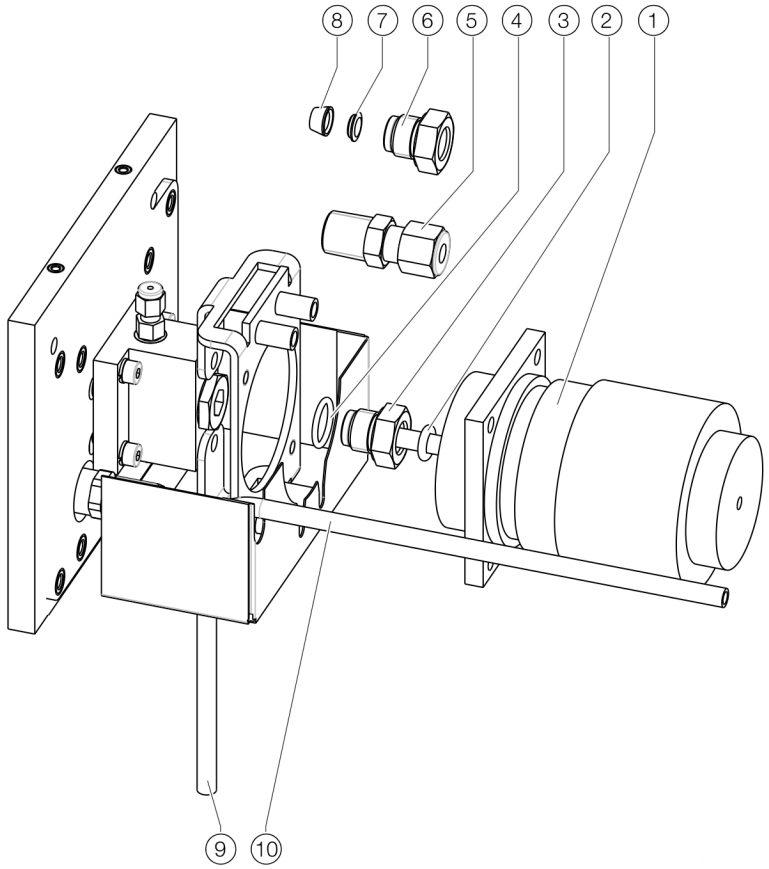
Maximum length of the sample gas line

The maximum length of the unheated sample gas line (inside diameter 4 mm) is 50 m.

Provide for Sample Gas Line Purging

Install a shut-off valve in the sample gas line (highly recommended for pressurized sample gas) and provide the option of introducing an inert gas, e.g. nitrogen, from the gas sampling point, for purging of the sample gas line.

Connection of the sample gas line to the unheated sample gas connection



(1) Sample gas line (heated or unheated, PTFE or stainless steel tubing with a 4/6 mm inside/outer diameter)

Connection either with:

(2) O-ring 6.02 × 2.62

(3) Socket

(4) O-ring 12.42 × 1.78

Alternatively, with:

(5) Screw-in connector G¼”

Alternatively, with:

(6) Socket

(7) Wedge ring

(8) Clamping ring

(9) Exhaust gas tube for 19” housing

(10) Exhaust gas tube for wall-mount housing

Figure 37: Connection of the sample gas line

5 Electrical connections

Safety instructions

⚠ DANGER

Explosion hazard

There is a risk of explosion if the device is opened in a potentially explosive atmosphere.

Please take note of the following information before opening the device:

- A valid fire permit must be present.
- Make sure that there is no explosion hazard.
- Before opening the device, switch off the power supply.

⚠ WARNING

Risk of injury due to live parts.

Improper work on the electrical connections can result in electric shock.

- Connect the device only with the power supply switched off.
- Observe the applicable standards and regulations for the electrical connection.

General Notes

Protective lead connection

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

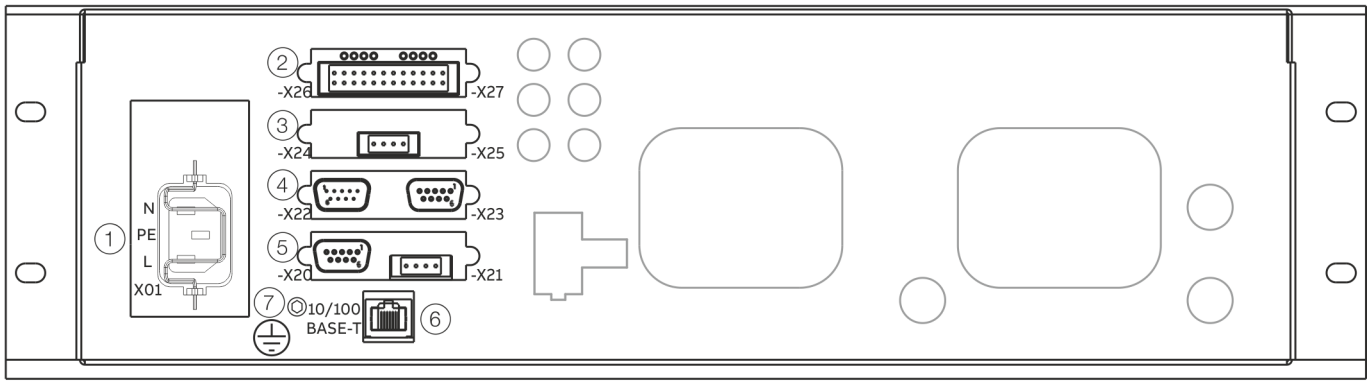
Risks of a disconnected protective lead

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

Model EL3020

Safety instructions

Observe the relevant national safety regulations for installing and operating electric systems.



1. Power supply connection
   (see **Connecting the power supply** on page 98)
   (3-pin grounded instrument connector in accordance with EN 60320-1/C14; connection cable included in scope of supply)
2. Digital I/O module
   (see **Digital I/O module** on page 95)
3. Analog output module
   (see **Analog output modules** on page 94)
4. Modbus module
   (see **Modbus®-Module** on page 97)
5. Profibus module
   (siehe **PROFIBUS®-Module** on page 97)
6. Ethernet 10/100BASE-T interface (for configuration and software update as well as for transferring the QAL3 data)
7. Potential equalization connection (terminal capacity max. 4 mm^2)

Figure 38: Electrical connections model EL3020

Note

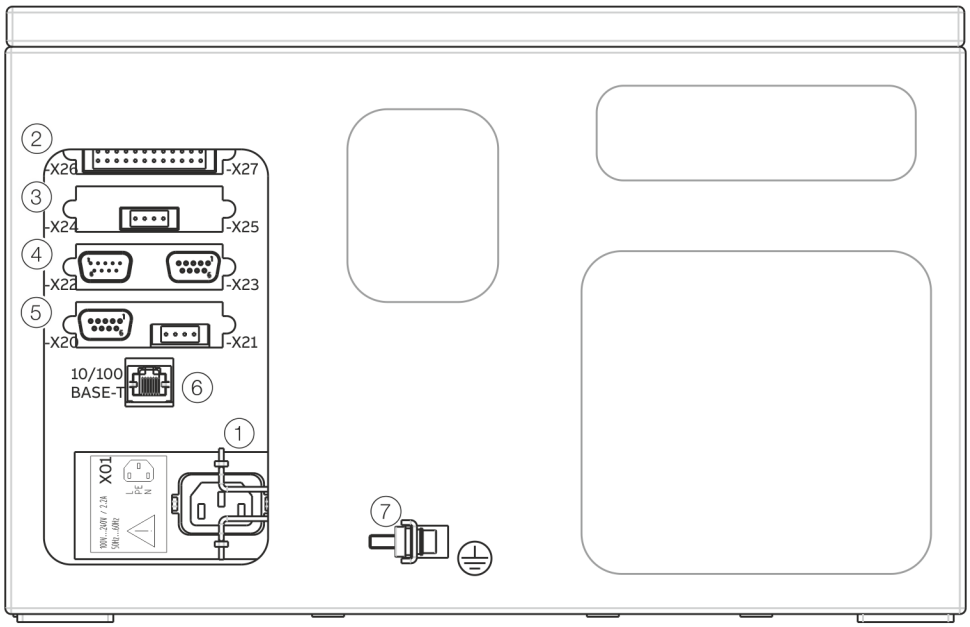
The figure shows all available I/O module types and shows only an example of the assembly with I/O modules (max. 4). The actual assembly of a delivered gas analyzer may differ from this; it is documented in the device data sheet.

… 5 Electrical connections

Model EL3040

Safety instructions

Observe the relevant national safety regulations for installing and operating electric systems.



