

Operating instructions

GSS/LPG combi module

LPG 2.0



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1 Basic information

1.1 User manual notes

The gas sampling systems GSS/LPG combi module and LPG 2.0 are modules of the elemental analyzers multi EA 5100, multi EA 5000 and compEAct. Therefore, this user manual only applies in conjunction with the following documents:

- User manual basic module (multi EA 5100, multi EA 5000 or compEAct)
- Software manual of the control and data evaluation software (multiWin or EAvolution)

This user manual provides information about the design and function of the GSS/LPG combi module and the LPG 2.0. It provides operating personnel familiar with analysis the necessary knowledge for the safe handling of the equipment and its components. The user manual further includes notes on the maintenance and service of the equipment and potential causes and remedies of any faults.

User manual conventions

Instructions for action which occur in chronological order are numbered and combined into action units and furnished with the corresponding results.

Lists which are not in chronological order are shown as itemized lists.

Safety instructions are indicated by pictographs and signal words. The type and source of the danger are stated together with notes on preventing the danger. The meaning of the pictographs and signal words used is explained in the chapter "Safety instructions".

The elements of the control and data evaluation software are indicated as follows:

- Program terms are identified with SMALL CAPS.
- Buttons are shown by square brackets (e.g. [OK] button)
- Menu items are separated by arrows (e. g. FILE ► OPEN).

The GSS/LPG combi module and the LPG 2.0 have various identical parts. If these operating instructions apply equally to both devices, they are referred to as gas sampling systems. When different functions are concerned, the full device name is mentioned.

Symbols and signal words

The user manual uses the following symbols and signal words to indicate hazards or instructions. The warnings are always placed before an action.



WARNING

Indicates a potentially hazardous situation which might cause death or very serious injuries (deformities).



CAUTION

Indicates a potentially hazardous situation which might cause light or minor injuries.



ATTENTION

Provides information on potential material or environmental damage.

1.2 Intended use

The extension of the elemental analyzers multi EA 5100, multi EA 5000 and compEAct with the GSS/LPG combi module and the LPG 2.0 permits the supply of pressurized liquefied gases (LPG) or pressurized gases (GSS).

- LPG 2.0

The module is used to dose liquefied gases with a pressure of up to 34 bar (< 500 psi).

- GSS/LPG combi module

A GSS module has been integrated in addition to the LPG module. Pressurized gases and under pressure liquefied gases can be dosed:

LPG: max. 18 bar

GSS: max. 200 bar

The gas sampling system can only be used in conjunction with the elemental analyzers multi EA 5100, multi EA 5000 and compEAct. The modules are controlled via multi-Win/EAEvolution software.

The gas sampling system may only be used for the methods described in this user manual and in the user manuals of the analyzers to determine the sulfur, nitrogen, chlorine and carbon content of pressurized liquefied gases or pressurized gases. Any other use is not as intended!

1.3 Warranty and liability

The warranty duration and liability comply with the legal requirements and the provisions in the general terms and conditions of Analytik Jena.

Deviations from the intended use described in this user manual result in limitations of warranty and liability in the event of a damage. Damage to wearing parts is not included in the warranty.

Warranty and liability claims are excluded for personal injury and property damage due to one or several of the following causes:

- use of the gas sampling system other than intended
- improper commissioning, operation and maintenance of the gas sampling system
- modifications to the gas sampling system without prior consultation with Analytik Jena
- unauthorized intervention in the gas sampling system
- operation of the gas sampling system with faulty safety equipment or improperly fitted safety and protection equipment
- inadequate monitoring of the equipment components subject to wear
- use of other than original spare parts, wearing parts or consumables
- improper repairs
- faults due to the non-observance of this user manual

2 Safety instructions

2.1 General notes

For your own safety and to ensure error-free and safe operation of the gas sampling system, please read this chapter carefully before commissioning. Observe the safety notes in the operating instructions of multi EA 5100, multi EA 5000 and compEAct.





Observe all safety notes listed in this user manual and all messages and displayed by the control and data evaluation software on the monitor.

2.2 Safety marking and notice symbols on the module

Safety symbols have been attached to the gas sampling system, whose content must always be observed.

Damaged or missing safety symbols can cause incorrect actions leading to personal injury or material damage! The safety symbols must not be removed! Damaged safety symbols must be replaced without delay!

The following warning signs and notice symbols are attached to the module:

Warning / notice symbol	Meaning
	Warning against dangerous electrical voltage Do not open the device housing without authorization. Maintenance work on the device may only be carried out by service personnel authorized by Analytik Jena.
	Observe the operating manual Inform yourself about the required safety measures and work steps in the operating instructions before doing any work on the device.
	Before opening the device always disconnect the mains plug Disconnect the device from the mains before doing any maintenance work on electronic components.
	The device contains controlled substances (in accordance with the guideline "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products"). Analytik Jena guarantees that the substances will not leak within the next 25 years and, therefore, will not cause any environmental danger or health risk within this period of time if the device is used as intended.

2.3 Summary of safety instructions

Observe the following notes:

- Only use the GSS/LPG combi module and the LPG 2.0 as intended and do not endanger yourself and others. Only operate the gas sampling system under supervision!
- Only sample cylinders filled with liquefied gas or pressurized gas may be connected to the gas sampling system.
- The investigation of hazardous substances is the exclusive responsibility of the operator. Always wear suitable protective equipment (respiratory protection, goggles and protective gloves)!
- Observe the notes relating to the substances or their handling attached to the sample cylinders. Do not use unlabeled cylinders!
- Observe in particular the statutory and local regulations for the storage and handling of radioactive, flammable, explosive, biological or other hazardous substances.
- Never dose gas samples containing particles without the filtration unit. Minute particles cause wear and hence damage to the dosing unit and may lead to leaks. Only operate the gas sampling system with the filtration units fitted to the sample connections.

2.4 Safety instructions for positioning and connection

Observe the following notes:

- Danger from hazardous or toxic gases escaping! Use gas monitoring equipment when examining hazardous substances. Such equipment warns the personnel if gas escapes.
- Only connect the gas sampling system to a properly grounded mains outlet in accordance with the voltage specifications on the rating plate.
- Only connect argon to the device as carrier gas. Connecting an incorrect gas may be a fire hazard and cause severe damage to the device.
- The sample cylinder is connected using a 6 mm Swagelok screw connection tube with clamping ring and union nut (precompact). The counter piece of the screw connection must be present on the sample cylinder. Do not use any other screw connection or makes!
- Risk of injury and measuring errors from a leaking system! When inserting the sample cylinder observe the correct sequence (→ "Connecting the LPG sample cylinder" p. 24 and "Connecting the GSS sample cylinder" p. 26). The sample cylinder mount is only used to secure the sample cylinder. No forces must be applied through the mount onto the sample cylinder connection, otherwise the system might start leaking! Place the mount centered above the connection and tighten the knurled screws only lightly and symmetrically!
- Sample cylinders whose geometry and weight does not permit them to be connected to the gas sampling system securely (i.e. inside the clamping mount) and without damaging the connection, must not be connected directly to the module! Such sample cylinders must be attached adequately secured to the floor or work table. The

sample cylinder must then be connected to the module using a pressure-resistant transfer line (Swagelok)!

- The user is responsible for the safety and conformity of the sample cylinder and any corresponding mount.
- The substances may not escape unchecked from the sample cylinders. Only open the valve of the sample cylinder once the sample cylinder has been properly connected to the gas sampling system.
- Check before commissioning that all hose connections are present and tight and that the "waste" connection is connected to an explosion-proof exhaust vent.

2.5 Safety instructions - operation

- Only operate the gas sampling system under supervision!
- Danger from hazardous or toxic gases escaping! Use suitable gas monitoring equipment when examining hazardous substances. Such equipment warns the personnel if gas escapes.
- Check the device regularly during operation for escaping gas, in particular at the sample cylinder connection.
- Ensure adequate room ventilation (e.g. using an explosion-proof extraction device)! Ensure that the exhaust vents cannot get clogged up.
- Shut the sample cylinder immediately if you notice signs of leaks or danger.
- If you detect escaping gas, remove the cause of the leak immediately or call Service, if applicable! Only carry out an analysis if the check of the system tightness did not result in any problems.
- Relieve the pressure from the device before any maintenance and before replacing the sample cylinder. To do so carefully open the respective needle valve for sample flow adjustment until the manometer indication has dropped to zero. When relieving the pressure, make sure that the liquid in the bubble vessel does not boil so that it splashes out of the vessel.
- Only shut down the device when the device has been depressurized. Ensure good ventilation.

2.6 Behavior during emergencies

When using the GSS/LPG combi module or the LPG 2.0, the following instructions must be observed during emergencies:

- Immediately close the shut-off valve on the sample cylinder.
- Open the appropriate needle valve for the sample flow adjustment to drain the gas present in the system (see Figure below).
- Ensure adequate ventilation.
- Take additional measures appropriate for the escaped substance in accordance with the emergency plan of the operator.

