EasyLine Continuous Gas Analyzers

# Model EL3020

Software Version 3.2

## Installation and Start-up Instructions

41/24-400 EN Rev. 1

# Contents

# Preface

## Content of the Installation and Start-up Instructions

These installation and start-up instructions contain all the information you will need to safely and efficiently install and start-up the EL3000 series gas analyzers.

Information about calibration, configuration and maintenance as well as about Modbus is documented in the operator's manual online help file which can be found on the CD-ROM supplied with each gas analyzer (see below).

## Symbols and Typefaces

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. |

## Technical Data in the Data Sheet

The technical data of the gas analyzers is documented in the data sheet; the data sheet can be found on the CD-ROM supplied with each gas analyzer (see below).

## Additional Information in the Analyzer Data Sheet

The version of the delivered gas analyzer is described in the Analyzer Data Sheet (on page 18) supplied with each gas analyzer.

# Additional Information on CD-ROM

A CD-ROM with the following contents is supplied with the gas analyzer:

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

# Additional Information on the Internet

You will find additional information on ABB Analytical products and services on the Internet at "http://www.abb.com/analytical". You can also download the current versions of the software tools and the documentation there.

# Further Information

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 ABB service representative or

ABB Service, Telephone: 0180-5-123580, Telefax: 0621-381-5135,
E-mail: callcenter.automation@de.abb.com

# Guideline for Installation and Commissioning

## Basic Steps

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

1. Follow the safety information
2. Prepare for the installation, provide the requisite material
3. Unpack the gas analyzer
4. Check the seal integrity of the sample gas feed path
5. Install the gas analyzer
6. Connect the gas lines
7. Connect the electrical leads
8. Check the installation
9. Purge the sample gas feed path
10. Start-up the gas analyzer
11. Configure the gas analyzer

# Safety Information

## Intended Application of the Gas Analyzer

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

A special version of the gas analyzer may be used for the measurement of flammable gases and vapors.

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

## Requirements for Safe Operation

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

## Personnel Qualifications

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

## Special Information and Precautions

These include

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

## National Regulations

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

## Device Safety and Safe Operation

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

## Protective Lead Connection

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

## Risks of a Disconnected Protective Lead

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

## Risks Involved in Opening the Covers

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

## Risks Involved in Working with an Open Device

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

## When Safe Operation can no Longer be Assured

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

The possibility of safe operation is excluded:

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

CHAPTER 1

# Preparation for Installation

## Requirements at the Installation Site, Power Supply

### 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.

When installing (see "Installing the Gas Analyzer" on page 31) several housings in a 19-inch rack, maintain 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
- Vibration

## 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 | +5...+40 °C |

## Stability of the Installation Site

The installation site must be stable enough to bear the weight of the gas analyzer (approx. 7...15 kg)!
To ensure safe installation and removal, we recommend that the 19-inch case is supported in a cabinet or rack with slide rails!

## Case Style

The case for the gas analyzer model EL3020 is executed as a 19-inch case with 3 height units and the degree of protection IP20.

## Power Supply

| | |
|---|---|
| Input voltage | 100...240 V AC (– 15 %, + 10 %), 50...60 Hz (± 3 Hz) |
| Power consumption | max. 187 VA |
| Connection | 3-pole grounded-instrument connector to EN 60320-1/C14<br>(2 m connecting cable supplied) |
| Battery | Lithium button-cell 3 V CR2032, for supply of the integrated clock during a power failure |

## Electrical Safety

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

# Electromagnetic Compatibility

| | |
|---|---|
| Interference immunity | Tested to EN 61326:1997 + A1:1998 + A2:2001 + A3:2003. Inspection severity: Industrial area, complies with at least the rating "continuously monitored operation" to Table 2 of EN 61326. |
| Emitted interference | Tested to EN 61326:1997 + A1:1998 + A2:2001 + A3:2003, EN 61000-3-2:2000 and EN 61000-3-3:1995 + A1:2001. Threshold class B for interference field strength and interference voltages is complied with. |

# Sample Gas Inlet and Outlet Conditions

## Sample Gas Inlet Conditions

| Analyzer | Temperature | Positive pressure | Flow | Pressure drop |
|---|---|---|---|---|
| Uras26 | +5...+55 °C | 2...500 hPa | 20...100 l/h | |
| Magnos206 | +5...+50 °C | 2...100 hPa | 30...90 l/h | |
| Caldos27 | +5...+50 °C | 2...100 hPa | 10...90 l/h, min. 1 l/h | < 2 hPa at 60 l/h $N_2$ |

## 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.

## Flammable Gases

### Uras26

The analyzer in the 19-inch housing (Model EL3020) and with stainless steel gas lines and gas connections is suitable for the measurement of flammable gases in a non-hazardous environment.

### Magnos206, Caldos27

The analyzers in the 19-inch housing (Model EL3020) are suitable for the measurement of flammable gases in a non-hazardous environment.

### Oxygen Sensor

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

### Integral Gas Feed

The modules of the integral gas feed may not be used for the measurement of flammable gases.

### Special Conditions

Please observe the special conditions for the measurement of flammable gases (on page 12).

## Other Requirements

### Uras26

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

### Magnos206

If the sample gas contains $Cl_2$, HCl, HF or other highly corrosive components, ABB Analytical must be consulted. If the sample gas contains $NH_3$, the analyzer AO2000 Magnos106 must be used.

### Caldos27

If the sample gas contains $Cl_2$HCl, HF, $SO_2$, $NH_3$, $H_2S$ or other highly corrosive components, ABB Analytical must be consulted.

### Oxygen Sensor

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

# Special Conditions for the Measurement of Flammable Gases

Please note the following special conditions for the measurement of flammable gases with the Model EL3020 gas analyzer:

- The seal integrity of the sample gas path must be checked regularly. It must be checked in any case if the sample gas path inside the gas analyzer had been opened.
- The sample gas path must be purged with inert gas
  - before the gas analyzer is started up and
  - prior to connecting the power supply after the sample gas path had been opened.
- A natural exchange of air with the environment must be possible around the gas analyzer from below (base plate) and from behind (gas connections). The gas analyzer must not be placed directly on a table. The housing openings must not be closed. The distance to adjacent installations must be at least 3 cm.
- If the gas analyzer is fitted in an enclosed cabinet, adequate ventilation of the cabinet must be provided (at least 1 air change per hour). The distance to adjacent installations below (base plate) and behind (gas connections) must be at least 3 cm.
- The sample gas lines and connections must be made of stainless steel.
- Before using the gas analyzer the corrosion resistance against the specific sample gas must be checked.
- The positive pressure in the sample gas path must not exceed the following maximum values:
  - $p_e$ = 100 hPa during normal operation and
  - $p_e$ = 500 hPa in case of failure.

