

EasyLine Continuous gas analyzers

Models EL3020, EL3040

Software version 3.4

Instructions for installation, start-up and operation

41/24-400 EN Rev. 7



ABB

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Preface

Content of the Operator's Manual

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

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

Further Information

Analyzer Data Sheet

The version of the delivered gas analyzer is described in the "Analyzer Data Sheet" supplied with the gas analyzer.

DVD-ROM "Software tools and technical documentation"

The DVD-ROM "Software tools and technical documentation" with the following contents is included in the scope of supply of the gas analyzer:

- Software tools
- Operator's manuals
- Data sheets
- Technical information
- Certificates

DVD-ROM "Measurement & Analytics Spare parts catalog"

Information on spare parts can be found on the DVD-ROM "Measurement & Analytics Spare parts catalog", which is enclosed with the gas analyzer.

Internet

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

Service contact

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

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

ABB Service,
Telephone: +49-(0)180-5-222 580, Telefax: +49-(0)621-381 931 29031,
E-mail: automation.service@de.abb.com

Symbols and Typefaces in the Operator's Manual

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

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

1, 2, 3, ... Identifies reference numbers in figures.

Display Identifies a display on the screen.

▲ ► ▼ ◀ OK Identifies function keys.

Guideline for Installation and Commissioning

Basic Steps

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

- 1** Please note the information on the intended application (see page 9).
- 2** Follow safety precautions (see page 10).
- 3** Prepare for the installation, provide the requisite material (see page 16).
- 4** Unpacking the gas analyzer (see page 41).
- 5** Check sample gas path seal integrity (see page 122).
- 6** Install the gas analyzer (see page 70).
- 7** Connect the gas lines (see page 72).
- 8** Connect the electrical leads (see page 84).
- 9** Check the installation (see page 95).
- 10** Purge the sample gas path (see page 96).
- 11** Start up the gas analyzer (see page 97).
- 12** Configure the gas analyzer.

Safety Information

Intended Application

Intended Application of the Gas Analyzer

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

Any other use is not as specified.

The specified use also includes taking note of this operator's manual.

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

The gas analyzer version with stainless steel gas lines and gas connections (EL3020 and EL3040 models) may be used for the measurement of flammable gases¹ and vapors in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 40) must be complied with. The oxygen sensor and the modules of the integrated gas feed (Option "Integrated Gas Feed" – only in the EL3020 model, not with Limas23, ZO23, Fidas24) may not be used for the measurement of flammable gases.

The explosion-proof version of the gas analyzer with degree of protection II 3G (see page 14) (EL3040 model) may be used for the measurement of non-flammable gases and vapors in a hazardous environment.

NOTE

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

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

Safety Information

Requirements for Safe Operation

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

Personnel Qualifications

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

Special Information and Precautions

These include

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

National Regulations

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

Device Safety and Safe Operation

The device is designed and tested in accordance with the relevant safety standards and has been shipped ready for safe operation. To maintain this condition and to assure safe operation, read and follow the safety information in this operator's manual. Failure to do so can put persons at risk and can lead to device damage as well as damage to other systems and devices.

Protective Lead Connection

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

Risks of a Disconnected Protective Lead

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

Risks Involved in Opening the Covers

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

Risks Involved in Working with an Open Device

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

When Safe Operation can no Longer be Assured

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

The possibility of safe operation is excluded:

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

Fidas24: Information on the safe operation of the gas analyzer

ATTENTION

The gas analyzer uses hydrogen as a combustion gas!
All the information and instructions contained in this operator's manual must be complied with without fail to ensure 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 seal integrity 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 start-up 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 is not assigned to an (explosion protection) zone; no explosive gas mixture can escape from it 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 exceed 15 vol.% CH₄ or C1 equivalents.
- The relevant safety regulations for working with flammable gases must be complied with.
- The gas connection diagram (see page 68) must be complied with when connecting the combustion gas and combustion air.
- The combustion gas feed path in the gas analyzer may not be opened! The combustion gas feed path can become leaky as a result! Escaping combustion gas can cause fires and explosions, also outside the gas analyzer!
- If the combustion gas feed path in the gas analyzer has been opened, however, it must always be checked for seal integrity (see page 121) with a leak detector after it has been sealed again (leakage rate $< 1 \times 10^{-4}$ hPa l/s).
- The seal integrity of the combustion gas line (see page 119) outside the gas analyzer and the combustion gas feed path (see page 121) in the gas analyzer must be checked on a regular basis.
- The maximum combustion gas flow (see page 31) may not be exceeded.

- The maximum pressures of combustion gas and combustion air (see page 31) may not be exceeded.
- The combustion gas flow rate must be limited to a maximum of 10 l/h of H₂ or 25 l/h of H₂/He mixture. For this purpose, the end user has to provide suitable measures (see page 31) outside the gas analyzer.
- A shut-off valve (see page 31) must be installed in the combustion gas supply line to increase the safety in the following operating states:
 - Shutting down the gas analyzer,
 - Failure of the instrument air supply,
 - Leakage in the combustion gas feed path inside the gas analyzer.This shut-off valve should be installed outside the analyzer house in the vicinity of the combustion gas supply (cylinder, line).
- If there is no automatic shut-off of the combustion gas supply to the gas analyzer in case of an instrument supply failure, a visible or audible alarm must be triggered (see page 132).
- When measuring flammable 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.
- The unobstructed exchange of air with the environment must be possible around the gas analyzer. The gas analyzer may not be directly covered. The openings in the housing towards the top and at the side may not be closed. The distance to laterally adjacent built-in components must be at least 4 mm.
- 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 4 mm.

Explosion-proof design in degree of protection II 3G

NOTE

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

Description

The gas analyzer model EL3040 in degree of protection II 3G has been tested for explosion protection and is suitable for use in hazardous areas in compliance with the technical data (see page 19) and the special conditions (see below).

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

The gas analyzer is only intended for installation indoors.

The analyzers Uras26, Magnos206 and Caldos27 can be installed individually or as combinations of Uras26 with Magnos206 or Caldos27 or oxygen sensor in the gas analyzer.

Operating the instrument under regular conditions cannot cause any ignitable sparks, arcs or impermissible temperatures inside the instrument.

Explosion-proof with: Spark-free instruments and devices with low power consumption; sealed or enclosed instruments.

The gas analyzer is designated pursuant to European Directive 2014/34/EU with:



II 3G Ex nA nC IIC T4 Gc

Type examination certificate no. BVS 16 ATEX E 085 X.

Parameters

Electrical data

Power supply AC 100...240 V

Power consumption max. 187 VA

Pneumatic data

Purge gas

Inlet pressure max. 1104 hPa

Sample gas

Non-flammable sample gas

Inlet pressure max. 1100 hPa

Flow rate (gas outlet atmospheric) max. 100 l/h

Ambient temperature +5 to +45 °C

Special requirements

- The cables have to be properly inserted in the screwed cable glands and sealed by screwing the nut firmly in order to comply with degree of case protection IP65. Cable connectors not in use have to be closed with suitable vent plugs in order to ensure degree of case protection IP65 here as well.
- Purging gas connections not in use during operation have to be closed with vent plugs.
- If the installation site of the gas analyzer is hazardous, the case must not be opened live and electrical connectors must not be disconnected live.
- Due to the low mechanical stability of the display window, the gas analyzer has to be installed and operated in such a way that mechanical damage to the display window with an energy exceeding 2 Joule is ruled out. In the event that the display window is still damaged making it impossible to comply with degree of case protection IP65, the gas analyzer has to be shut down, secured against re-starts and it has to be repaired.
- Due to the low UV resistance of the plastic parts of the housing, the gas analyzer has to be installed and operated in such a way that exposure to UV radiation is ruled out. In the event that the housing is still damaged by UV radiation making it impossible to comply with degree of case protection IP65, the gas analyzer has to be shut down, secured against re-starts and it has to be repaired.

Replacing the battery

- The battery may not be replaced in an explosive atmosphere.
- Only the original battery type Varta CR2032 may be used as replacement.

Preparation for Installation

Scope of Supply and Delivery

Scope of Supply and Delivery

- Gas analyzer model EL3020 (19-inch housing) or model EL3040 (wall-mount housing)
 - Screwed fittings with tubing connectors for the connection of flexible tubes
 - Mains lead (see page 93), length 5 m
 - Mating plugs (socket housing) for the electrical connection of the I/O modules (attached to the terminals of the I/O modules)
 - Screwdriver (required for attaching the electric lines in the mating plugs)
 - Micro-porous filter (see page 72) (pre-assembled)
 - CD-ROM "Software tools and technical documentation" with software tools and technical documentation
 - CD-ROM "Spare parts analytical" with information on spare parts
 - Instructions in brief for Installation, Commissioning and Operation
 - Analyzer data sheet
- Fidas24:**
- Mains lead (see page 94), length 5 m, with 4-pin socket connector and separate grounding connector for the power supply to the heating of the detector and the heated sample gas connection
 - Accessories pack with fittings and O-rings for connection of the sample gas line
 - Exhaust pipe with fitting nut and compression fitting

Material Required for the Installation (not supplied)

Gas Connections

- For the connection of pipelines: Threaded connections with a 1/8 NPT thread and PTFE sealing tape
Fidas24: Use only metal threaded connectors!

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 at least 10 mm inside diameter for waste air
- Tube fittings
- Pressure regulator
- Flow restrictor in the combustion gas supply line (see page 31)
- Shut-off valve in the combustion gas supply line (see page 31)

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 in the scope of supply and delivery of the gas analyzer.

Flowmeter/Flow Monitor

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

Recommendation: Flowmeter 7...70 l/h, Part Number 23151-5-8018474

Shut-off Valve

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

Purging of the gas line system

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

Installation Material

19-inch housing (Model EL3020)

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

Wall-mount housing (Model EL3040)

- 4 screws M8 or M10

Signal Lines

- Select conductive material which is appropriate for the length of the lines and the predictable current load.
- Notes concerning the cable cross-section for connection of the I/O modules:
 - The max. capacity of terminals for stranded wire and solid wire is 1 mm² (17 AWG).
 - The stranded wire can be tinned on the tip or twisted to simplify the assembly.
 - When using wire end ferrules, the total cross-section may not be more than 1 mm², i.e. the cross-section of the stranded wire may not be more than 0.5 mm². The PZ 6/5 crimping tool of Weidmüller & Co. must be used for crimping the ferrules.
- Max. length of the RS485 leads 1200 m (max. transmission rate 19200 bit/s). Cable type: 3-core twisted-pair cable, cable cross-section 0.25 mm² (e.g. Thomas & Betts, Type LiYCY).
- Max. length of the RS232 leads 15 m.

Power Supply Lines

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

Requirements for the installation site, power supply

NOTE

For the analyzers ZO23 and Fidas24 the information contained in the sections "ZO23: Preparation for Installation" or "Fidas24: Preparation for Installation" (see page 31) must be considered in addition.

Requirements for the installation site

The gas analyzer is only intended for installation indoors.

The max. altitude of the installation site may not exceed 2000 m above sea level.

The installation site must be stable enough to bear the weight of the gas analyzer!

To ensure safe installation and removal, we recommend that the 19-inch housing is supported in a 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.

Mount (see page 70) several 19-inch housings with a minimum spacing of 1 height unit between housings.

Protection from adverse conditions

Protect the gas analyzer from:

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

Climatic conditions

Air Pressure	600...1250 hPa
Relative humidity	max. 75 %, slight condensation permissible
Ambient temperature	
for storage and transport	–25...+65 °C
during operation	+5...+45 °C
Uras26 in combination with another analyzer, Limas23, Fidas24	+5...+40 °C

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

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

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

Special requirements for the gas analyzer model EL3040 in degree of protection II 3G**Protection against mechanical damage**

Due to the low mechanical stability of the display window, the gas analyzer has to be installed and operated in such a way that mechanical damage to the display window with an energy exceeding 2 J is ruled out.

Protection against UV radiation

Due to the low UV resistance of the plastic parts of the housing, the gas analyzer has to be installed and operated in such a way that exposure to UV radiation is ruled out.

Housing design

Model	Housing design	Degree of protection	Weight
EL3020	19-inch housing	IP20	approx. 7...15 kg
EL3040	Wall-mount housing	IP65	approx. 13...21 kg

Power supply

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

Fidas24: Heating of the detector and sample gas inlet

Input voltage	115 V AC or 230 V AC, ± 15 % (max. 250 V AC), 47...63 Hz
Power consumption	125 VA for detector, 125 VA for sample gas Inlet (option)
Connection	4-pin plug connector (connecting cable supplied)

Electrical safety

Test	to EN 61010-1:2010
Class of protection	I
Overvoltage category/ degree of pollution	Power supply: II/2 Signal inputs and outputs: II/2
Safe isolation	Galvanic isolation of the power supply from the other circuits by means of reinforced or double insulation. Functional extra-low voltage (PELV) on the low-voltage side.

Electromagnetic compatibility

Interference immunity	Tested to EN 61326-1:2013: Industrial environment
Emitted interference	Tested to EN 61326-1:2013: Class B

Sample gas inlet and outlet conditions

NOTE

For the analyzers ZO23 and Fidas24 the information contained in the sections "ZO23: Preparation for Installation" or "Fidas24: Preparation for Installation" (see page 31) must be considered in addition.

ATTENTION

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

Uras26

Sample gas inlet conditions

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

Positive pressure 2...500 hPa

Flow 20...100 l/h

Flammable gases

The analyzer version with stainless steel gas lines and gas connections is suitable for the measurement of flammable gases in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 40) must be complied with.

Corrosive gases

The analyzer may not be used for the measurement of corrosive gases. Associated gases such as chlorine (Cl₂) or hydrogen chlorides (e.g. wet HCl) as well as gases or aerosols containing chlorine must be cooled or pre-absorbed.

Limas23

Sample gas inlet conditions

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

Positive pressure 2...500 hPa

Flow 20...100 l/h

Flammable gases

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

Corrosive gases

The analyzer may not be used for the measurement of corrosive gases. Associated gases such as chlorine (Cl₂) or hydrogen chlorides (e.g. wet HCl) as well as gases or aerosols containing chlorine must be cooled or pre-absorbed.

Magnos206

Sample gas inlet conditions

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

Flammable gases

The analyzer is suitable for the measurement of flammable gases in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 40) must be complied with.

Corrosive gases

If the sample gas contains Cl₂, 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.

Magnos27

Sample gas inlet conditions

Temperature	+5...+50 °C
Positive pressure	2...100 hPa
Flow	20...90 l/h

Flammable gases

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

Caldos27

Sample gas inlet conditions

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

Flammable gases

The analyzer is suitable for the measurement of flammable gases in a non-hazardous environment. The special requirements for the measurement of flammable gases (see page 40) must be complied with.

Corrosive gases

If the sample gas contains Cl₂, HCl, HF, SO₂, NH₃, H₂S or other corrosive components, the analyzer may only be used if the sample gas composition has been taken into account by the manufacturer for the configuration of the analyzer.

Oxygen sensor

Flammable gases

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

Other requirements

The H₂O 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: H₂S, compounds containing chlorine or fluorine, heavy metals, aerosols, mercaptans, alkaline components.

Integrated gas feed

Flammable gases

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

Note: The integrated gas feed can be installed in model EL3020 as an option. It cannot be used in the EL3040 model or in conjunction with the Limas23, ZO23 or Fidas24 analyzer.

Sample gas dew point

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

Outlet pressure

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

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

Flammable gases

The explosion-proof version of the gas analyzer (see page 14) may be used only for the measurement of non-flammable gases and vapors.

Sample gas inlet pressure

Absolute pressure max. 1100 hPa or positive pressure max. 100 hPa

Test Gases for Calibration

NOTE

For the analyzers ZO23 and Fidas24 the information contained in the sections "ZO23: Preparation for Installation" or "Fidas24: Preparation for Installation" (see page 31) must be considered in addition.

Analyzer(s)	Test gas for the zero-point calibration and the single-point calibration	Test gas for the end-point calibration
Uras26 with calibration cells (automatic calibration)	N ₂ or air or IR sample component-free gas	– (calibration cells)
Uras26 without calibration cells (automatic calibration)	N ₂ or air	Span gas*
Uras26 without calibration cells (manual calibration)	N ₂ or air	Test gas for each sample component
Uras26 + Magnos206 (automatic calibration, i.e. Magnos206 with single-point calibration)	IR sample component-free test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Calibration cells or span gas*
Uras26 + Magnos206 (manual calibration)	Zero gas for Uras26, respectively Magnos206, or IR sample component-free test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Span gas for all sample components in the Uras26 and Magnos206 (possibly only for the Uras26 if a single-point calibration is carried out for the Magnos206)
Uras26 + Magnos27 (automatic calibration)	IR sample component-free test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Calibration cells or span gas*
Uras26 + Magnos27 (manual calibration)	Zero gas for Uras26, respectively Magnos27, or IR sample component-free test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Span gas for all sample components in the Uras26 and 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 gas for Uras26, respectively Caldos27, or IR sample component-free test gas with a known rTC value	Span gas for all sample components in the Uras26 and Caldos27 (possibly only for the Uras26 if a single-point calibration is carried out for the Caldos27)
Uras26 + oxygen sensor (automatic calibration)	IR sample component-free test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Calibration cells or span gas*
Uras26 + oxygen sensor (manual calibration)	IR sample component-free test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	Span gas for all sample components in the Uras26

Analyzer(s)	Test gas for the zero-point calibration and the single-point 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 or oxygen sensor with calibration cells (automatic calibration, i.e. Magnos206 with single-point calibration)	N ₂ or oxygen- and UV sample component-free gas	Either calibration cells and test gas for oxygen detector or test gas for each sample component, respectively for each detector
Limas23 + Magnos206 or oxygen sensor without calibration cells (automatic calibration)	N ₂ or oxygen- and UV sample component-free gas	Test gas for each sample component, respectively for each detector
Limas23 + Magnos206 or oxygen sensor without calibration cells (manual calibration)	N ₂ or oxygen- and UV sample component-free gas	Test gas for each sample component, respectively for each detector
Magnos206	Oxygen-free process gas	Process gas with known O ₂ concentration
Magnos206 with suppressed measuring range	Test gas with O ₂ concentration near the starting point of the measuring range	Test gas with O ₂ concentration near the end point of the measuring range
Magnos206 with single-point calibration	Test gas with O ₂ concentration in an existing measuring range or ambient air. Same moisture content as process gas.	–
Magnos206 with substitute gas calibration	Oxygen-free process gas or substitute gas (O ₂ in N ₂)	Substitute gas, e.g. dried air
Magnos27	Oxygen-free process gas	Process gas with known O ₂ concentration
Magnos27 with substitute gas calibration	Oxygen-free process gas or substitute gas (O ₂ in N ₂)	Substitute gas, e.g. dried air
Caldos27	Sample component-free test gas or process gas	Test gas or process gas with a known sample gas concentration
Caldos27 with 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)	–

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

ZO23: Preparation for Installation

Installation site

Ambient temperature

during operation	with analyzer module installed in a system housing
+5...+45 °C	without electronics module
+5...+45 °C	with electronics module or with power supply only

Vibrations/shocks

max. ± 0.04 mm at 5 to 55 Hz; 0.5 g at 55 to 150 Hz

No heat sources or magnetic fields

No heat sources or devices which generate strong magnetic fields (e.g. electric motors or transformers) may be located in the vicinity of the installation site.

Sample gas

ATTENTION

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

Sample Gas Inlet Conditions

Temperature	+5...+50 °C
Inlet pressure	$p_e \leq 70$ hPa
Flow	4...20 l/h

The sample gas flow rate must be kept constant at ± 0.2 l/h in the specified range. The sample gas must be taken from a bypass at zero pressure. If the sample gas flow rate is too low, the effects of contaminants from the gas lines (leaks, permeabilities, desorptions) have an adverse affect on the measurement result. If the sample gas flow rate is too high, asymmetrical cooling of the sensor can cause measuring errors. This can also cause faster aging of or damage to the sample cell.

Note: Sample gas temperature, pressure and flow rate should be maintained constant to such a degree that the fluctuation influence on the accuracy of measurement is acceptable (see also Chapter "Analyzer Module Operating Data").

Corrosive Gases

The presence of corrosive gases and catalyst poisons, e.g. halogens, gases containing sulphur and heavy metal dusts, causes faster aging and/or or destruction of the ZrO_2 cell.

Flammable Gases

The analyzer module is suitable for the measurement of flammable gases in a non-hazardous environment. The concentration of flammable gases in the sample gas may not exceed 100 ppm.

Associated Gas Effect

Inert gases (Ar, N₂) have no effect. Flammable gases (CO, H₂, CH₄) in stoichiometric concentrations for the oxygen content: Conversion of O₂ < 20 % of the stoichiometric conversion. If there are higher concentrations of flammable gas, higher O₂ conversion rates must be expected.

Sample Gas Outlet Conditions

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

Test Gases**Reference point (= electrical zero)**

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

Example:

Water vapor content at 25 °C and 50 % relative humidity = 1.56 Vol.-% of H₂O ⇒ factor 0.98

Oxygen concentration = 20.93 Vol.-% of O₂ × 0.98 = 20.6 Vol.-% of O₂

End-point

Test gas with oxygen concentration in the smallest measurement range (e.g. 2 ppm O₂ in N₂)

NOTES

The pressure ratios at reference point and end-point must be identical.

Notes for checking the reference point and end-point must be considered.

Purge gas

If a housing purge is selected (only in IP54 version), purging may only be carried out with air (not with nitrogen) as the ambient air serves as a reference gas.