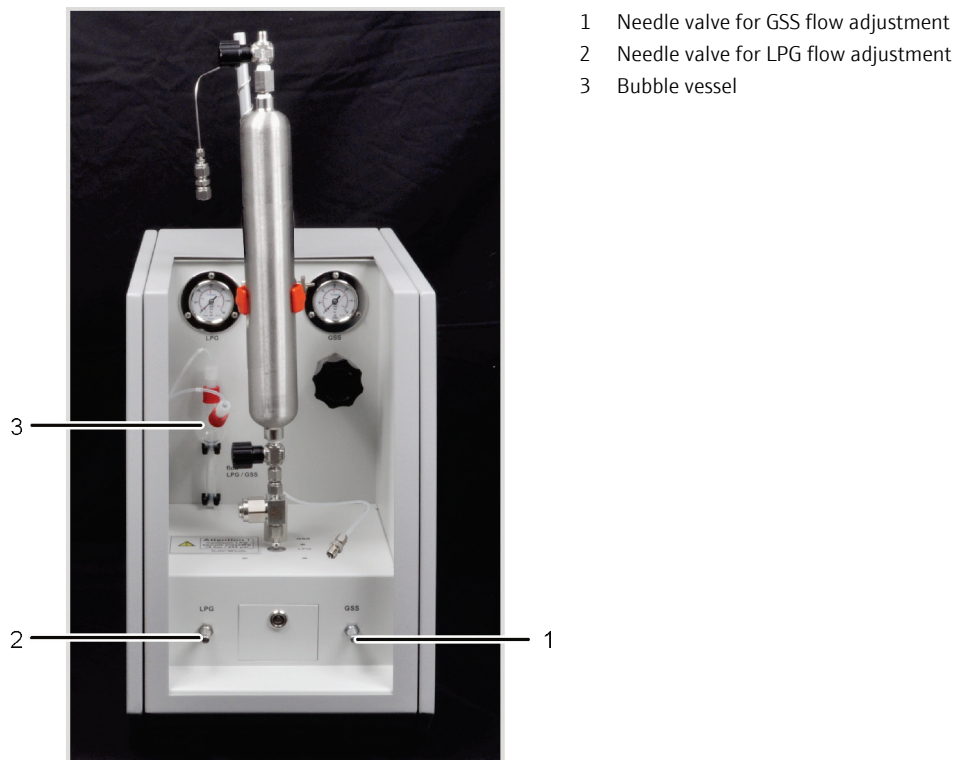


Figure 1 GSS/LPG combi module (needle valves)

If there is no imminent danger of injury:

- Check the connections at the sample cylinder and filtration unit.
- Close the gas supply if possible.
- Only shut down the gas sampling system or disconnect the mains plug when the module has been fully depressurized.

3 Structure of the gas sampling systems

The gas sampling systems consist of the following main components:

- Dosing unit
- Expansion chamber
- Flow adjustment
- Bubble vessel
- Mount and connections for sample cylinders
- Filtration units for LPG or GSS connection
- Manometer for pressure indication
- Purge unit
- Hose connection with injection needle or flexible injection needle
- Gas inlets and outlets and communication interface to the basic module on the equipment backplate

3.1 Front view of the LPG 2.0

The LPG 2.0 has the following device components at the front:

- LPG flow
Needle valve to adjust the gas flow
- **Note:**
Only close the needle valve finger-tight to protect it against damage.
- Manometer
Display of the gas pressure in the sample cylinder
- LPG sample cylinder connection
6 mm Swagelok pipe union with clamping rings and union nut
- Sample cylinder mount
- Filtration unit
- Bubble vessel for the flow indication
- Mount for securely attaching the sample cylinder

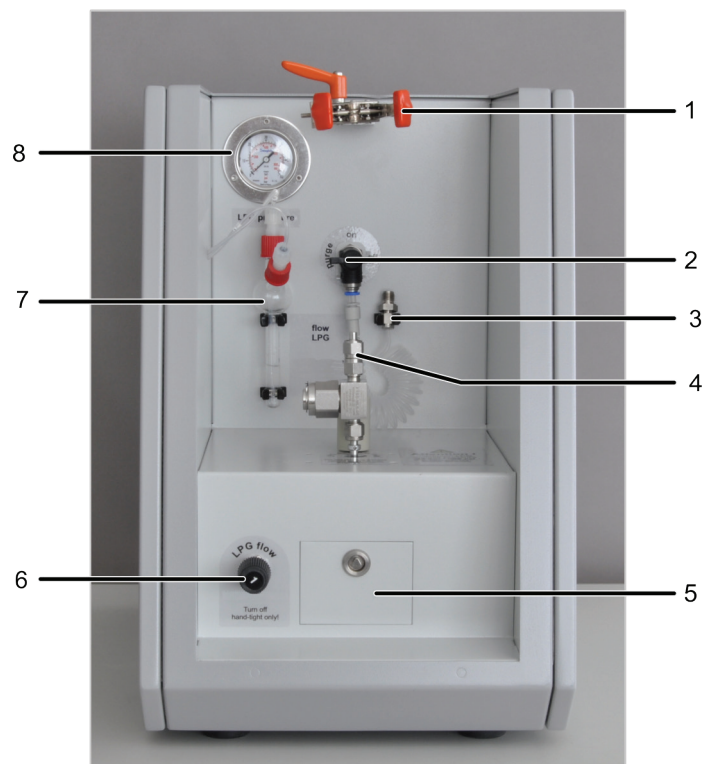


Figure 2 Front view of the LPG 2.0

- | | |
|-------------------------------------|--|
| 1 Sample cylinder stand | 5 Service flap |
| 2 Purge unit (purge shut-off valve) | 6 Needle valve for LPG flow adjustment |
| 3 Purging gas connection | 7 Bubble vessel |
| 4 LPG sample cylinder connection | 8 LPG manometer |

The electrical connections and interfaces and the gas connections are on the rear of the equipment (→"Connections" p. 15).

3.2 Front view of the GSS/LPG module

The LPG components are on the left-hand side of the GSS/LPG combi module and the GSS components on the right-hand side.

LPG components

- LPG flow
Needle valve to adjust the gas flow
- **Note:**
Only close the needle valve finger-tight. To protect the valve against damage it is not closed completely. A residual gas flow is visible in the bubble vessel and normal.
- Manometer
Display of the gas pressure in the sample cylinder
- LPG sample cylinder connection
6 mm Swagelok pipe union with clamping rings and union nut
- Sample cylinder mount
- Filtration unit

-
- GSS components
- GSS flow
Needle valve to adjust the sample gas flow
Note:
Only close the needle valve finger-tight. To protect the needle valve against damage it is not closed completely. A residual gas flow is visible in the bubble vessel and normal.
 - Pressure reducer
reduces the pressure from the sample cylinder
adjustable from 0.7 to 1.7 bar, recommended setting: 1 bar
Note:
The desired output pressure of 1 bar is set by rotating the handwheel. Clockwise rotation increases the pressure; counterclockwise rotation reduces the pressure. Fine adjustments of the output pressure should always be made in the direction of a pressure increase to achieve the precise setpoint.
 - Manometer
indicates the pressure set via the pressure reducer (does not indicate the gas pressure in the sample cylinder!)
 - Sample cylinder support
used to secure the GSS sample cylinder
 - GSS sample cylinder connection
6 mm Swagelok pipe union with clamping rings and union nut
 - GSS sample gas connection mount
 - Filtration unit
- Bubble vessel and mount
- Bubble vessel for the flow indication
It is filled with water and used by both components to check the gas flow (bubbles).
 - Mount for securely attaching the sample cylinders

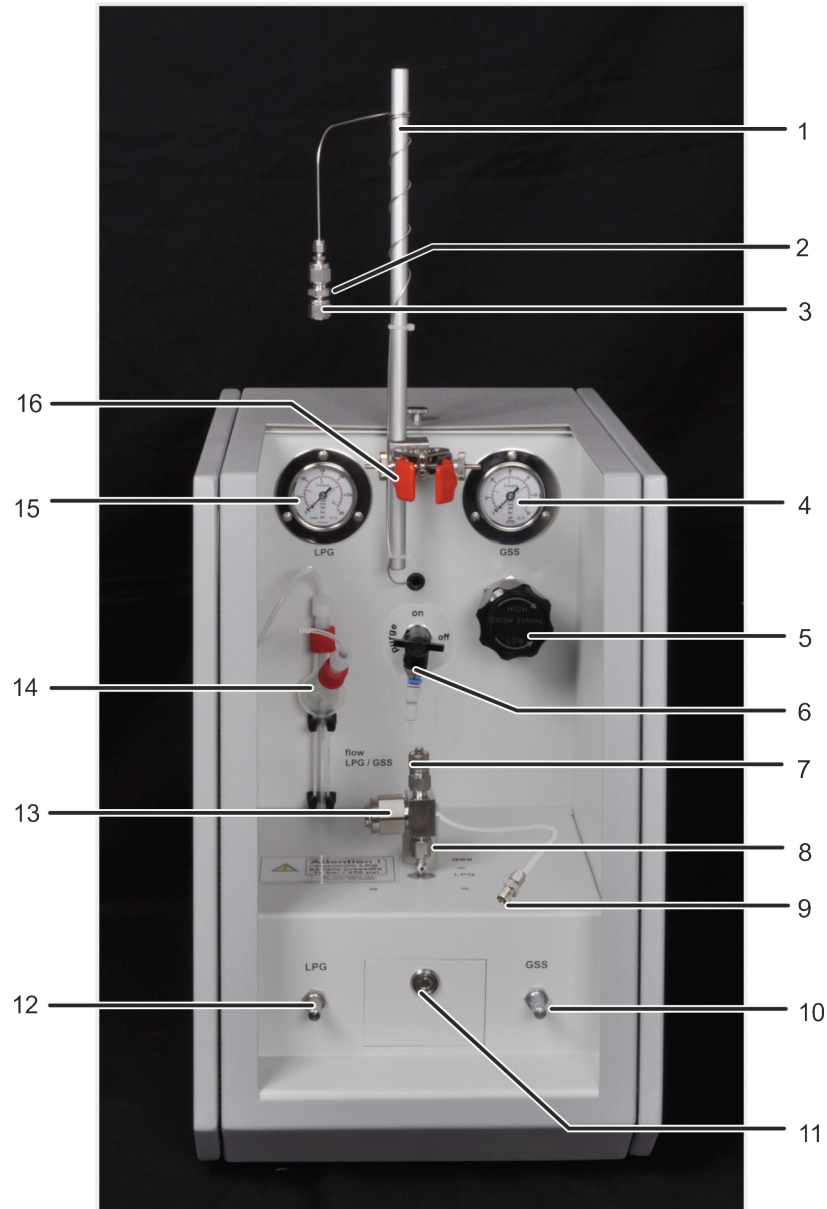


Figure 3 GSS/LPG combi module (front view)

- | | |
|-------------------------------------|---|
| 1 GSS connection mount | 9 Purging gas connection for connection to the LPG or GSS sample cylinder |
| 2 GSS filtration unit | 10 Needle valve for GSS flow adjustment |
| 3 GSS sample cylinder connection | 11 Service flap |
| 4 GSS manometer | 12 Needle valve for LPG flow adjustment |
| 5 GSS pressure reducer | 13 Filtration unit for LPG connection |
| 6 Purge unit (purge shut-off valve) | 14 Bubble vessel |
| 7 LPG sample cylinder connection | 15 LPG manometer |
| 8 LPG sample cylinder support | 16 Sample cylinder mount |

The electrical connections and interfaces and the gas connections are on the rear of the equipment (→"Connections" p. 15).