# Test Gases for the Calibration

| Analyzer(s) | Test gas for the zero-point calibration and the single-point calibration | Test gas for the end-point calibration |
|---|---|---|
| **Uras26** with calibration cells (automatic calibration) | $N_2$ or air or IR sample component-free gas | – (calibration cells) |
| Uras26 without calibration cells (automatic calibration) | $N_2$ or air | Span gas* |
| Uras26 without calibration cells (manual calibration) | $N_2$ or air | Test gas for each sample component, respectively for each detector |
| **Magnos206** | Oxygen-free process gas | Process gas with known $O_2$ concentration |
| Magnos206 with a suppressed measuring range | Test gas with $O_2$ concentration near the starting point of the measuring range | Test gas with $O_2$ concentration near the end point of the measuring range |
| Magnos206 with single-point calibration | Test gas with $O_2$ concentration in an existing measuring range or ambient air. Same moisture content as process gas. | |
| Magnos206 with substitute gas calibration | Oxygen-free process gas or substitute gas ($O_2$ in $N_2$) | Substitute gas, e.g. dried air |
| **Caldos27** | Sample component-free test gas or process gas | Test gas or process gas with a known sample gas concentration |
| Caldos27 with 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) | |
| **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 + 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 |

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

# Material Required for the Installation (not supplied)

## Gas Connections

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

## Flow Meter/Monitor

- Flow meter or flow monitor with a needle valve for adjustment and monitoring of the sample gas flow rate

## 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

- 4 oval head screws (Recommendation: M6; this depends on the cabinet/rack system)
- 1 pair of slide rails (Version depends on the cabinet/rack system)

## Signal Lines

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

## Power Supply Lines

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

# Scope of Supply and Delivery

## Scope of Supply and Delivery

- Gas Analyzer Model EL3020

  Gas Connections (see "Installing the Gas Connections" on page 22):

  - Uras26 and gas analyzers with the option "Internal gas feed": Straight screwed fittings of PVDF with nozzles for the connection of flexible tubes are screwed into the rear panel of the housing (number according to the design of the instrument)
  - Magnos206 and Caldos27: 2 straight screwed fittings (PP) with nozzles for the connection of flexible tubes are enclosed
- Mains lead (see "Connect the Power Supply Lines" on page 41), length 2 m
- Female multipoint connectors for the electrical connections (see "Electrical Connections: Overview" on page 34) of the I/O modules (number and design in accordance with the order)
- Micro-porous filter (see "Connect the Gas Lines" on page 32) (preassembled)
- CD-ROM (see "Preface" on page 2) with software tools and technical documentation
- Installation and start-up instructions
- Analyzer Data Sheet (on page 18)

# Analyzer Data Sheet

## Contents of the Analyzer Data Sheet

The analyzer data sheet contains the following information:

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

# Type Plate

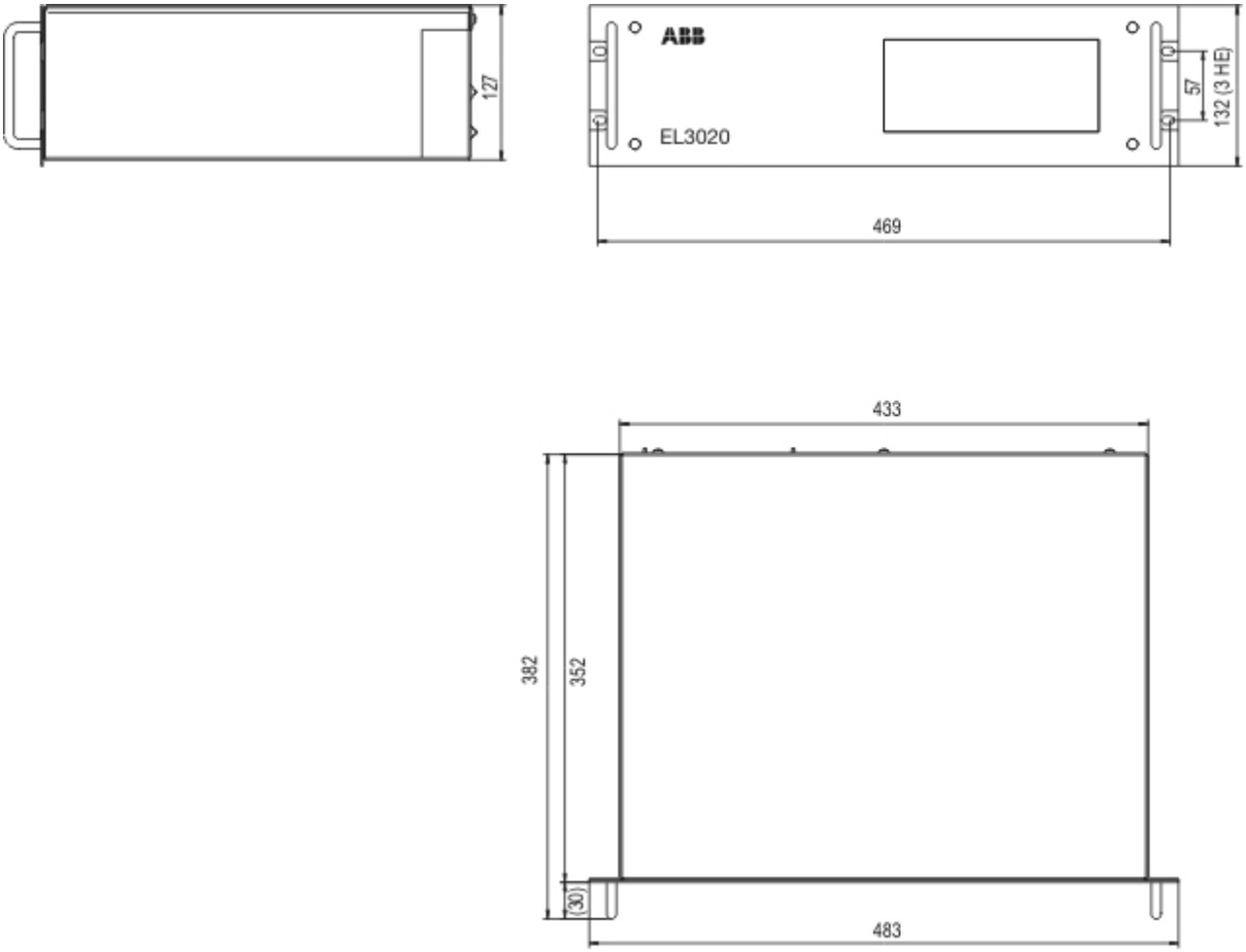
## Contents of the Type Plate

The type plate contains the following information:

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

# Dimensional Drawing

## 19-inch Housing




Dimensions in mm

CHAPTER 2

# Installing the Gas Analyzer

## Unpacking the Gas Analyzer

### Unpacking the Gas Analyzer

1 Remove the accessories (see Scope of Supply and Delivery (on page 17)) from the shipping box.
Ensure that the accessories do not get lost.