Gas Connections

see section "ZO23: Gas Connections"

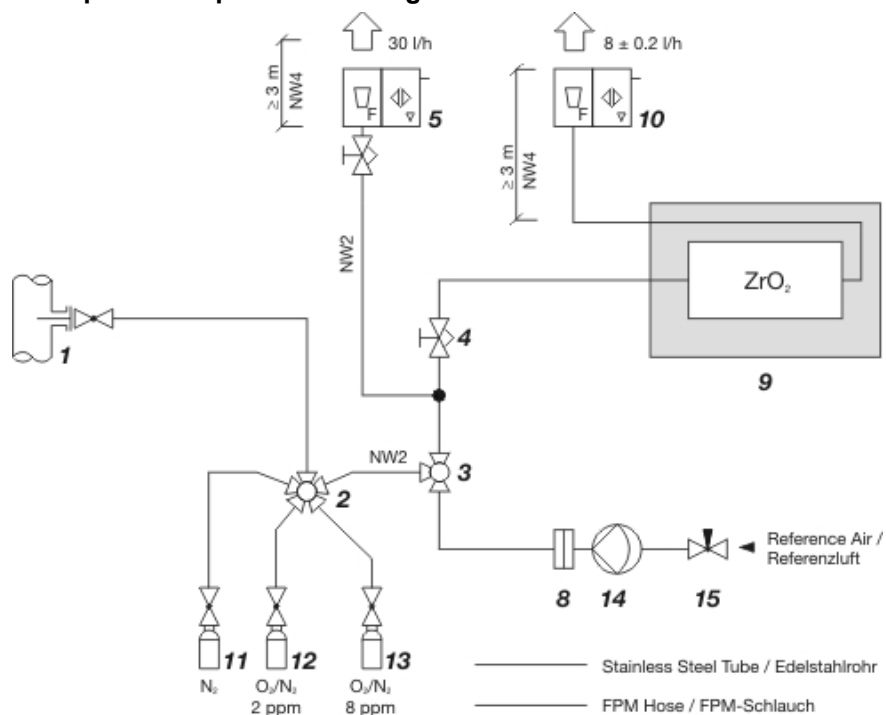
Installation and sample conditioning**ATTENTION**

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 conditioning 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.

Example of sample conditioning



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 Supply Line

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 to the gas analyzer is specified for a tube with an outside diameter of 3 mm. The connections should be executed 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 takes 8 l/h from the gas flow. A surplus of approx. 20 l/h remains. If several ZO23 analyzer modules are supplied with gas in parallel (redundant measurement), the flow rate must be set, so that the bypass has a surplus 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.

Fidas24: Preparation for Installation

Sample gas

Sample components

Hydrocarbons (THC). The sample component concentration in the sample gas path should not exceed the temperature-dependent LEL. The analyzer temperature is 180 °C.

Sample gas inlet conditions

Temperature	≤ Thermostat temperature (thermostat temperature for sample gas path, detector and air jet injector ≤ 200 °C, pre-set ex works to 180 °C)
Inlet pressure	$p_{\text{abs}} = 800$ to 1100 hPa
Flow	Approx. 80 to 100 l/h at atmospheric pressure (1000 hPa)
Humidity	≤ 40 % H ₂ O

Note: Sample gas temperature, pressure and flow rate should be maintained constant to such a degree that the fluctuation influence on the accuracy of measurement is acceptable (see also Chapter "Analyzer Module Operating Data").

Sample gas outlet conditions

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

Flammable gases

The gas analyzer may be used for the measurement of flammable gases provided that the flammable portion does not exceed 15 vol.% CH₄ or C1 equivalents.

Further sample gas inlet conditions

The sample gas may not be explosive at any time.

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

Process gases

Instrument air

Quality	as per ISO 8573-1 Class 2 (max. particle size 1 µm, max. particle density 1 mg/m ³ , max. oil content 0.1 mg/m ³ , dew point at least 10 °C below the lowest expected ambient temperature)
Inlet pressure	$p_e = 4000 \pm 500$ hPa
Flow	typically approx. 1800 l/h (1200 l/h for air jet injector and approx. 600 l/h for housing purge), maximum approx. 2200 l/h (1500 l/h + 700 l/h)

Combustion air

Quality	Synthetic air or catalytically cleaned air with an organic C content < 1 % of span
Inlet pressure	$p_e = 1200 \pm 100$ hPa
Flow	< 20 l/h

Combustion gas

Quality	Hydrogen (H ₂), Quality 5.0	H ₂ /He mixture (40 %/60 %)
Inlet pressure	$p_e = 1200 \pm 100$ hPa	$p_e = 1200 \pm 100$ hPa
Flow	≤ 3 l/h	approx. 10 l/h

NOTE

H₂/He mixture may only be used if the gas analyzer has been ordered and supplied in the execution specified for this. If the gas analyzer has been supplied in the execution for H₂/He mixture, H₂ may not be used as a combustion gas under any circumstances. This would cause overheating and therefore the destruction of the detector!

ATTENTION

A flow restriction and a shut-off valve must be installed in the combustion gas supply line by the end user, so that safe operation of the gas analyzer is ensured.

Flow restrictor in the combustion gas supply line

The combustion gas flow must be restricted to a maximum of 10 l/h of H₂ or 25 l/h of H₂/He mixture. Suitable measures outside the gas analyzer must be provided by the end user for this purpose.

ABB recommends the use of a bulkhead fitting with an integrated flow restrictor which must be installed in the combustion gas supply line. This bulkhead fitting can be purchased from ABB:

- Combustion gas H₂: Part Number 8329303,
- Combustion gas H₂/He mixture: Part 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 the safety in the following operating states:

- Shutting down the gas analyzer,
- Failure of the instrument air supply,
- Leakage in the combustion gas feed path inside the gas analyzer.

This shut-off valve should be installed outside the analyzer house in the vicinity of the combustion gas supply (cylinder, line).

ABB recommends the use of a pneumatic shut-off valve which is actuated by the instrument air. Recommendation: Type Swagelok® SS-42GS6MM-A15C3.

If a pneumatic shut-off valve of this kind cannot be installed, precautionary measures must be taken, so that the overall status or the "failure" status of the gas analyzer is monitored (see section "Fidas24: Troubleshooting" (see page 132)).

Test Gases

Zero-point Calibration

Quality	Nitrogen, Quality 5.0, synthetic air or catalytically cleaned air with an organic C content < 1 % of span
Inlet pressure	$p_e = 1000 \pm 100$ hPa
Flow	130 to 250 l/h

End-point Calibration

Quality	Sample component or substitute gas component in nitrogen or synthetic air with concentration adjusted to the measuring range
Inlet pressure	$p_e = 1000 \pm 100$ hPa
Flow	130 to 250 l/h

NOTE

The Notes for Calibration must be considered.

Gas Connections

See the sections "Gas and Electrical Connections for Fidas24 (Model EL3020)" (see page 68) and "Gas and Electrical Connections for Fidas24 (Model EL3040)" (see page 69)

Pressure Sensor

NOTE

A pressure sensor cannot be installed in the ZO23 and Fidas24 gas analyzers.

Uras26

The pressure sensor is installed in the gas analyzer as standard. Depending on the design of the gas analyzer, it is internally connected as follows (see also Gas Connections for the models EL3020 (see page 44) and EL3040 (see page 46)):

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

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

Limas23

The pressure sensor is installed in the gas analyzer as standard. It is internally connected in the outlet of the sample cell (see also gas connections for the models EL3020 (see page 56) and EL3040 (see page 57)).

Magnos206

The pressure sensor is installed in the gas analyzer as an option. It is connected to a connection port via an FPM hose (see also gas connections for the models EL3020 (see page 60) and EL3040 (see page 61)).

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

Particular care should be taken to ensure that the gas discharge line is as short as possible. If this is not practicable, the line must have a sufficiently wide internal diameter (at least 10 mm).

Magnos27

The pressure sensor is installed in the gas analyzer as an option. It is connected to a connection port via an FPM hose (see also gas connections for the model EL3020 (see page 62)).

Caldos27

The pressure sensor is installed in the gas analyzer as standard. It is connected to a connection port via an FPM hose (see also gas connections for the models EL3020 (see page 66) and EL3040 (see page 67)).

Information for the proper operation of the pressure sensor

- The yellow plastic screw cap must be screwed out of the connectors of the pressure sensor before the gas analyzer is started up.
- The pressure sensor and sample gas outlet must be connected to each other via a T-piece and short lines to ensure a precise pressure correction. The lines must be as short as possible or if this is not practicable, the line must have a sufficiently wide internal diameter (at least 10 mm) so that the flow effect is minimized.
- If the pressure sensor is connected to the sample gas feed path, the sample gas may not contain any corrosive, flammable or ignitable components.
- If the pressure sensor connection is not connected to the sample gas outlet, an exact pressure correction is required, so that the pressure sensor and the sample gas outlet are on the same pressure level.

Housing Purge

Housing Design

Remark: Housing purge in the Fidas24 is described in a separate section, see below.

Housing Purge is only possible with the wall-mount housing (EL3040 model). The purging gas connectors (1/8-NPT female thread) are factory-installed based on orders.

When does a housing purge become necessary?

Housing purge becomes necessary when the sample gas contains flammable (see page 40), corrosive or toxic components.

Purge Gas

The following is to be used as purge gas:

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

NOTE

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

ATTENTION

Leaks may cause the purging gas to escape from the housing. When applying nitrogen as purge gas, appropriate precautionary measures must be taken against asphyxiation!

The purge gas flow must always be restricted upstream of the purge gas inlet! If the purge gas flow is not restricted until after the purge gas outlet, the full pressure of the purge gas is exerted on the seals. This can destroy the operator panel keypad!

Initial Purging for Start-up

Purging of the gas feed path: Purge gas flow max. 100 l/h, duration approx. 20 s

Purging of the wall-mount housing: Purge gas flow max. 200 l/h, duration approx. 1 h

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

Housing Purge during Operation

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

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

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

Housing Purge during Operation when Measuring Flammable Gases

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

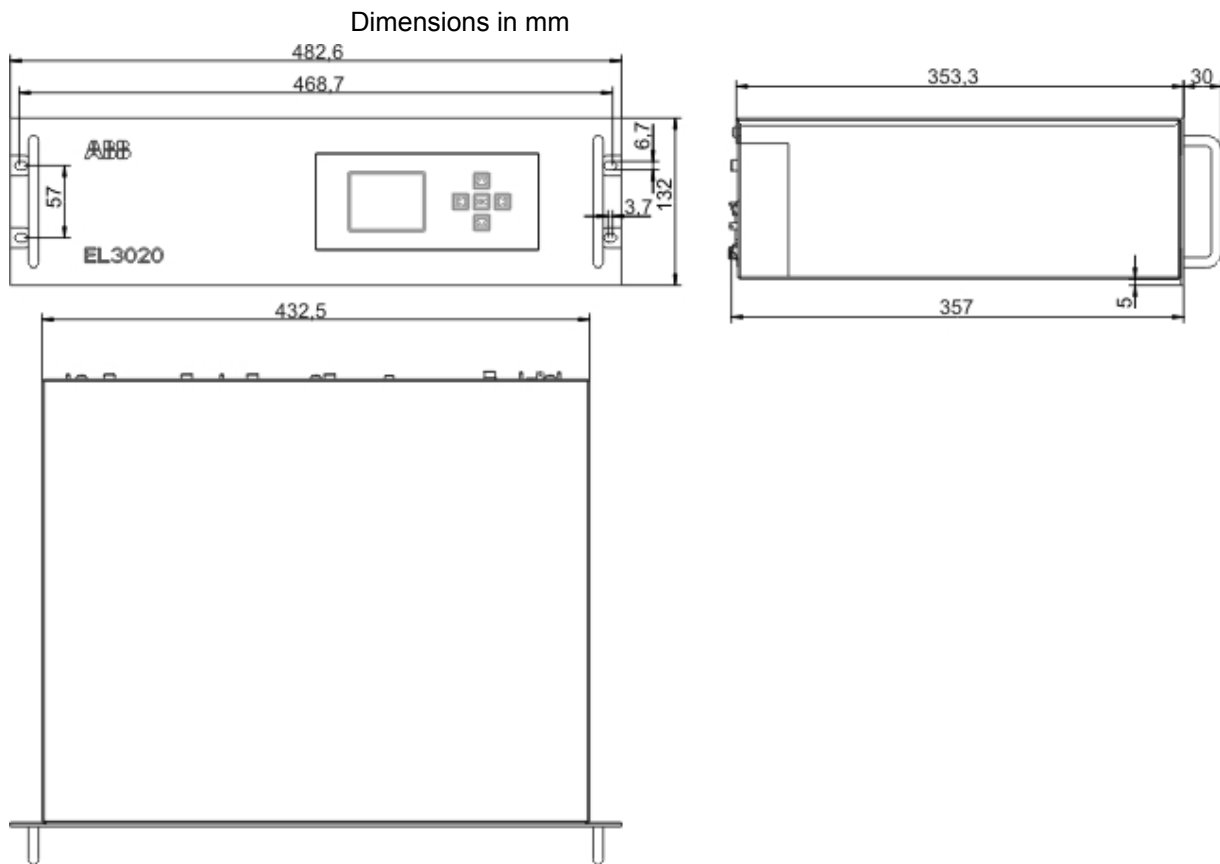
Housing Purge in the Fidas24

The housing purge is implemented in the Fidas24 gas analyzer in such a way that a part (approx. 600...700 l/h) of the instrument air is conducted continuously through the housing as purging air. This ensures that a flammable mixture cannot form in the housing in the event of a leak in the combustible gas feed path.

The housing purge is always active if compressed air is switched on, even if the instrument air valve is closed.

Dimensional Drawings

19-inch Case (Model EL3020)

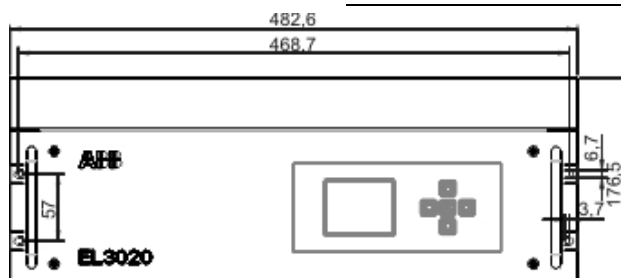


19-inch Case (Model EL3020 with Magnos27)

Dimensions in mm

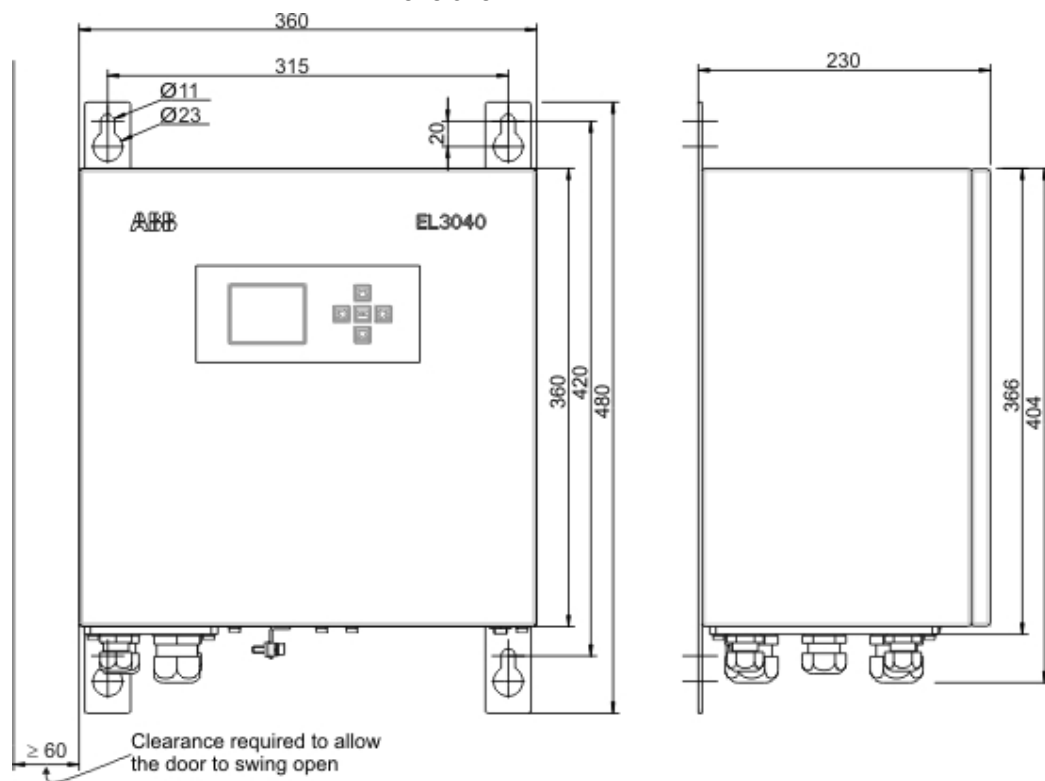
NOTE

Only the front view of the housing with its height differing from the standard dimension is depicted in this dimensional drawing. Refer to the dimensional drawing above for other views and dimensions of the housing.



Wall-mounting Case (Model EL3040)

Dimensions in mm



Special Requirements for the Measurement of Flammable Gases

NOTE

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

Installation of the Gas Analyzer

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

Commissioning of the Gas Analyzer

- The sample gas feed path must be purged (see page 96) with inert gas, before the gas analyzer is commissioned.

Operation and Maintenance of the Gas Analyzer

- Model EL3040 only: The case must be purged with nitrogen. Purge gas flow 1 to 20 l/h. The purge gas flow must be monitored at the purge gas outlet.
- The positive pressure in the sample gas feed path may not exceed a maximum value of 100 hPa in normal operation and a maximum value of 500 hPa in the event of a fault.
- The seal integrity of the sample gas feed path should be checked regularly (see page 122).
- After the sample gas feed path inside the gas analyzer has been opened (see page 123), the following measures are required:
 - The seal integrity of the sample gas feed path should be checked.
 - The sample gas feed path must be purged with inert gas, before the power supply is switched on.

Installing the Gas Analyzer

Unpacking the Gas Analyzer

ATTENTION

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

Unpacking and transporting requires two persons!

Unpacking the Gas Analyzer

- 1 Remove the accessories (see scope of supply and delivery (see page 16)) from the shipping box.
Ensure that the accessories do not get lost.
- 2 Remove the gas analyzer from the shipping box together with the respective protective packaging.
- 3 Remove the protective packaging and place the gas analyzer in a clean location.
- 4 Remove the adhesive packaging residues from the gas analyzer.

NOTES

Keep the shipping box and the protective packaging for future shipping needs.

If there is shipping damage which indicates improper handling, file a damage claim with the shipper (rail, mail or freight carrier) within seven days.

Installing the Gas Connections

NOTES

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

Position and Layout of the Gas Connections

Uras26	Model EL3020 (see page 44)	Model EL3040 (see page 46)
Uras26 with Magnos206	Model EL3020 (see page 48)	Model EL3040 (see page 50)
Uras26 with Caldos27	Model EL3020 (see page 52)	Model EL3040 (see page 54)
Limas23	Model EL3020 (see page 56)	Model EL3040 (see page 57)
Limas23 with Magnos206	Model EL3020 (see page 58)	Model EL3040 (see page 59)
Magnos27	Model EL3020 (see page 62)	–
Magnos27 with Uras26	Model EL3020 (see page 63)	–
Magnos206	Model EL3020 (see page 60)	Model EL3040 (see page 61)
ZO23	Model EL3020 (see page 64)	Model EL3040 (see page 65)
Caldos27	Model EL3020 (see page 66)	Model EL3040 (see page 67)
Fidas24	Model EL3020 (see page 68)	Model EL3040 (see page 69)

Requisite Material

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

Installing the Gas Connections

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

NOTE

Screw in the fittings carefully and not too tightly!

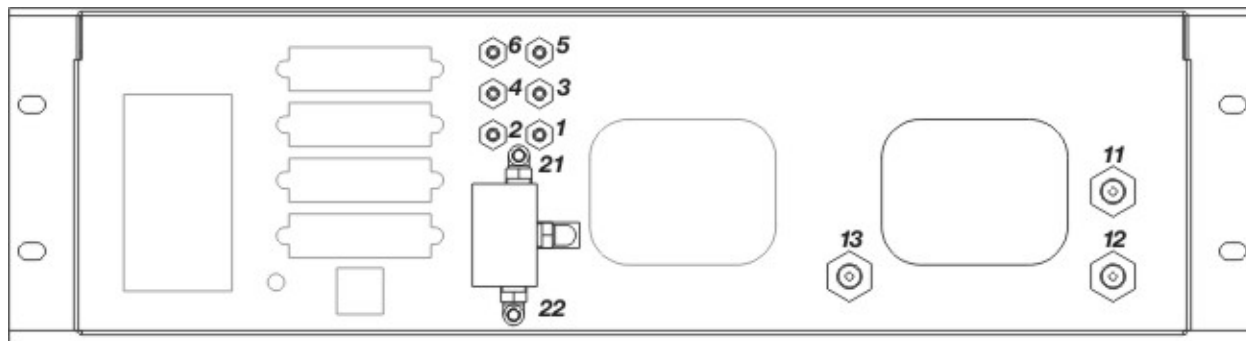
Checking the Seal Integrity of the Sample Gas Feed Path

The tightness of the sample gas feed path was checked in the factory. However since it may have been affected during transport of the gas analyzer (e.g. by strong vibrations), we recommend that it is checked (see page 122) before the instrument is commissioned at the installation site.