3.3 Connections

The electrical connections and interfaces and the gas connections of the LPG 2.0 and the GSS/LPG combi module are on the rear of the equipment.

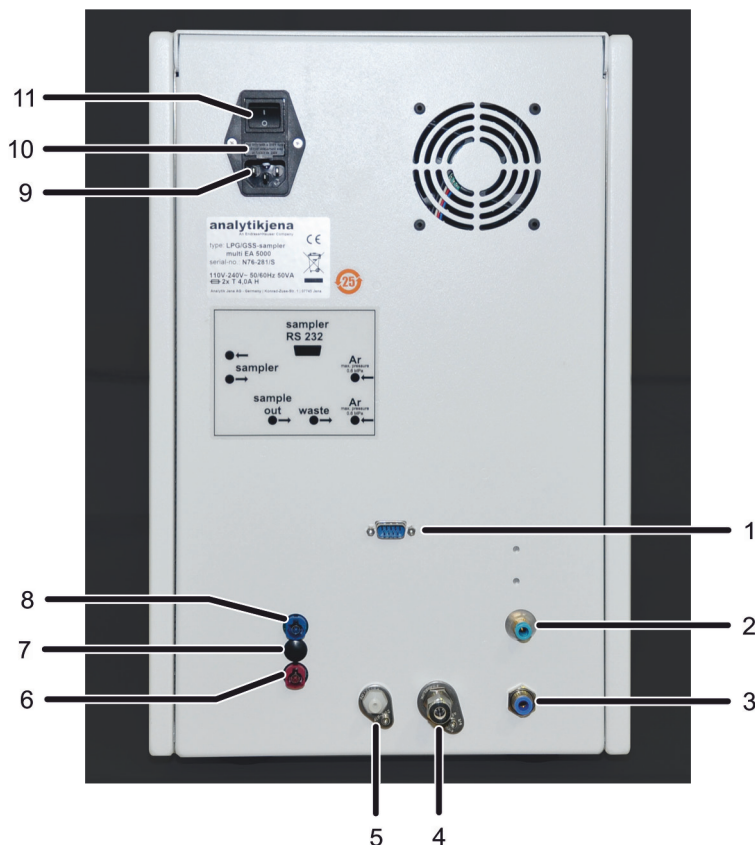


Figure 4 Connections and interfaces (equipment backplate)

- | | | | |
|---|---|----|---|
| 1 | RS 232 interface to the multi EA 5100, multi EA 5000 | 6 | RS 485 interface to other system modules |
| 2 | Argon connection | 7 | DIP switches for bus termination (behind cover) |
| 3 | Argon connection | 8 | RS 485 interface to the compEAct |
| 4 | Gas outlet "waste" for connection to an extractor with explosion protection | 9 | Mains connection |
| 5 | Gas outlet "sample out" for transferring the sample gas to the elemental analyzer | 10 | Fuse holder |
| | | 11 | Device switch |

The device switch for switching the modules on and off is (viewed from the front) at the top right of the equipment backplate. The equipment fuse and mains connection are positioned below.

The communication with the multi EA 5100/multi EA 5000 takes place via a connection cable for the sampler (RS 232 special bus). The corresponding interface on the equipment backplate is labeled "sampler RS 232" (1 in Figure 4). The RS 232 bus system enables both the direct connection to the multi EA 5100/multi EA 5000 and the intermediate connection of additional sample feeding modules.

The communication with the compEAct takes place via a connection cable for the sampler (RS 485 interface). The corresponding interface in the equipment backplate is labeled "← sampler" (8 in Figure 4). The gas sampling system can be connected directly to the compEAct. Additional sample feeding modules may also be connected in series with

the gas sampling system. For this purpose, a second RS 485 interface is provided on the dosing module (6 in Figure 4).

If you want to connect several system modules to the compEAct, see section "Connecting several sample feeding modules to the compEAct" on page 39. The setting of the DIP switches (7 in Figure 4) for the bus termination is described there.

The supply with argon as carrier gas and purging gas takes place via the "argon" connections. The gas outlet "sample out" is used to transfer the sample gas to the furnace of the elemental analyzers multi EA 5100, multi EA 5000 and compEAct.

The "waste" outlet must be connected to an explosion-proof extractor. The statutory and local regulations for the proper waste disposal must always be observed.

3.4 Measuring gas transfer

compEAct +
multi EA 5100/5000 (in
vertical operating mode)

The measuring gas is dosed directly into the combustion tube via the injection port (screw cap with needle guide and septum).

The measuring gas transfer takes place via a hose connected to the measuring output "sample out" on the equipment backplate of the gas sampling system. At the other end of the hose there is an injection needle, which is injected through the needle guide and septum up to the stop of the Fingertight screw connection.

The connections between the hose and the injection needle are made using Fingertight screw connections. These flangeless fittings consist of a ferrule and a banjo bolt and seal by only finger-tight tightening of the banjo joint.

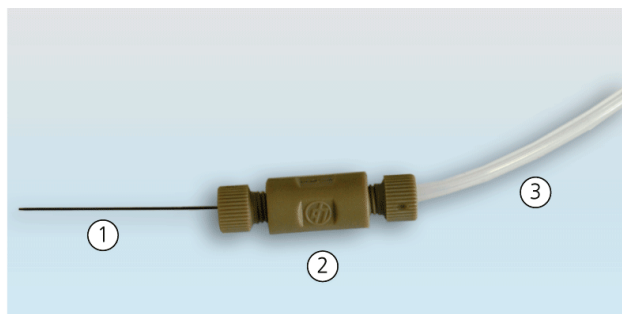


Figure 5 Measuring gas injection needle (for vertical operating mode)

- | | |
|--------------------------------|---|
| 1 Injection needle | 3 Hose from the measuring gas output "sample out" on the module |
| 2 Fingertight screw connection | |

multi EA 5100/5000 (in
horizontal operating
mode)

The sample is transferred into the combustion zone by means of a hose with flexible injection needle via the ABD port (Automatic Boat Drive). The hose connection on the equipment backplate and the connection technology are identical for the vertical and horizontal operating modes.

Argon distributor

Using the purge unit requires two argon inputs on the back of the module, one for the GSS/LPG carrier gas and one for the purge unit. The three gas connections (two for the module and one for the elemental analyzer) are made with the two supplied Y-distributors. When connecting the argon, the shut-off valve of the purge unit must be closed!

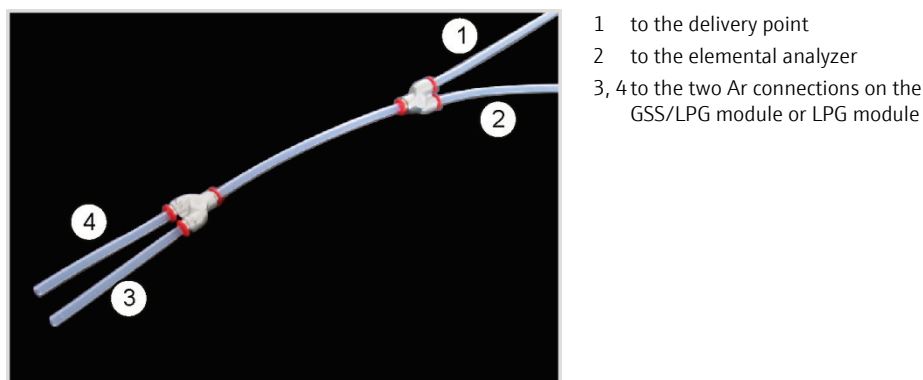


Figure 6 Distributor for argon connections

3.5 Functional principle of the GSS/LPG combi module and LPG 2.0

The liquefied gas samples in sample cylinders are connected directly to the GSS/LPG combi module (LPG branch) or LPG 2.0, injected fully automated as a depressurized gaseous sample into the analysis system and burnt quantitatively.

The pressurized gases in sample cylinders are also connected directly to the GSS/LPG combi module (GSS branch), injected fully automated at a defined outlet pressure into the analysis system and burnt quantitatively.

With the aid of the argon carrier gas the gas samples are dosed directly into the vaporization zone of the combustion tube in the basic module. First a pyrolysis is carried out in the argon flow. The pyrolysis gases are then fully oxidized in the oxygen flow.

4 First commissioning

4.1 Site requirements

4.1.1 Installation conditions

The site requirements are the same as for the elemental analyzer (→ operating instructions of multi EA 5100, multi EA 5000 and compEAct).