1. Power supply connection
   (see **Connecting the power supply** on page 98)
   (3-pin grounded instrument connector in accordance with EN 60320-1/C14; connection cable included in scope of supply)
2. Digital I/O module
   (see **Digital I/O module** on page 95)
3. Analog output module
   (see **Analog output modules** on page 94)
4. Modbus module
   (see **Modbus®-Module** on page 97)
5. Profibus module
   (see **PROFIBUS®-Module** on page 97)
6. Ethernet 10/100BASE-T interface (for configuration and software update as well as for transferring the QAL3 data)
7. Potential equalization connection (terminal capacity max. 4 mm^2)

Figure 39: Electrical connections model EL3040

Note

The figure shows all available I/O module types and shows only an example of the assembly with I/O modules (max. 4). The actual assembly of a delivered gas analyzer may differ from this; it is documented in the device data sheet.

Cable glands

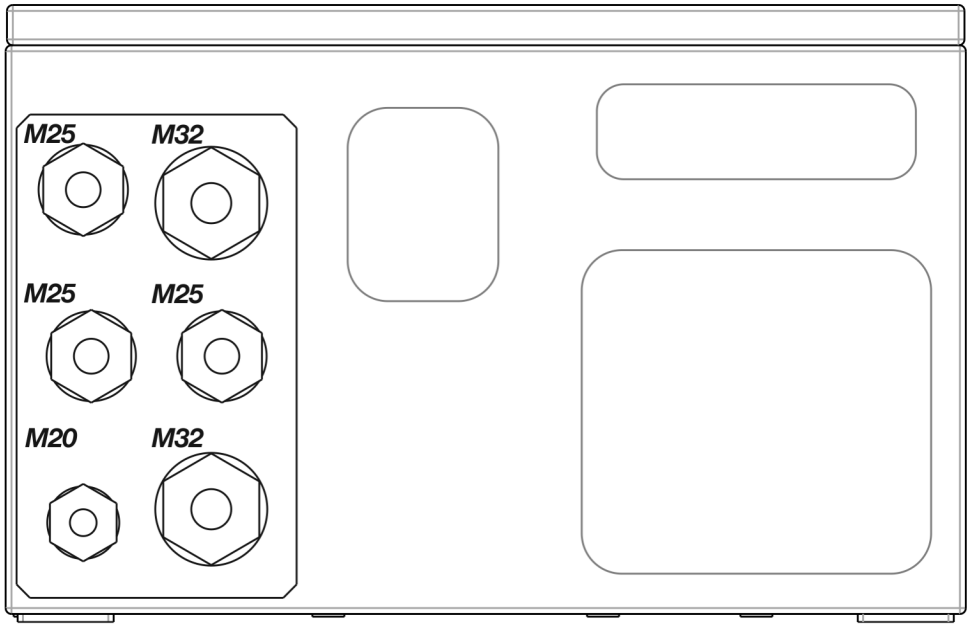


Figure 40: Cable glands model EL3040

Type	Application (recommended)	Permissible cable diameter
M20	Power supply	5 to 13 mm
M25	Modbus / Profibus	8 to 17 mm (insert 5 × 4 mm)
M25	Network	8 to 17 mm
M25	3 × analog outputs	8 to 17 mm (insert 3 × 7 mm)
M32	Digital inputs/outputs	12 to 21 mm
M32	Digital inputs/outputs	12 to 21 mm

Cable glands for use in potentially explosive atmospheres

During installation, the clamping range for lines as well as the tightening torques of the cable glands must be observed. The cable glands have several gasket rings which need to be removed as needed depending on the cable diameter.

Cable gland	Clamping range for lines and tightening torque					
	Sealing ring 1+2+3		Sealing ring 1+2		Sealing ring 1	
M20×1.5	Ø 5.5 mm / 1.5 Nm	Ø 7.0 mm / 1 Nm	Ø 7.0 mm / 1.5 Nm	Ø 9.0 mm / 1.4 Nm	Ø 9.5 mm / 1.0 Nm	Ø 13 mm / 1.7 Nm
M32×1.5	—	—	Ø 14 mm / 3.0 Nm	Ø 17 mm / 4.0 Nm	Ø 17.5 mm / 1.5 Nm	Ø 21 mm / 1.3 Nm
M25×1.5 2-way	—	—	—	—	Ø 2×4.5 mm / 2.0 Nm	Ø 2×7 mm / 2.0 Nm

Note

Only suited and cable glands and reduction nozzles approved for the Ex Zone may be used as spare parts.

- The use of other cable glands and blind plugs lead to a loss of Ex-approval!

Specifications for the selection of cable glands	
Thread sizes in the connection box	M20×1.5; M32×1.5; M25×1.5
Sealing	Gasketing via sprayed-on sealing ring on the contact surface of the cable gland
Maximum surface roughness of the connection box	max. Ra = 8 µm
Wall thickness range of the connection box	4 to 5 mm

… 5 Electrical connections

Analog output modules

Terminal layout

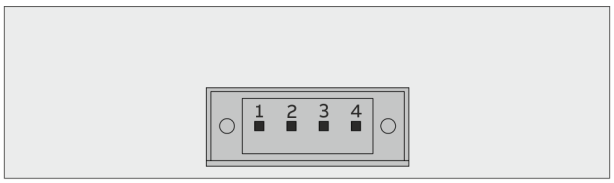


Figure 41: 2-way analog output module

Figure 42: 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 to AO4
0/4 to 20 mA (factory-set to 4 to 20 mA), common negative pole, electrically isolated from ground, freely connectible to ground, max. gain relative to protective ground potential 50 V, max. load 750 Ohm. Resolution 16 bit.
The output signal cannot be lower than 0 mA.

Version
4-pole or 8-pole plug-in terminal strip with counter plug (included in the scope of delivery).

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

Note
The allocation of the terminals can be changed in the configurator.

Refer to Operating instruction.

Digital I/O module

Terminal layout

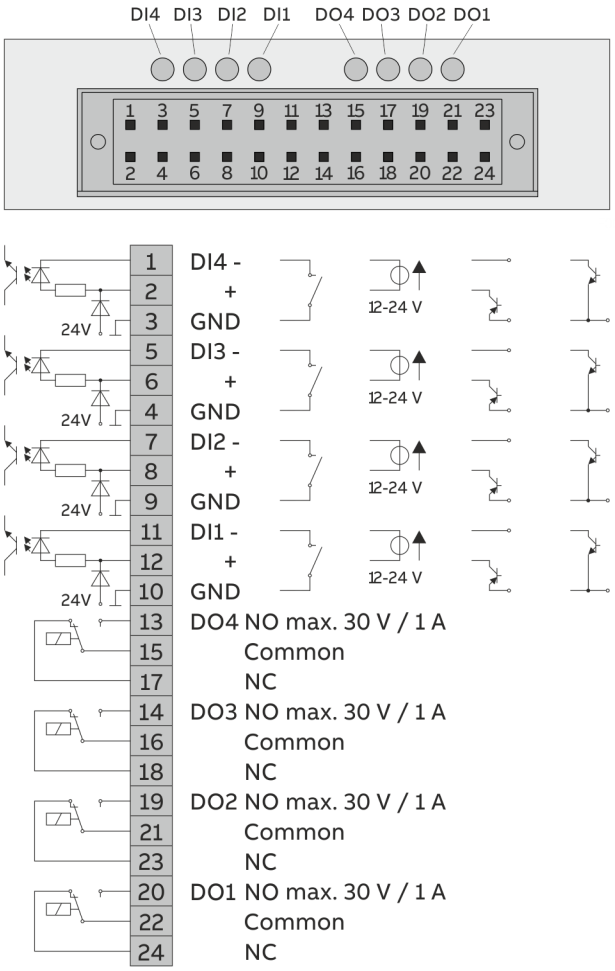


Figure 43: Electrical connections, digital I/O module

Digital inputs DI1 to DI4
Optocouplers with internal 24 V DC power supply. Control system alternatively available with potential-free contacts, with external voltage 12 to 24 V DC or with PNP or NPN open-collector driver.

Digital outputs DO1 to DO4
Potential-free changeover contacts, maximum contact load capacity 30 V/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).
Relays are shown in the unpowered state.
The unpowered state corresponds to the state in the event of a fault ("fail safe").

Version
2 × 12-pole plug-in terminal strip with mating connector (included in the scope of delivery).

… 5 Electrical connections

… Digital I/O module

Standard assignment of digital inputs and digital outputs

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

* If a pump is installed ('Integral gas feed' option – only in model EL3020, not for Limas23, ZO23, Fidas24).

** Multiple external status signals can be configured depending on the number of free digital inputs.

Note

The allocation of the terminals (see Operating instruction) can be changed in the configurator.

Modbus®-Module

Terminal layout

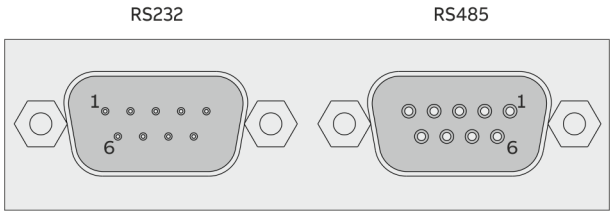


Figure 44: Modbus module

RS232 Interface

Version: 9-pin sub-D male connector

Pin	Signal
2	RxD
3	TxD
5	GND

RS485 interface

Version: 9-pin sub-D female connector

Pin	Signal
2	RTxD-
3	RTxD+
5	GND

Note

You can find detailed information regarding Modbus® in the ‘COM/EL3000/MODBUS’ interface description.