NOTE

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

Gas Connections for Uras26 (Model EL3020)



Uras26: Gas Connections for Flexible Tubes

(internal gas lines executed as flexible tubes)

1	Sample gas inlet	Gas feed path 1	without option "Integrated gas feed"
2	Sample gas outlet	Gas feed path 1	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to 1 Sample gas inlet Gas feed path 1	
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)	
5	Sample gas inlet	Gas feed path 2	with separate gas feed paths for (NOx measurement with upstream converter)
6	Sample gas outlet	Gas feed path 2	
Design:		Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)	
21	Sample gas inlet	on the solenoid valve with the option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor	
22	Test gas inlet		

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner diameter (supplied)

Note: The pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
 in the outlet of sample cell 1 with one sample cell and with separate gas feed paths,
 in the outlet of sample cell 2 with two sample cells in series.
 The second O₂ sensor (option for version with two separate gas paths) is connected in the outlet of sample cell 2.

Uras26: Gas Connections for Pipelines

(internal gas lines executed as stainless steel pipes)

6 Pressure sensor

Design: Screwed fitting with hose nozzle (stainless steel 1.4305/SAE 303) for hose with 4 mm inner diameter (supplied)

11 Sample gas inlet

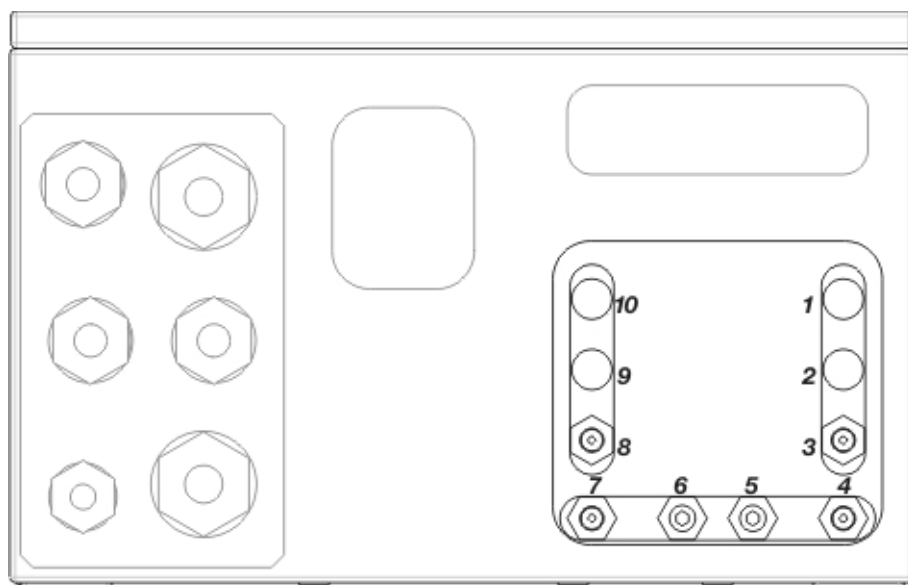
12 Sample gas outlet with one sample cell

13 Sample gas outlet with two sample cells in series

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303) for threaded connections (not supplied)

Note: The oxygen sensor, the option "Integrated gas feed" and the version with separate gas feed paths are not possible.

Gas Connections for Uras26 (Model EL3040)



Uras26: Gas Connections with 1 Gas Feed Path

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

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

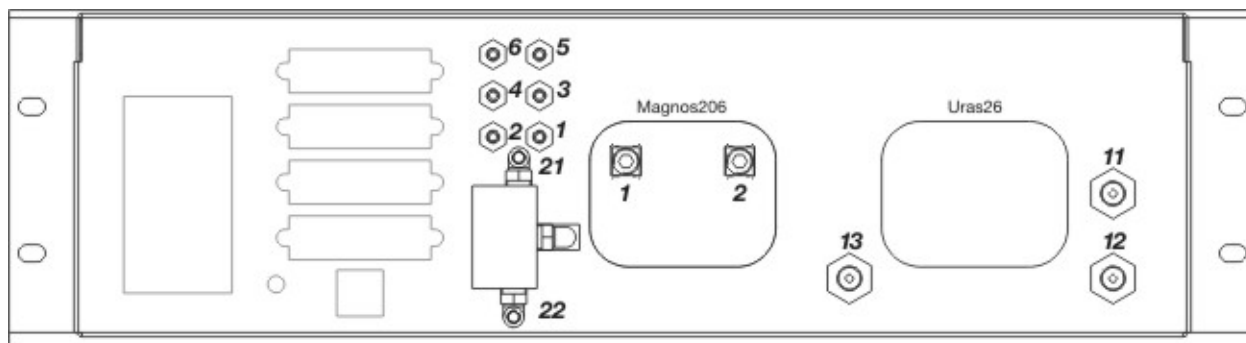
Uras26: Gas Connections with 2 Separate Gas Feed Paths

(internal gas lines executed as flexible tubes)

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

- Design:** 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)
- Notes:** If the internal gas lines are flexible tubes, the pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
 in the outlet of sample cell 1 for a sample cell and two separate feed paths
 in the outlet of sample cell 2 with two sample cells in series.
- If the internal gas lines are stain steel pipes, the oxygen sensor and the version with separate gas feed paths are not possible.

Gas Connections for Uras26 with Magnos206 (Model EL3020)



Uras26: Gas Connections for Flexible Tubes

(internal gas lines executed as flexible tubes)

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

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner diameter (supplied)

Note: The pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
 in the outlet of sample cell 1 with one sample cell and with separate gas feed paths,
 in the outlet of sample cell 2 with two sample cells in series.
 The second O2 sensor (option for version with two separate gas paths) is connected in the outlet of sample cell 2.

Uras26: Gas Connections for Pipelines

(internal gas lines executed as stainless steel pipes)

6 Pressure sensor

Design: Screwed fitting with hose nozzle (stainless steel 1.4305/SAE 303) for hose with 4 mm inner diameter (supplied)

11 Sample gas inlet

12 Sample gas outlet with one sample cell

13 Sample gas outlet with two sample cells in series

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303) for threaded connections (not supplied)

Note: The oxygen sensor, the option "Integrated gas feed" and the version with separate gas feed paths are not possible.

Magnos206: Gas Connections

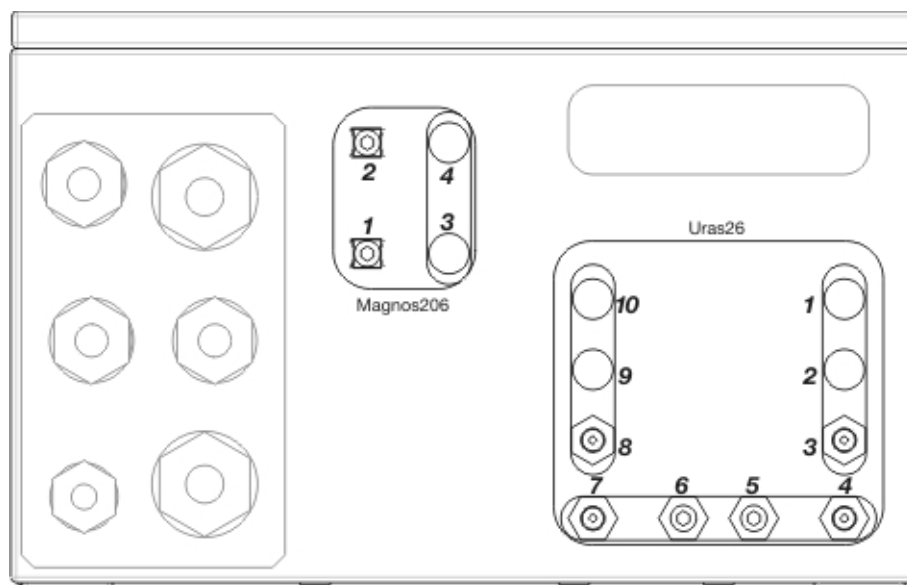
1 Sample gas inlet

2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

Gas Connections for Uras26 with Magnos206 (Model EL3040)



Uras26: Gas Connections with 1 Gas Feed Path

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

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

Uras26: Gas Connections with 2 Separate Gas Feed Paths

(internal gas lines executed as flexible tubes)

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

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

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

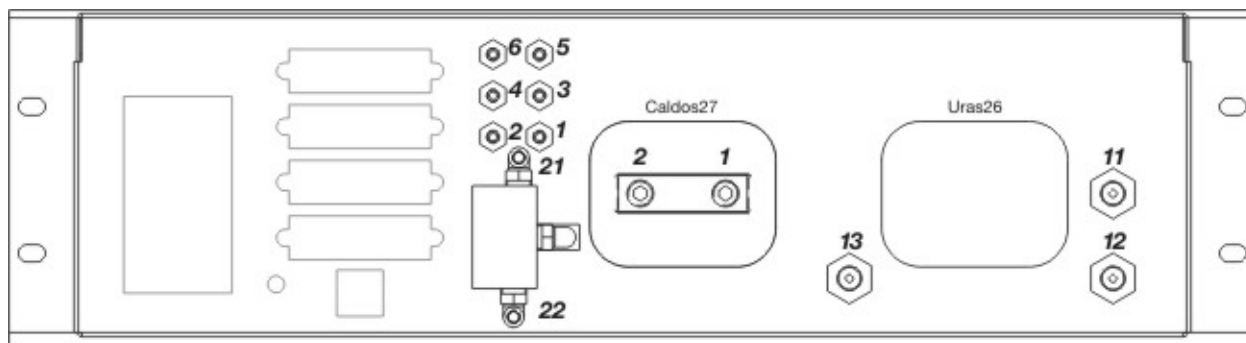
Magnos206: Gas Connections

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

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

Gas Connections for Uras26 with Caldos27 (Model EL3020)



Uras26: Gas Connections for Flexible Tubes

(internal gas lines executed as flexible tubes)

1	Sample gas inlet	Gas feed path 1	without option "Integrated gas feed"
2	Sample gas outlet	Gas feed path 1	
3	Sample gas outlet	with the option "Integrated gas feed", connected ex works to 1 Sample gas inlet	Gas feed path 1
4	Sample gas inlet	with the option "Integrated gas feed", only with flow sensor (without solenoid valve)	
5	Sample gas inlet	Gas feed path 2	with separate gas feed paths for (NO _x measurement with upstream converter)
6	Sample gas outlet	Gas feed path 2	
21	Sample gas inlet	on the solenoid valve with the option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor	
22	Test gas inlet		

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner diameter (supplied)

Note: The pressure sensor (standard) and the oxygen sensor (option) are internally connected as follows:
 in the outlet of sample cell 1 with one sample cell and with separate gas feed paths,
 in the outlet of sample cell 2 with two sample cells in series.
 The second O₂ sensor (option for version with two separate gas paths) is connected in the outlet of sample cell 2.

Uras26: Gas Connections for Pipelines

(internal gas lines executed as stainless steel pipes)

6 Pressure sensor

Design: Screwed fitting with hose nozzle (stainless steel 1.4305/SAE 303) for hose with 4 mm inner diameter (supplied)

11 Sample gas inlet

12 Sample gas outlet with one sample cell

13 Sample gas outlet with two sample cells in series

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303) for threaded connections (not supplied)

Note: The oxygen sensor, the option "Integrated gas feed" and the version with separate gas feed paths are not possible.

Caldos27: Gas Connections

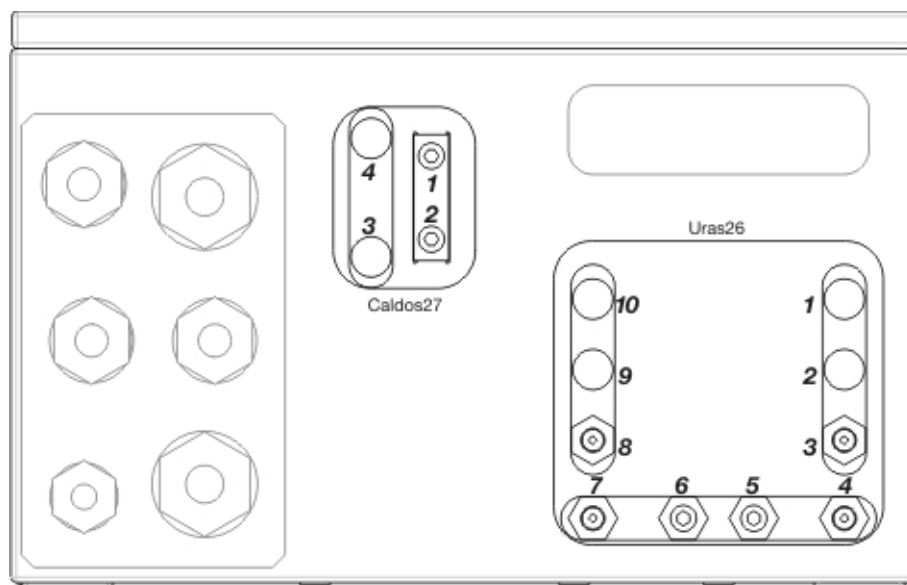
1 Sample gas inlet

2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

Gas Connections for Uras26 with Caldos27 (Model EL3040)



Uras26: Gas Connections with 1 Gas Feed Path

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

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

Uras26: Gas Connections with 2 Separate Gas Feed Paths

(internal gas lines executed as flexible tubes)

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

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

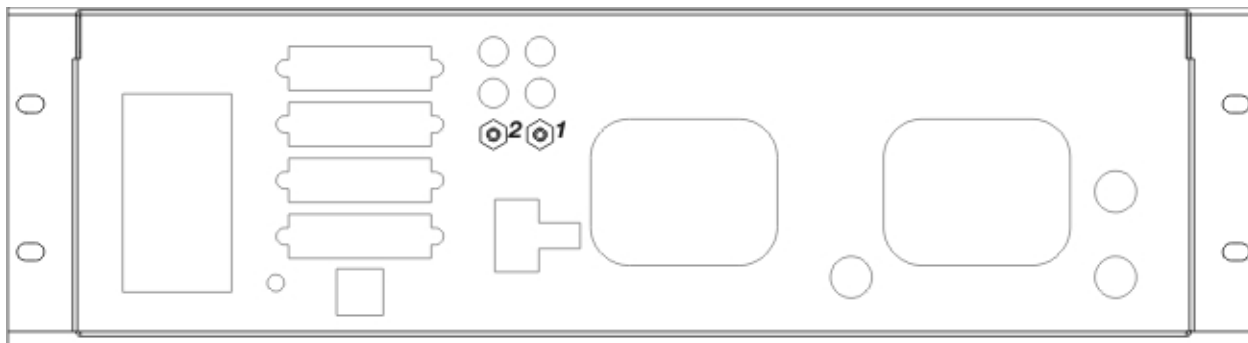
If the internal gas lines are stain steel pipes, the oxygen sensor and the version with separate gas feed paths are not possible.

Caldos27: Gas Connections**1** Sample gas inlet**2** Sample gas outlet**3** not assigned**4** not assigned

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

Gas Connections for Limas23 (Model EL3020)



Limas23: Gas Connections

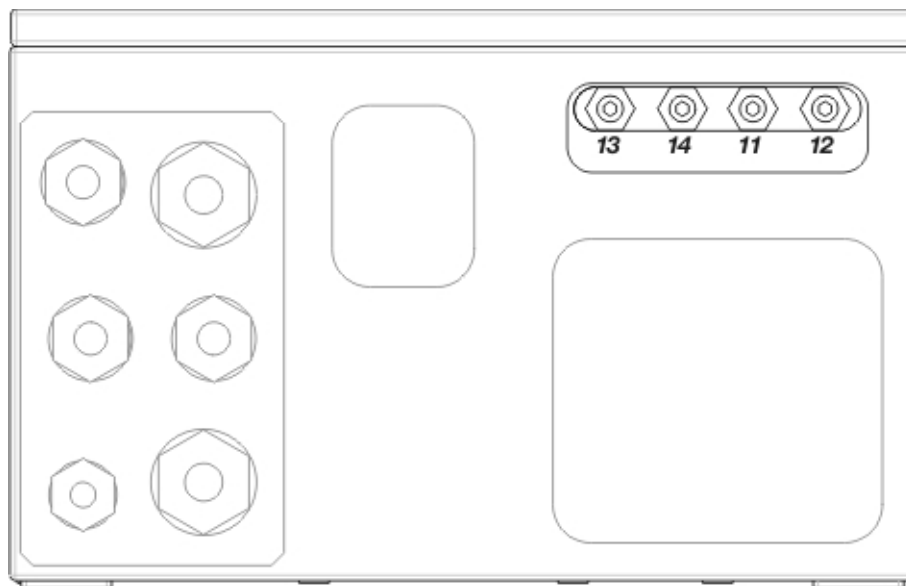
1 Sample gas inlet

2 Sample gas outlet

Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

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

Gas Connections for Limas23 (Model EL3040)



Limas23: Gas Connections

13 Sample gas inlet

14 Sample gas outlet

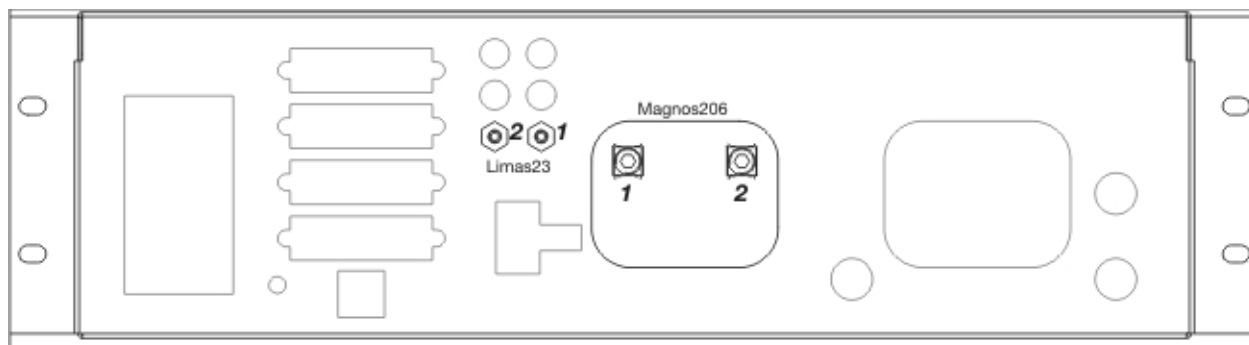
11 Purge gas inlet for case

12 Purge gas outlet for case

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: Straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

Gas Connections for Limas23 with Magnos206 (Model EL3020)



Limas23: Gas Connections

1 Sample gas inlet

2 Sample gas outlet

Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

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

Magnos206: Gas Connections

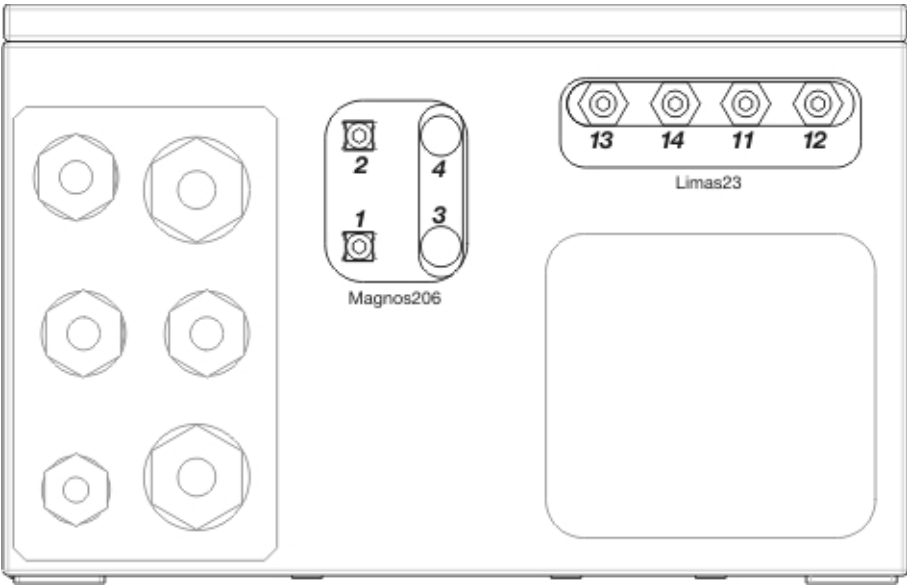
1 Sample gas inlet

2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

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

Gas Connections for Limas23 with Magnos206 (Model EL3040)



Limas23: Gas Connections

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

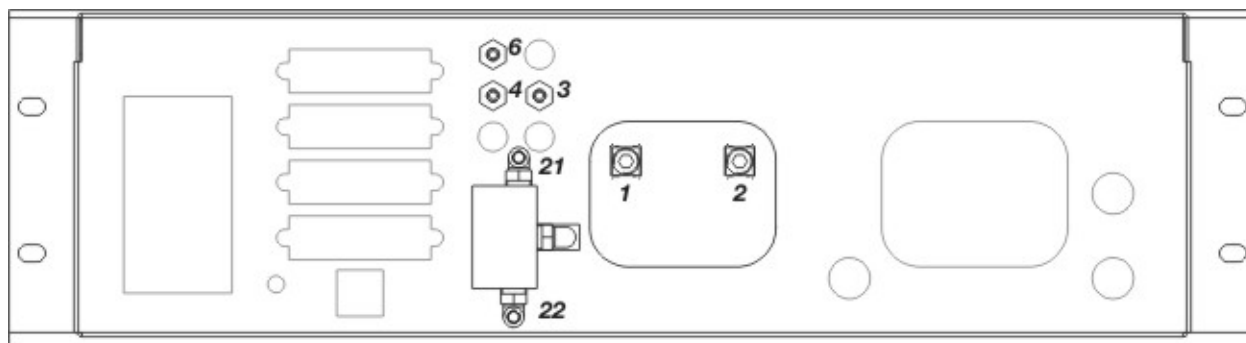
Design:	1/8 NPT female thread (stainless steel 1.4305/SAE 303) Connection of flexible tubes: Straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)
Note:	The pressure sensor is connected internally in the outlet of the sample cell.

Magnos206: Gas Connections

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

Design:	1/8 NPT female thread (stainless steel 1.4305/SAE 303) Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied) Connection of pipelines: Threaded connections (not supplied)
Note:	The sample gas inlet of the Limas23 is connected ex works to the sample gas inlet of the Magnos206.