4.1.2 Space requirement

The gas sampling system can be placed on the right of the elemental analyzer or next to the ABD. The arrangement depends on the use of other system components and can be adapted to the local conditions. The space requirement results from the system modules required for the measuring task.

4.1.3 Gas supply



WARNING

Risk of explosion from incorrectly connected gas supply!

The gas connections must not be swapped. The gas pressures specified in the technical data must be adhered to (→ Specification p. 44).

The operator is responsible for the gas supply and the corresponding connections and pressure reducers.

The connection hoses with outer diameter 6 mm and inner diameter 4 mm are included with the delivery. The length is 2 m. If other lengths are preferred, please contact the customer service department at Analytik Jena.

A distributor for the argon connection is supplied for the gas sampling system so that module and analyzer can use a common argon supply. When connecting the gas to the gas sampling system the purge shut-off valve must be closed ("off" position).

4.1.4 Energy supply



WARNING

The gas sampling system must only be connected to a properly grounded mains outlet in accordance with the voltage specifications on the type plate.

The gas sampling system is operated on single-phase alternating current.

The installation of the electrical equipment of the laboratory must comply with the standard DIN VDE 0100. After the connection point an electrical current in accordance with the standard IEC 38 must be available.

4.2 Unpacking and connecting the module



WARNING

The elemental analyzer and the gas sampling system must only be set up, assembled and installed by the customer service of Analytik Jena or by trained specialist personnel authorized by Analytik Jena!

Any unauthorized intervention in the elemental analyzer and its system components can endanger the user and the operational safety of the equipment and limits or completely invalidates any warranty claims.

Retain the transport packaging! Return transport for service must be in the original packaging. This alone prevents transport damage.



WARNING

Danger of short circuit!

Make the electrical connections to the elemental analyzer and the additional system components only when the power is switched off!

Before connecting the mains cable ensure that the mains switch on the rear of the equipment is set to "0"!

Only use the IEC connection cable included in the scope of delivery for the connection to the mains supply (VDE label, 2 m long). Extensions of the supply cable are not permitted!



WARNING

Risk of fire and explosion from incorrect gas connection!

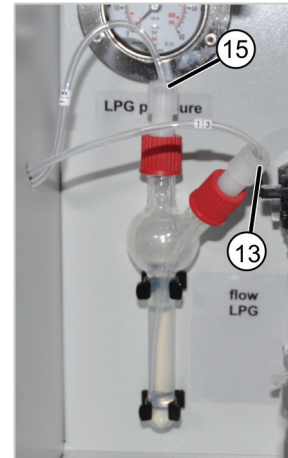
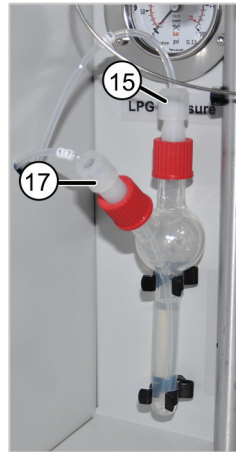
Only connect argon to the gas sampling system! When connecting the wrong gas, there is a fire risk or explosive mixtures may develop. Set the preliminary pressure at the pressure reducer to 6 bar.

The operator is responsible for providing the necessary gas connection.

Assembling the components

Assemble the components of the gas sampling system as follows:

1. Carefully remove the module and accessories from the transport packaging.
2. Place the module at its intended location.
3. Remove all adhesive tape and protective bags.
4. Fit the bubble vessel for the flow indication in the module. Fill the bubble vessel with water up to approx. 1 to 2 cm below the glass sphere.
5. Connect the hoses to the bubble vessel:



GSS/LPG combi module connections

LPG 2.0 connections

- Connect hose no. 15 to the top outlet of the bubble vessel.
- LPG 2.0: Connect hose no. 13 to the side inlet.
- GSS/LPG combi module: Connect hose no. 17 to the side inlet.
- Slide the hose at the side inlet so far into the bubble vessel until it reaches to just above the floor.
- ✓ The module is now fully assembled.

Connecting the module

The electrical connections and argon connections are on the rear of the GSS/LPG combi module and the LPG 2.0.



- 1 RS 232 interface to the multi EA 5100/5000
- 2 Argon connection
- 3 Argon connection
- 4 Gas outlet "waste"
- 5 Gas outlet "sample out"
- 6 RS 485 interface to the compEAct
- 7 Mains connection
- 8 Fuse holder
- 9 Mains switch

Figure 7 Device backplate of the GSS/LPG combi module with interfaces and device switch

1. Connect the mains supply cable to the mains connection on the equipment backplate and to an isolated ground receptacle.
2. Connect the gas sampling system to the elemental analyzer by means of the supplied interface cable:

multi EA 5100, multi EA 5000

- Interface "sampler RS 232" on the equipment backplate of the module (1 in Figure 7)
- Interface "Sampler" on the equipment backplate of the multi EA 5100/multi EA 5000

Note:

If another system module is already connected to the "Sampler" connection of the multi EA 5100/multi EA 5000, the interface cables can be connected "in series" using the bus system.

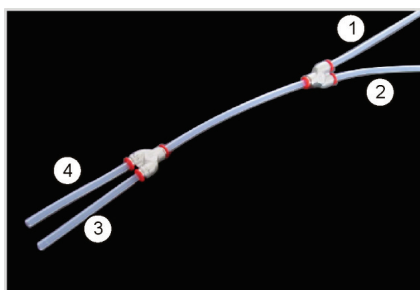
compEAct

- Connect the blue plug of the interface cable to the blue socket on the backplate of the gas sampling system (6 in Figure 7).
- Connect the red plug of the cable to the interface "Sampler" on the backplate of the compEAct. Do not use the connector "Power Sampler" for the attachment of the gas sampling system!

Note:

If you want to connect more than one system module to the compEAct, see section "Connecting several sample feeding modules to the compEAct" on page 38.

3. Set the purge shut-off valve of the module to "off".
4. Connect the argon carrier gas via the argon distributor included in the scope of delivery as follows:



Argon gas hose connector

- 1 connection hose at the pressure reducer of the gas supply
- 2 to the elemental analyzer
- 3, 4 to the two Ar connections at the module

5. At the "sample out" gas outlet, connect the hose with the injection needle for the direct connection to the combustion tube or the hose with the flexible injection needle for connection to the ABD injection port (see description below).
6. The "waste" outlet must be connected to an explosion-proof extractor.

Note:

Always connect the "waste" outlet to an explosion-proof exhaust vent, even if no toxic or explosive gases escape.

Connect the measuring gas as follows:

compEAct +
multi EA 5100/5000
(vertical operation)

To connect the measuring gas a special connection piece for the gas sampling systems must be fitted on the combustion tube:

1. Connect the hose with the flexible injection needle to the "sample out" outlet on the backplate of the gas sampling system.
2. Open the front door of the analyzer and open the pneumatic seal.

3. Feed the injection needle up to the stop of the Fingertight screw connection centered through the needle guide and the septum.
4. On the combustion tube, replace the injection port with the injection port for gas dosing with the injection needle.
5. Close the pneumatic seal and shut the front door of the analyzer.
6. Check the system for gas tightness (→ operating manual multi EA 5100, multi EA 5000 or compEAct).

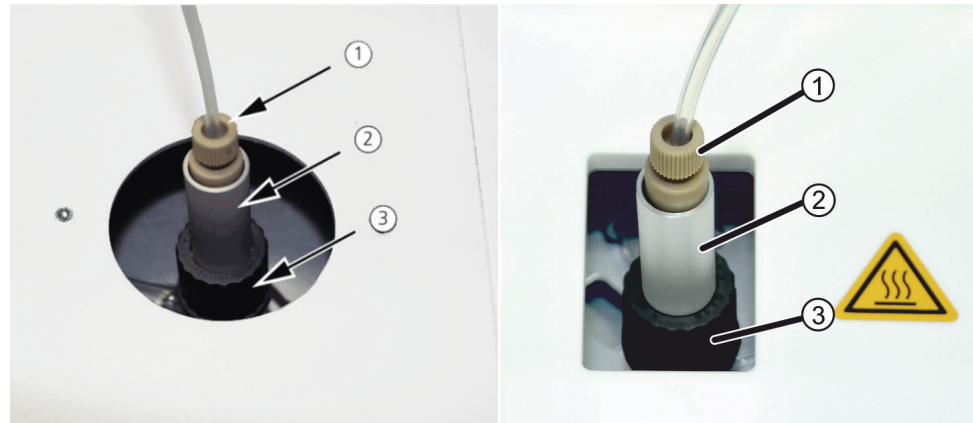


Figure 8 Connecting the measuring gas to multi EA 5100/5000 (left) + compEAct (right)

- | | | | |
|---|----------------------------|---|----------------------------|
| 1 | Hose with injection needle | 3 | Injection port with septum |
| 2 | Needle guide | | |

multi EA 5100/5000
(horizontal operation)

1. Connect the hose with the flexible injection needle to the "sample out" outlet on the backplate of the gas sampling system.
2. Unscrew the cap with septum from the injection port of the ABD and replace it with the prefitted cap with injection needle.

⚠ CAUTION

If sampler MMS 5000 is fitted to the ABD, the solvent container must be removed prior to opening the lid of the sample port. Otherwise, the injection needle can not be positioned correctly.

3. Open the lid of the ABD sample port and feed the flexible injection needle into the hole in the injection port and further towards the combustion tube into the ABD connection piece.
4. Close the lid on the sample port and screw the cap on lightly.

⚠ CAUTION

Risk of crushing! High forces occur when closing the sample port. Do not reach into the port whilst closing it.

5. Adjust the length of the flexible injection needle until the end is approximately 1 cm from the left housing side of the ABD in the ABD connection piece.
6. Tighten the cap finger-tight.
 - ✓ The measuring gas connection has thus been established.