Note

The Modbus® protocol is an unsecured protocol, as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

PROFIBUS®-Module

Terminal layout

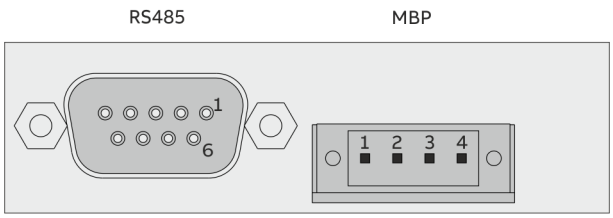


Image 45: PROFIBUS® module

RS485 interface

Version: 9-pin sub-D female connector

Pin	Signal	Description
1	—	not assigned
2	M24	24 V output voltage, ground
3	RxD/TxD-P	Receive/transmit 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/transmit data N, A-line
9	—	not assigned

MBP Interface (not intrinsically safe)

Model: 4-pole plug-in terminal strip with mating connector (included in the scope of delivery).

Pin	Signal
1	+
2	Shield
3	–
4	not used

Note

You will find detailed information regarding PROFIBUS® in the ‘30/24-415’ technical information.

Note

The PROFIBUS® protocol is an unsecured protocol (in the context of IT or cyber security), therefore the intended application should be assessed before implementation, in order to ensure that the protocol is suitable.

… 5 Electrical connections

Connecting the Signal Lines

Safety instructions

- Follow local regulations on installing and connecting electrical wiring.
- Lay the signal lines separately from the power supply lines.
- Lay analog and digital signal lines separately from each other.
- Label cables or counter plug so that they can be clearly allocated to the corresponding I/O modules.

Requisite Material

Refer to **Signal Lines** on page 14.

Connecting the Signal Lines

1. Only for the wall-mounted housing (model EL3040):
   Feed the cables through the cable glands and strip them over a length of approx. 18 cm, see **Model EL3040** on page 92.
   - M20 and M32 cable gland:
     Remove the plug from the insert; leave the ring in the gland to act as a gasket and to provide strain relief.
   - Cable gland M25:
     Remove the plug from the gland. Remove the drilled insert from the accessory bag and if necessary, slit it open and press it over the cable; close any free drill holes with dowel pins from the accessory bag.
2. Connect the cables to the opposite connectors, according to the connection diagrams of the I/O modules.
   - Analog output module, see **Analog output modules** on page 94
   - Digital-I/O module, see **Digital I/O module** on page 95
3. Connect the opposite connectors to the plug-in terminal strips on the I/O modules.

Connecting the power supply

NOTICE

Damage to the gas analyzer

Damage to the gas analyzer due to condensing sample gas during commissioning.

- Observe the condition of the sample gas inlet of the analyzer modules.
- Purge the sample gas path before commissioning, see **Purge sample gas path and analyzer housing** on page 101.
- Do not connect the sample gas until the gas analyzer has reached room temperature and after the warm-up phase has elapsed, see **Duration of the Warm-up Phase** on page 101.

NOTICE

Heater damage

Damage to the detector heater and the heated sample gas connection due to an improper connection.

- Attach or disconnect the connector **30** of the power supply for heating the detector and the heated sample gas connection only if the gas analyzer is de-energized.

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.

Potential equalization

The gas analyzer has a terminal marked with the symbol ⏚ for connection with the building-side potential equalization. The connector has a clamping range of max. 4 mm^2.

Grid connection cable EL3000

For the power supply of the gas analyzer, a connection cable (length 5 m, conductor cross section 3 × 1.5 mm^2) with a 3-pole cold device plug is included in the scope of supply.

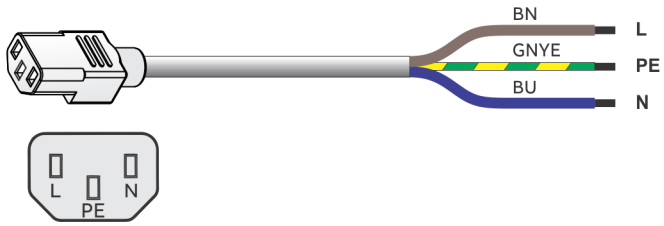


Figure 46: Pin side of the plug 30

Grid connection cable Fidas24

A connection cable is provided for the power supply (115 / 230 V AC) for heating the detector and, if necessary, the heated sample gas connection (length 5 m, cable cross-section 3 × 1.5 mm^2) with a 4-pole socket connector for the connection to the analyzer module.

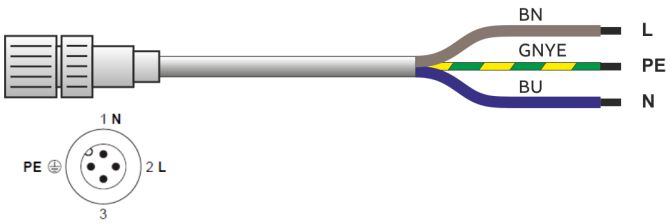


Figure 47: Pin side of the plug 30

The illustration shows the pin side of the plug **30** on the analyzer (see **Figure 32** on page 80).

The operating voltage of the detector heating is automatically detected and switched. The set voltage can be identified through two LEDs on the mains distribution card.

Connect power supply lines

1. Ensure that the power supply feeder has an adequately dimensioned protective device (circuit-breaker).
2. Install an easily accessible mains isolator or a switched socket in the power supply line, close to the gas analyzer, so that all the poles of the gas analyzer can be disconnected from the power supply if necessary. Label the supply circuit isolator to make it clear that it is associated with the device that needs to be isolated.
3. Plug the cold device power cable into the power supply connection **X01** (see **Figure 38** on page 91 and **Figure 39** on page 92) of the gas analyzer and fasten the plug with the bracket.
4. Attach the Fidas24 power cable to the power supply connection **30** (see **Figure 32** on page 80 and **Figure 33** on page 81) of the Fidas24 analyzer module and tighten.
5. Connect the other ends of the power cable to the power supply.
6. If stipulated by the relevant installation regulations, connect the gas analyzer to the building's equipotential grounding system.

Note

The supply circuit isolator must mutually isolate the power supply of the gas analyzer and the Fidas24.

Note

The gas analyzer can be put into operation as soon as it is connected to the power supply of the building.

6 Commissioning

Safety instructions

NOTICE

Damage to the gas analyzer
Damage to the gas analyzer due to condensing sample gas during commissioning.

- Observe the condition of the sample gas inlet of the analyzer modules.
- Purge the sample gas path before commissioning, see **Purge sample gas path and analyzer housing** on page 101.
- Do not connect the sample gas until the gas analyzer has reached room temperature and after the warm-up phase has elapsed, see **Duration of the Warm-up Phase** on page 101.

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.

Installation Check

NOTICE

Potential adverse effect on the IP rating
Yellow sealing plugs (transport protection) are applied to the gas connections on the analyzer and housing to secure them during transport. The yellow sealing plugs do not guarantee a sufficient IP rating.

- Remove the yellow sealing plugs before commissioning.
- Close unused gas connections with suited sealing plugs to guarantee the IP rating.

1. Is the gas analyzer securely fastened, see **Gas Analyzer Installation** on page 82?
2. Are all gas lines including that of the pressure sensor correctly connected and installed, see **Installing the fittings** on page 41?
3. Are all signal lines and power supply lines correctly connected and installed, see **Connecting the Signal Lines** on page 98 and **Connecting the power supply** on page 98?
4. Are all devices and equipment needed for gas conditioning, calibration and exhaust gas disposal correctly connected and ready for use?
5. When measuring flammable gases: are the special conditions complied with, see **Special conditions for the measurement of flammable gases** on page 39?
6. When using the explosion-proof design in degree ofprotection II 3G: are the special conditions complied with,see **Special conditions for the model EL3040 gas analyzer in degree of protection II 3G** on page 16?

Purge sample gas path and analyzer housing

Before the gas analyzer is commissioned and the sample gas is connected, the sample gas path and, if necessary, the wall housing must be purged.

First of all, this makes sure that before commissioning, the sample gas paths and wall-mounted housing are free from contaminants, e.g. corrosive gases and accumulations of dust.

Secondly, this prevents any explosive gas / air mixture present in the sample gas paths or wall-mounted housing from being ignited when the power supply is powered-up.

Initial purging upon commissioning

Pre-purging the gas path	
Purge gas	Nitrogen
Purge gas flow	Maximum 100 l/h
Purge time	approx. 20 s

Housing purge*	
Purge gas	Nitrogen
Purge gas flow	Maximum 200 l/h
Purge time	Approx. 1 hour

* Not for Fidas24, see for a separate description at **Housing purge with Fidas24** on page 35.