2 Remove the gas analyzer from the shipping box together with the respective protective packaging.

3 Remove the protective packaging and place the gas analyzer in a clean location.

4 Remove the adhesive packaging residues from the gas analyzer.

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

ATTENTION
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

NOTE
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

Gas connections for Uras26 (on page 24)

Gas connections for Magnos206 (on page 25)

Gas connections for Caldos27 (on page 26)

Gas connections for Uras26 with Magnos206 (on page 27)

Gas connections for Uras26 with Caldos27 (on page 29)

## Requisite Material

Screwed fittings with nozzles (supplied for Magnos206 and Caldos27) or threaded connections with 1/8 NPT threads and PTFE sealing tape

## Installing the Gas Connections

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.

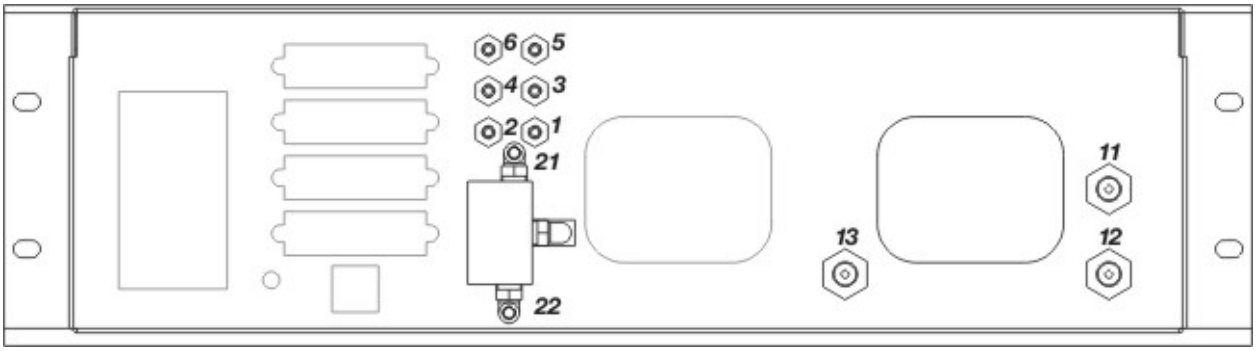
NOTE
Screw in the fittings carefully and not too tightly!

# Check the Tightness of the Sample Gas Feed Path

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

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

# Gas Connections for Uras26




## Uras26: Gas Connections for Flexible Tubes

| | | | |
|---|---|---|---|
| ***1*** | Sample gas inlet | Gas feed path 1 | without option "Integral gas feed" |
| ***2*** | Sample gas outlet | Gas feed path 1 | |
| ***3*** | Sample gas outlet | with option "Integral gas feed", connected ex works to ***1*** Sample gas inlet Gas feed path 1 | |
| ***4*** | Sample gas inlet | with option "Integral 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 converter connected upstream) |
| ***6*** | Sample gas outlet | Gas feed path 2 | |
| ***21*** | Sample gas inlet | on the solenoid valve with option "Integral gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor | |
| ***22*** | Test gas inlet | | |

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

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

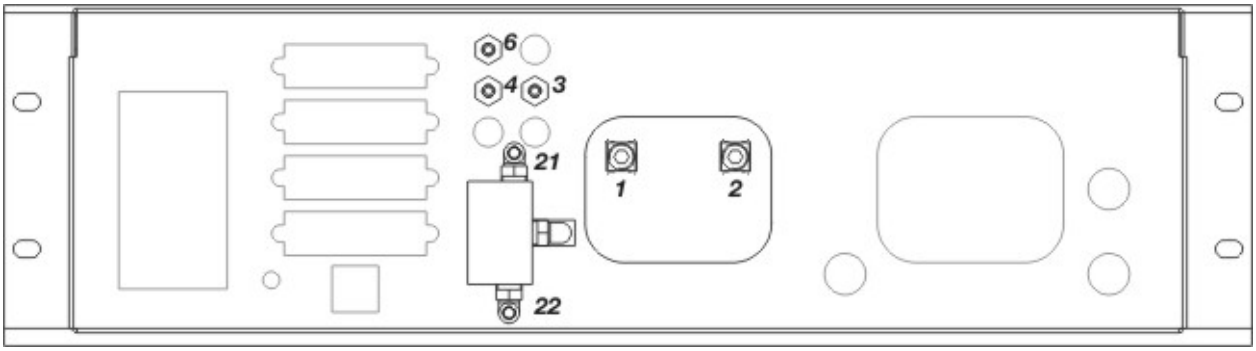
## Uras26: Gas Connections for Pipelines

| | | |
|---|---|---|
| ***6*** | Pressure sensor | |
| Design: | Nozzle (PVDF) for flexible tube with inside diameter = 4 mm | |
| ***11*** | Sample gas inlet | |
| ***12*** | Sample gas outlet | with one sample cell |
| ***13*** | Sample gas outlet | with two sample cells in-line |

Design: 1/8 NPT female thread for threaded connections (not supplied)

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

# Gas Connections for Magnos206

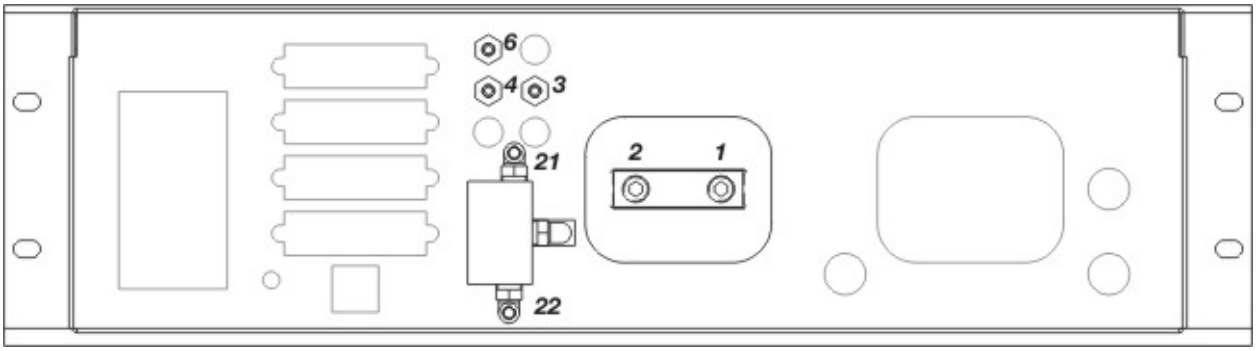



## Magnos206: Gas Connections

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

Note: The pressure sensor is installed as an option.