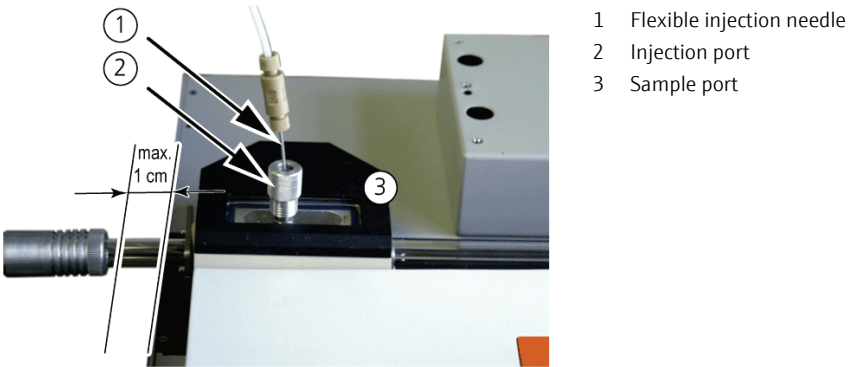


Figure 9 Connecting the measuring gas in horizontal operation

5 Operation

5.1 Sampling with the GSS/LPG combi module and LPG 2.0

5.1.1 Connecting the LPG sample cylinder

The connection of an LPG sample cylinder is identical in the GSS/LPG combi module and the LPG 2.0. The description below has been illustrated with the Figures of the LPG 2.0 but applies equally to the GSS/LPG combi module.



WARNING

Danger from flammable or harmful gases escaping! Risk of fire and explosion!

Always monitor the gas sampling system during operation! Use a gas warning device!

In case of problems or leaks close the sample cylinder valve immediately. Ensure adequate ventilation of the room. For the subsequent procedure see section "Behavior during emergencies" p. 9

Only carry out analyses if the check of the system tightness did not result in any problems.



CAUTION

Risk of injury or measuring errors from a leaking system!

The sample cylinder mount is only used to secure the sample cylinder. No forces must be applied through the mount onto the sample cylinder connection, otherwise the system might start leaking! Place the mount centered above the connection and tighten the knurled screws only lightly and symmetrically!



Attention

Sample cylinders whose geometry and weight does not permit them to be connected to the GSS/LPG combi module or LPG 2.0 securely (i.e. inside the clamping mount) and without damaging the connection, must not be connected directly to the module!

Such sample cylinders must be attached adequately secured to the floor or work table. The sample cylinder must then be connected to the module using a pressure-resistant transfer line (Swagelok)!

Attention

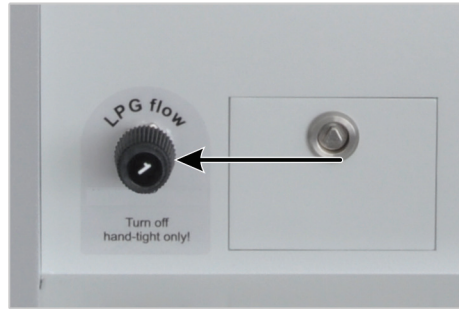
The connection for the sample cylinder is a 6 mm Swagelok pipe union with clamping rings and union nut. The customer connection must match this screw connection! Do not use any other screw connection or makes!

Attention

Potential damage to the gas sampling system!

The samples must be free from particles. Always operate the module with the filtration unit prefitted to the sample connections!

Connect the LPG sample cylinder as follows:

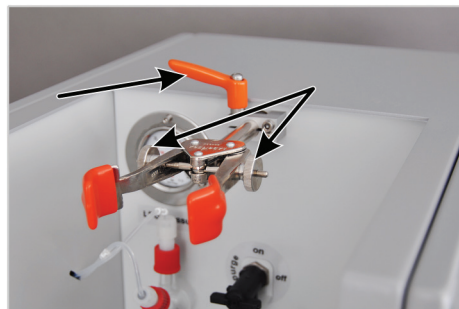


1. Carefully close the "LPG" needle valve up to the rotation stop.

Note

To protect the needle valve against damage, it is not closed completely in the case of the GSS/LPG combi module. A residual gas flow is visible in the bubble vessel and normal.

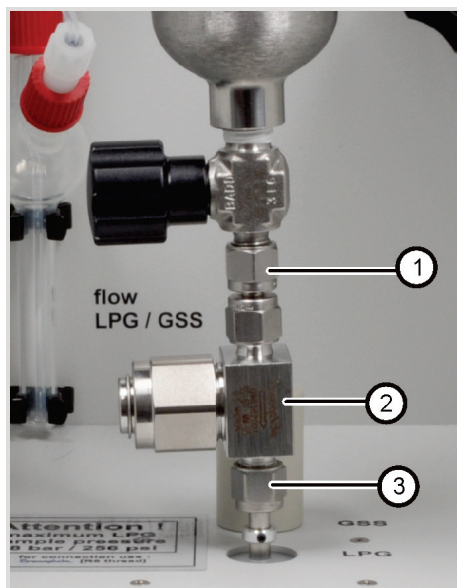
On the LPG 2.0 the valve can be fully closed.



2. Undo the horizontal bar and the screw clamp on the sample cylinder stand. Pay attention to the diameter of the sample cylinder.
3. Slide the screw clamp centered over the connection of the sample cylinder.



4. Place the sample cylinder vertically onto the filtration unit at the LPG sample connection.
5. Adjust the stand until the sample cylinder is straight. Secure the horizontal bar with the clamping lever and tighten the knurled head screws of the clamp symmetrically finger-tight.



6. Do not twist the filtration unit (2). Hold the filtration unit with a wrench and tighten the union nut (1) initially finger-tight and then another 1/4 turn with the wrench supplied.
7. Check that the union nut (3) on the filtration unit (2) has been tightened. If necessary, retighten the union nut with the wrench. Hold the filtration unit when doing so.
8. Check the system for tightness (→ "Checking the system tightness" p. 38).
 - ✓ This completes the connection of the LPG sample cylinder.

5.1.2 Connecting the GSS sample cylinder



WARNING

Danger from flammable or harmful gases escaping! Risk of fire and explosion!

Always monitor the gas sampling system during operation! Use a gas warning device!

In case of problems or leaks close the sample cylinder valve immediately. Ensure adequate ventilation of the room. For the subsequent procedure see section "Behavior during emergencies" p. 9

Only carry out analyses if the check of the system tightness did not show any problems.



CAUTION

Risk of injury or measuring errors from a leaking system!

The sample cylinder mount is only used to secure the sample cylinder. No forces must be applied through the mount onto the sample cylinder connection, otherwise the system might start leaking! Place the mount centered above the connection and tighten the knurled screws only finger-tight and symmetrically!



Attention

Sample cylinders whose geometry and weight does not permit them to be connected to the GSS/LPG combi module securely (i.e. inside the clamping mount) and without damaging the connection, must not be connected directly to the module!

Such sample cylinders must be attached adequately secured to the floor or work table. The sample cylinder must then be connected to the module using a pressure-resistant transfer line (Swagelok)!

Attention

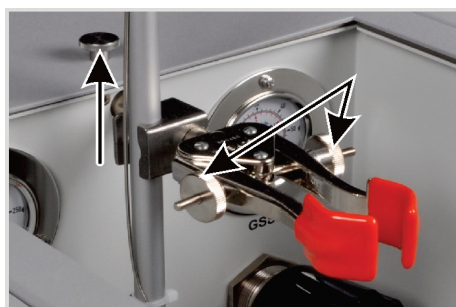
The connection for the sample cylinder is a 6 mm Swagelok pipe union with clamping rings and union nut. The customer connection must match this screw connection! Do not use any other screw connection or makes!

Attention

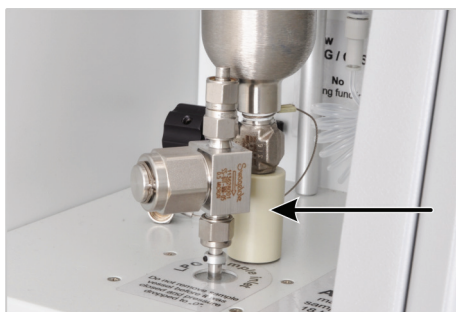
Potential damage to the metering valve!

The samples must be free from particles. Always operate the gas sampling system with the filtration unit prefitted to the sample connections!

Connect the GSS sample cylinder as follows:



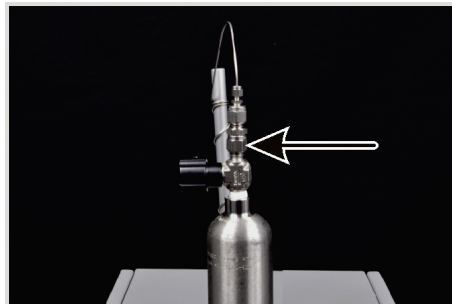
1. Undo the horizontal bar and open the screw clamp on the stand.
2. Slide the screw clamp centered over the support of the sample cylinder.



3. Place the sample cylinder straight onto the support (left arrow). Adjust the mount of the sample cylinder until the sample cylinder is vertical.



4. Tighten the knurled screws on the screw clamp only finger-tight and symmetrically. Attach the horizontal bar of the stand.



5. Slide the module connection onto the connection of the sample cylinder and tighten the union nut (arrow) finger-tight by turning it clockwise.
6. Retighten the union nut with the supplied wrench by approx. 1/4 turn.

7. Check the system for tightness (→ "Checking the system tightness" p. 38).
 - ✓ This completes the connection of the GSS sample cylinder.

5.2 Performing measurements



WARNING

Danger from flammable or harmful gases escaping! Risk of fire and explosion!

Always monitor the gas sampling system during operation! Use a gas warning device!