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

Housing purge with Fidas24

In the Fidas24 gas analyzer, the housing purge is provided in such a way that a part (approx. 600 to 700 l/h) of the instrument air is conducted continuously through the housing as purge air.

Thus it is guaranteed that no ignitable gas mixture can form within the housing in case of a leak in the combustion gas path. The housing purge is always active when pressurized air is on, that is also when the instrument air valve is closed.

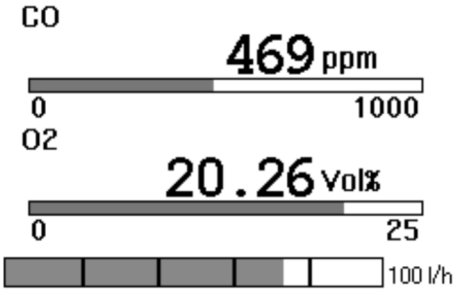
Gas analyzer start-up

Note

For the analyzers ZO23 and Fidas24, the instructions specified in **ZO23 – Commissioning the gas analyzer** on page 102 or **Fidas24 – Commissioning the gas analyzer** on page 102 must be observed.

General description of commissioning

1. Turn on the gas analyzer power supply.
2. During the start-up phase ('Booting'), the LCD display shows the name of the gas analyzer and the number of the software version.
3. At the end of the start-up phase, the LCD display switches over to display the measured values.
   Example:



4. Check the gas analyzer configuration and change if necessary, see Operating instruction.
5. Once the warm-up phase is complete, the gas analyzer is ready to begin the measurement process, see **Duration of the Warm-up Phase** on page 101.
6. Check the gas analyzer calibration, see Operating instruction. The gas analyzer is factory calibrated. However, transport influences as well as the pressure and temperature conditions at the installation site can influence the calibration.
7. Turn on the sample gas supply.

Duration of the Warm-up Phase

Analyzer	**Duration of the Warm-up Phase**
Uras26	Without thermostat: approx. ½ h With thermostat: approx. 2 h
Limas23	Approx. 2 hours
Magnos206	< 1 hours
Magnos28	< 5 h, The value may be elevated during first commissioning or after a longer service life.
Magnos27	2 to 4 h
Caldos27	Approx. ½ h
Fidas24	Approx. 2 hours
ZO23	approx. 2 h, see for detailed information **ZO23 – Commissioning the gas analyzer** on page 102.

… 6 Commissioning

… Gas analyzer start-up

ZO23 – Commissioning the gas analyzer

Note

We recommend starting the first calibration procedure at the installation site on the day before the actual measurement operation is started, so that the gas paths and valves can be purged as long as possible.

Commissioning the gas analyzer, first calibration at the installation site:

1. Power-up the power supply on the gas analyzer.
   - After 15 min, the operating temperature of the cell has been reached, the corresponding status message goes out. From this moment on, the gas can be connected.
2. Supply ambient air for setting the reference point (= electric zero point) and wait for the measured value to stabilize (time approx. 2 h).
   - During this time, flush the test gas valves and the gas inlet line with oxygen-free gas (for example, with nitrogen from a ring line) or with sample gas (flow rate 5 to 10 l/h).
3. Set the reference point to the oxygen content of the ambient air, taking into account the air humidity. See calculation example in **Test gases** on page 26.
4. Use nitrogen to flush the entire gas path and the valves, which was previously blown with air. It's best to do this for at least 12 hours, for example overnight.
5. Feed in the span gas and wait for the measured value to stabilize (max. duration 2 h).
6. Set the end point value in accordance with the analysis certificate of the test gas cylinder used.
7. The gas analyzer is ready for measurement; connect sample gas.

Note

For information on the test gases, refer to **ZO23** on page 26.

Fidas24 – Commissioning the gas analyzer

Power-up the power supply, heat-up phase, connect operating gases

1. Switch on the power supply of the gas analyzer and the heaters of the Fidas24.
2. During the start-up phase 'Booting', the LCD display shows the name of the gas analyzer and the number of the software version. At the end of the start-up phase, the LCD display switches over to display the measured values.
3. Select the 'Controller Values' menu item:
   '▼ Maintenance / ▼ Diagnosis / ▼ Device Status / ▶ Analyzer Status / ▲ Controller Values'
   Under this menu item, both the actual and setpoint values and the manipulated variables of the internal temperature controllers are displayed:
   - **T-Re.D:** Detector temperature
   - **T-Re.E:** Temperature of the heated sample gas connection
   - **T-Re.K:** Internal combustion air conditioning temperature
   - **TR.VV1:** Temperature of the pre-amplifier

   The temperature values increase slowly after activating the power supply.
4. Switch on the instrument air, combustion air and combustion gas (H_2 or H_2/He mixture). Adjust the pressure to the value specified in the Device Data Sheet with the corresponding external pressure regulator.
5. The 'Controller Values' menu item also displays both the actual and set point values and the manipulated variables of the internal pressure controllers:
   - **C Air:** Combustion air pressure
   - **C Gas:** Combustion gas pressure (H_2 or H_2/He mixture)
   - **MGE:** Pressure at the sample gas nozzle
   - **MGA:** Pressure in the combustion chamber (output)

Note

The following status messages are active during the heating-up phase:

6. During the heating phase, the following status messages are displayed:

Message	Description
Working temperature	the temperature of the detector has not yet reached the threshold.
Flame error	the flame has not yet ignited.
Temperature limit value 1, 2	The temperature of the detector (**T-Re.D**) and if applicable the heated sample gas connection (**T-Re.E**) up-scales or down-scales the upper or lower limit value 1 or 2.
Pressure limit value 1, 2	The pressure at one of the internal pressure regulators for instrument air (**inlet, outlet**), combustion air (**air**) or combustion gas (H_2) up-scales or down-scales the upper or lower limit value 1 or 2.

7. As soon as the temperature of the detector reaches the threshold value (150 °C), the corresponding solenoid valve in the analyzer automatically switches off the instrument air. The negative pressure regulation and the combustion air regulation attempt to adjust the pressures to the respective set point.
   The sample gas begins to flow through the analyzer after the instrument air is connected.
8. After the pressures have been adjusted to the respective set point, the respective solenoid valve in the analyzer automatically connects the combustion gas. The combustion gas regulation attempts to adjust the pressure to the set point.

Adjust output variables of the internal pressure controllers
If the analyzer cannot be commissioned automatically with the pressure values specified in the device data sheet, the manipulated variables of the internal pressure controllers must be adjusted.

Note
In order to bring the pressure regulators into a more favorable control range, the external supply pressures can be adapted with the aid of the manipulated variables. However, this should only be done once the flame has been ignited.
In general, this is not necessary.

9. Instrument air:
   Use the external pressure regulator to set the controlled variable for Outlet to approx. 60 % (max. 70 %).
   Manipulated variable too high → Reduce pressure.
   Manipulated variable too low → Increase pressure.
   (The controlled variable for “Inlet” depends on the sample gas flow rate.)
10. Combustion air:
    Use the external pressure regulator to set the control variable for “air” to approx. 55 % (max. 60 %).
    Manipulated variable too high → increase pressure.
    Controlled variable too low → reduce pressure.
11. Combustion air:
    Use the external pressure regulator to set the manipulated variable for ‘H_2’ to approx. 42 % (max. 52 %).
    Manipulated variable too high → increase pressure.
    Controlled variable too low → reduce pressure.

… 6 Commissioning

… Gas analyzer start-up

Igniting the flame

12. Flame ignition is automatic.

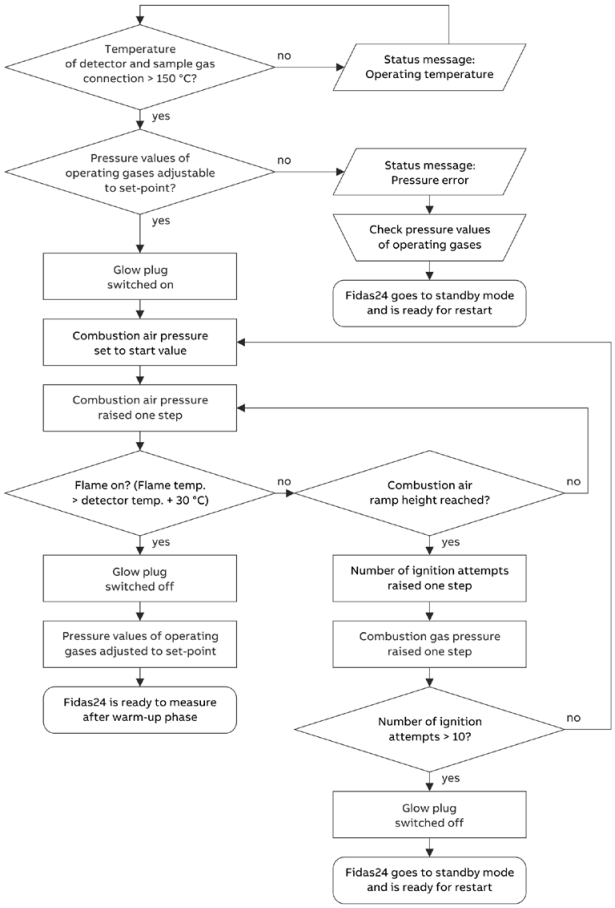


Image 48: Igniting the flame

Depending on the number of ignition attempts, flame ignition can take up to 10 minutes.