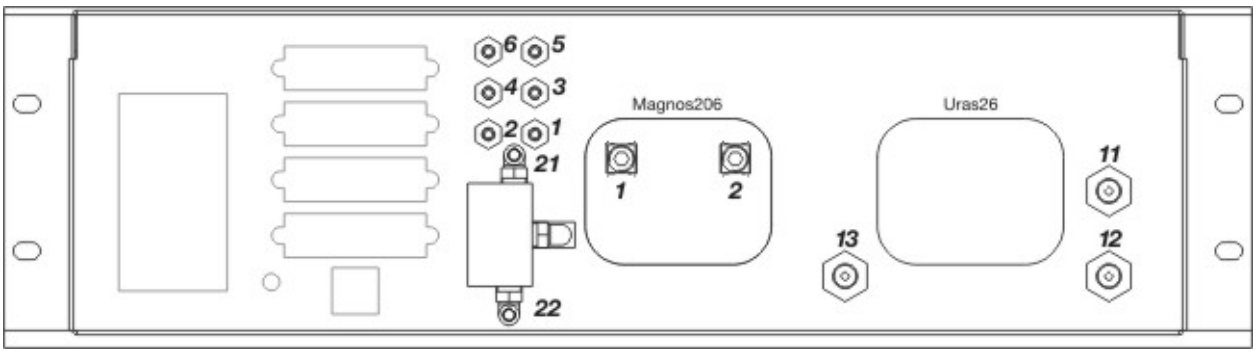
# Gas Connections for Caldos27




## Caldos27: Gas Connections

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

# Gas Connections for Uras26 with Magnos206




## Uras26: Gas Connections for Flexible Tubes

| | | | |
|---|---|---|---|
| ***1*** | Sample gas inlet | Gas feed path 1 | without option "Integral gas feed" |
| ***2*** | Sample gas outlet | Gas feed path 1 | |
| ***3*** | Sample gas outlet | with option "Integral gas feed", connected ex works to ***1*** Sample gas inlet Gas feed path 1 | |
| ***4*** | Sample gas inlet | with option "Integral 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 converter connected upstream) |
| ***6*** | Sample gas outlet | Gas feed path 2 | |
| ***21*** | Sample gas inlet | on the solenoid valve with option "Integral gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor | |
| ***22*** | Test gas inlet | | |

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

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

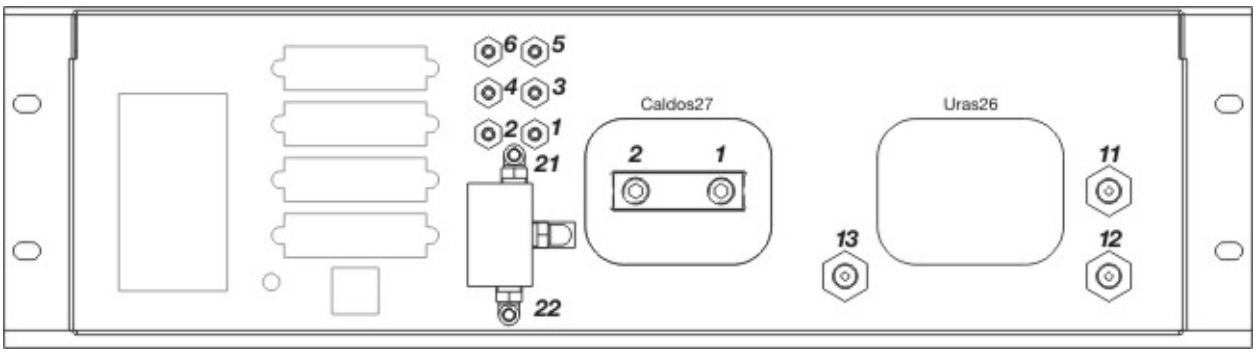
## Uras26: Gas Connections for Pipelines

| | |
|---|---|
| ***6*** | Pressure sensor |
| Design: | Nozzle (PVDF) for flexible tube with inside diameter = 4 mm |
| ***11*** | Sample gas inlet |
| ***12*** | Sample gas outlet with one sample cell |
| ***13*** | Sample gas outlet with two sample cells in-line |
| Design: | 1/8 NPT female thread for threaded connections (not supplied) |
| Note: | The oxygen sensor, the option "Integral 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<br>Connection of flexible tubes: 2 straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm supplied<br>Connection of pipelines: Threaded connections not supplied |
| Note: | The sample gas outlet gas path 1 of the Uras26 is connected ex works to sample gas inlet of the Magnos206. |

# Gas Connections for Uras26 with Caldos27




## Uras26: Gas Connections for Flexible Tubes

| | | | |
|---|---|---|---|
| ***1*** | Sample gas inlet | Gas feed path 1 | without option "Integral gas feed" |
| ***2*** | Sample gas outlet | Gas feed path 1 | |
| ***3*** | Sample gas outlet | with option "Integral gas feed", connected ex works to ***1*** Sample gas inlet Gas feed path 1 | |
| ***4*** | Sample gas inlet | with option "Integral 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 converter connected upstream) |
| ***6*** | Sample gas outlet | Gas feed path 2 | |
| ***21*** | Sample gas inlet | on the solenoid valve with option "Integral gas feed" with solenoid valve, pump, filter, capillary tube and flow sensor | |
| ***22*** | Test gas inlet | | |

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

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

# Uras26: Gas Connections for Pipelines

| | |
|---|---|
| ***6*** | Pressure sensor |
| Design: | Nozzle (PVDF) for flexible tube with inside diameter = 4 mm |
| ***11*** | Sample gas inlet |
| ***12*** | Sample gas outlet with one sample cell |
| ***13*** | Sample gas outlet with two sample cells in-line |
| Design: | 1/8 NPT female thread for threaded connections (not supplied) |
| Note: | The oxygen sensor, the option "Integral 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<br>Connection of flexible tubes: 2 straight screwed fittings (PP) with nozzles for flexible tubes with inside diameter = 4 mm supplied<br>Connection of pipelines: Threaded connections not supplied |
| Note: | The sample gas outlet gas path 1 of the Uras26 is connected ex works to sample gas inlet of the Caldos27. |

# Installing the Gas Analyzer

ATTENTION
The installation site must be stable enough to bear the weight of the gas analyzer (approx. 7...15 kg)!
To ensure safe installation and removal, we recommend that the 19-inch case is supported in a cabinet or rack with slides!