Gas Connections for Magnos206 (Model EL3020)



Magnos206: Gas Connections

1 Sample gas inlet

2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

3 Sample gas outlet with the option "Integrated gas feed", connected ex works to **1** Sample gas inlet

4 Sample gas inlet with the option "Integrated gas feed", only with flow sensor (without solenoid valve)

6 Pressure sensor

Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

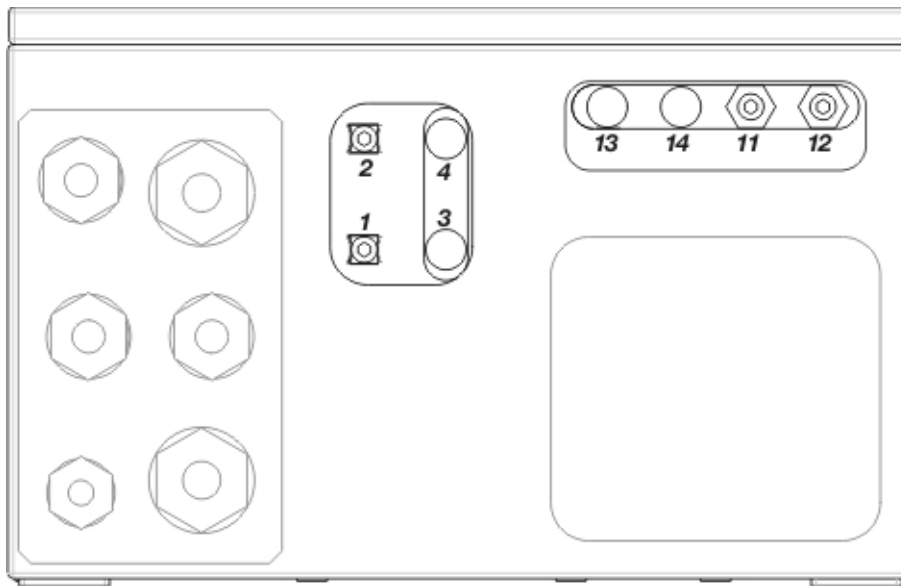
21 Sample gas inlet on the solenoid valve with option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor

22 Test gas inlet

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner diameter (supplied)

Note: The pressure sensor is installed as an option.

Gas Connections for Magnos206 (Model EL3040)



Magnos206: Gas Connections

1 Sample gas inlet

2 Sample gas outlet

3 not assigned

4 not assigned

11 Purge gas inlet for case

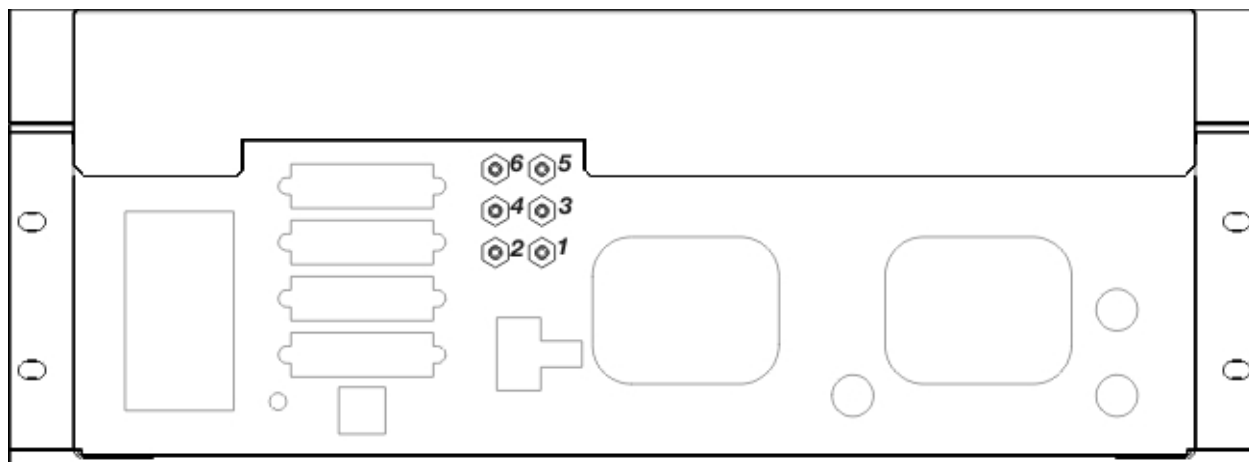
12 Purge gas outlet for case

13 Pressure sensor

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

Note: The pressure sensor is installed as an option.

Gas Connections for Magnos27 (Model EL3020)



Magnos27: Gas Connections

1 Pressure sensor (option)

2 not used

3 Sample gas inlet

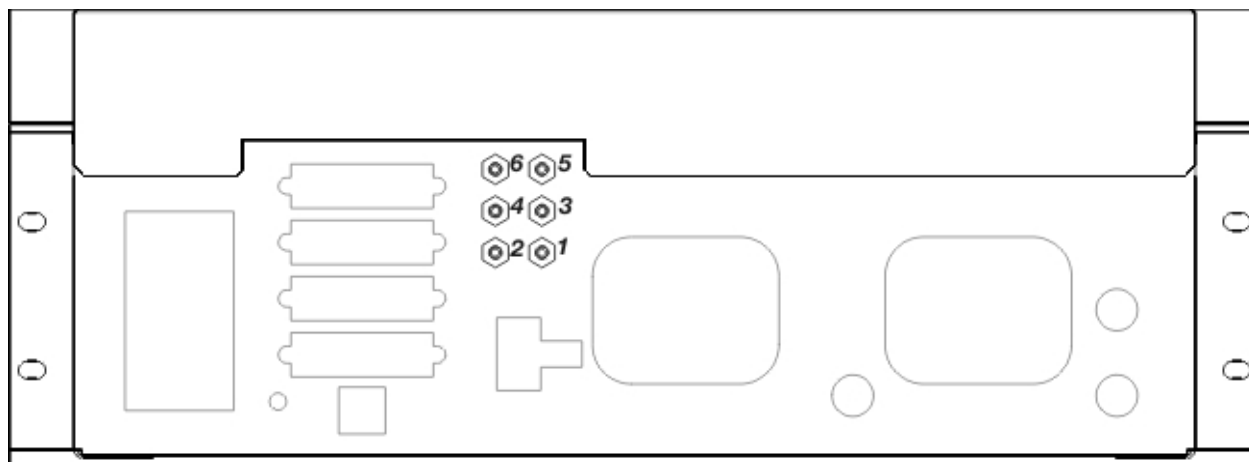
4 Sample gas outlet

5 Purge gas inlet analyzer

6 Purge gas outlet analyzer

Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

Gas Connections for Magnos27 with Uras26 (Model EL3020)



Magnos27: Gas Connections

- | | |
|----------|---------------------------|
| 3 | Sample gas inlet |
| 4 | Sample gas outlet |
| 5 | Purge gas inlet analyzer |
| 6 | Purge gas outlet analyzer |

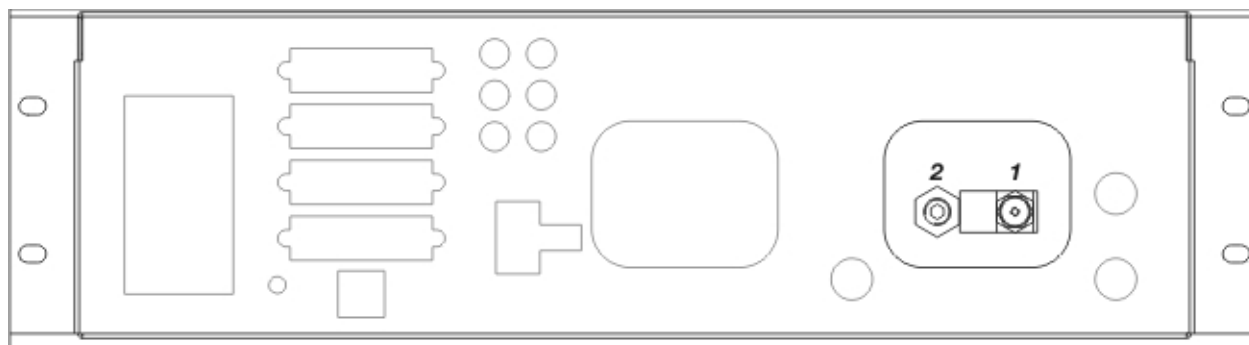
Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

Uras26: Gas Connections

- | | |
|----------|-------------------|
| 1 | Sample gas inlet |
| 2 | Sample gas outlet |

Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

Gas Connections for ZO23 (Model EL3020)

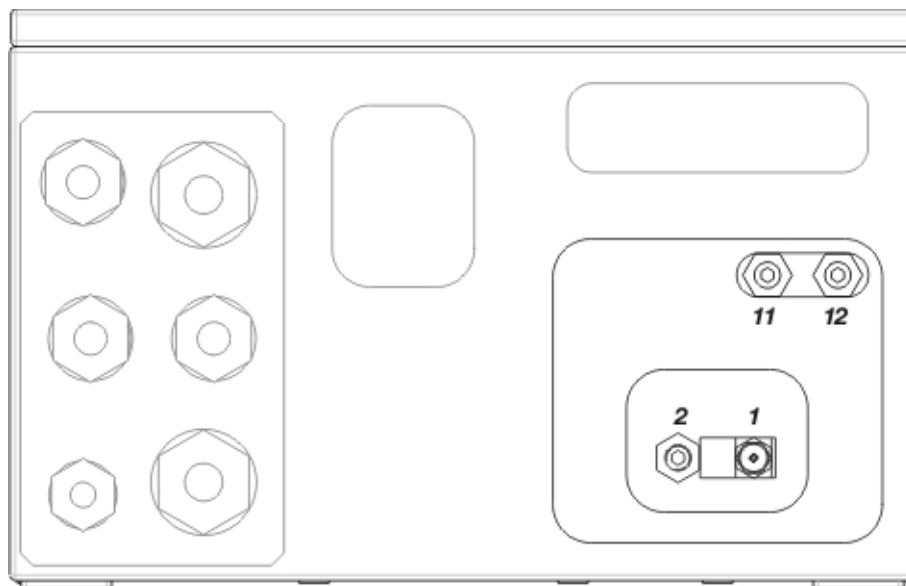


ZO23: Gas Connections

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

- | | |
|----------|---|
| 1 | Sample gas inlet (3 mm Swagelok®) |
| 2 | Sample gas outlet (1/8 NPT female thread for threaded connections – not supplied) |

Gas Connections for ZO23 (Model EL3040)



ZO23: Gas Connections

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

1 Sample gas inlet (3 mm Swagelok®)

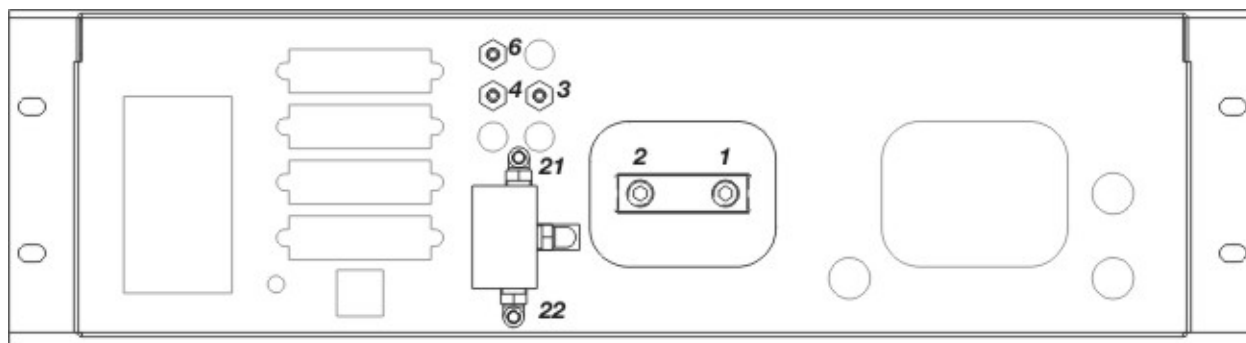
2 Sample Gas Outlet

11 Purge gas inlet for housing

12 Purge gas outlet for housing

Design of the gas connections unless stated otherwise: 1/8 NPT female thread for threaded connections (not supplied)

Gas Connections for Caldos27 (Model EL3020)



Caldos27: Gas Connections

1 Sample gas inlet

2 Sample gas outlet

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

3 Sample gas outlet with the option "Integrated gas feed", connected ex works to **1** Sample gas inlet

4 Sample gas inlet with the option "Integrated gas feed", only with flow sensor (without solenoid valve)

6 Pressure sensor

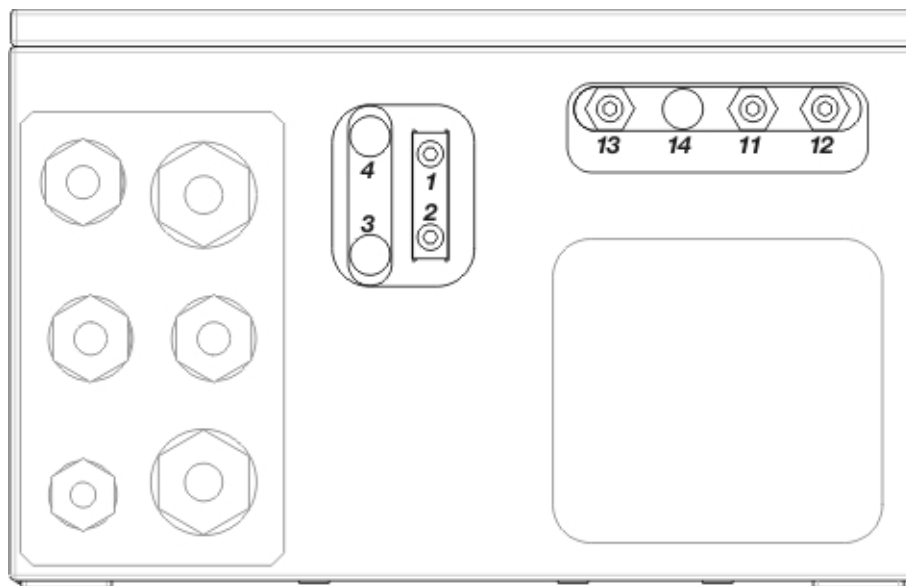
Design: Screwed fittings with hose nozzles (stainless steel 1.4305/SAE 303) for hoses with 4 mm inner diameter (supplied)

21 Sample gas inlet on the solenoid valve with option "Integrated gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor

22 Test gas inlet

Design: Screwed fittings with hose nozzles (PVDF) for hoses with 4 mm inner diameter (supplied)

Gas Connections for Caldos27 (Model EL3040)

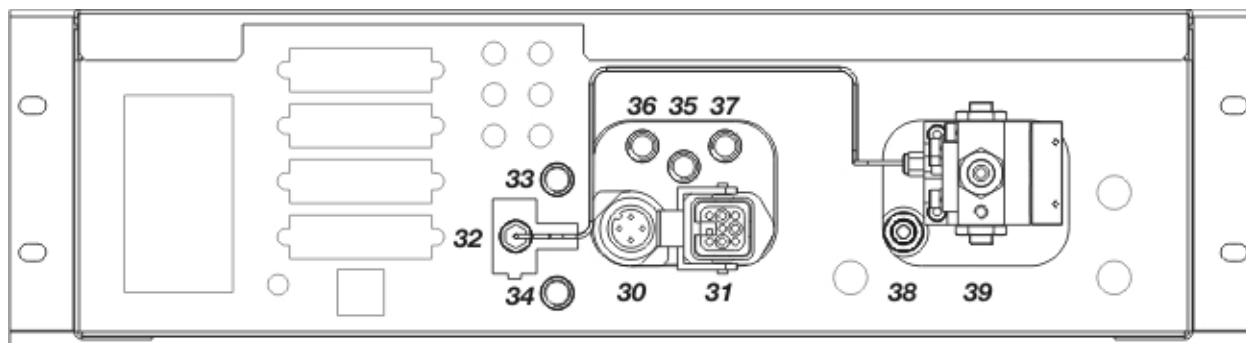


Caldos27: Gas Connections

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

Design: 1/8 NPT female thread (stainless steel 1.4305/SAE 303)
 Connection of flexible tubes: straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm (supplied)
 Connection of pipelines: Threaded connections (not supplied)

Gas and Electrical Connections for Fidas24 (Model EL3020)

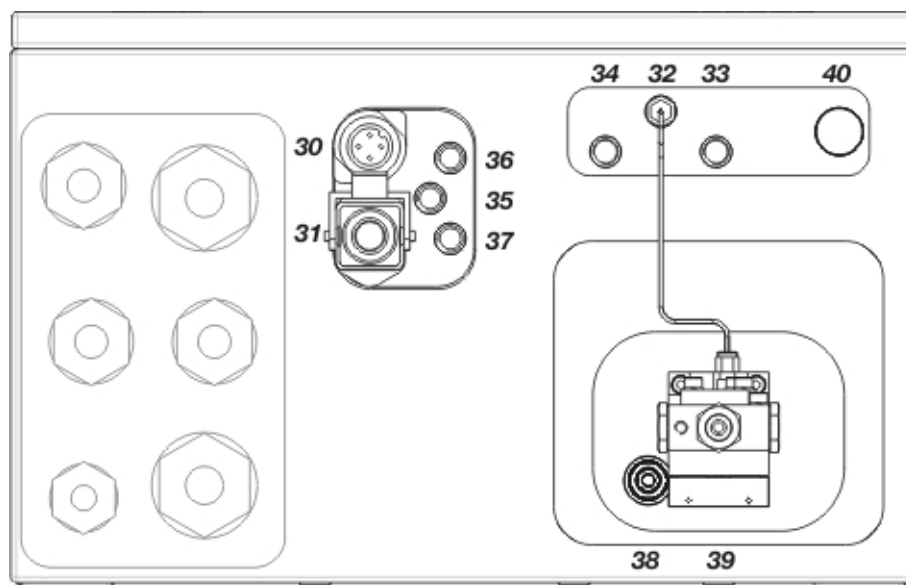


Fidas24: Gas and Electrical Connections

- | | |
|-----------|---|
| 30 | Power supply 115 V AC or 230 V AC for heating the detector and sample gas inlet (4-pin plug connector, connecting cable supplied) |
| 31 | Electrical connection to the heated sample gas inlet (hard mounted) |
| 32 | Test gas outlet |
| 33 | Zero gas inlet |
| 34 | Span gas inlet |
| 35 | Combustion air inlet |
| 36 | Combustion gas inlet |
| 37 | Instrument air inlet |
| 38 | Exhaust air outlet
Design: Male fitting for connecting the exhaust air outlet (stainless steel tube with outside diameter = 6 mm, included in the scope of supply and delivery of the gas analyzer). |
| 39 | Sample gas inlet, heated or unheated
Design: Screw joint for PTFE or stainless steel tube with outside diameter = 6 mm |

Design of the gas connections unless stated otherwise: 1/8 NPT female thread for threaded connections (not supplied)

Gas and Electrical Connections for Fidas24 (Model EL3040)



Fidas24: Gas and Electrical Connections

- | | |
|-----------|---|
| 30 | Power supply 115 V AC or 230 V AC for heating the detector and sample gas inlet (4-pin plug connector, connecting cable supplied) |
| 31 | Electrical connection to the heated sample gas inlet (hard mounted) |
| 32 | Test gas outlet |
| 33 | Zero gas inlet |
| 34 | Span gas inlet |
| 35 | Combustion air inlet |
| 36 | Combustion gas inlet |
| 37 | Instrument air inlet |
| 38 | Exhaust air outlet
Design: Male fitting for connecting the exhaust air outlet (stainless steel tube with outside diameter = 6 mm, included in the scope of supply and delivery of the gas analyzer). |
| 39 | Sample gas inlet, heated or unheated
Design: Screw joint for PTFE or stainless steel tube with outside diameter = 6 mm |
| 40 | Pressure equalizing opening with protective filter (the protective filter must be protected against moisture) |

Design of the gas connections unless stated otherwise: 1/8 NPT female thread for threaded connections (not supplied)

Installing the gas analyzer

ATTENTION

The installation site must be stable enough to bear the weight (see page 19) of the gas analyzer!

The 19-inch housing must be supported in the cabinet or the rack with mounting rails!

Requisite material (not supplied)

19-inch housing (Model EL3020)

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

Wall-mount housing (Model EL3040)

- 4 screws M8 or M10

Installing the gas analyzer

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

Refer to the dimensional drawings.

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

Special requirements for the gas analyzer Fidas24

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).

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

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

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

Special requirements for the gas analyzer model EL3040 in degree of protection II 3G**Protection against mechanical damage**

Due to the low mechanical stability of the display window, the gas analyzer has to be installed and operated in such a way that mechanical damage to the display window with an energy exceeding 2 J is ruled out.

Protection against UV radiation

Due to the low UV resistance of the plastic parts of the housing, the gas analyzer has to be installed and operated in such a way that exposure to UV radiation is ruled out.

Connecting the Gas Lines

Connect the Flexible Tubes

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

Connect the Pipelines

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

Install the Micro-Porous Filter

A pre-assembled micro-porous filter (disposable filter, part no. 769144 – not for Fidas24) is included in the scope of delivery (see page 16).

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

Install the Flow Meter

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

Provide for Gas Line System Flushing

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

Evacuate Exhaust Gases

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

NOTES

Dispose of corrosive and toxic waste gases according to the regulations!

Take note of the sample gas inlet conditions (see page 22)!

Purge (see page 96) the sample gas feed path before commissioning.

Do not feed in the sample gas until the gas analyzer has reached room temperature and the warm-up phase (see page 97) has ended!