On initial commissioning of the gas analyzers, it may occur that, depending on the position of the combustion gas line, there is not sufficient combustion gas available to ignite the flame at first. In this case, you need to go to the 'Fidas Restart' menu to restart the ignition of the flame, see **Fidas24 – Standby / Restart** on page 105.
The flame temperature is also displayed in this menu. The flame is considered to be 'on' when the flame temperature is at least 30 °C higher than the detector temperature.
With the ignition of the flame, the actual commissioning of the gas analyzers is ended.

Note
Unused sample gas lines and sampling probes may continue to emit hydrocarbons for an extended period after initial operation. As a result, it can take much longer for the measured value drift to reach an acceptable value.

Recommissioning the gas analyzer

⚠ CAUTION

Risk of burns
Risk of burns on the hot (> 70 °C) cover of the heated sample gas connection.
- Do not touch the cover of the heated sample gas connection.

NOTICE

Heater damage
Damage to the detector heater and the heated sample gas connection due to an improper connection.
- Attach or disconnect the connector **30** of the power supply for heating the detector and the heated sample gas connection only if the gas analyzer is de-energized.

1. Feed in instrument air and combustion air and purge the gas analyzer for **at least 20 minutes**
2. Check the leak tightness of the combustion gas supply line, see **Check the integrity of combustion gas path** on page 106.
3. Turn on the gas analyzer power supply.
4. Power-up the combustion gas supply and check the combustion gas pressure.
5. Turn on the sample gas supply.

Fidas24 – Standby / Restart

Definitions

- **Standby mode:**
  Heater on, combustion gas valve closed, combustion air valve closed, instrument air valve closed, housing purging on, zero gas valve opened in standby mode with purging of the detector.
- **Fail-safe mode:**
  Fail-safe means: heater off, combustion gas valve closed, instrument air valve closed, housing purging on, zero gas valve open.

Set Fidas24 in Standby mode

'▲ Operation / ▶ Pump / Standby / ▼ Fidas Standby ▶ Fidas Standby'

In the 'Fidas Standby' menu, you can choose between the 'Standby & Purge' and'Standby' operating modes:

Standby	Standby mode is activated.
Standby & Purge	Standby mode with opening of the zero gas valve for purging the detector is activated (only when executing with test gas connection).

In standby mode, there is a 'Function check' status signal (see **"Diagnosis / error messages" in the operating instruction**) and the status message no. 411 'Fidas24 Standby mode' (see **"Diagnosis / error messages" in the operating instruction**) is issued; the measured values are invalid.

Note

If the Fidas24 is in fail-safe mode (see **"Diagnosis / error messages" in the operating instruction**), it cannot be set to standby mode.

Setting Fidas24 back to measurement mode

'▲ Operation / ▶ Pump / Standby / ▼ Fidas Standby ▼ Fidas Restart'

The menu 'Fidas Restart' shows the most important operating parameters of the Fidas24:

F-D1	Flame temperature
B-Air	Combustion air pressure
B-Gas	Combustion gas pressure

The restart is initiated by pressing **OK**. After initiating the restart, you can leave the menu by selecting ◀; the restart sequence will continue to be executed. The restart sequence can, however, also be observed further in the menu.

Note

If the Fidas24 is in fail-safe mode (see **"Diagnosis / error messages" in the operating instruction**), it cannot be set to measurement mode.

… 6 Commissioning

Checking gas path leak tightness

When should gas paths be checked for leak tightness?
The leak tightness of the sample gas path should be checked on a regular basis.

We recommend that you check the leak tightness of the sample gas path prior to commissioning at the installation site, as it may have been affected during transport of the gas analyzer (for example, due to high vibrations).

The leak tightness of the sample gas path must always be checked after the sample gas path has been opened inside the gas analyzer.

Requisite Material
- Pressure gauge
- Hose, length approx. 1 m
- T-piece with stop cock
- Air or nitrogen

⚠ DANGER

Explosion hazard
Explosion hazard due to mixing of air and flammable sample gas residues in the sample gas path.
- If the leak tightness test is to be carried out with air and the sample gas or test gas is flammable, the sample gas path must be rinsed with nitrogen beforehand!
- Otherwise the leak tightness test can be performed with nitrogen.

Check leak tightness
1. Close off the sample gas output so it is gas-tight.
2. Connect the T-piece with stop cock to the sample gas inlet with the hose.
3. Connect the free end of the T-piece to the pressure gauge.
4. Blow air or nitrogen through the stop cock until the sample gas feed path is under a gauge pressure of approx. 50 hPa. Maximum gauge pressure = 150 hPa.
5. Close the shut-off valve.
   - Within 15 mins, the pressure must not drop more than 1 hPa. A sharp pressure drop is an indication of a leak inside the sample gas path.
6. Repeat steps 1 to 5 for all sample gas paths in the gas analyzer.

Check the integrity of combustion gas path

Combustion gas line
The seal integrity of the combustion gas feed line must be regularly checked in accordance with the two following instructions, depending on whether the combustion gas is offered from a bottle or a central supply.

Combustion gas supply from a cylinder
1. Switch off the gas analyzer power supply. Ensure that the shut-off valve in the combustion gas supply line is open.
2. Set the combustion gas pressure at 1.1 x the normal pressure of the combustion gas, i.e. at approx. 1.3 bar.
3. Mark bottle pressure display on the high-pressure manometer.
4. Close the valve of the combustion gas bottle.
5. Observe the display on the high-pressure manometer – it should not change measurably in 10 minutes.
   - A measurable change in the display is an indication of a leak in the combustion gas path between the bottle pressure reducer and the combustion gas inlet valve of the gas analyzer.
     In this case the following measures are to be taken:
     – Check the combustion gas line between the bottle and gas analyzer with a leak detection spray. A leak in this area must be remedied and another leak test must be performed before the gas analyzer is put into operation again.
     – If no leak is found, that means the gas analyzer combustion gas inlet valve is leaky.

⚠ DANGER

Explosion hazard
Explosion hazard if there is a leak in the combustion gas inlet valve.
If a leak is detected at the combustion gas inlet valve:
- Disconnect the combustion gas supply.
- Do not restart the gas analyzer.
- Have the combustion gas valve replaced by the ABB Service team.

6. After conclusion of the seal integrity test, set the combustion gas pressure to normal pressure again, i.e. 1.2 bar.

Combustion gas supply from a central unit

1. Switch off the gas analyzer power supply. Ensure that the shut-off valve in the combustion gas supply line is open.
2. Set the combustion gas pressure at 1.1 x the normal pressure of the combustion gas, i.e. at approx. 1.3 bar.
3. Mark pressure indication on the manometer of the pressure reducer.
4. Shut off the combustion gas supply.
5. Observe the display on the manometer – it should not change measurably in 10 minutes.
   - A measurable change in the display is an indication of a leak in the combustion gas path between the pressure reducer and the combustion gas inlet valve of the gas analyzer.
     In this case the following measures are to be taken:
     – Check the combustion gas line between the pressure reducer and gas analyzer with a leak detection spray. A leak in this area must be remedied and another leak test must be performed before the gas analyzer is put into operation again.
     – If no leak is found, that means the gas analyzer combustion gas inlet valve is leaky.

⚠ DANGER

Explosion hazard

Explosion hazard if there is a leak in the combustion gas inlet valve.

If a leak is detected at the combustion gas inlet valve:

- Disconnect the combustion gas supply.
- Do not restart the gas analyzer.
- Have the combustion gas valve replaced by the ABB Service team.

6. After conclusion of the seal integrity test, set the combustion gas pressure to normal pressure again, i.e. 1.2 bar.

Combustion gas path in the gas analyzer

1. The gas analyzer must be in operation (flame on).
2. Inspection of combustion gas feed path with positive pressure (combustion gas inlet to combustion gas nozzle):
   - Check all connection points with a hydrogen detector (for example, based on thermal conductivity) for leakage of combustion gas.
     – The leakage rate may not up-scale 1×10^{-4} hPa l/s.
3. Inspection of the combustion gas feed path with negative pressure (in the detector, after the combustion gas nozzle):
   - Connect zero gas at the sample gas inlet.
   - Shroud all joints successively with a small cloud of a gas that contains hydrocarbons (e.g. with a cold spray or a test gas that contains hydrocarbons, or a cloth soaked in acetone).
     – Observe the measured value display; if the measured value changes to a positive value, the relevant connection is **leaking**.