## Requisite Material (not supplied)

- 4 oval head screws (Recommendation: M6; this depends on the cabinet/rack system)
- 1 pair of slide rails (Version depends on the cabinet/rack system)

## Installing the Gas Analyzer

Install the gas analyzer in the cabinet/rack using the selected mounting accessories.

Refer to the dimensional drawing (on page 20) for this.

When installing several housings in a 19-inch rack, maintain a minimum spacing of 1 height unit between housings.

Observe the special conditions for the measurement of flammable gases (on page 12).

# Connect the Gas Lines

## Connect the Flexible Tubes

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

## Connect the Pipelines

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

## Install the Micro-Porous Filter

A pre-assembled micro-porous filter is included in the scope of supply and delivery (on page 17) of the gas analyzer (disposable filter, reference no. 769144).

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

## Install a Flow Meter

Install a flow meter or flow monitor with a needle valve upstream of the sample gas inlet, in order to be able to adjust and monitor the sample 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

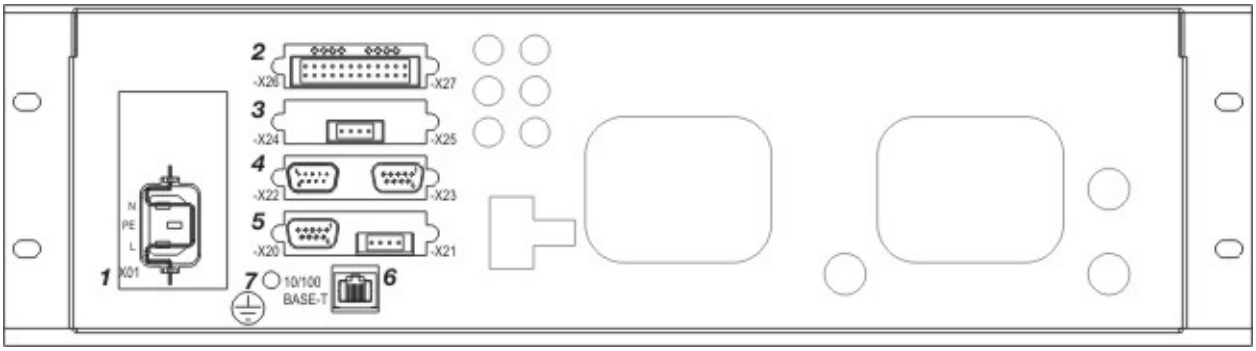
Dispose of corrosive and toxic waste gases according to the regulations!

Take note of the sample gas inlet conditions (see "Sample Gas Inlet and Outlet Conditions" on page 10)!

Purge (see "Purge the Sample Gas Feed Path" on page 43) 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 "Start up the Gas Analyzer" on page 44) has ended! Otherwise, the sample gas could condense in the cold analyzer.

# Electrical Connections: Overview

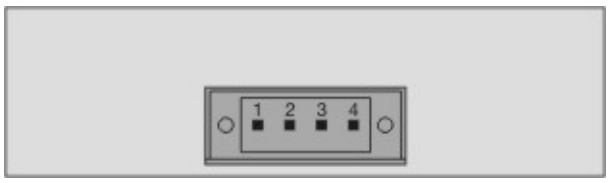



## Electrical Connections

| | |
|---|---|
| ***1*** | Power supply connection (see "Connect the Power Supply Lines" on page 41) (3-pole grounded-instrument connector to EN 60320-1/C14, 2 m connecting cable supplied) |
| | I/O modules (4 slots, example for the complement): |
| ***2*** | Digital I/O module (see "Electrical Connections: Digital I/O Module" on page 36) |
| ***3*** | Analog output module (see "Electrical Connections: Analog Output Module" on page 35) |
| ***4*** | RS232/RS485 module (see "Electrical Connections: RS232/RS485 Module" on page 39) |
| ***5*** | Profibus module (in preparation) |
| ***6*** | Ethernet-10/100BASE-T interface (for service and configuration, 8 pole RJ45 socket) |
| ***7*** | Connection for equipotential bonding (see "Connect the Power Supply Lines" on page 41) (M5 female thread) |

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

# Electrical Connections: Analog Output Module




## Analog outputs AO1, AO2

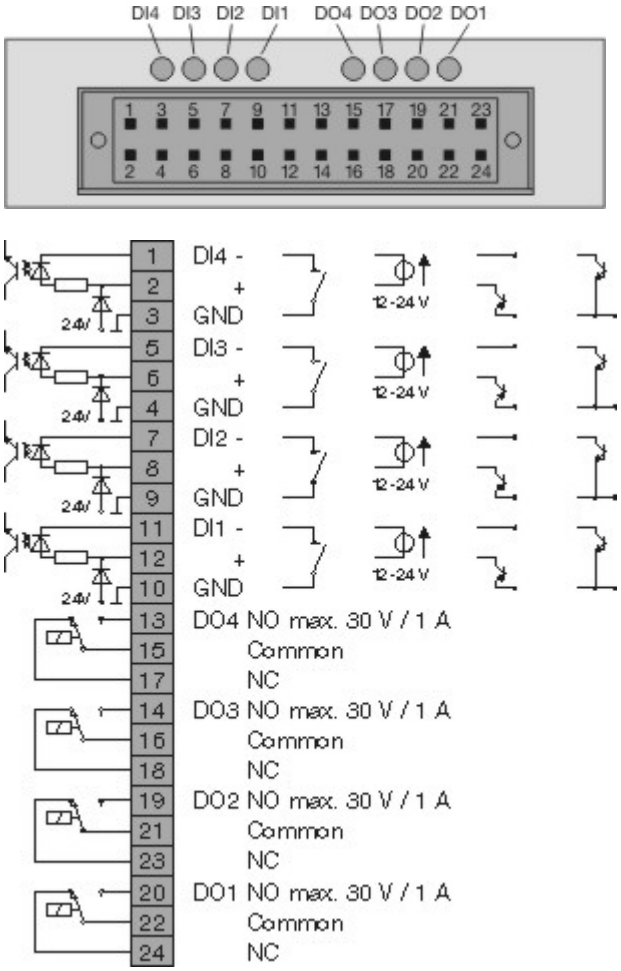
0/4...20 mA (pre-set ex works to 4...20 mA), common negative pole, electrically isolated to ground, can be connected to ground as required, in this regard, max. gain compared to local protective ground potential 50 V, working resistance max. 750 Ω. The output signal may not be less than 0 mA.