Otherwise, the sample gas could condense in the cold analyzer.

Fidas24: Connecting the Gas Lines

ATTENTION

The relevant safety regulations for working with flammable gases must be complied with.

The fittings of the gas paths in the gas analyzer may not be opened.

The gas paths can become leaky as a result.

However, if the fittings of the gas paths in the gas analyzer have been opened (only by trained personnel), a seal integrity test with a leak detector (thermal conductivity) must always be carried out after they have been sealed again.

The seal integrity of the combustion gas supply line outside the gas analyzer must be checked regularly.

Combustion gas which escapes through leak points in the gas paths in the instrument can cause fires and explosions, also outside the gas analyzer.

The lines and fittings must be clean and free of any residues (e.g. particles left over 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 section "Installing the Gas Connections" (see page 42).

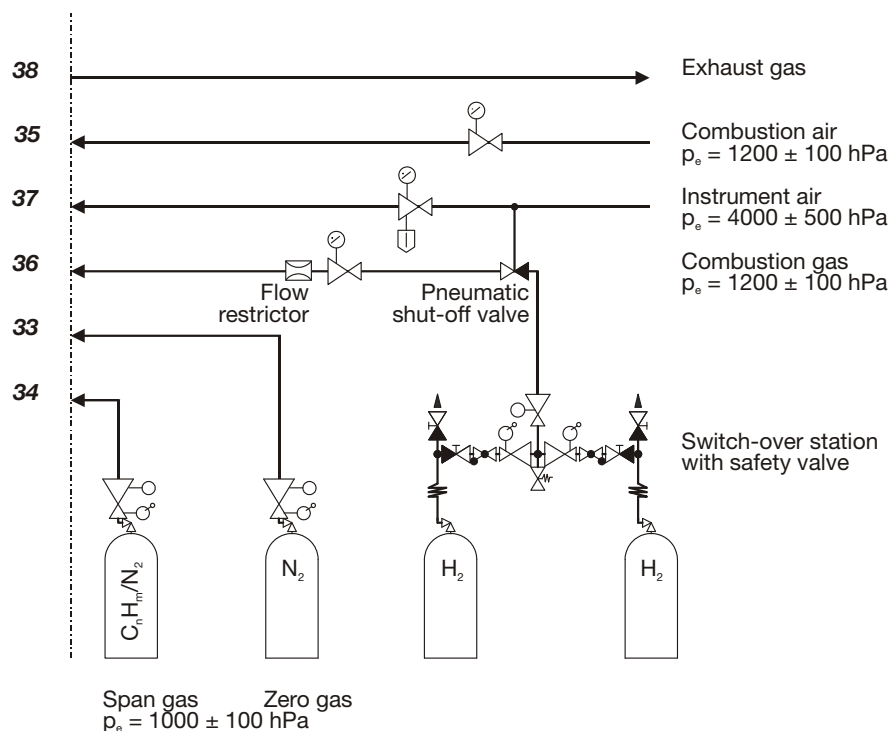
Follow the manufacturer's installation instructions for the fittings! In particular, hold the male fittings (gas connections) in place when connecting the gas lines.

Follow the manufacturer's instructions when laying and connecting the gas lines.

If gas lines made of stainless steel are connected to the analyzer modules, the lines must be connected to the building-side equipotential bonding.

Never connect more than three analyzer modules in series!

Connection of Process Gases and Test Gases



The numbering of the gas connections corresponds to the numbering in the connection diagram (see page 68) as well as the labeling on the rear of the analyzer module.

Instrument Air Connection

Instrument air is used as propellant for the air jet injector and as purging air for the housing purge (see page 36).

Connect (see page 68) the instrument air line to the instrument air inlet of the analyzer module via a pressure regulator (0 to 6 bar).

Combustion Air Connection

Connect (see page 68) the combustion air line to the combustion air inlet of the analyzer module via a pressure regulator (0 to 1.6 bar).

Combustion Gas Connection

See section "Fidas24: Connecting the Combustion Gas Line" (see page 76)

Test Gas Connection

The test gas outlet is connected to the sample gas connection ex works. If the test gases are to be introduced directly into the gas sampling point, the connection between the test gas outlet and the test gas inlet on the sample gas connection must be removed, and the respective opening in the sample gas connection must be sealed with an M6 screw, so that it is gas-tight.

Exhaust Air Connection

Conduct exhaust air directly into the atmosphere at zero pressure through a line with a large internal diameter which is as short as possible, or into a gas discharge line.

Use an exhaust air line of PTFE or stainless steel! The temperature of the medium can be up to 200 °C! Lay the exhaust air line with a downward gradient.

The inside diameter of the exhaust line should be increased to ≥ 10 mm within no more than 30 cm from the exhaust outlet. If a very long exhaust air line is used, its inside diameter must be much larger than 10 mm; otherwise the pressure regulation in the gas analyzer may not work properly.

Do not conduct waste air via restrictions or shut-off valves!

NOTE

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

Fidas24: Connecting the Combustion Gas Line

Connecting the Combustion Gas Line

Cleaning the Combustion Gas Line

- 1** Pump cleaning agent (alkaline cleaner, stainless steel pickling agent) through the stainless steel tube.
- 2** Thoroughly rinse the tube with distilled water.
- 3** Purge the tube for several hours at a temperature of > 100 °C with synthetic air or with nitrogen (10 to 20 l/h).
- 4** Seal the ends of the tube.

Connecting the Combustion Gas Line

- 5** Connect a two-stage cylinder pressure reducer (version for high purity gases) to the combustion gas cylinder.
- 6** Connect the combustion gas line to the cylinder pressure reducer.
- 7** Install a flow restrictor in the combustion gas supply line which restricts the combustion gas flow to 10 l/h of H₂ or 25 l/h of H₂/He mixture. This means that operation of the gas analyzer is safe even with a defect in the combustion gas feed path (e.g. leaks).
- 8** Install a shut-off valve in the combustion gas supply line. It is recommended that a pneumatic valve is installed; this valve must be controlled by the instrument air supply in such a way that the combustion gas feed is automatically shut off if the instrument air supply fails (see page 132) (and the continuous housing purge therefore fails).
- 9** Connect (see page 68) the combustion gas line to the combustion gas inlet of the analyzer module via a pressure regulator (0 to 1.6 bar).

Check the seal integrity of the combustion gas line

- 10** Check (see page 119) the seal integrity of the combustion gas line after connection.

Fidas24: Connecting the Sample Gas Line (Heated Sample Gas Connection)

ATTENTION

If a plastic vent plug has been inserted in the sample gas inlet in the factory, it must be removed without fail before commissioning the analyzer module!

Material of the Sample Gas Line

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

Connecting the Sample Gas Line

The heated sample gas line is connected directly to the sample gas inlet. In this respect, the correct seat of the O-rings must be ensured and also that the sample gas tube is inserted all the way in into the sample gas connection.

Unused sample gas inlets

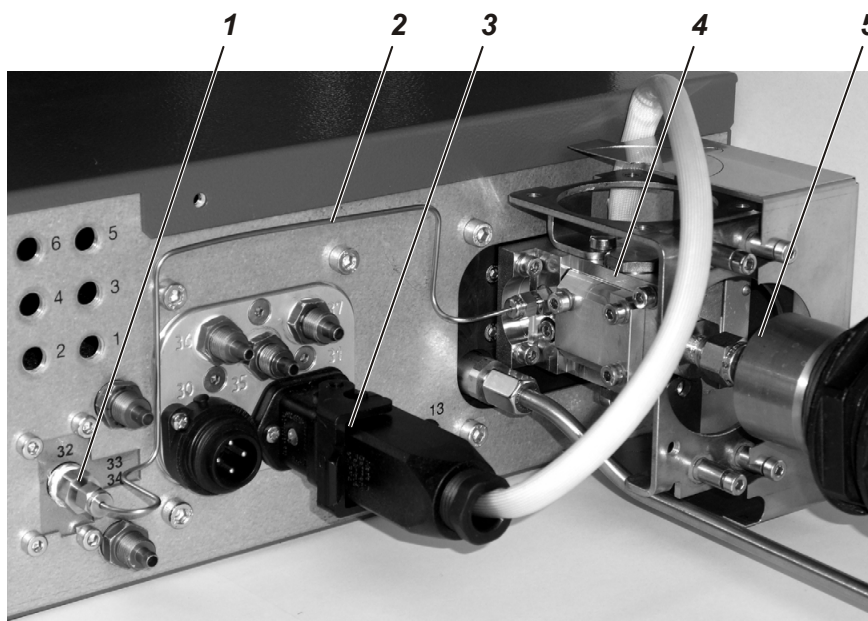
If the analyzer module draws in the sample gas through the sample gas line, the unused sample gas inlets must be sealed with the screw plugs (screwed in in the factory).

If the sample gas is under positive pressure, a sample gas inlet must be open and connected to a gas discharge line, so that no positive pressure builds up in the analyzer module.

Fittings and O-rings

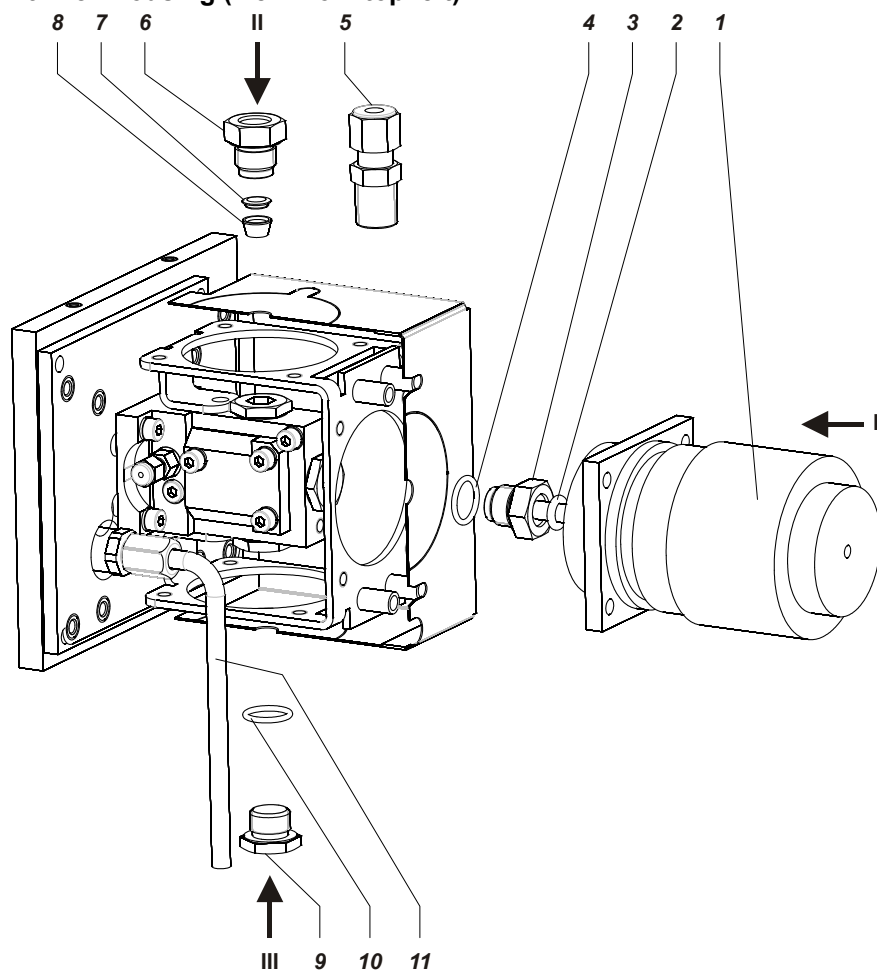
The requisite fittings and O-rings are included in the supplied accessories pack.

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)

Note: One half of the cover of the heated sample gas connection has been removed in the picture.

19-inch housing (view from top left)

Connection of the sample gas line

- 1** Heated sample gas line (tube with inside/outside diameter 4/6 mm)
 - 2** O-ring 6.02 x 2.62
 - 3** Socket
 - 4** O-ring 12.42 x 1.78
- Connection of a further sample gas line (tube with outside diameter 6 mm):
- either with
- 5** male fitting with a tapered ISO external thread G1/4"
- or with
- 6** Socket
 - 7** Tapered ring
 - 8** Compression fitting
- Closure:
- 9** Screw cap
 - 10** O-ring 12.42 x 1.78
-
- 11** Waste gas tube

Sample gas inlets:	Connection of the sample gas line	
	on 19-inch housing:	on wall-mount housing:
I	from the rear	from below
II	from above	from the right
III	from below	not possible – the sample gas inlet must always be closed

Maximum length of the sample gas line

The maximum length of the heated sample gas line (inside diameter 4 mm) is 30 m.

Provide for Sample Gas Line Purging

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

Fidas24: Connecting the Sample Gas Line (Unheated Sample Gas Connection)

ATTENTION

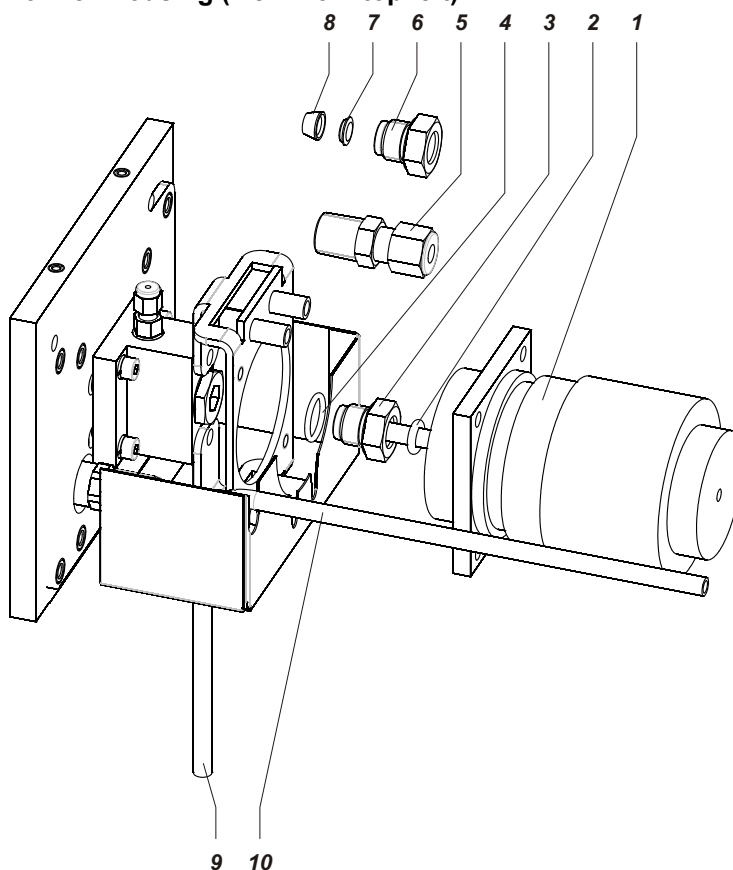
If a plastic vent plug has been inserted in the sample gas inlet in the factory, it must be removed without fail before commissioning the analyzer module!

Connection of the sample gas line

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 a exhaust gas discharge line, so that no positive pressure builds up in the analyzer module.

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

19-inch housing (view from top left)



Connection of the sample gas line

- 1** Sample gas line (heated or unheated, PTFE or stainless steel tube with inside/outside diameter 4/6 mm)
Connection either with
- 2** O-ring 6.02 x 2.62
- 3** Socket
- 4** O-ring 12.42 x 1.78
or with
- 5** Male fitting with a tapered ISO external thread G1/4"
or with
- 6** Socket
- 7** Tapered ring
- 8** Compression fitting

- 9** Exhaust gas tube for 19-inch housing
- 10** Waste gas tube for wall-mount housing

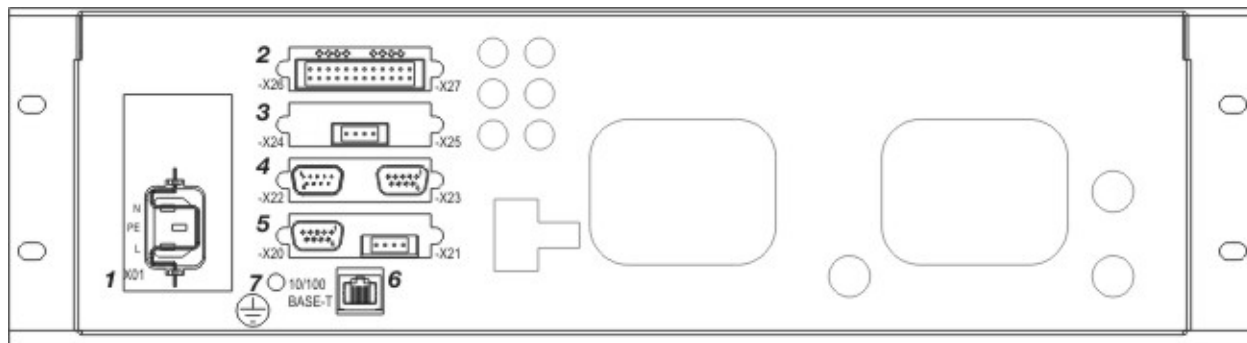
Maximum length of the sample gas line

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

Electrical Connections Model EL3020



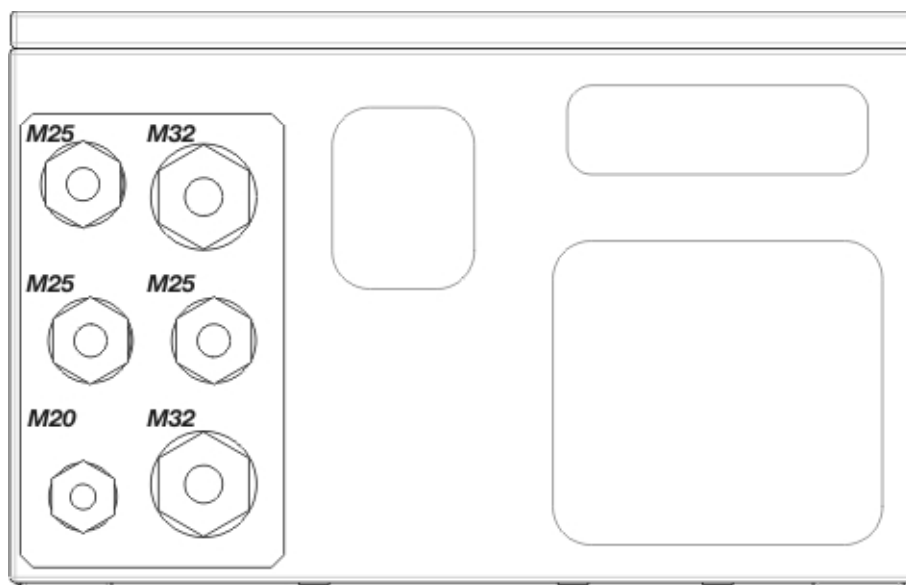
Electrical Connections

- | | | |
|----------|---|---|
| 1 | Power supply connection (see page 93) (3-pole grounded-instrument connector to EN 60320-1/C14, mains lead supplied) | |
| 2 | Digital I/O module (see page 88) | NOTE
The illustration shows all the available I/O module types and only represents an example of the I/O modules equipment (max. 4). The actual equipment of the supplied gas analyzer can differ; it is documented in the analyzer data sheet. |
| 3 | Analog output module (see page 87) | |
| 4 | Modbus module (see page 90) | |
| 5 | Profibus module (see page 91) | |
| 6 | Ethernet-10/100BASE-T interface (for configuration and software update and for transmission of the QAL3 data) | |
| 7 | Connection for equipotential bonding (see page 93) (capacity of terminal max. 4 mm ²) | |

ATTENTION

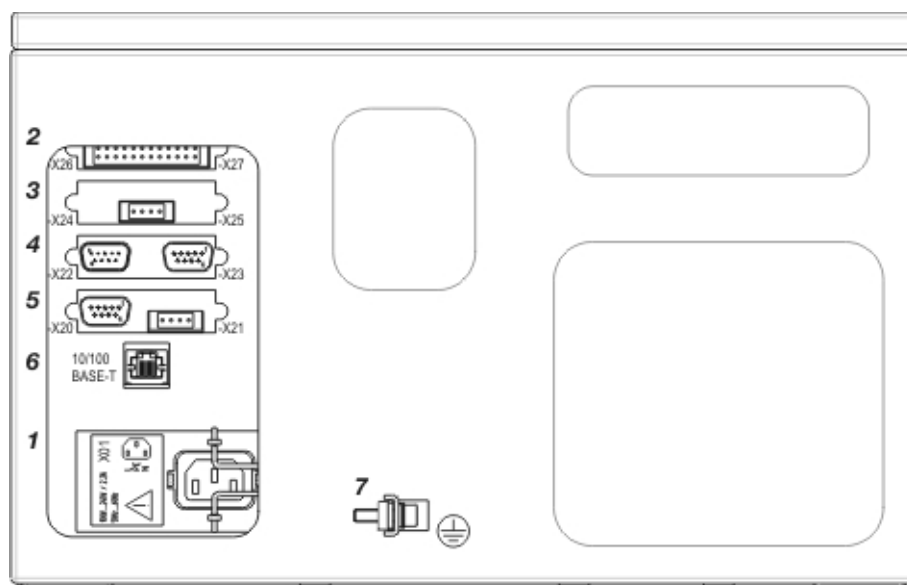
Follow all applicable national safety regulations for the installation and operation of electrical devices!