In case of problems or leaks close the sample cylinder valve immediately. Ensure adequate ventilation of the room. For the subsequent procedure see section "Behavior during emergencies" p. 9

Only carry out analyses if the check of the system tightness did not show any problems.



CAUTION

Risk of injury or measuring errors from a leaking system!

The sample cylinder mount is only used to secure the sample cylinder. No forces must be applied through the mount onto the sample cylinder connection, otherwise the system might start leaking! Place the mount centered above the connection and tighten the knurled screws on the screw clamp only lightly and symmetrically!



Attention

Potential damage to the metering valve!

The samples must be free from particles. Always operate the gas sampling system with the filtration unit prefitted to the sample connections!

1. Connect the gas sampling system to the combustion furnace of the elemental analyzer.
2. Check whether the bubble vessel for the flow indication is filled up to approx. 1 to 2 cm below the glass sphere and refill it, if necessary. Reconnect all hoses gas-tight (→ "Unpacking and connecting the module" p. 19).
3. Check the preliminary pressure at the pressure reducer of the carrier gas. The preliminary pressure must be 6 bar.
4. Switch on the PC (multi EA 5100, multi EA 5000 only).
5. Switch on the gas sampling system.
6. Switch on the elemental analyzer at the mains switch.
7. For compEAct only: Push the ON/OFF switch on the skirting after 30 seconds. The EAvolution software is started automatically.
For multi EA 5100, multi EA 5000: Start the multiWin software on the PC.
8. Create a method or activate a method (→ operating instructions for the control and data evaluation software multiWin or EAvolution). Initialize the analyzer.
9. Check the gas flows in the elemental analyzer and the carrier gas flow in the module (60 ± 5 mL/min). To do so, use the flow monitoring set included in the scope of delivery of the analyzer.
10. Connect a sample cylinder (→ "Sampling with the GSS/LPG combi module and LPG 2.0" p. 24).
11. Open the valve on the sample cylinder.

12. Open the needle valve "LPG flow" or "GSS flow" until 5 to 10 bubbles per second rise in the bubble vessel.
13. Create an analysis sequence. In multiWin: Select or create an analysis group.
14. Start the measurement.
 - ✓ The analyzer starts processing the analysis sequence.

6 Fault removal

6.1 Device error

Error	Possible cause	Remedy
No argon flow	Module not switched on	Switch module on at the device switch
	Argon not connected	Connect carrier gas supply on the equipment backplate
	Interface cable not connected	Connect the elemental analyzer and module via the interface cable.
	No suitable method loaded	Load a suitable method for GSS/LPG analysis
	Housing fan faulty	Inform service
System is not gas-tight, argon flow at the module output "sample out" is < 55 ml/min	Argon preliminary pressure set too low	Set argon preliminary pressure to 6 bar
	Hose connection to injection needle or to flexible injection needle leaking	Check correct installation of the injection needle or flexible injection needle
No sample gas transfer, no measured values	Sample cylinder not connected or connected incorrectly	Connect the sample cylinder correctly (→ "Sampling with the GSS/LPG combi module" p. 24 ff.) Check for leaks
	Shut-off valve of the sample cylinder not open	Open the shut-off valve of the sample cylinder
	Valve "LPG flow" or "GSS flow" not open	Dependent on the measuring task, open one of the needle valves, set flow to approx. 5 to 10 bubbles per second
	Empty sample cylinder	Fill or replace sample cylinder
	Particle filter clogged	Replace particle filter
	Metering valve faulty	Inform service
	Output pressure continues to increase after closing the GSS pressure reducer without turning the pressure reducer	Faulty valve seat
Output pressure drops significantly	Clogged inlet filter	Inform service

6.2 Analytical problems on the GSS/LPG combi module or LPG 2.0

Error	Possible cause	Remedy
Low results independent of detection	GSS/LPG combi module or LPG 2.0: Faulty dosing	Check metering
	GSS/LPG combi module: Sample cylinder pressure too low – LPG sample already gaseous	Only use correctly filled sample cylinders, the LPG sample must be in the liquid state
	GSS/LPG combi module: Sample cylinder not gas-tight	Check coupling for sample cylinder
	GSS/LPG combi module: Sample flow too low	Open the needle valve "LPG flow" or "GSS flow" until approx. 5 to 10 bubbles rise per second

7 Maintenance

7.1 Maintenance intervals

Check gas flow	Daily
Check the system for leaks	Daily
Check hose screw connections for tight fit	Weekly
Check fastening screws for tight fit	Weekly.
Check metering valve (rotor and stator)	Semi-annually, initiate maintenance by Service
Purge metering valve with argon	After each LPG sample measurement
Fill/clean bubble vessel	As required
Check injection needle	Weekly / as required
Check Fingertight connection at the needle mount	Daily
Check connections at the ABD injection port	Daily

7.2 Replacing the injection needle



WARNING

Danger from flammable or harmful gases escaping! Risk of fire and explosion!

Always monitor the gas sampling system during operation! Use a gas warning device!

In case of problems or leaks close the sample cylinder valve immediately. Ensure adequate ventilation of the room. For the subsequent procedure see section "Behavior during emergencies" p. 9.

Only carry out analyses if the check of the system tightness did not show any problems.

WARNING

If there is a leak between the injection needle and the Fingertight screw connection, explosive or toxic gases can escape or explosive or toxic gas mixtures may develop!

Do not tighten the Fingertight connection too much. Over tightening may damage the ferrule and cause the system to leak Do not use a tool for tightening.

Always check the gas tightness of the system after replacing the injection needle.



CAUTION

Risk of burns!

The injection needle is very hot after removal from the combustion tube!

Allow the injection needle to cool down to ambient temperature before replacing the needle!

Direct connection to the combustion tube

The injection needle must be replaced if it is damaged (e.g. by aggressive samples) or is clogged with small particles.

1. Open the front door of the analyzer and open the pneumatic seal.
2. Remove the injection port with the injection needle from the combustion tube.
3. Allow the injection needle to cool down to ambient temperature.
4. Undo the Fingertight screw connection of the injection needle.
5. Remove the damaged injection needle with the ferrule.
6. Insert the new injection needle with ferrule into the Fingertight screw connection and tighten the Fingertight screw connection finger-tight.
7. Reinsert the injection needle into the injection port (→ "Unpacking and connecting the module" p. 19).
8. Reattach the injection port with needle to the combustion tube.
9. Check the gas tightness of the system:
 - First check the gas tightness of the elemental analyzer (→ multi EA 5100, multi EA 5000 or compEAct operating instructions).
 - Then check the gas tightness of the GSS/LPG combi module (→ "Checking the system tightness" p. 38).

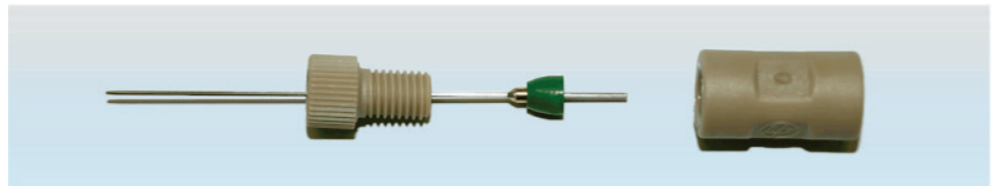


Figure 10 Injection needle replacement

7.3 Replacing the filtration unit at the LPG connection



WARNING

Danger from flammable or harmful gases escaping! Risk of fire and explosion!

Always monitor the gas sampling system during operation! Use a gas warning device!

In case of problems or leaks close the sample cylinder valve immediately. Ensure adequate ventilation of the room. For the subsequent procedure see section "Behavior during emergencies" p. 9

Only carry out analyses if the check of the system tightness did not show any problems.

Replace the particle filter of the filtration unit at the LPG connection as follows:

1. Close the shut-off valve on the sample cylinder.
2. Open the needle valve "LPG flow" or the needle valve "GSS flow". Drain the gas pipe of the module until the corresponding manometer indicates "0". Then close the needle valve again.
3. Remove the sample cylinder from the module.



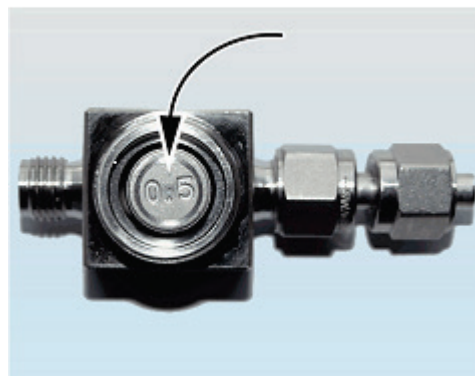
4. Unscrew the filtration unit from the LPG connection (wrench size 9/16").
Meanwhile, hold the unit with a second wrench.



5. Unscrew the union nut from the filter body. Hold the filter body with a wrench and detach the union nut with a second wrench (both 1").

Note:

Discard the sealing disk on the union nut and replace it with the sealing disk supplied.



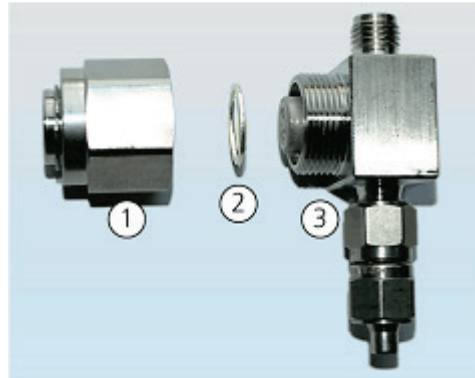
6. Undo the filter cartridge by pressing lightly from the side and remove it from the filter body.



7. Insert the new filter cartridge with the label pointing upwards straight into the filter body and press lightly on it from the top.