## Design

4 pole plug-in terminal strip for stranded wire or solid wire with max. 1 $mm^2$ (17 AWG). Please refer to the information about the requisite material (see "Connect the Signal Lines" on page 40)!

NOTE:
The output signal assignment of the terminals in a supplied gas analyzer can be altered in the configurator.

# Electrical Connections: Digital I/O Module



## Digital inputs DI1...DI4

Opto-electronic couplers with 24 V DC internal power supply. Activation by floating contacts with an external voltage of 12...24 V DC or by mit Open-Collector drivers PNP or NPN.

## Digital outputs DO1...DO4

Floating double-throw contacts, max. contact load rating 30 V/1 A.
The relays must at all times be operated within the specified data range. Inductive or capacitive loads are to be connected with suitable protective measures (self-induction recuperation diodes for inductive loads and series resistors for capacitive loads).
Relays are shown in the unpowered state. The unpowered state is the failure mode ("fail safe").

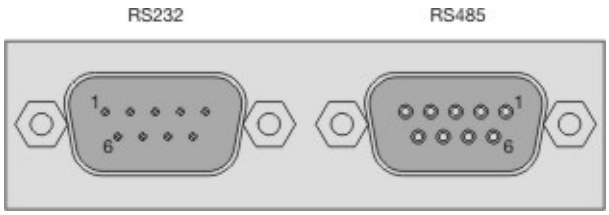
## Design

2x12 pole plug-in terminal strip for stranded wire or solid wire with max. 1 $mm^2$ (17 AWG). Please refer to the information about the requisite material (see "Connect the Signal Lines" on page 40)!

NOTE:
The output signal assignment of the terminals in a supplied gas analyzer can be altered in the configurator.

| Digital input and output signals | Standard assignment Digital I/O Module 1 | Standard assignment Digital I/O Module 2 |
|---|---|---|
| Error | | |
| Maintenance request | | |
| Maintenance mode | | |
| Overall status | DO1 | |
| Start automatic calibration | DI1 | |
| Stop automatic calibration | | |
| Disable automatic calibration | DI2 | |
| Sample gas valve | DO4 | |
| Zero gas valve | | |
| Span gas valve | | |
| Pump on/off | | |
| Limit 1 | DO2 | |
| Limit 2 | DO3 | |
| Limit 3 | | DO1 |
| Limit 4 | | DO2 |
| Limit 5 | | DO3 |
| Limit 6 | | DO4 |
| Limit 7 | | |
| Limit 8 | | |
| Limit 9 | | |
| Limit 10 | | |
| Bus DI 1 | | |
| Bus DI 2 | | |
| Bus DI 3 | | |
| Bus DI 4 | | |
| Bus DI 5 | | |
| Bus DI 6 | | |
| Bus DI 7 | | |
| Bus DI 8 | | |
| External failure | DI3 | |
| External maintenance request | DI4 | |

# Electrical Connections: RS232/RS485 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

# Connect the Signal Lines

NOTE
Lay the signal lines separately from the power supply lines.
Lay analog and digital signal lines separately from each other.

## Requisite Material (not supplied)

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

## Connect the Signal Lines

1. Connect the lines to the mating plugs as shown in the connection diagrams of the I/O modules.
2. Insert the mating plugs in the plug-in terminal strips.

# Connect the Power Supply Lines

## Requisite Material

- A 2 m mains lead with a grounding plug is supplied with the gas analyzer.
- If this mains lead is not used, select conductive material which is appropriate for the length of the lines and the predictable current load.

## Equipotential Bonding

The gas analyzer has a connection marked with the symbol ⏚ for the connecting line to the equipotential bonding on the building side. The connection has a M5 female thread for screwing in suitable screws or terminals.

## Connect the Power Supply Cable

1. Ensure that the power supply feeder has an adequately dimensioned protective device (circuit-breaker).
2. Install an easily accessible mains isolator in the power supply feeder near the gas analyzer, or a switched socket-outlet, in order to be able to disconnect all the power from the gas analyzer if required. Mark the mains isolator in such a way that the assignment of the devices to be disconnected can be clearly recognized.
3. Attach the supplied mains lead to the power supply connection of the gas analyzer and secure the connector by means of the fastening.
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.

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

CHAPTER 3

# Commission the Gas Analyzer

## Check the Installation

### Check the Installation

1. Is the gas analyzer securely fastened (see "Installing the Gas Analyzer" on page 31)?
2. Are all gas lines (see "Connect the Gas Lines" on page 32) correctly connected and laid?
3. Are all signal lines (see "Connect the Signal Lines" on page 40) and power supply lines (see "Connect the Power Supply Lines" on page 41) correctly connected and laid?
4. Are all devices needed for gas conditioning, calibration and exhaust gas disposal correctly connected and ready for use?
5. When measuring flammable gases with the Model EL3020 gas analyzer:
   Is the Uras26 analyzer equipped with gas lines and connections made from stainless steel?
   Is an unobstructed exchange of air with the environment possible according to the "Special Conditions (see "Special Conditions for the Measurement of Flammable Gases" on page 12)"?

# Purge the Sample Gas Feed Path

## Purge before Commissioning

The sample gas feed path must be purged before the gas analyzer is started up and the sample gas fed in.

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

Secondly, this prevents the any explosive gas/air mixture present in the gas feed path from being ignited when the power supply is switched on.

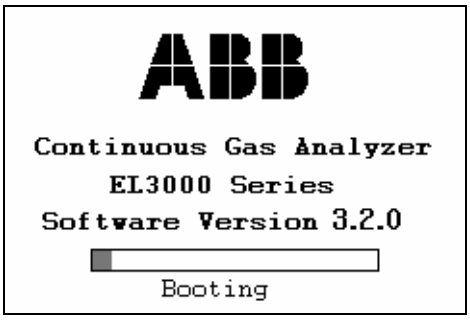
| | |
|---|---|
| Purge gas | inert gas, e.g. nitrogen |
| Purge gas flow | max. 100 l/h |
| Duration of the purging | approx. 20 s for the sample gas feed path in the gas analyzer |

# Start up the Gas Analyzer

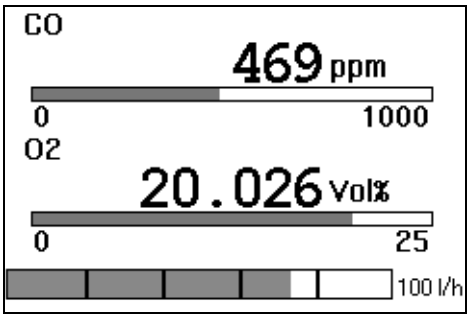
## Start up the Gas Analyzer

1 Switch on the power supply of the gas analyzer

2 The name of the gas analyzer and the number of the software version are shown in the display during the start-up phase.