Electrical Connections Model EL3040



Screwed Cable Glands

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



Electrical Connections

- | | |
|---|---|
| 1 | Power supply connection (see page 93) (3-pole grounded-instrument connector to EN 60320-1/C14, mains lead supplied) |
| 2 | Digital I/O module (see page 88) |
| 3 | Analog output module (see page 87) |
| 4 | Modbus module (see page 90) |
| 5 | Profibus module (see page 91) |
| 6 | Ethernet-10/100BASE-T interface (for configuration and software update and for transmission of the QAL3 data) |
| 7 | Connection for equipotential bonding (see page 93) (capacity of terminal max. 4 mm ²) |

NOTE

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

ATTENTION

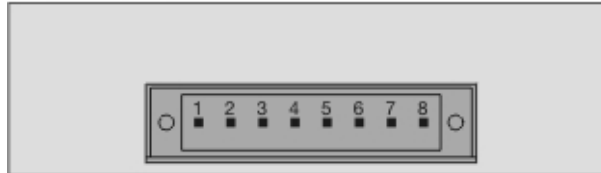
Follow all applicable national safety regulations for the installation and operation of electrical devices!

Electrical Connections Analog Output Modules

2-Way Analog Output Module



4-Way Analog Output Module



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

Analog Outputs AO1 to AO4

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

Design

4-pole or 8-pole plug-in terminal strip. Please refer to the information about the requisite material (see page 92)!

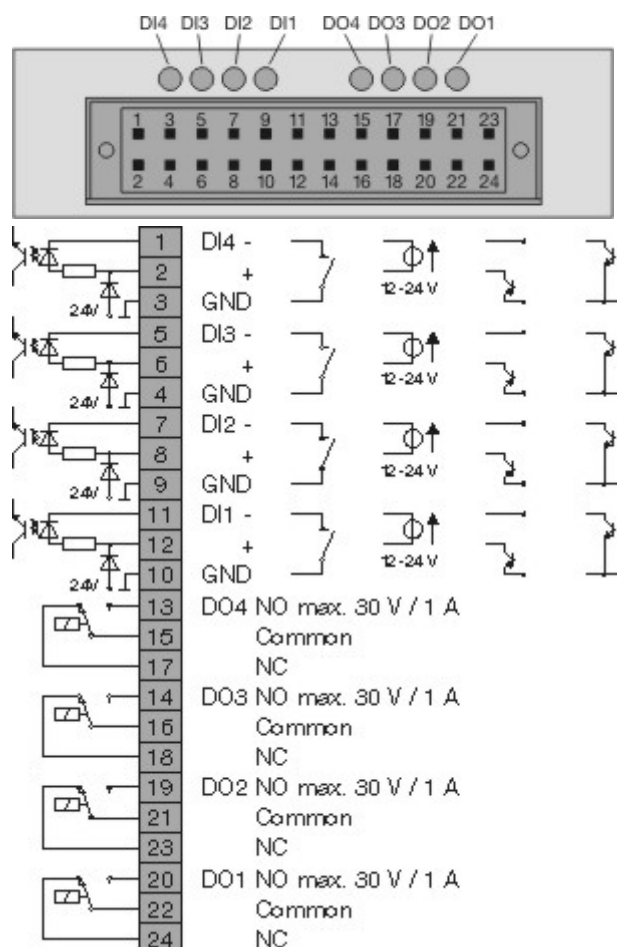
Terminal Layout

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

NOTE

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

Electrical Connections Digital I/O Module



Digital Inputs DI1 to DI4

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

Digital Outputs DO1 to DO4

Floating double-throw contacts, max. contact load rating 30 V/1 A. The relays must always be operated within the specified data. Inductive or capacitive loads are to be connected with appropriate protective measures (freewheeling diodes for inductive and series resistors with capacitive loads).

Relays are shown in the unpowered state. The unpowered state corresponds to the state in the event of a fault ("fail safe").

Design

2x12-pole plug-in terminal strip. Please refer to the information about the requisite material (see page 92).

Digital input and output signals	Standard assignment Digital I/O module 1	Standard assignment Digital I/O module 2
Failure		
Maintenance request		
Maintenance mode		
Overall status	DO1	
Start automatic calibration	DI1	
Stop automatic calibration		
Disable automatic calibration	DI2	
Sample gas valve	DO4	
Zero 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 ¹⁾		
Alarm value 1	DO2	
Alarm value 2	DO3	
Alarm value 3		DO1
Alarm value 4		DO2
Alarm value 5		DO3
Alarm value 6		DO4
Alarm value 7		
Alarm value 8		
Alarm value 9		
Alarm value 10		
Measuring range switchover		
Measuring range feedback		
Sample component switchover		
Sample 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 ²⁾	DI3	
External maintenance request ²⁾	DI4	

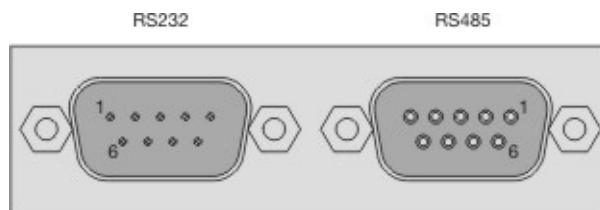
1) if a pump (Option "Integrated Gas Feed" – only in the EL3020 model, not with Limas23, ZO23, Fidas24) has been installed

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

NOTE

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

Electrical Connections Modbus Module



RS232 Interface

Pin	Signal
-----	--------

2	RxD
---	-----

3	TxD
---	-----

5	GND
---	-----

Design: 9-pole male Sub-D plug

RS485 Interface

Pin	Signal
-----	--------

2	RTxD-
---	-------

3	RTxD+
---	-------

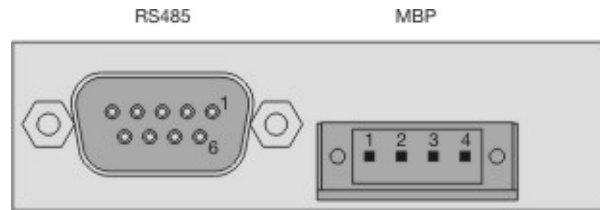
5	GND
---	-----

Design: 9-pole female Sub-D plug

NOTE

For detailed Information on "Modbus", refer to the Technical Information "EL3000, EL3060, EL3010-C – Modbus".

Electrical Connections Profibus Module



RS485 Interface

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

Design: 9-pole female Sub-D plug

MBP Interface (not intrinsically safe)

Pin	Signal
1	+
2	Shield
3	–
4	not assigned

Design: 4-pole plug-in terminal strip. Please refer to the information about the requisite material (see page 92).

NOTE

For detailed information on "Profibus", refer to the Technical Information "EL3000, EL3060 – PROFIBUS DP/PA Interface".

Connecting the Signal Lines

NOTES

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.

Mark the cables or mating plugs in such a way that they can be clearly assigned to the corresponding I/O modules.

Requisite Material

- Select conductive material which is appropriate for the length of the lines and the predictable current load.
- Notes concerning the cable cross-section for connection of the I/O modules:
 - The max. capacity of terminals for stranded wire and solid wire is 1 mm² (17 AWG).
 - The stranded wire can be tinned on the tip or twisted to simplify the assembly.
 - When using wire end ferrules, the total cross-section may not be more than 1 mm², i.e. the cross-section of the stranded wire may not be more than 0.5 mm². The PZ 6/5 crimping tool of Weidmüller & Co. must be used for crimping the ferrules.
- Max. length of the RS485 leads 1200 m (max. transmission rate 19200 bit/s). Cable type: 3-core twisted-pair cable, cable cross-section 0.25 mm² (e.g. Thomas & Betts, Type LiYCY).
- Max. length of the RS232 leads 15 m.
- The mating plugs (socket housing) for the plug-in terminal strips on the I/O modules are supplied.

Connecting the Signal Lines

- 1 Only for the wall-mount housing (EL3040 model): Pass the cables through the screwed cable glands (see page 85) and strip to a length of approx. 18 cm.
 M20 and M32: Remove the plugs from the insert; leave the ring in the screwed cable glands for sealing and strain relief.
 M25: Remove the plugs from the screwed cable glands. If required, slit open the insert with drill holes from the accessories pack and press over the cable; seal any open drill holes with dowel pins from the accessories pack.
- 2 Connect the lines to the mating plugs as shown in the connection diagrams of the I/O modules:
 Analog output module (see page 87)
 Digital I/O module (see page 88)
- 3 Attach the mating plug to the plug-in terminal strips on the I/O-modules.

Connecting the Power Supply Lines

Requisite Material

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

Equipotential Bonding

The gas analyzer has a connection marked with the symbol \oplus for the connecting line to the equipotential bonding on the building side. The max. capacity of terminals is 4 mm².

Connecting the Power Supply Cable

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

NOTES

The gas analyzer can be started up after the power supply has been connected.

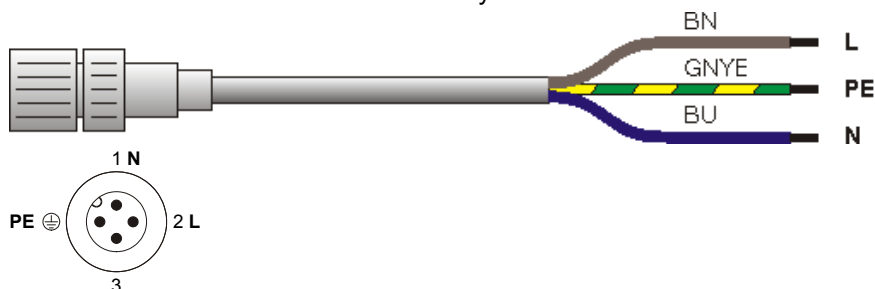
Do not feed in the sample gas until the gas analyzer has reached room temperature and the warm-up phase (see page 97) has ended!

Otherwise, the sample gas could condense in the cold analyzer.

Fidas24: Power Supply Line Connection to 115/230 V AC

115/230-V-AC-connection cable

A connecting cable is supplied for the 115/230 V AC power supply for heating the detector and, if applicable, the heated sample gas connection (length 5 m, cable cross-section 3 x 1.5 mm²) with a 4-pole socket connector for the connection to the analyzer module.



The illustration shows the pin side of the plug **30** in the analyzer module (see page 68).

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.

115/230 V AC Connection to an Analyzer Module

- 1 Attach the supplied 115/230-V-AC connecting cable with the 4-pole socket connector to the power supply connection **30** of the analyzer module and screw tight.
- 2 Connect the wires on the free end of the power cable to the power supply.

Starting Up the Gas Analyzer

Check the Installation

Check the Installation

- 1 Is the gas analyzer securely fastened (see page 70)?
- 2 Are all gas lines (see page 72) including that of the pressure sensor correctly connected and laid?
- 3 Are all signal lines (see page 92) and power supply lines (see page 93) correctly connected and laid?
- 4 Are all devices needed for gas conditioning, calibration and waste gas disposal correctly connected and ready for use?
- 5 When measuring flammable gases: Are the special requirements (see page 40) being observed?
- 6 When applying the explosion-protected version in the degree of protection II 3G: Are the special requirements (see page 14) being observed?

Purge the sample gas path

Purge before Start-up

Prior to starting up the gas analyzer and feeding in the sample gas, the sample gas feed path and, where necessary, the wall-mount housing must be purged (see page 36).

One reason is to ensure that the sample gas path and the wall housing are free of contamination, e.g. corrosive gases and dust deposits, during start-up.

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

Purge gas: Nitrogen

Purging of the gas feed path: Purge gas flow max. 100 l/h,
duration approx. 20 s

Purging of the wall-mount housing: Purge gas flow max. 200 l/h,
duration approx. 1 h

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

Gas Analyzer Start-Up

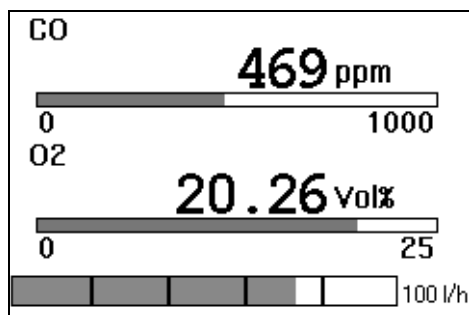
NOTE

The notes in the sections "ZO23: Gas analyzer start-up" (see page 98) and "Fidas24: Gas analyzer start-up" (see page 99) must also be considered for the ZO23 and Fidas24 analyzers.

Starting Up the Gas Analyzer

- 1 Switch on the power supply of the gas analyzer.
- 2 The name of the gas analyzer and the number of the software version are shown in the display while booting.
- 3 After the start-up phase has ended, the display switches over to the measured value display.

Example:



- 4 Check the configuration of the gas analyzer and alter if necessary.
- 5 After the warm-up phase has ended, the gas analyzer is ready to carry out measurements.
Duration of the warm-up phase:
Uras26: approx. ½ hour without thermostat, approx. 2 hours with thermostat
Limas23: approx. 2 hours
Magnos206: approx. 1 hour
Magnos27: approx. 2–4 hours
Caldos27: approx. ½ hour
Fidas24: approx. 2 hours
- 6 Check the calibration (see page 114) of the gas analyzer.
The gas analyzer is calibrated ex works. However, transport stresses and the pressure and temperature conditions at the installation site may influence the calibration.
- 7 Turn on the sample gas supply.

ZO23: Gas Analyzer Start-Up

Gas Analyzer Start-Up Procedure, Initial Calibration at the Installation Site

- 1** Turn on the gas analyzer power supply.
After approx. 15 minutes, the sample cell has reached its operating temperature. If required, the gas analyzer can be calibrated at the reference point (see step 3) and the end-point (see step 5).
- 2** For setting the reference point (= electrical zero), feed ambient air wait and until the measured value has stabilized (duration approx. 2 hrs). Meanwhile, purge the test gas valves and the gas supply line with oxygen-free gas (e.g. with nitrogen from a loop feeder) or with sample gas (flow rate 5 to 10 l/h).
- 3** Set reference point to 20.6 vol.% of O₂.
- 4** Feed span gas and wait until the measured value has stabilized (duration max. 2 hrs).
- 5** Set end-point value in accordance with the certificate of analysis of
- 6** The gas analyzer is ready for performing measurements; feed sample gas.

NOTE

Information for test gases can be found in the section "ZO23: Preparation for Installation" (see page 27).

Fidas24: Gas Analyzer Start-Up

Fidas24: Start-up of the Gas Analyzer

Switch on the power supply, heating-up phase, feed in supply gases

- 1 Switch on the power supply of the gas analyzer and the heaters of the Fidas24.
- 2 The name of the gas analyzer and the number of the software version are shown in the display while booting.
After the start-up phase has ended, the display switches over to the measured value display.
- 3 Select the Controller values menu item:
▼ Maintenance ▼ Diagnosis ▼ Device Status ►
Analyzer Status ▲ Controller Values
 The actual values and setpoints and the controlled variables of the internal temperature regulators are displayed in this menu option:
 T-Re.D Detector temperature
 T-Re.E Temperature of the heated sample gas connection
 T-Re.K Temperature of the internal combustion air preparation
 TR.VV1 Temperature of the preamplifier
 The temperature values slowly increase after the power supply is switched on.
- 4 Feed in instrument air, combustion air and combustion gas (H₂ or H₂/He mixture). Adjust the pressure to the value specified in the analyzer data sheet with the corresponding external pressure regulator.
- 5 The controlled variables of the internal pressure regulator are also displayed in the Controller values menu option:
 C-Air Combustion air pressure
 C-Gas Combustible gas pressure (H₂ or H₂/He mixture)
 MGE Pressure at the sample gas nozzle
 MGA Pressure in the combustion chamber (outlet)
 The pressures of the supply gases are set by means of the controlled variables. To begin with, any values can be displayed for the controlled variables. The values are updated for the first time approx. 10 s after selecting the menu option and then approx. every 10 s. The pressure control continues to run in the background. It may take some time to set the pressures depending on the setting of the inlet pressure.
 The gas analyzer automatically reverts to the measurement mode to display values if the user has not pressed a key in menu mode in the last five minutes.
- 6 The following status messages are active during the heating-up phase:
 "Operating 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 possibly of the heated sample gas connection (T-Re.E) is over or below the upper or lower limit value 1 (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 (H₂) is over or below the upper or lower limit value 1 (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 setpoint.
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 setpoint, the respective solenoid valve in the analyzer automatically connects the combustion gas. The combustible gas regulation attempts to adjust the pressure to the setpoint.

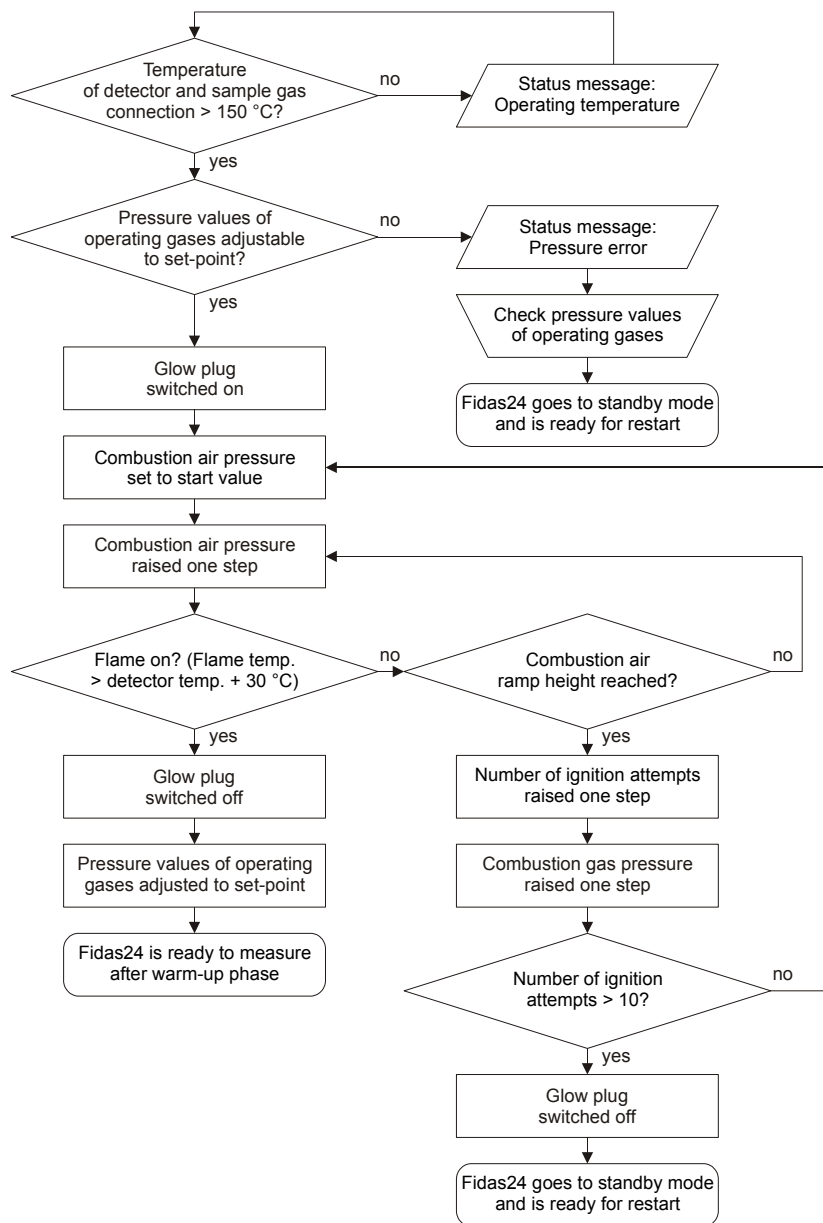
Adjust the controlled variables of the internal pressure regulators

If the analyzer is not automatically put into service with the pressure values specified in the analyzer data sheet, the controlled variables of the internal pressure regulators must be adjusted. If the controlled variables of the internal pressure regulators deviate, the inlet pressures of the instrument air, combustion air and combustion gas must be adjusted.

- 9 Instrument air: use the external pressure regulator to set the controlled variable for `outlet` to approx. 60 % (max. 70 %).
Controlled variable too high \Rightarrow reduce pressure.
Controlled variable too low \Rightarrow 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 controlled variable for `air` to approx. 55 % (max. 60 %).
Controlled variable too high \Rightarrow increase pressure.
Controlled variable too low \Rightarrow reduce pressure.
- 11 Combustion gas: use the external pressure regulator to set the controlled variable for `H2` to approx. 42 % (max. 52 %).
Controlled variable too high \Rightarrow increase pressure.
Controlled variable too low \Rightarrow reduce pressure.

Ignition of the flame

12 The flame ignites automatically:



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

Depending on the length of the combustible gas supply line, it is possible that not enough combustible gas is available to ignite the flame at first during the initial start-up of the gas analyzer. In this case, the ignition of the flame must be restarted in the Fidas Restart menu (see page 118). The temperature of the flame is also displayed in this menu option; the flame is regarded as "on" when the flame temperature is at least 30 °C higher than the detector temperature.

The actual start-up of the gas analyzer is concluded with the ignition of the flame.

NOTE

New and still unused sample gas lines and sampling probes can release hydrocarbons over a longer period after initial start-up. Therefore, it can take a longer time until the measured value drift has reached an acceptable value.

Restarting the Gas Analyzer

- 1** Feed in instrument air and combustion air and purge the gas analyzer **for at least 20 minutes**.
- 2** Switch on power supply of the gas analyzer.
- 3** Turn on the combustion gas supply and adjust the combustion gas pressure.
- 4** Check (see page 121) the seal integrity of the combustion gas feed path.
- 5** Turn on the sample gas supply.

ATTENTION

The connection cable of the 115/230 V AC power supply for heating the detector and possibly the heated sample gas connection may not be removed under voltage on any account!

The cover of the heated sample gas terminal is hot during operation. It reaches a temperature of more than 70 °C!