… 6 Commissioning

Important instructions for measuring flammable gases

Measures to take after each opening of the gas paths within the gas analyzer

- If the sample gas path inside the gas analyzer has been opened, leak tightness should be checked afterwards with a helium leak test for a leakage rate of $< 1 \times 10^{-4}$ hPa l/s.
- As an alternative to the helium leak test, the pressure drop method can be used, see **Checking gas path leak tightness** on page 106.
  - For this purpose, a test pressure of $p_e \sim 400$ hPa for a test duration of 15 min should be applied.
    Within this time, the pressure must not drop more than 1 hPa.
- Every time the sample gas path is opened, it needs to be pre-rinsed before you power-up the power supply. That way, any explosive gas/air mixture which might be present should be removed.
  - Purge gas: nitrogen
  - Purge gas volume: 5 times the volume of the gas paths
  - Purge gas flow rate: approx. 30 l/h
  - Purge duration: at least 3 min

Important instructions for explosion-proof design in degree of protection II 3G

Visual inspection

- If the viewing glass is damaged to the point that the IP65 housing protection is no longer met, the gas analyzer must be decommissioned, secured against recommissioning and repaired.
- If the housing is damaged by UV radiation to the point that the housing protection IP 65 is no longer maintained, the gas analyzer must decommissioned, secured against recommissioning and repaired.

Replacing the battery

- The battery may only be replaced in a non-hazardous atmosphere.
- This battery may only be replaced with the original battery type:
  - Varta CR 2032 type no. 6032 or
  - Renata Type No. CR2032 MFR

Failure of instrument air supply

It must be ensured that the gas supply to the analyzer module is shut off if the instrument air supply fails.

This is generally ensured by the installation of a pneumatic shut-off valve in the combustion gas supply line (refer to **Shut-off valve in the combustion gas supply line** on page 32); this valve must be controlled by the instrument air supply in such a way that, should it fail (and therefore, also in the event of failure of the continuous purging of the housing) the combustion gas supply is automatically shut off (refer to **Housing purge with Fidas24** on page 35).

If such a pneumatic shut-off valve is not installed, the following precautions and measures must be taken:

- The Overall Status or the "Failure" status of the gas analyzer must be monitored.
- If the status appears, the cause must be verified in the gas analyzer on site:
  - if the gas analyzer is not in operation (for example as a result of a voltage failure), the operating gases must be shut off.
  - If the gas analyzer is in operation, an adequate instrument air supply must be verified. If this is the case, the status messages must be verified. If this is not the case, proceed as follows:
    1. Shut off the combustion gas supply.
    2. Restore the instrument air supply.
    3. Purge gas analyzer for 20 minutes.
    4. Turn on combustion gas supply.
    5. Gas analyzer starts automatically.

Note for measuring combustion gases

When measuring combustion gases, it must be made sure that in case of a failure of the instrument air supply or of the analyzer module itself the sample gas supply to the analyzer module is shut off and the sample gas path is purged with nitrogen.

7 Operation

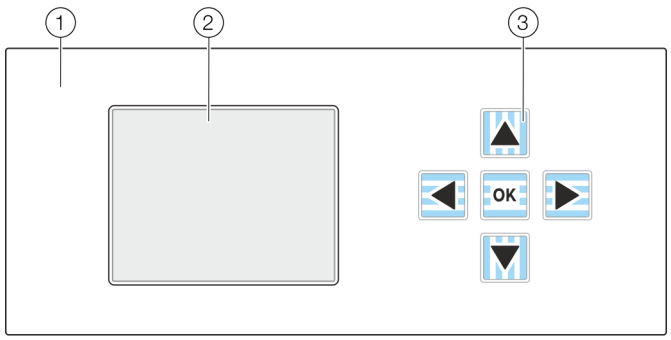
Safety instructions

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.

LCD indicator

Note
For detailed information on the operation and parameterization of the device, consult the associated operating instructions (OI)!
Note
All representations of the LCD indicator in these Commissioning Instruction are examples.
The indications on the IED will usually differ from this.



1 LCD indicator
2 LCD display
3 Operating buttons for menu navigation

Figure 49: LCD indicator on the device

The gas analyzer is operated via the LCD indicator on the device.

LCD display in measurement mode

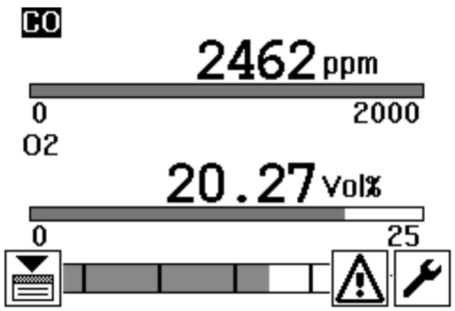


Figure 50: LCD display in measurement mode (example)

In measurement mode, the LCD display displays the name, the measured value in numbers and the physical unit of the measured value for each sample component.

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

Status icons provide information on the operating condition of the gas analyzer.

Status Icons

Icon	Description
	An automatic calibration is in progress, see Operating instruction. The icon also appears in menu mode in the menu title line, see **LCD display in menu mode** on page 111.
	A status message is active, see **"Diagnosis / error messages" in the operating instruction**.
	The status signal 'Maintenance required' is active, see **"Diagnosis / error messages" in the operating instruction**. The icon also appears in menu mode in the menu title line, see page 111.
	The status signal 'Failure' is active (see **"Diagnosis / error messages" in the operating instruction**) or the maintenance switch (see Operating instruction) is set to 'On'. The icon is flashing. The icon also appears in menu mode in the menu title line, see **LCD display in menu mode** on page 111.
	The configuration has been saved. The icon is flashing. Do not turn off the power supply of the gas analyzer while the icon is displayed!

Key functions in measurement mode

Button	Description
◀ ▶	Toggle to display each individual measured value; in addition to the number display, an analog bar with an indication of the measuring range limits appears on this indicator.
▲ ▼	Decrease or increase the contrast of the LCD display. If a status message is active: First, press the ▲ button.
OK	Switch to menu mode (see 111).
▼	If a status message is active  : Press the button to display the message list (see "Diagnosis / error messages" in the operating instruction).

Number of decimal places

When displaying the measured value in physical units (such as ppm), the number of decimal places depends on how large the span of the set measuring range is.

Measuring span	Decimal places
≤ 0,05	5
≤ 0,5	4
≤ 5	3
≤ 50	2
≤ 500	1
> 500	0

The number of decimal places when setting the parameters is the same as in the display in measuring mode.

LCD display in menu mode

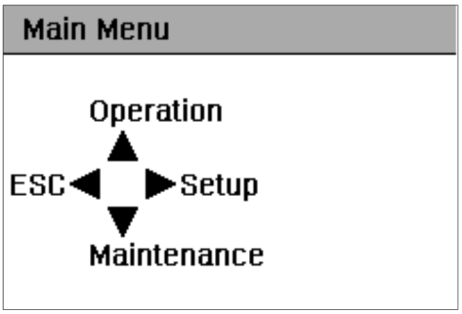


Figure 51: Main menu

Structure of the menu

Each menu (see **Menu Overview** on page 114) from the main menu contains a maximum of three menu items ('3-tier menu').

Each menu item is assigned to one of three buttons ▲, ▶ and ▼, therefore each menu item can be selected directly. The ◀ button is always used to return to the next higher menu.

The most commonly needed functions are arranged in the menu in a way that they can be called up by pressing each of the keys repeatedly:

'▲ Operation / ▲ Calibration / ▲ Manual Calibration / ▲ Zero point / Single point'
'▶ Setup / ▶ Calibration Data / ▶ Test gas set points'
'▼ Maintenance / ▼ Diagnosis / ▼ Device status / ▼ Status messages'

… 7 Operation

… LCD indicator

Button functions in menu mode

Button	3-tier menu
▲ ▶ ▼	Select menu item
◀	Return to the next higher menu
OK	Return to measurement mode
	Component list
▲ ▼	Select component
▶ or **OK**	Call up selected component for editing
◀	Return to the next higher menu
	Parameter list ('Selector')
▲ ▼	Select parameter
▶	Call up value change
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 item
▶	Select items to be changed
OK	Confirm changed value and return to the parameter list
◀	Discard changed value and return to the parameter list

Password protection
Access to the calibration as well as to the menus where the configuration of the device can be changed can be password-protected. Password protection is not activated at the factory.

Password protection variants:

- Access to calibration can be excluded from password protection.
- Access to all device functions can be password-protected (for devices with SIL certification).

Note
For security reasons it is recommended, to set a password.