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




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

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

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

7 Feed in the sample gas.

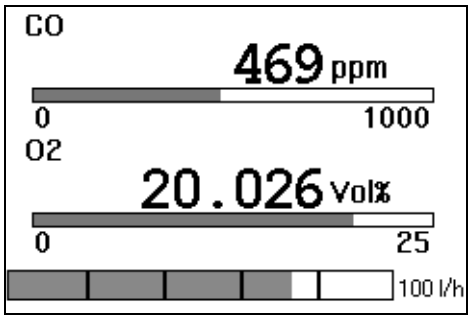
CHAPTER 4

# Display and Operation of 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.

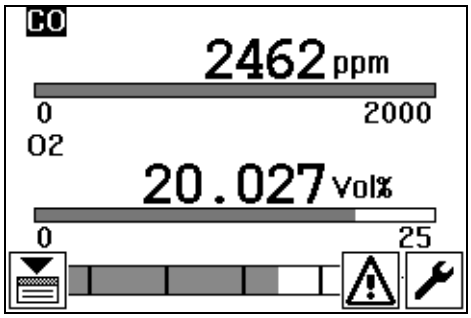
## Display – Measuring Mode

### 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.

## Status Icons in Measuring Mode




An automatic calibration is running.
The icon also appears in menu mode (see "Operation - Menu Mode" on page 47) in the menu title line.

A status message is active.

The status signal "Maintenance request" is active.
The icon also appears in menu mode (see "Operation - Menu Mode" on page 47) in the menu title line.

The status signal "Error" is active or the maintenance switch is set to "On".
The icon is blinking. The icon also appears in menu mode (see "Operation - Menu Mode" on page 47) in the menu title line.

## 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.
If a status message is active: press the key ▲ first of all.

**OK** Switch over to the menu mode. (see "Operation - Menu Mode" on page 47).

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

## Number of Decimal Places

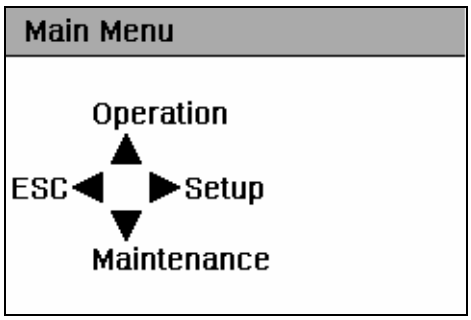
The number of decimal places in the display of the measured value in physical units (e.g. ppm) depends on the span of the measuring range:

| Span (in physical units) | < 5 | ≥ 5...< 50 | ≥ 50...< 500 | ≥ 500 |
|---|---|---|---|---|
| Number of decimal places | 3 | 2 | 1 | 0 |

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

# Operation – Menu Mode

## Display in Menu Mode




## Structure of the Menus

Starting from the main menu, each menu (on page 49) contains a maximum of three menu items ("3-point menu"). Each menu item is assigned to one of the three buttons ▲, ▶ and ▼ each menu item can therefore be selected directly. The button ◀ is used to return to the next higher menu.

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

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

▶ Setup ▶ Calibration Data ▶ Test Gas Set Points

▼ Maintenance ▼ Diagnosis ▼ Device Status ▼ Status Messages

# Key Functions in Menu Mode

| | |
|---|---|
| | **3-point menu** |
| ▲▶▼ | Select menu item |
| ◀ | Return to the next higher menu |
| **OK** | Return to measuring mode (see "Display - Measuring Mode" on page 45) |
| | **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 |

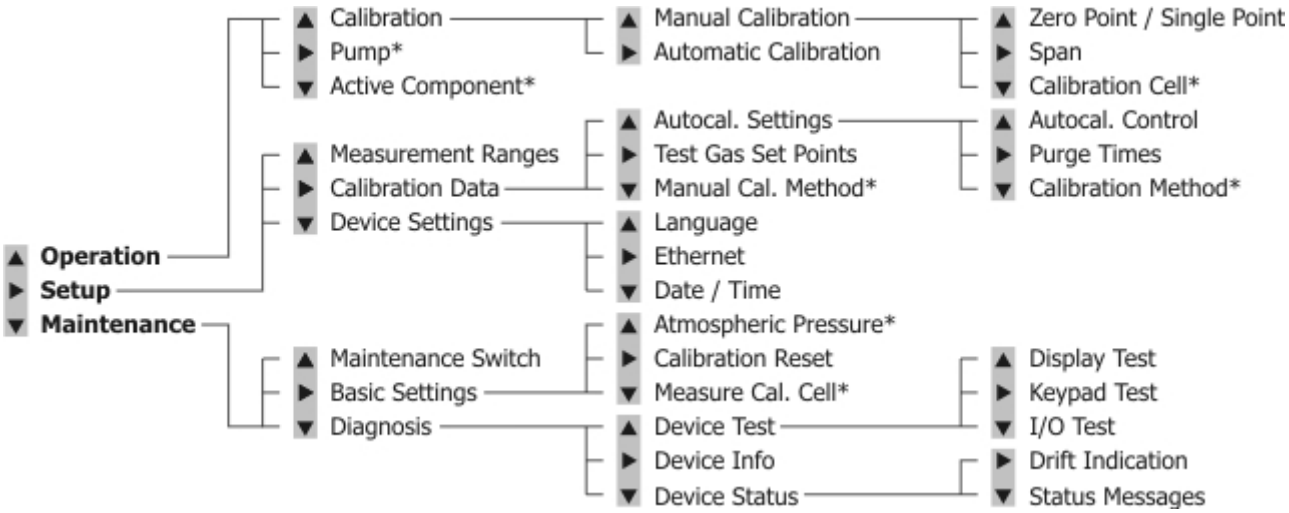
# Time-out Function

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 measuring mode (see "Display - Measuring Mode" on page 45) (time-out function).