IMPORTANT

The circular gap (see arrow) must be uniform in size.



8. Center the new sealing disk (2) within the union nut (1).
9. Screw the union nut finger-tight onto the filter body (3).

Note:

The thread of the filter body must no longer be visible. If the thread is still visible the sealing disk is not centered properly in the union nut.



10. Hold the filter body with a wrench and tighten the union nut with a second wrench (size 1") by 1/4 a turn.

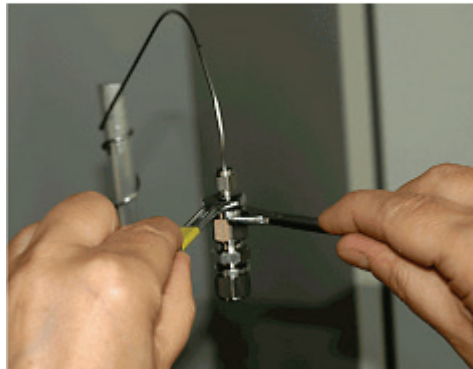
- ✓ The particle filter has now been replaced.

11. Screw the filtration unit back onto the LPG connection and check the system for tightness (→ "Checking the system tightness" p. 38).

7.4 Replacing the filtration unit at the GSS connection

The filtration unit at the GSS connection can be replaced completely, if necessary:

1. Close the shut-off valve on the sample cylinder.
2. Open the needle valve "LPG flow" or the needle valve "GSS flow". Drain the gas pipe of the module until the corresponding manometer indicates "0". Then close the needle valve again.
3. Remove the sample cylinder from the module.



4. Remove the filtration unit from the GSS connection using two wrenches (size 9/16").
5. Replace the complete filtration unit.
6. Screw the new filtration unit onto the GSS connection.
 - ✓ The filtration unit is replaced.
7. Check the system for tightness (→ "Checking the system tightness" p. 38).

7.5 Purging the metering valve

To purge the metering valves in the LPG or GSS branch proceed as follows:

1. Close the shut-off valve on the sample cylinder.
2. Open the needle valve "LPG flow" or the needle valve "GSS flow". Drain the gas pipes of the module until the corresponding manometers indicate "0". Then close the needle valve "LPG flow" or the needle valve "GSS flow" again.
3. Remove the sample cylinder from the module.
4. Remove hose no. 17 (GSS/LPG combi module) or hose no. 13 (LPG 2.0) with the screw cap from the bubble vessel.
5. Remove the injection needle from the combustion tube.
6. Connect the purge connection to the LPG or GSS connection for the sample cylinder.

Caution!

The 6 bar Argon set at the gas supply is present directly at the purge unit.

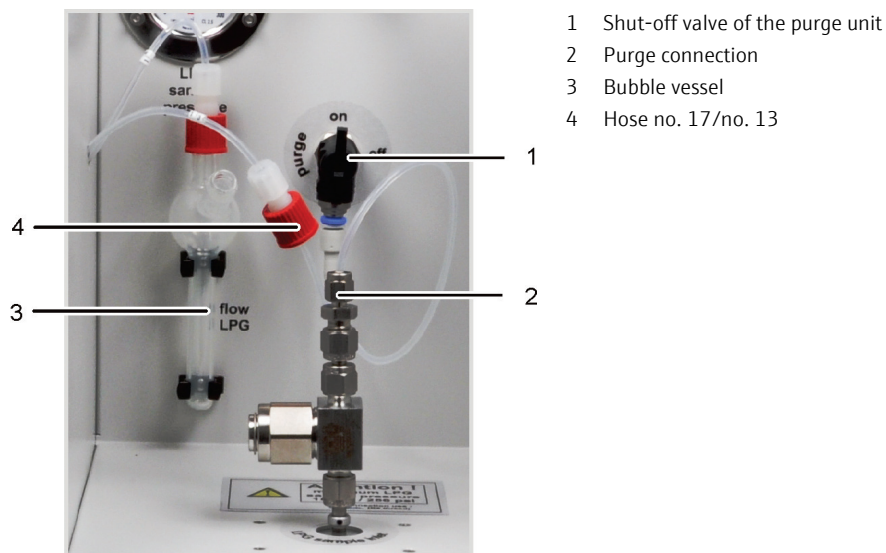


Figure 11 Purge unit connected to the LPG branch

7. Open the shut-off valve of the purge unit (position "on").
8. Control the flow of the purging gas via the needle valve "LPG flow" or "GSS flow".
9. Switch the valve several times during the purging process:

In multiWin

- To do so, in the multiWin program, under the menu item SYSTEM ► COMPONENT TEST ► GSS/LPG, click the [METERING VALVE ON/OFF] button.
- The purging time depends on the sample type and should be at least 2 min. (5 switching cycles).

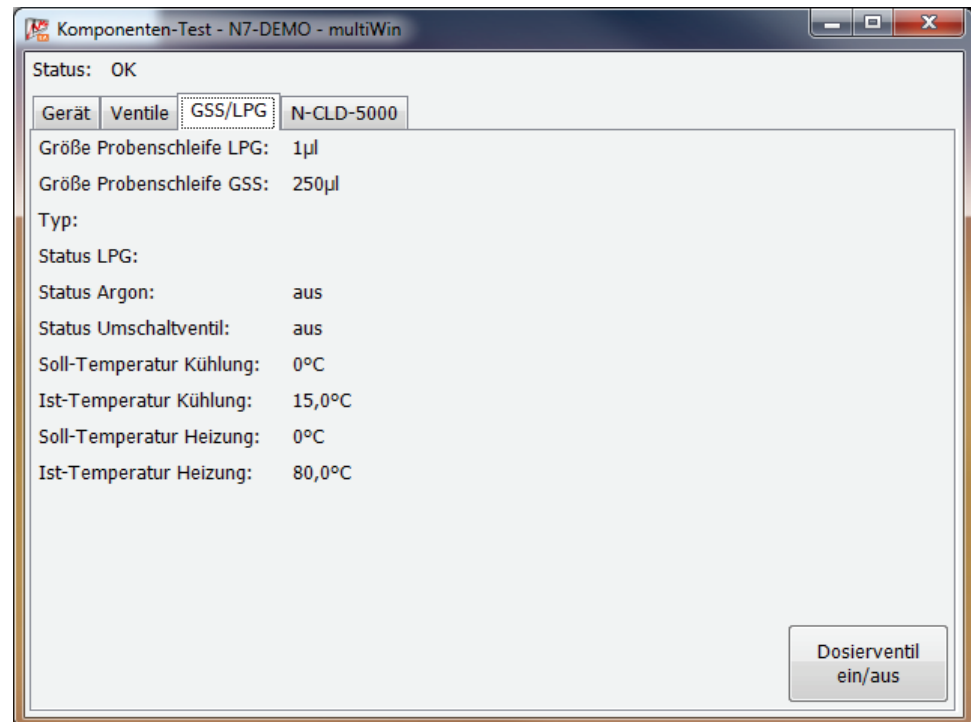



Figure 12 In multiWin: Window COMPONENT TEST with button for the metering valve

In EAvolution

- In EAvolution, select the SYSTEM ► DEVICE ► MAINTENANCE ► GSS/LPG command.
 - Tap on . Select the number of purges (at least 5).
10. After purging, close the shut-off valve of the purge unit ("off" position).
 11. Drain the gas pipe for which you are purging the filter. Open the needle valve of the gas pipe "LPG flow" or "GSS flow" and wait until the corresponding manometer indicates "0". Then close the needle valve again.
 12. Remove the purge connection from the LPG or GSS connection.
 13. Screw the screw cap with hose no. 17 or hose no. 13 back onto the bubble vessel.
 14. Fit the injection needle on the combustion tube or the ABD sample port.
 - ✓ This completes the purging process.

7.6 Checking the system tightness



WARNING

Danger from flammable or harmful gases escaping! Risk of fire and explosion!

Always monitor the gas sampling system during operation! Use a gas warning device!

In case of problems or leaks close the sample cylinder valve immediately. Ensure adequate ventilation of the room. For the subsequent procedure see section "Behavior during emergencies" p. 9

Only carry out analyses if the check of the system tightness did not show any problems.

Check the system for tightness at the following locations using a gas warning device/gas detector:

- at the sample cylinder connection
- at all joints
- at the service hatch
- in the air flow of the housing fan at the rear of the module

7.7 Connecting several sample feeding modules to the compEAct

The communication between gas sampling system and compEAct takes place via a RS 485 interface. The module can be connected directly to the compEAct. Alternatively, additional sample feeding modules (LS 1, LS 2, etc.) can be connected in series with the gas sampling system. For this purpose, two RS 485 interfaces are provided on the backplate of the gas sampling system.