Configure password
The password is set in the Configurator in menu 'Options – Password…'. It consists of a 4-digit number; each of the digits may only assume the values of 1, 2 and 3 (for example: '1213'. The setting '0000' means that password protection is not enabled.

Enter password

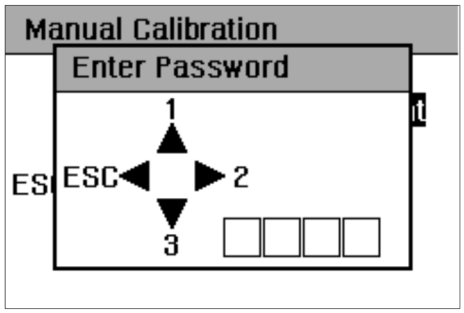


Figure 52: Password entry

As soon as the user wants to access a password-protected menu or a password-protected value change, password entry is prompted.

For this purpose, as shown on the LCD display, the digits 1, 2 and 3 are assigned to three buttons ▲, ▶ and ▼.

Example
If the password set is '1213', the user needs to push the buttons ▲, ▶, ▲ and ▼ one after the other. Each push of a button is acknowledged by displaying the '*' symbol.

The password entered remains active until the user returns to measuring mode or until the gas analyzer automatically switches to measuring mode through the time-out function.

Time out function
If the user does not press a button for more than 5 minutes while selecting menu items, the gas analyzer automatically switches back to measurement mode (see **LCD display in measurement mode** on page 110).

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

Status messages on the LCD display

Menu path

'▼ Maintenance / ▼ Diagnosis / ▼ Device Status / ▼ Status Messages'

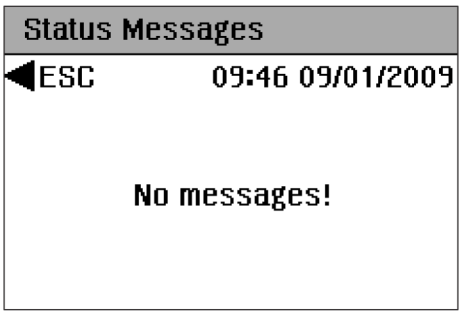


Figure 53: Menu 'Status Messages'

When a status message is active, the message list display is called up directly by pressing the ▼ button once.

Message list and detailed view

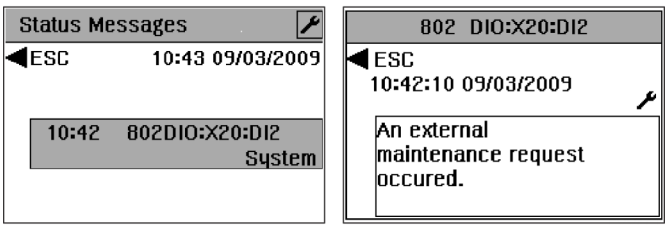


Figure 54: List of status messages and detailed view

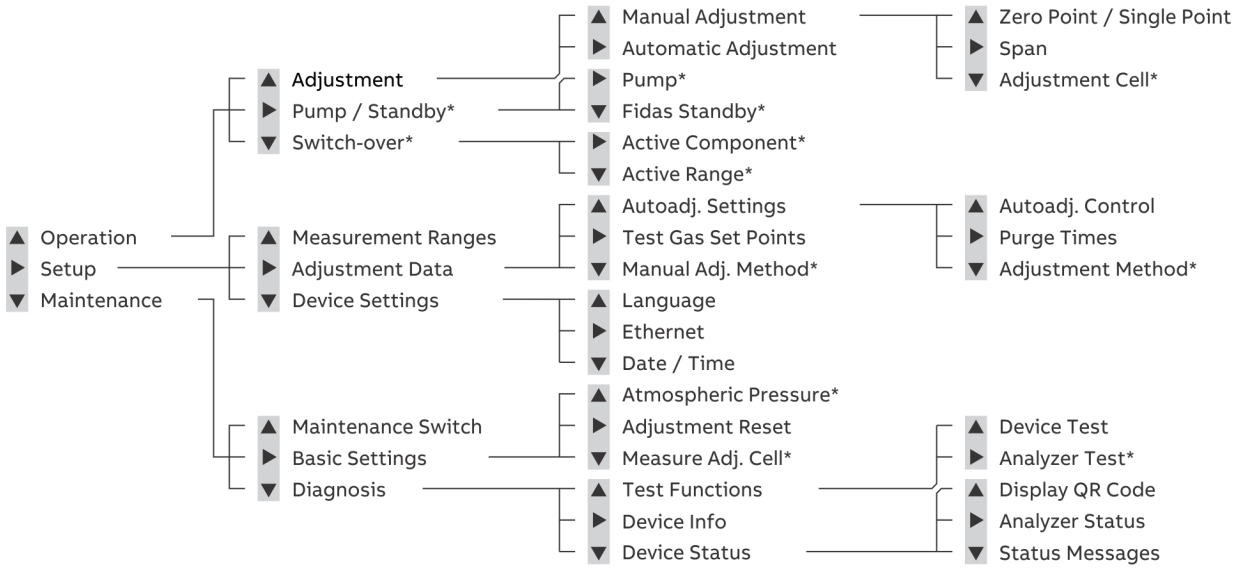
The message list with the short text of the status messages is displayed in the 'Status Messages' menu.

By pressing the ▶ button, the detailed view of the individual status messages is displayed; in the detailed view, the time and date of occurrence, as well as cancellation or acknowledgment of the status message are displayed.

Note
For a detailed description of errors and information regarding troubleshooting, refer to the chapter titled "Diagnosis / Error messages" in the operating instruction.

… 7 Operation

Menu Overview



* This menu depends on the configuration of the gas analyzer

Figure 55: Menu overview

Notes on the operating concept

The operating concept of the gas analyzer requires that the functions needed in normal operating mode are operated and configured directly on the device.

On the other hand, those functions that are seldom needed, for example when commissioning the device, are named, configured and then loaded into the gas analyzer offline using the ECT ‘EasyLine Configuration Tool’ software tool, also referred to as the ‘Configurator’ in this instruction.

Communication between gas analyzer and computer

Ethernet communication

The communication between the gas analyzer and the computer runs via an Ethernet connection either as a point-to-point connection or via a network.

The Ethernet connection enables communication

- using the test and calibration software Optima TCT Light,
- using the ECT configuration software,
- for QAL3 data transfer if the 'QAL3 monitoring' option is integrated in the gas analyzer,
- For reading the measured values and calibration and control of the gas analyzer via the Modbus® TCP/IP protocol.

Establishing communication between the gas analyzer and the computer

To establish the communication between the gas analyzer and the computer, the following steps must be performed in particular:

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

Check the TCP/IP parameters in the gas analyzer and in the computer

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

Example:
Gas analyzer: 192.168.1.4,
Computer: 192.168.1.2

Note
If the gas analyzer is connected to a network without a DHCP server, then the parameter 'DHCP' should be set to 'off'.
This also applies if the gas analyzer is not connected to a network via Ethernet.
This is to prevent the gas analyzer from continuously attempting to establish a network connection.

Setting the IP address

Menu Path

'▶ Setup / ▼ Device Settings / ▶ Ethernet'

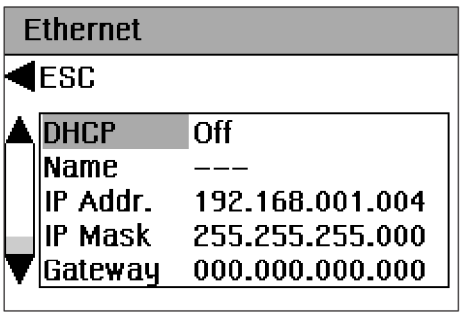


Illustration56: 'Ethernet' Menu

Parameters

It depends on the DHCP settings what parameters need to be integrated:

DHCP setting	Parameter
DHCP on	Network name (max. 20 characters, no empty and special characters),
DHCP off	IP address, IP address mask and IP gateway address.

The network name can only be changed in the Configurator. The default network name consists of 'EL3K' and the last six characters of the MAC address (for example, 'EL3KFF579A').

If the parameter 'DHCP' is set to 'off', the Ethernet configuration is set to the default configuration (default IP address) in order to avoid unintentional assignment of an IP address from a DHCP pool.

Adresses

The IP address, IP address screen and IP gateway address need to be queried from the system administrator.

Note
The address bits variable from the address screen may not be set to 0 or 1 (broadcast addresses).

MAC address

The 12 character MAC address is unique worldwide and is stored in the device during manufacture. It cannot be changed.