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

# Menu

## Overview of the Menu




* This menu depends on the configuration of the gas analyzer

# Information on the Concept of Operation

## Concept of Operation

The concept of operation of the gas analyzers of the EL3000 series 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 (also possible via digital inputs) | X | | X |
| Activate/deactivate cyclically time-controlled automatic calibration | X | X | X |
| Cycle time of the automatic calibration | | X | |
| End-point calibration together with zero-point calibration | | X | X |
| Date and time of the next automatic calibration (Start of the cycle) | X | X | |
| Test gas concentration | X | X | X |
| Purging times | X | X | |
| Output current response (for automatic and manual calibration) | | X | |
| Calibration method (Magnos206) | X | X | |
| Pump on during calibration | | X | |
| **Manual calibration:** | | | |
| Calibration method | X | X | |
| Test gas concentration | X | X | |
| Execute calibration | X | | |
| **Maintenance functions:** | | | |
| Pump control | X | X | |
| Calibration reset | X | | |
| Calibrate pressure sensor / Set air pressure value | X | | |
| Measure calibration cell (Uras26) | X | | |
| Drift, delta drift (display) | X | | X |

| | | | |
|---|---|---|---|
| Software version | X | X | |
| Status information | X | | X |
| **Component parameters:** | | | |
| Range limits | X | X | |
| Alarm value parameters | | X | |
| Low pass time constant (T90 time, filter) | | X | X |
| Active component | X | X | X |
| Modbus parameters | | X | |
| Ethernet parameters | X | X | |
| Signal inputs and outputs (I/O connections) | | X | |

# Communication between the Gas Analyzer and the Computer

## Communication via Ethernet

Communication between the gas analyzer and the computer on which the configurator (see "Information on the Concept of Operation" on page 50) is installed is executed via an Ethernet connection, either as a point-to-point connection or via a network.

## Check the TCP/IP Parameters

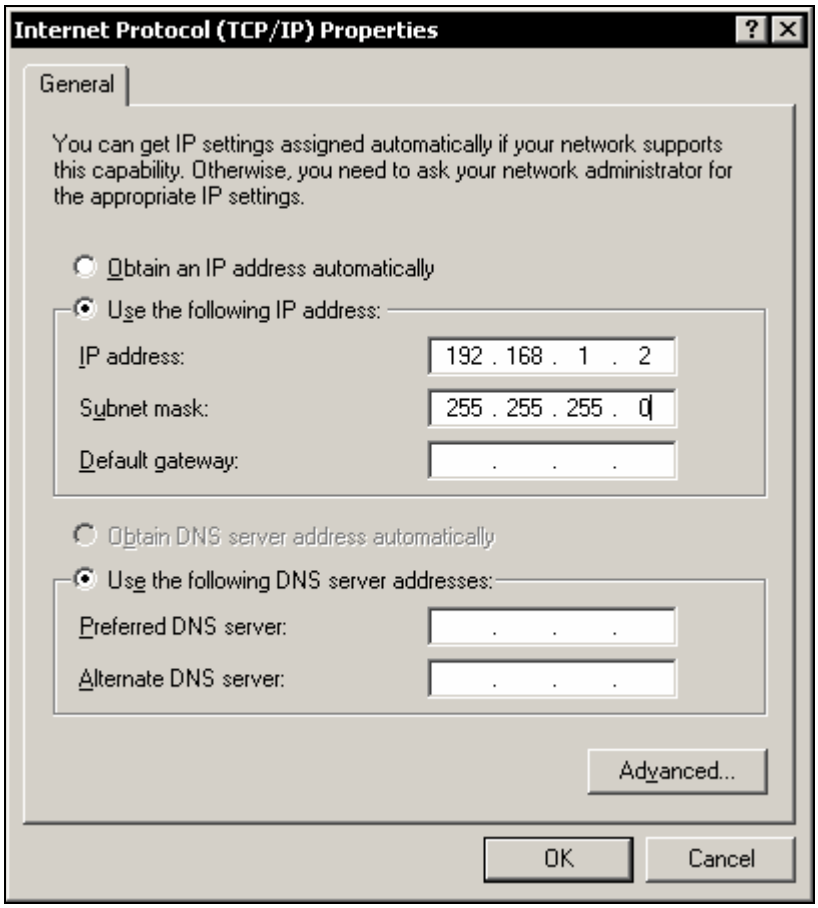
The TCP/IP parameters in the gas analyzer and the computer must be checked and changed if necessary for operation of the configurator. In the case of a point-to-point connection, the IP addresses in the gas analyzer and the computer must be customized.

### Example

Gas analyzer: 192.168.1.4
Computer: 192.168.1.2

## Set the IP address in the computer

Start → Settings → Network connections → Local Area Connection → Tab "General": Properties → Tab "General": Select Internet Protocol (TCP/IP), Properties → Tab "General": Use the following IP address: **(Example)**



# Ethernet Connection

## Cables

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

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

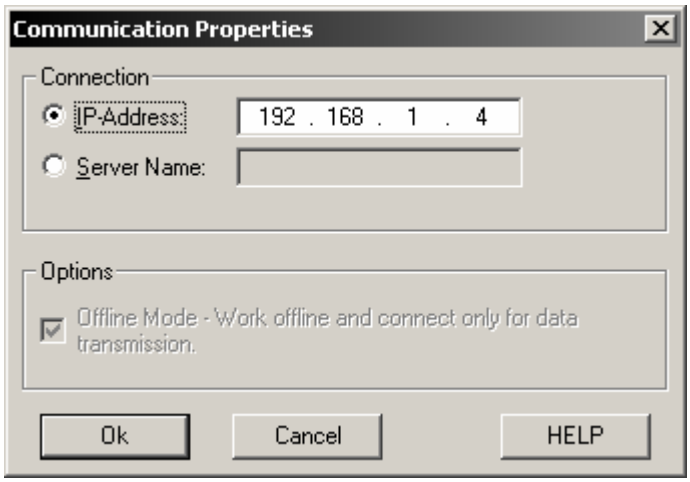
## Test the Ethernet connection

To test the Ethernet connection, enter the following in the computer in "Start → Run...": "ping *IP address*" (*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 specific to the instrument). 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 of Communication

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.



## Receiving Configuration Data

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

Menu "File → Receive Data" or  .

## Sending Configuration Data

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

Menu "File → Send Data" or  .

## Storage of 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  .

ABB has Sales & Customer Support expertise
in over 100 countries worldwide.

**www.abb.com**

The Company's policy is one of continuous product
improvement and the right is reserved to modify
the information contained herein without notice.

Printed in the Fed. Rep. of Germany (11.05)



41/24-400 EN Rev. 1

**ABB Automation GmbH**
Analytical Division
Stierstaedter Strasse 5
60488 Frankfurt am Main
Germany
Phone: +49 69 7930-40
Fax: +49 69 7930-4566
E-Mail: analytical-mkt.deapr@de.abb.com