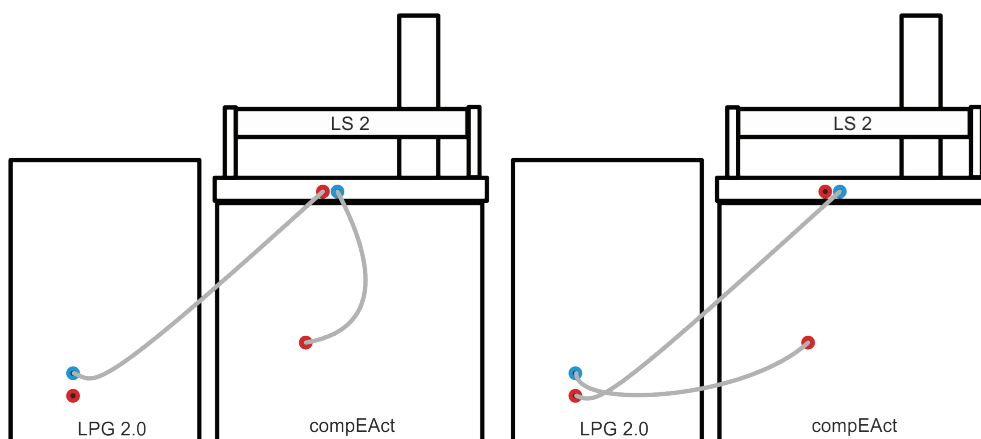


Figure 13 Connecting more than one module to the compEAct

On the left Gas sampling system as last module after sampler LS 2
On the right Sampler LS 2 connected after the gas sampling system

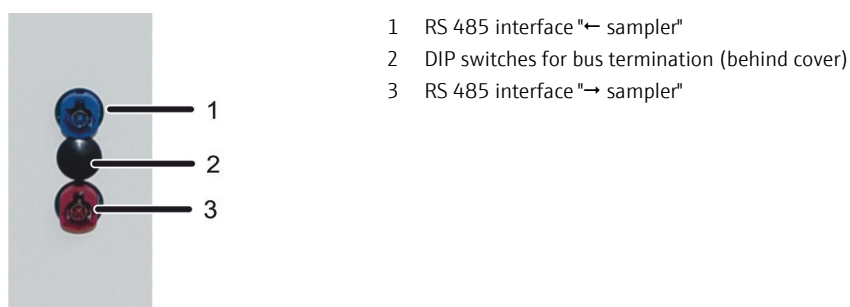


Figure 14 RS 485 interfaces and DIP switches

Connect the gas sampling system as last device in a row of sample feeding modules:

1. Connect the blue plug of the interface cable to the blue socket on the backplate of the gas sampling system ("← sampler", 1 in Figure 14).
2. Connect the red plug of the cable to the red socket on the backplate of the adjacent sample feeding module.
3. Remove the plastic cover above the DIP switches with a flat screwdriver or spatula.

4. For bus termination, switch the two DIP switches to the upper position ("ON", → Figure 15). This is the factory default setting.

Connect sample feeding modules after the gas sampling system:

1. Connect the blue plug of the interface cable to the blue socket on the backplate of the gas sampling system ("← sampler", 1 in Figure 14). Connect the red plug of the cable to the interface "Sampler" on the backplate of the compEAct.
2. Connect a second interface cable to the red socket on the backplate of the gas sampling system ("→ sampler", 3 in Figure 14). Connect the blue plug of the interface cable to the blue plug on the backplate of the next sample feeding module in the row.
3. Remove the plastic cover above the DIP switches with a flat screwdriver or spatula.
4. Switch the two DIP switches to the lower position.



Gas sampling system as last module:
DIP switches 1 + 2 in the upper position "ON"
(factory default setting)



Modules positioned after gas sampling system:
Dip switches 1 + 2 in lower position

Figure 15 DIP switch positioning

8 Transport and storage

8.1 Preparing the GSS/LPG combi module and LPG 2.0 for transport



CAUTION

Risk of injury from glass breakage!

Remove all glass components carefully from the module!



Attention

Unsuitable packaging material can cause damage to the individual components of the module!

Only transport the module in its original packaging! Ensure that the module is fully drained and all transport locks have been fitted!

Prepare the module for transport as follows:

1. Close the shut-off valve on the sample cylinder.
2. Drain the gas pipes of the module by opening the needle valves "LPG flow" or "GSS flow" until the corresponding manometers indicate "0" (→ Figure 2 p. 12 or Figure 3 p. 14). Close the needle valves.
3. Remove the sample cylinder from the module.
4. Switch off the module at the device switch.
5. Switch off the gas supply and disconnect the mains plug from the mains outlet.
6. Disconnect all connections on the rear of the module.
7. Remove and drain the bubble vessel for the flow indication.
8. Pack open hose ends in protective bags and secure them, e.g. using adhesive tape.
9. Remove the injection needle with the injection port from the combustion tube or remove the flexible injection needle with the pre-fitted cap from the ABD. Pack the accessories so that the needles will not bend.
10. Carefully package the module and accessories in the original packaging.

8.2 Moving the module within the laboratory



CAUTION

There is a risk of injury due to parts falling down!

Move the module with great care! Securely hold the module with both hands from below!

When moving the module in the laboratory observe the following:

1. Close the shut-off valve on the sample cylinder.
2. Drain the gas pipes of the module by opening the needle valves "LPG flow" or "GSS flow" until the corresponding manometers indicate "0" (→ Figure 2 p. 12 or Figure 3 p. 14). Close the needle valves.
3. Remove the sample cylinder from the module. Always transport the sample cylinder separately!
4. Switch the module off at the device switch and unplug the mains plug from the mains outlet.
5. Switch off the gas supply.
6. Undo all connections on the back of the module (serial connection cable, carrier gas supply, exhaust air hose).
7. Securely hold the module with both hands from below.

For the setup at the new location observe the notes in section "Site requirements" p. 18.

8.3 Storing the module



Attention

Environmental influences and condensate formation can destroy individual components of the device!

The device must only be stored in air-conditioned rooms. The atmosphere must be low in dust and free from aggressive vapors.

If the device is not installed immediately after delivery or not required for a prolonged period, it must be stored in its original packaging. A suitable desiccant should be added to the packaging or equipment to prevent damage from moisture.

Ambient conditions

For requirements with regard to the ambient conditions at the storage location observe the technical data (→ "Ambient conditions for operation and storage" p. 45).

9 Disposal

The LPG 2.0 and the GSS/LPG combi module must be purged and cleaned before their disposal.

At the end of their service life, the LPG 2.0 and the GSS/LPG combi module must be disposed of as electronic waste in accordance with applicable regulations.

10 Specification

10.1 Technical data of the GSS/LPG combi module

General characteristics	Designation / type	GSS/LPG combi module
	Basic device dimensions (W x H x D)	approx. 300 mm x 470 mm x 500 mm
	Mass	approx. 12 kg
Procedural data	Sample type	<ul style="list-style-type: none"> ▪ LPG samples that can be completely vaporized or depressurized ▪ Pressurized gas samples
	Sample condition	<ul style="list-style-type: none"> ▪ LPG branch: pressurized liquefied gas (max. 18 bar) ▪ GSS branch: pressurized gas (max. 200 bar)
	Sample volume	<ul style="list-style-type: none"> ▪ LPG branch: 1 to 50 µL in 1 µL increments ▪ GSS branch: 1 to 20 mL in 1 mL increments
	Sample supply for the depressurized LPG sample or GSS sample	Via flexible injection needle through the injection port of the ABD into the combustion tube or via injection needle with direct connection to the combustion tube
	Carrier gas	Argon
	Preliminary pressure	6 bar
	Consumption	Approx. 6 l/h
Electrical variables	Power supply	110 to 240 V AC, 50/60 Hz
	Fuses	T 4.0 AH (2x) Only use original fuses from Analytik Jena
	Typical average power consumption	40 W
	Analyzer interfaces	to multi EA 5100, multi EA 5000: RS 232 to compEAct: RS 485

10.2 Technical data of the LPG 2.0

General characteristics	Designation / type	LPG 2.0
	Basic device dimensions (W x H x D)	approx. 300 mm x 470 mm x 500 mm
	Mass	approx. 12 kg
Procedural data	Sample type	LPG samples that can be completely vaporized or depressurized
	Maximum sample pressure	34 bar (< 500 psi)
	Sample volume	1 to 50 µL in 1 µL increments
	Sample supply of the depressurized LPG sample	Via flexible injection needle through the injection port of the ABD into the combustion tube or via injection needle with direct connection to the combustion tube
Carrier gas	Argon	4.6 (free from halogen and HC)
	Preliminary pressure	6 bar
	Argon	Approx. 6 l/h
Electrical variables	Power supply	110 to 240 V AC, 50/60 Hz
	Fuses	T 4.0 AH (2x) Only use original fuses from Analytik Jena
	Typical average power consumption	40 W
	Analyzer interfaces	to multi EA 5100, multi EA 5000: RS 232 to compEAct: RS 485

10.3 Ambient conditions for operation and storage

Conditions during operation	Temperature range	+20 °C to +35 °C
	Max. humidity:	90 % at 30 °C
	Air pressure	0.7 bar to 1.06 bar
Conditions for storage	Temperature range	+15 to +55 °C
	Max. humidity:	10 to 30 % (use desiccant)
	Air pressure	0.7 to 1.06 bar

10.4 Standards and directives

Safety class and safety type	The gas sampling system is classified as protection class I. The housing has protection type IP 20.
Device safety	The gas sampling system meets the safety standards <ul style="list-style-type: none">▪ EN 61010-1▪ EN 61010-2-081▪ EN 61010-2-010
EMC compatibility	The gas sampling system has been tested for interference emission and resistance. It meets the requirements for interference emission of <ul style="list-style-type: none">▪ EN 61326-1 (EN 55011 group 1, class B) It meets the requirements for noise immunity of <ul style="list-style-type: none">▪ EN 61326-1 (requirements for use in a basic EMC environment)
Environmental compatibility	The gas sampling system has been tested for environmental compatibility and meets the requirements of <ul style="list-style-type: none">▪ ISO 9022-3▪ ISO 9022-2
EU directives	The gas sampling system is designed and tested in accordance with standards meeting the requirements of EU directives 2014/35/EU (LVD), 2014/30/EU (EMC) and 2011/65/EU (RoHS) The device leaves the factory in a sound condition as far as technical safety is concerned.
Guidelines for China	The device contains controlled substances (in accordance with the guideline "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products"). Analytik Jena guarantees that the substances will not leak within the next 25 years and, therefore, will not cause any environmental danger or health risk within this period of time if the device is used as intended.