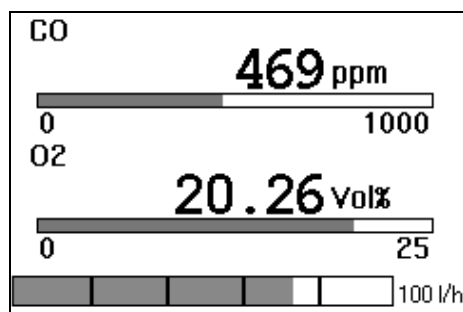
Operating the Gas Analyzer

NOTE

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

Display - Measuring Mode

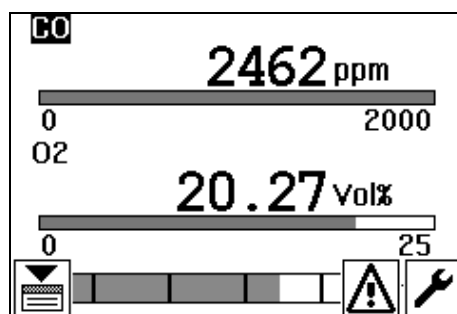
Display in Measuring Mode



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

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

Status Icons



An automatic calibration is executed.

The icon also appears in the menu title line in menu mode (see page 105).



A status message (see page 125) is active.



The status signal "Maintenance request" is active.

The icon also appears in the menu title line in menu mode (see page 105).



The status signal "Error" is active or the maintenance switch has been set to "On".


The icon is blinking. The icon also appears in the menu title line in menu mode (see page 105).



The configuration is being saved. The icon is blinking.

Do not switch off the power supply of the gas analyzer when the icon is displayed!

Key Functions in Measuring Mode

- ◀▶ Switch over the display of each individual measured value; in addition to the digital display, an analog bar with information on the range limits is shown in this display.
- ▼▲ Reduce or increase the contrast of the display.
When a status message is active, press key ▲ first.
- OK Switch to menu mode (see page 105).
- ▼ If a status message is active : press the key to display the message list (see page 125).

Number of Decimal Places

When the screen displays the measured value in physical units (e.g. ppm) the number of places after the decimal point depends on the size of the set measuring range:

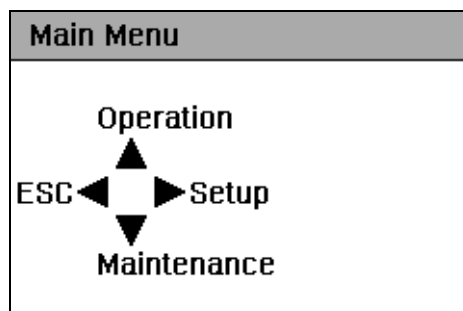
Span	Places after the decimal point
≤ 0.05	5
≤ 0.5	4
≤ 5	3
≤ 50	2
≤ 500	1
> 500	0

For the display of the measured value as a percentage of the whole measuring range (%Span) two places are always shown after the decimal point.

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

Operation - Menu Mode

Display in Menu Mode



Structure of the Menus

Starting from the main menu, each menu (see page 107) contains a maximum of three menu items ("3-point menu"). Each menu option is assigned to one of the three keys ▲, ► and ▼; each menu option can therefore be selected directly. The button ◀ is used to return to the next higher menu.

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

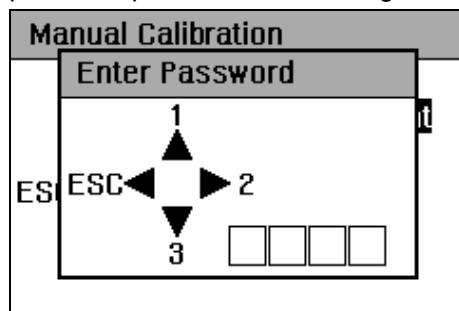
- ▲ Operation ▲ Calibration ▲ Manual Calibration
- ▲ Zero Point / Single Point
- Setup ► Calibration Data ► Test Gas Set Points
- ▼ Maintenance ▼ Diagnosis ▼ Device Status
- ▼ Status Messages

Key Functions in Menu Mode

- | | |
|------------------------------------|---|
| 3-point menu | |
| ▲ ► ▼ | Select menu item |
| ◀ | Return to the next higher menu |
| OK | Return to measuring mode (see page 103) |
| Component list | |
| ▲ ▼ | Select component |
| ► or OK | Call up selected component for processing |
| Parameter list ("Selector") | |
| ▲ ▼ | Select parameters |
| ► | Call up change in value |
| OK | Accept all displayed values and return to the next higher menu |
| ◀ | Discard all displayed values and return to the next higher menu |
| Change in value | |
| ▲ ▼ | Change selected position |
| ► | Select position to be changed |
| OK | Confirm altered value and return to the parameter list |
| ◀ | Discard altered value and return to the parameter list |

Entering the Password

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



In this respect, the numbers 1, 2 and 3 are assigned to the three keys ▲, ► and ▼, as shown in the illustration.

Example: If the password "1213" has been configured, the user has to press the keys ▲, ►, ▲ and ▼ in succession. Each key stroke is acknowledged by display of the character *.

The entered password remains active until the user returns to the measuring mode or the gas analyzer automatically switches over to the measuring mode through the time-out function (see page 105).

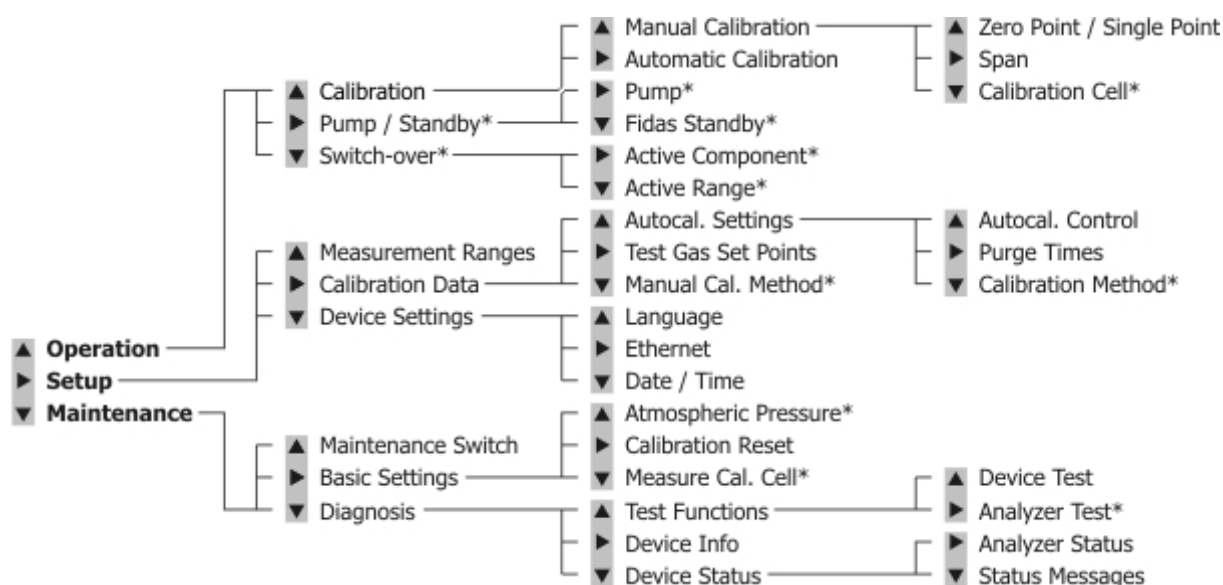
Time-out Function

If the user does not press a key for more than approx. 5 minutes during the selection of menu items, the gas analyzer will automatically return to the measuring mode (see page 103) (time-out function).

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

Menu

Overview of the Menu



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

Notes on the Concept of Operation

Concept of Operation

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

Overview of the functions

Function	Instrument	Configurator	Modbus
Automatic calibration:			
Start/cancel automatic calibration (see page 114) (also possible via digital inputs)	X		X
Activate/deactivate cyclically time-controlled automatic calibration	X	X	X
Cycle time of the automatic calibration		X	
End-point calibration together with zero-point calibration		X	X
Date and time of the next automatic calibration (start of the cycle)	X	X	
Test gas concentration	X	X	X
Purging times	X	X	
Output current response (for automatic and manual calibration)		X	
Calibration method (Magnos206)	X	X	
Pump on during calibration		X	
Manual calibration:			
Calibration method	X	X	
Test gas concentration	X	X	
Execute calibration (see page 116)	X		
Maintenance functions:			
Pump control	X	X	
Calibration reset	X		
Calibration of the pressure sensor / Setting the air pressure value	X		
Measuring the calibration cell (Uras26)	X		
Drift, delta drift (display)	X		X
Software version	X	X	
Status information (see page 125)	X		X

Function	Instrument	Configurator	Modbus
Component parameters:			
Measuring range parameters	X	X	
Alarm value parameters		X	
Low pass time constant (T90 time, filter)		X	X
Active component	X	X	X
Modbus parameters ²		X	
Profibus Parameters ³		X	
Ethernet parameters	X	X	
Signal inputs and outputs (I/O connections)		X	

² NOTEFor detailed Information on "Modbus", refer to the Technical Information "EL3000, EL3060, EL3010-C – Modbus".

³ NOTEFor detailed information on "Profibus", refer to the Technical Information "EL3000, EL3060 – PROFIBUS DP/PA Interface".

Communication between the Gas Analyzer and the Computer

Communication via Ethernet

Communication between the gas analyzer and the computer is executed via an Ethernet connection, either as a point-to-point connection or via a network.

The Ethernet connection enables communication

- with the test and calibration software TCT-light,
- with the configuration software ECT,
- for transmission of the QAL3 data, if the option QAL3 monitoring has been integrated in the gas analyzer,
- for reading the measured values and for calibrating and controlling the gas analyzer via the Modbus TCP/IP protocol.

NOTE

Detailed information on "Modbus" can be found in the technical information "EL3000 Modbus" and "EL3010-C – Modbus via TCP/IP".

Setting up the communication between the gas analyzer and the computer

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

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

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

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

Example: gas analyzer: 192.168.1.4, computer: 192.168.1.2

Set the IP address in the gas analyzer

► Setup ▼ Device settings ► Ethernet

Ethernet	
◀ ESC	
▲ DHCP	Off
Name	---
IP Addr.	192.168.001.004
IP Mask	255.255.255.000
Gateway	000.000.000.000

Parameters

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

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

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

The network name can only be altered in the configurator (see page 108). The default network name consists of "EL3K" and the last six positions of the MAC address (example: "EL3KFF579A").

If the parameter "DHCP" is set to "off", the Ethernet configuration is reset to the standard configuration (default IP address); this will prevent the inadvertent assignment of an IP address from a DHCP pool.

Addresses

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

NOTE

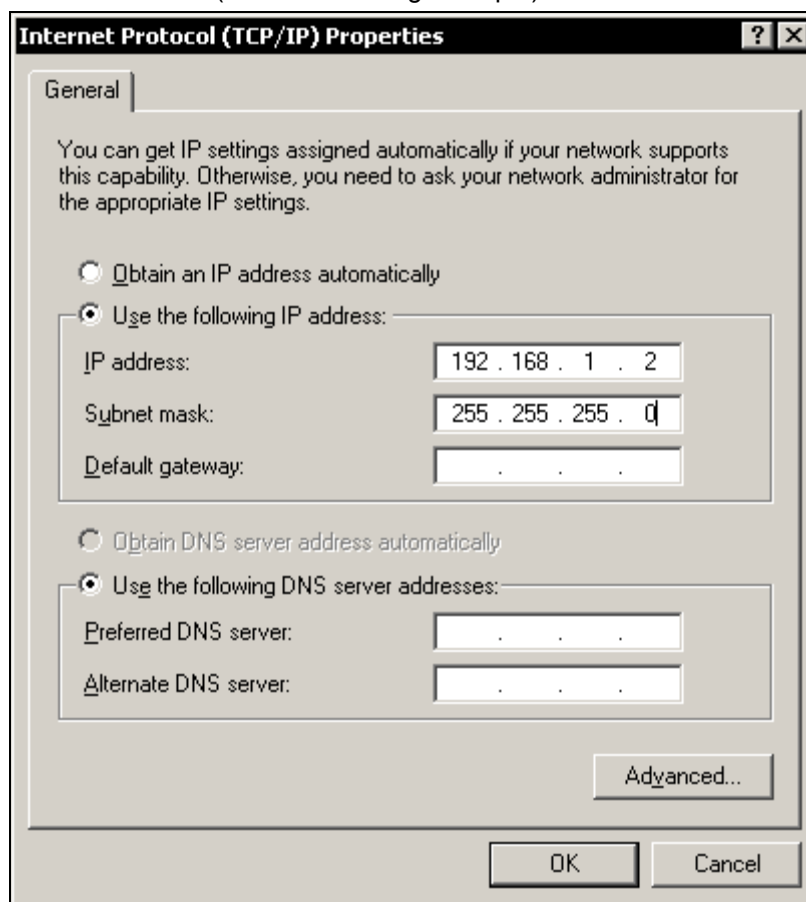
The address bits that can be varied in the address mask may not all be set to 0 or 1 (broadcast addresses).

MAC Address

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

Set the IP address in the computer

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



Establish and test the Ethernet connection

Cable

Point-to-point connection: Twisted-pair cable with RJ45 connectors, terminal layout: 1–3, 3–1, 2–6, 6–2

Connection via an Ethernet network: twisted-pair cable with RJ45 connectors

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


Test the Ethernet connection

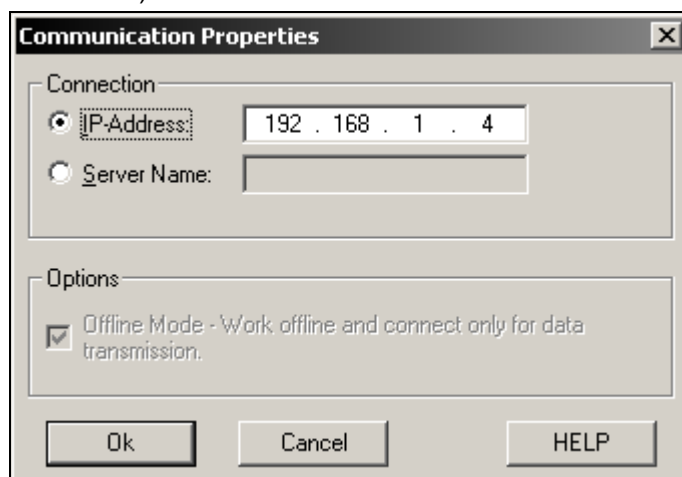
To test the Ethernet connection, enter the following in the computer in "Start – Execute...": "ping *IP address*" (with *IP address* = IP address of the gas analyzer). If the connection is OK, the gas analyzer reports "Answer from *IP address*: Bytes=32 Time<10ms TTL=255" (the numbers are instrument-specific).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

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

Start the communication between the gas analyzer and the computer


Communication between the configurator and the gas analyzer is started in the menu "Options – Communication Properties..." or by clicking the

symbol . Input either the IP address or the network name (server name) of the gas analyzer (see the following example of a point-to-point connection).




Receiving Configuration Data

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

Menu "File – Receive Data" or .

Sending Configuration Data

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

Menu "File – Send Data" or .

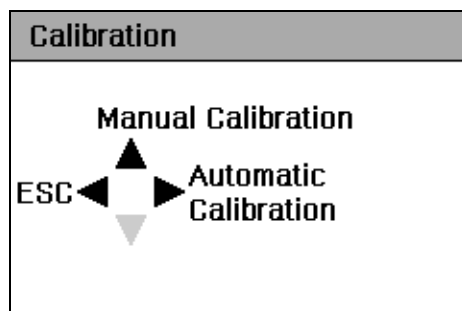
Saving Configuration Data

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

Menu "File – Save As..." or .

Calibrating the Gas Analyzer

Automatic Calibration: Manual Start



Menu path

▲ Operation ▲ Calibration ► Automatic Calibration

Wait until the Warm-up Phase has Ended

The gas analyzer may not be calibrated until the warm-up phase has been concluded.

Duration of the warm-up phase:

Uras26: approx. ½ hour without thermostat, approx. 2 hours with thermostat

Limas23: approx. 2 hours

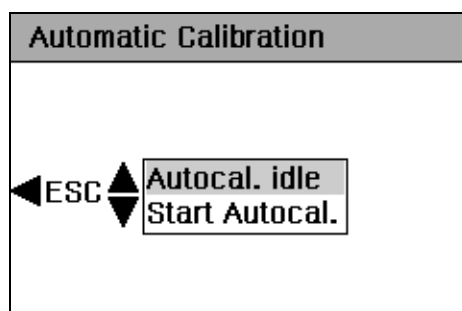
Magnos206: approx. 1 hour

Magnos27: approx. 2–4 hours

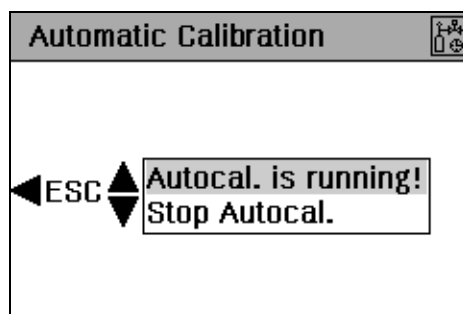
Caldos27: approx. ½ hour

Fidas24: approx. 2 hours

Start Automatic Calibration Manually



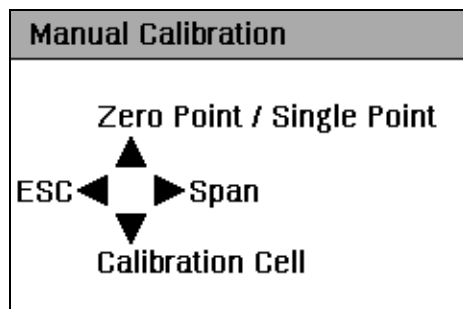
Abort Automatic Calibration Manually



NOTE

If the automatic calibration is aborted, the analyzer is in an undefined state (with respect to the calibration). For example, the zero point calibration may have been completed and calculated, but the end-point calibration has not yet been carried out. As a result, the automatic calibration must be restarted after it has been aborted and allowed to run through to the end.

Manual Calibration: Execution



Menu Path

▲ Operation ▲ Calibration ▲ Manual Calibration

Wait until the warm-up phase has ended

The gas analyzer may not be calibrated until the warm-up phase has been concluded.

Duration of the warm-up phase:

Uras26: approx. 1/2 hour without thermostat, approx. 2.5 hours with thermostat

Magnos206: approx. 2 hours

Caldos27: approx. 1/2 hour

Caldos25: 1...4 hours, depending on the measuring range

NOTES

A zero point calibration must always be carried out before an end-point calibration. A zero-point calibration can also be carried out on its own.

Manual calibration cannot be carried out when an automatic calibration is running.

Calibrate the Sample Component Manually

Zero-point Calibration

- 1 Select menu **Zero point/Single point**.
- 2 Select individual sample component or "All" (according to the configuration in the ECT dialog "Manual Calibration").
- 3 Check zero point set point⁴ and adjust if required.
- 4 Connect zero reference gas (if it is not automatically connected).
- 5 Start calibration as soon as the measured value display is stable.
- 6 Store calibration or repeat calibration⁵.

End-point Calibration

- 1 Select menu **Span**.
- 2 Select sample component.
- 3 Check span set point⁶ and adjust if required.
- 4 Connect span gas (if it is not automatically connected).
- 5 Start calibration as soon as the measured value display is stable.
- 6 Store calibration or repeat calibration.

End-point calibration with calibration cell (option with Uras26 and Limas23)

- 1 Select menu **Calibration Cell**.
- 2 Select sample component or "All" (only possible with Uras26).
- 3 Connect zero reference gas (if not already connected).
- 4 Start calibration as soon as the measured value display is stable.
- 5 Store calibration or repeat calibration.

⁴ The parameterized test gas concentration is displayed. If the setpoint is altered here, the parameterized test gas concentration is overwritten.

⁵ A calibration may have to be repeated if the measured value is not stable after initiation of the calibration. The repeated calibration is based on the measured value obtained in the preceding calibration.

⁶ The parameterized test gas concentration is displayed. If the setpoint is altered here, the parameterized test gas concentration is overwritten.

Maintenance

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 open for standby with detector purging.

Fail-safe status: heater off, combustion gas valve closed, instrument air valve closed, housing purging on, zero gas valve open.

Putting Fidas24 into Standby mode

▲ Operation ► Pump/Standby ▼ Fidas Standby
► Fidas Standby

The operating modes Standby and Standby & Purge can be selected in the Fidas Standby menu:

Standby Standby mode is activated.

Standby & Purge The standby mode with opening of the zero gas valve for purging the detector is activated (only in the version with test gas connection).

The status signal "Maintenance Mode" is active in the standby mode, and the status message (see page 125) no. 411 "Fidas24 Standby Mode" is output; the measured values are invalid.

NOTE

If the Fidas24 is in the fail-safe status (see page 132), it cannot be set to the standby mode.

Resetting the Fidas24 to the measuring mode

▲ Operation ► Pump/Standby ▼ Fidas Standby
▼ Fidas Restart

The most important operating parameters of the Fidas24 are displayed in the Fidas Restart menu:

F-D1 Flame temperature

C-Air Combustion air pressure

C-Gas Combustion gas pressure

The restart is initiated by pressing **OK**. After the initiation of the restart, the menu can be quit with **◀**; the restart sequence is continued. However, the change of the operating parameters can also continue to be observed in the menu.

NOTE

If the Fidas24 is in the fail-safe status (see page 132), it cannot be reset to the measuring mode.

Fidas24: Checking Combustion Gas Supply Line for Seal Integrity

ATTENTION

The seal integrity test described in this section should only be performed by qualified and specially trained personnel. If these conditions are not provided or the prescribed materials are not available, a seal integrity test must be carried out by ABB after sales service.