… 7 Operation

… Setting the IP address

Setting the IP address in the computer

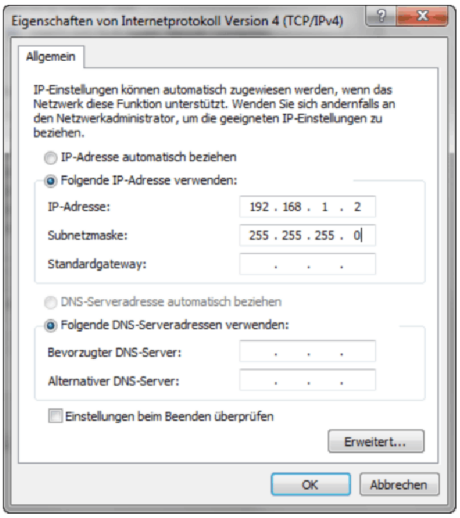


Figure 57: Microsoft Windows® IP properties (example)

1. Call up ‘Start’ → ‘System control’ → ‘Network and release center’.
2. Click on ‘Change adapter settings’.
3. Right-click on ‘Ethernet’ (Windows 10®) or ‘Local Area Connection’ (Windows 7®) → ‘Properties’
4. in the network tab → double-click on ‘Internet Protocol Version 4 (TCP/IPv4)’
5. In the ‘General’ tab, you can configure the IP settings (see **Setting the IP address** on page 115) appropriate for the configuration of the gas analyzer and confirm the settings by clicking on ‘OK’.

Establishing and testing the Ethernet connection

Cables

The cables are standard Ethernet cables and are in the scope of delivery of the gas analyzer.

Testing the Ethernet connection

1. Call up ‘Start’ → ‘Input request’.
2. Enter ‘ping IP-Adresse’ (along with the IP address of the gas analyzer) and press the Enter button.

If the connection is OK, the gas analyzer reports: ‘Response from IP address: Bytes=32 Time<10ms TTL=255”
(the numbers are device-specific).

If the message ‘Request timeout’ appears, the connection is not OK.

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

Establish communication between configurator and gas analyzer

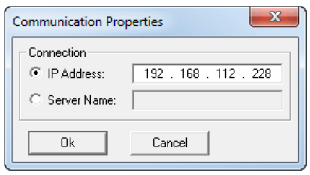


Figure 58: ‘Communication Properties’ menu in ECT

The communication between the configurator and the gas analyzer is established in the ‘Options / Communication Properties...’menu or by clicking on the icon.
Either the IP address or the network name (server name) of the gas analyzer should be entered.

Receiving configuration data

Once communication is established, configuration data can be received from the gas analyzer.

‘File / Receive Data’ menu or icon.

Sending configuration data

Once the configuration data has been processed, it can be sent to the gas analyzer.
The configuration is active after an automatic restart of the gas analyzer.

Menu ‘File / Send Data’ or icon.

Saving configuration data

The gas analyzer configuration data can be stored on the computer.
The saved configuration file can be processed later and sent to the gas analyzer.

‘File / Save As...’ menu or icon.

Release of communication via Modbus® TCP/IP

In the EasyLine EL3000, communication via Modbus® TCP/IP is blocked on all Ethernet interfaces by default.

Note

The Modbus® protocol is an unsecured protocol (in the meaning of IT security or cybersecurity), as such the intended application should be assessed before implementation to make sure that the protocol is suited.

Release communication via Modbus® TCP/IP

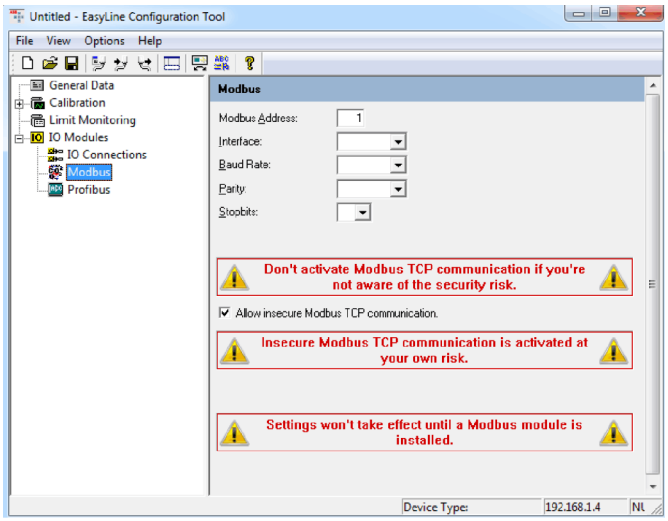


Figure 59: Modbus configuration in ECT

Implement the following steps to release communication via Modbus TCP/IP:

1. Select '…\IO Modules\Modbus' in the menu tree of the ECT Controller.
2. Select the '☑ Allow insecure Modbus TCP communication' checkbox.
3. Set the required Modbus parameters, save the settings and transfer them to the gas analyzer.
4. Communication via the Modbus TCP/IP protocol has now been released.

Note

You will find detailed information regarding the Modbus® in the description of the interface 'COM/EL3000/MODBUS'.

8 Maintenance

Safety instructions

⚠ DANGER

Explosion hazard

There is a risk of explosion if the device is opened in a potentially explosive atmosphere.

Please take note of the following information before opening the device:

- A valid fire permit must be present.
- Make sure that there is no explosion hazard.
- Before opening the device, switch off the power supply.

⚠ DANGER

Risk of explosion during maintenance of the device

While the device or its components are being maintained/serviced, there is no explosion protection.

- ensure that no potentially explosive atmosphere can occur.

⚠ WARNING

Risk of injury

Risk of injury due to maintenance work being carried out incorrectly.

The work described in this chapter require special knowledge and may require work to be done on the gas analyzer while it is open and under voltage!

- Maintenance work on the gas analyzer should be performed by qualified and specially trained personnel only !

Note

For detailed information on the maintenance of the device, consult the associated operating instructions (OI)!

9 Decommissioning

Decommissioning the gas analyzer

In the case of a temporary shutdown:

1. Shut off the sample gas.
2. Purge the gas lines and gas feed paths in the gas analyzer with dry air or nitrogen for at least 5 minutes.
3. Switch off the gas analyzer power supply.

In the case of a long-term shutdown, carry out the following in addition:

4. Remove the gas lines from the gas analyzer ports. Tightly seal the gas ports.
5. Disconnect the electrical leads from the gas analyzer.

Fidas24 – Shutting down the gas analyzer

In the case of a temporary shutdown:

1. Shut off the sample gas supply at the sampling point.
2. Purge the sample gas line with nitrogen for at least 5 minutes, from the sampling point.
3. Set the gas analyzer to standby mode, refer to **Fidas24 – Standby / Restart** on page 105.
   In case of corrosive and combustion gases set the gas analyzer to standby operation with detector purging.
4. Shut off combustion air supply and combustion gas supply.

In the case of a long-term shutdown, carry out the following in addition:

5. Shut off instrument air supply.
6. Switch off the gas analyzer power supply.
7. Remove the gas lines from the gas analyzer ports. Tightly seal the gas ports.
8. Disconnect the electrical leads from the gas analyzer.

Packing the Gas Analyzer

1. Remove adapters from the gas ports and tightly seal the gas ports.
2. If the original packaging is not available, wrap the gas analyzer in bubble wrap or corrugated cardboard. For overseas shipment, always add a desiccant (e.g., silica gel) and hermetically seal the gas analyzer plus desiccant in a layer of polythene that is 0.2 mm thick. The amount of drying agent should be appropriate for the package volume and the expected shipping duration (at least 3 months).
3. Pack the gas analyzer in an adequately sized box lined with shock-absorbing material (foam or similar). The thickness of the shock-absorbing material should be adequate for the weight of the gas analyzer and the mode of dispatch. When shipping overseas, additionally line the box with a double layer of bitumen paper.
4. Mark the box as "Fragile Goods".

Note

If the device is returned to ABB Service (e.g. for repair), the following points must be observed:

- It is essential that the gases that were introduced into the gas analyzer are specified on the return form (see **Return form** on page 121).
- See the information in **Returning devices** on page 119!

Transport-/Storage temperature

−25 to 65 °C

Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.
Fill out the return form (see **Return form** on page 121) and include this with the device.
In accordance with the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:
All devices delivered to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Address for the return:

ABB AG
Service Analysentechnik – Parts & Repair
Stierstädter Straße 5
60488 Frankfurt, Deutschland
Fax: +49 69 7930-4628
E-Mail: repair-analytical@de.abb.com

10 Recycling and disposal

Note

Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).
They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:

- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

11 Specification

Note

The device data sheet is available in the ABB download area at www.abb.com/analytical.

12 Additional documents

Note

All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/analytical

13 Appendix

Return form

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.
Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:	
Address:	
Contact person:	Telephone:
Fax:	Email:

Device details:

Type:	Serial no.:
Reason for the return/description of the defect:	

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items):

☐ biological	☐ corrosive / irritating	☐ combustible (highly / extremely combustible)
☐ toxic	☐ explosive	☐ other toxic substances
☐ radioactive		

Which substances have come into contact with the device?

1.
2.
3.

We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date	Signature and company stamp

Trademarks

Notes

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ABB Measurement & Analytics

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

For more product information, visit:
www.abb.com/analytical

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