Regular inspection of the seal integrity of the combustion gas supply line

The seal integrity of the combustion gas supply line must be checked regularly according to one of the two following instructions, depending on whether the combustion gas is supplied from a cylinder or from a central unit.

Combustion gas 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 to 1.1 x the normal pressure of the combustion gas, i.e. approx. 1.4 bar.
- 3 Mark cylinder pressure indication on the high pressure gauge.
- 4 Close the valve of the combustion gas cylinder.
- 5 The display on the high pressure gauge – it should not change measurably in 10 minutes.
A measurable change in the display is an indication of a leak in the combustion gas feed path, between the cylinder pressure reducer and the combustion gas inlet valve of the gas analyzer. In this case, the following measures must be taken:
 - 1 Check the combustion gas line between the cylinder and gas analyzer with a leak-detecting 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.
 - 2 If a leak cannot be found in the combustion gas line, the combustion gas inlet valve of the gas analyzer is leaking. **In this case, the gas analyzer may not be returned to service on any account!** The combustion gas inlet valve must be replaced by ABB Service.
- 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. 1.4 bar.
- 3 Mark pressure indication on the gauge of the pressure reducer.
- 4 Shut off the combustion gas supply.
- 5 Observe the display on the pressure gauge – 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:
 - 1 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.
 - 2 If no leak is found that means the gas analyzer combustion gas inlet valve is leaky. **In this case, the gas analyzer may not be returned to service on any account!** The combustion gas inlet valve must be replaced by ABB Service.
- 6 After conclusion of the seal integrity test, set the combustion gas pressure to normal pressure again, i.e. 1.2 bar.

Fidas24: Checking the seal integrity of the combustion gas feed path in the gas analyzer

ATTENTION

The seal integrity test described in this section requires special training and under some circumstances involves working with the gas analyzer open and powered up. Therefore, it must only be performed by qualified and specially trained personnel.

If these conditions are not provided or the prescribed materials are not available, a seal integrity test must be carried out by ABB Service.

Regular seal integrity check of the combustion gas path in the gas analyzer

The gas analyzer must be in operation (flame on).

- 1 Inspection of combustion gas feed path with positive pressure (combustion gas inlet to combustion gas nozzle):
With a leak detector (measurement principle thermal conductivity) sniff all the connection points.
- 2 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.
Envelope all the connection points one after the other with a small gas cloud containing hydrocarbons (e.g. with coolant or test gas containing hydrocarbons or an acetone-soaked rag).
Observe the measured value display while doing so; if there is a positive change in the measured value, the connection concerned is leaking.

If there is a leak, shut down the gas analyzer

If a leak has been established in the combustion gas feed path inside the gas analyzer, **the gas analyzer must be put out of operation; it may under no circumstances be put into operation again.** The cause of the leak must be determined and remedied by ABB Service.

Checking the Seal Integrity of the Sample Gas Feed Path

When should the seal integrity of the sample gas feed path be checked?

The seal integrity of the sample gas feed path should be checked regularly.

We recommend that the seal integrity of the sample gas feed path is checked before commissioning (see page 97) the instrument at the installation site, since it may have been affected during transport of the gas analyzer (e.g. through strong vibrations).

The seal integrity of the sample gas feed path must always be checked after the sample gas feed path inside the gas analyzer has been opened (see page 123).

Requisite Material

- Pressure gauge
- Flexible tubing, length approx. 1 m
- T-piece with shut-off valve
- Air or nitrogen

ATTENTION

If the seal integrity test is to be carried out with air and if flammable gas could be present in the sample gas feed path or is to be subsequently introduced, the sample gas feed path must be purged with nitrogen beforehand! The seal integrity test can be carried out with nitrogen instead.

Checking the Seal Integrity of the Sample Gas Feed Path

- 1 Seal the sample gas outlet so that it is gas-tight.
- 2 Connect the T-piece with the shut-off valve to the sample gas inlet by means of the flexible tubing.
- 3 Connect the free end of the T-piece to the pressure gauge.
- 4 Blow air or nitrogen through the shut-off valve until the sample gas feed path is under a positive pressure of approx. 50 hPa. Maximum positive pressure = 150 hPa.
- 5 Close the shutoff valve. The pressure should not change measurably in 3 minutes. A sharp drop in pressure indicates a leak in the sample gas feed path.

Important Note for the Gas Analyzer Version for Measurement of Flammable Gases

Measures Taken after Opening the Gas Paths inside the Gas Analyzer

- If the sample gas feed path inside the gas analyzer has been opened, the seal integrity should be tested with helium at a leak rate of $< 2 \times 10^{-4}$ hPa l/s.
- The pressure drop method (see page 122) can be used as an alternative to the helium test. To accomplish this, increase the test pressure to a p_e of approx. 400 hPa (= 400 mbar) and increase the test period to 15 minutes. The maximum excess pressure $p_e = 500$ hPa (= 500 mbar).
- Any time the gas path is opened it must then be purged prior to connecting the power supply. This should remove any explosive gas/air mixture in the gas path.
 - Purge gas: Inert gas
 - Purge gas quantity: 5 times the volume of the gas paths
 - Purge gas flow: Approx. 30 liters/hour
 - Purge duration: At least 3 minutesThe purge gas should not contain any sample gas components.

Important notes for the explosion-protected version in degree of protection II 3G

Visual inspection

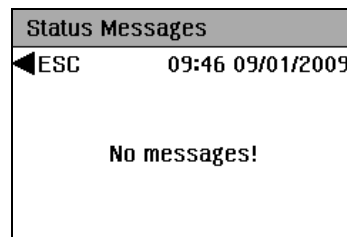
- In the event that the display window is damaged making it impossible to comply with degree of case protection IP65, the gas analyzer has to be shut down, secured against re-starts and it has to be repaired.
- In the event that the housing is damaged by UV radiation making it impossible to comply with degree of case protection IP65, the gas analyzer has to be shut down, secured against re-starts and it has to be repaired.

Replacing the battery

- The battery may not be replaced in an explosive atmosphere.
- Only the original battery type Varta CR2032 may be used as replacement.

Status Messages, Troubleshooting

Status Messages - List

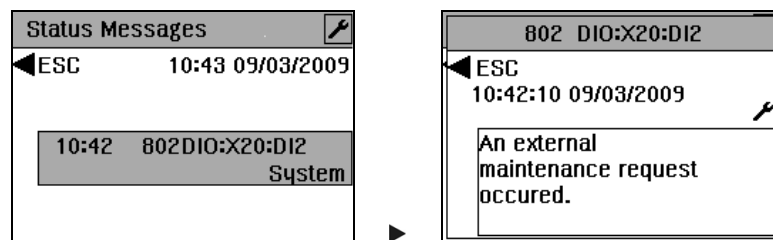


Menu Path

- ▼ Maintenance ▼ Diagnosis ▼ Device Status
- ▼ Status Messages

If a status message is active, the display of the message list is called directly by pressing the key ▼ once.

Message List and Detail View



The message list with the short text of the status messages is displayed in the menu item Status Messages. The detail view of the individual status messages is called by pressing the ► key; the time and date of arrival and clearance or the acknowledgment of the status message are displayed in the detail view.

Legend for the Table "Status Messages"**Status Signals**

A	Status "Failure"	A status has occurred in the gas analyzer which requires the immediate intervention of the user. The measured value is invalid.
W	Status "Maintenance Request"	A status has occurred in the gas analyzer which will soon require the intervention of the user. The measured value is valid.
F	Status "Maintenance Mode"	A calibration is being carried out in the gas analyzer, or the maintenance switch has been set to "On". The measured value is not a process measured value and is to be discarded.
S	Overall Status	The overall status is always set in conjunction with the status "Error" and for individual messages in conjunction with the status "Maintenance request"; it is not set in conjunction with the status "Maintenance mode".

Status Message Categories

a	Active status messages not requiring acknowledgment
aQ	Active status messages requiring acknowledgment
aL	Active status messages requiring acknowledgment and troubleshooting
iQ	Inactive status message requiring acknowledgment

Status Messages

No.	Status	Message	Reaction/Troubleshooting
110	A S a	The instrument is booting.	
116	A S a	The Profibus module is installed in the wrong slot! The interface is therefore not operative. Please install the Profibus module in slot X20/X21.	Install the Profibus module in slot X20/X21.
119	A S iQ	The configuration could not be loaded! This instrument is therefore currently not configured. Please load a configuration using TCT.	This instrument is therefore currently not configured. Notify service if this occurs again.
120	F a	The maintenance switch is ON.	
121	aL	The limit value has alarm status.	
122	A S a	The IO module is defective.	Exchange the IO module.
123	A S a	Communication error while accessing the IO module.	Exchange the IO module.
124	iQ	The configuration data was corrupt! The configuration was restored using the backup data.	
125	a	The limit value has alarm status.	
126	W a	The QAL3 data store is full. Please read out the data.	Export QAL3 data.
127	W a	The drift values exceed the QAL3 limits.	Repeat the calibration. Maintenance of AMS required.
250	A S a Q	The analyzer could not be found!	Check the connectors and cabling.
251	A S a Q	The connection to the analyzer has been lost!	Check the connectors and cabling.
252	A S aL	The EEPROM data of the analyzer is defective!	Check the configuration with TCT.
253	A S aL	Communication with the analyzer is faulty!	Check the connectors and cabling.
254	A S a	The boot program of the analyzer is defective! Notify Service!	Notify Service.
255	A S a	The program of the analyzer is defective! Notify Service!	Notify Service.
300	A S aL	No new measured values from the analog/digital converter.	Notify Service.
301	A S a	The measured value exceeds the value range of the analog/digital converter.	Check the sample gas concentration. Check connectors in the gas analyzer. Notify Service.
302	W a Q	The offset drift exceeds half the permissible range.	Monitor the drift. The measured value is valid as long as the drift remains below the value specified in the measurement data. As soon as the drift exceeds this value, notify Service.
303	A S a Q	The offset drift exceeds the permissible range.	Notify Service. Carry out a basic calibration (with TCT).

No.	Status	Message	Reaction/Troubleshooting
304	W a Q	The amplification drift exceeds half the permissible range.	Monitor the drift. The measured value is valid as long as the drift remains below the value specified in the measurement data. The detector concerned will have to be exchanged in the near future. Manually calibrate the indicated detector at the zero and end point. Permissible range: 50 % of the detector sensitivity. As soon as the drift exceeds this value, notify Service.
305	A S a Q	The amplification drift exceeds the permissible range.	Exchange the detector concerned. Notify Service. Carry out a basic calibration (with TCT).
306	W a Q	The offset drift between two calibrations exceeds the permissible range.	Manually calibrate the indicated detector at the zero point. (This message is generated by automatic calibration.) Permissible range: 15% of the smallest installed measuring range; 6% of the smallest installed measuring range for measurements on plants subject to approval pursuant to the 27th and 30th Federal Regulation on Immissions
307	W a Q	The amplification drift between two calibrations exceeds the permissible range.	Manually calibrate the indicated detector at the end-point. (This message is generated by automatic calibration.) Permissible range: 15% of the sensitivity; 6% of the sensitivity for measurements on plants subject to approval pursuant to the 27th and 30th Federal Regulation on Immissions
308	A S a Q	A calculation error occurred during calculation of the measured value.	Switch the power supply off and on. Notify Service.
309	W a	The temperature regulator is defective.	Notify Service.
310	W a	The temperature correction has been turned off for this component because the measured temperature value is invalid.	Notify Service.
311	A S a	The pressure regulator is defective.	See status message of the pressure detector concerned
312	W a	The pressure correction has been turned off for this component because the measured pressure value is invalid.	Notify Service.
313	W a	Cross-sensitivity correction is not possible for this component because the correction value is invalid.	Check with TCT.
314	W a	Carrier gas correction is not possible for this component because the correction value is invalid.	Check with TCT.
315	W aL	No new measured values from the analog/digital converter.	Notify Service.
316	W a	The measured value exceeds the value range of the analog/digital converter.	Notify Service.
317	W a	A calculation error occurred during calculation of the measured value.	Notify Service.

No.	Status	Message	Reaction/Troubleshooting
321	A S a	The temperature of the detector is below the minimum temperature.	Status message during the warm-up phase. If the status message appears following the warm-up phase: Check the overtemperature cutout and replace if necessary.
322	A S a	The flame is out.	Status message during the warm-up phase. If the status message appears following the warm-up phase: Check gas supply, heater plug.
323	A S a	The analyzer is in the fail-safe status.	Causes: Flame temperature > detector setpoint + 220 °C, hardware fault, Pt-100 line break or short circuit. Switch power supply off and on again after ≥ 3 seconds. If this status message appears again, notify Service. <i>Note: Fail-safe-status means: Heater off, combustion gas valve closed, instrument air valve closed, housing purge on, zero gas valve open.</i>
324	W a	The temperature is above or below the upper or lower alarm value 1.	Status messages during the warm-up phase. If the status message appears following the warm-up phase: Check whether the permissible ambient temperature range is being maintained. Check the connecting leads and connectors. Check the fit of the leads in the wire end ferrules. Check the overtemperature cutout and replace if necessary.
325	W a	The temperature is above or below the upper or lower alarm value 2.	
326	A S aL	No new measured values from the analog/digital converter.	Notify Service.
327	A S a	The measured value exceeds the value range of the analog/digital converter.	Notify Service.
328	A S a	A calculation error occurred during calculation of the measured value.	Notify Service.
329	W a	The pressure is above or below upper and/or lower limit value 1.	Fidas24: Check the supply gas pressures.
330	W a	The pressure is above or below upper and/or lower limit value 2.	Fidas24: Check the supply gas pressures.
331	A S a	The pressure regulator output variable is beyond the valid range.	Fidas24: Check the supply gas pressures.
342	W a	The flow falls below limit value 1	Check sample preparation. Alarm value 1 = 25 % of MRS.
343	A S a	The flow falls below limit value 2.	Check sample preparation. Alarm value 2 = 10 % of MRS. Automatic calibration is interrupted and disabled.
357	A S a	Limas motor optimization is in progress.	If the status message is active for longer than 5 minutes, the filter wheel is blocked.
358	W a	The intensity measured at the detector exceeds or falls below alarm value 1.	Notify Service.

No.	Status	Message	Reaction/Troubleshooting
359	A S a	The intensity measured at the detector exceeds or falls below alarm value 2.	Notify Service.
360	A S a	The filter wheel could not be initialized.	If the status message is active for longer than 5 minutes, the filter wheel is blocked.
362	A S a	The calibration filter wheel cannot be initialized.	If the status message is active for longer than 5 minutes, the calibration filter wheel is blocked.
378	A S aL	The chopper wheel is blocked.	Visual check. Notify Service.
379	A S aL	Chopper wheel speed not OK.	Notify Service.
380	A S aL	IR source element or electronics defective.	Notify Service.
381	A S aL	High voltage in the preamplifier defective.	Notify Service.
382	A S aL	Measured value is influenced by shocks.	
390	A S a Q	Failure of the power supply inside the module. Notify Service.	Notify Service.
397	A S a	The sensor of the temperature regulator is defective.	Notify Service
398	A S aL	No new measured values from the analog/digital converter.	Notify Service.
399	A S a	The measured value exceeds the value range of the analog/digital converter.	Check the sample gas concentration. Check connectors in the gas analyzer. Notify Service.
400	A S a	A calculation error occurred during calculation of the measured value.	Switch the power supply off and on. Notify Service.
401	W a	The flow is above or below the upper or lower alarm value 1.	Check sample gas path. Notify Service.
402	A S a	The flow is above or below the upper or lower alarm value 2.	Check sample gas path. Notify Service.
403	A S a	The flow controller output variable is beyond the valid range.	Notify Service.
404	A S a	The temperature is above or below the upper or lower alarm value 2.	Notify Service.
411	F S a	The analyzer is in standby mode. Reactivation in the Menu: Operation / Pump/Standby / Fidas Standby.. Fidas Restart.	Restart of the Fidas24.
412	F S a	Ignition failed. The analyzer must be manually reactivated. Reactivation in the Menu: Operation / Pump/Standby / Fidas Standby.. Fidas Restart.	Check process gases. Restart of the Fidas24.
413	A S aL	Auxiliary voltage failure in the analyzer hardware.	Notify Service.
414	F S a	The controlled variable of this controller is below the permissible range (< 20%).	Check the process gases and connection lines. If required, restart of the Fidas24.
415	F S a	The controlled variable of this controller is above the permissible range (< 90%)	Notify Service.
500	iQ	An internal calibration error has occurred.	Repeat the calibration. Check the configuration with TCT. Notify Service.
501	iQ	The requested functional capability is not available in the instrument.	Check the configuration with TCT.

No.	Status	Message	Reaction/Troubleshooting
502	iQ	A calibration error has occurred in the instrument.	Calibration will be terminated. Notify Service.
503	W S iQ	The sensitivity is too low! The calibration has been terminated.	Incorrect test gas! Check the test gas supply and infeed; repeat the calibration.
508	iQ	Unknown calibration error. Check the configuration.	Message during the automatic calibration. Check the configuration with TCT.
511	iQ	Autocalibration terminated	For information
512	F a	Autocalibration is in progress.	For information
513	iQ	An internal calibration error has occurred.	Repeat the calibration. Check the configuration with TCT. Notify Service.
517	F a	Instrument is in operation.	
518	iQ	The calibration could not be carried out because the measured value is unstable.	Check the test gas supply and infeed; repeat the calibration.
519	iQ	The calibration could not be carried out because the preamplifier is overdriven.	Check the test gas supply and infeed; repeat the calibration.
529	W S iQ	The calibration was stopped because no raw measured values can be recorded.	Check the test gas supply and infeed; repeat the calibration.
538	W S iQ	The zero-point calibration was stopped, because the analyzer is contaminated!	Clean the sample cell. Notify Service.
539	W S iQ	The zero-point calibration was stopped, because the analyzer is contaminated!	Clean the sample cell. Notify Service.
801	A S a	An external failure has occurred.	Input signal at the correspondingly configured digital input.
802	W a	An external maintenance request has occurred.	Input signal at the correspondingly configured digital input.
803	F a	A user-defined maintenance mode occurred during:	

Fidas24: Troubleshooting

Flame does not ignite

Air in the combustion gas line

When connecting or replacing the combustion gas bottle, make sure that no air penetrates into the combustion gas supply line. Air which has penetrated the combustible gas supply line results in the flame in the analyzer going out.

The analyzer automatically tries to reignite the flame up to 10 times in a period of approx. 10 minutes with increased combustion gas pressure each time. If this is unsuccessful, the analyzer switches to operating status "Wait for restart". In this case ignition of the flame must be restarted:

▲ Operation ► Pump/Standby ▼ Fidas Standby
▼ Fidas Restart

Note: The operating status "Wait for restart" means: Heater on, Combustion gas valve closed, Instrument air valve open, Housing purge on.

Combustion air pressure too high

- Reduce combustion air pressure (note details in analyzer data sheet).

Fidas24 in the Fail-safe Status

If a serious fault has occurred in the analyzer module, the analyzer module is put in the fail-safe mode.

Fail-safe status: heater off, combustion gas valve closed, instrument air valve closed, housing purging on, zero gas valve open.

The cause of the fault must be determined from the status messages (see page 125).

There is no option for restart of the analyzer in the Fidas restart menu; after fault recovery, the gas analyzer must be restarted by switching off and on again.

Failure of instrument air supply

Shutting-off gas supply if instrument air supply fails

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

As a rule, this is ensured by installing a pneumatic shut-off valve in the gas supply line (recommendation (see page 31)); this valve must be controlled by the instrument air supply in such a way that if it fails (and as a result continuous case purging fails (see page 36)), the gas supply is automatically shut off.

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 (e.g. as a result of a supply voltage failure), the supply gases must be shut off (see section "Gas Analyzer Shutdown").
 - 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. Reestablish instrument air supply.
 3. Purge gas analyzer for 20 minutes.
 4. Turn on combustion gas supply.
 5. Gas analyzer starts automatically.

Note for measuring flammable gases

When measuring flammable 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.

Shutting Down and Packing the Gas Analyzer

Shutting Down the Gas Analyzer

Shutting Down 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 fresh air or nitrogen for at least 5 minutes.
- 3 Switch off the power supply to the gas analyzer.

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: Gas Analyzer Shutdown

In the case of a temporary shutdown:

- 1 Turn off the sample gas supply.
- 2 Purge sample gas line with nitrogen for at least 5 minutes from the sampling point.
- 3 Set the gas analyzer to standby operation (see page 118). In case of corrosive and flammable 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.

Fidas24: Gas Analyzer Restart

- 1 Feed in instrument air and combustion air and purge the gas analyzer **for at least 20 minutes**.
- 2 Turn on the gas analyzer power supply.
- 3 Turn on the combustion gas supply and check the combustion gas pressure.
- 4 Carry out a seal integrity test on the combustion gas line (see page 119).
- 5 Turn on the sample gas supply.

See also the instructions in the section "Fidas24: Gas Analyzer Start-up" (see page 99).

Ambient Temperature

Ambient temperature during storage and transport: –25 to +65 °C

Packing the Gas Analyzer

Packing

- 1 Remove adapters from the 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. When shipping overseas, additionally shrink-wrap the gas analyzer air-tight in 0.2 mm thick polyethylene film adding a drying agent (such as silica gel). 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".

Ambient Temperature

Ambient temperature during storage and transport: –25 to +65 °C

ATTENTION

When you return the gas analyzer to the service department, e.g. for repair, please state which gases have been supplied to the gas analyzer. This information is needed so that service personnel can take any requisite safety precautions for harmful gases.

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ABB Automation GmbH

Analytical
Stierstaedter Strasse 5
60488 Frankfurt am Main
Germany
Fax: +49 69 7930-4566
E-Mail: cga@de.abb.com

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