BA02585C/90/EN/02.26-00
8031285/1XGM/V1-1/2026-07

Operating Instructions
SFU200, SFU250

Gas Sampling Unit
for Continuous Emission Monitoring Systems

Endress+Hauser
People for Process Automation

Described product

Gas sampling unit

Variants

- SFU200 (for indoor use for continuous emission monitoring)
- SFU250 (for outdoor use for continuous emission monitoring)

Manufacturer

Endress+Hauser SICK GmbH+Co. KG
Bergener Ring 27
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1 About this document

1.1 Function of this document

These Operating Instructions describe:

- Device components
- Mounting and electrical installation
- Commissioning and operation
- Maintenance work required for safe operation
- Troubleshooting
- Decommissioning

1.2 Scope of application

These Operating Instructions apply exclusively to the device components described in the product identification. They are not applicable for other devices.

The standards and directives referred to in these Operating Instructions are to be observed in the respective valid version.

1.3 Target groups

These Operating Instructions are intended for persons installing, commissioning, operating and maintaining as well as decommissioning the device.

1.4 Further information

- Gas analyzer Operating Instructions
- Sample gas line instructions
- Safety information (for analyzers)
- Connection diagrams and other technical information

1.5 Symbols and document conventions

1.5.1 Warning symbols

Table 1: Warning symbols

Symbol	Significance
	Hazard (general)
	Hazard by voltage
	Hazard by toxic substances
	Hazard by acidic substances
	Hazard through hot surfaces

Symbol	Significance
	Hazard for the environment/nature/organic life

1.5.2 Warning levels / signal words

DANGER

Risk or hazardous situation which will result in severe personal injury or death.

WARNING

Risk or hazardous situation which could result in severe personal injury or death.

CAUTION

Hazard or unsafe practice which could result in less severe or minor injuries.

Notice

Hazard which could result in property damage.

Note

Hints

1.5.3 Information symbols

Symbol	Significance
	Important technical information for this product
	Important information on electric or electronic functions

2 Safety information

2.1 Basic safety information

- ► Read and observe these Operating Instructions.
- ► Observe all safety instructions.
- ► If there is something you do not understand: Contact the Customer Service.

Retain documents

These Operating Instructions:

- ► Must be kept available for reference.
- ► Must be passed on to new owners.

Correct use

- ► Use the device only as described in “Intended use”. The manufacturer is not responsible for any other use.
- ► Perform the specified maintenance work.
- ► Do not carry out any work or repairs on the device not described in this Manual. Do not remove, add or modify any components to or on the device unless described and specified in the official manufacturer information.
- ► Only use original spare parts, wear parts and accessories from the manufacturer.

Failure to observe these precautions could result in:

- Voiding the manufacturer's warranty.
- Causing the device to become dangerous.

Special local conditions

In addition to the information in these Instructions, follow all local laws, technical rules and company-internal operating and installation directives applicable wherever the device is installed.

2.1.1 Electrical safety

Hazard through electric shock

The gas sampling unit is part of a measuring device and is supplied with electrical energy by this measuring device

There is a risk of electric shock when working on the device with the voltage supply switched on.

- ► Before working on the device, the voltage of the measuring device must be switched off at the upstream power isolating switch and secured against unintentional reconnection.
- ► Switch off the voltage supply before starting any work on the device.
- ► After completion of the work or for test purposes or calibration, the voltage supply may only be activated again by authorized personnel complying with the safety regulations.

2.1.2 Dangerous substances

Hazard through hot or toxic gases

The sample gas duct can contain hot or toxic gases which can escape when opening the duct-side flange. Even if the sample gas duct is out of operation during the installation, escaping gases can lead to severe damage to health.

- ► Always put the sample gas duct out of operation for the duration of the installation.
- ► If required, purge the sample gas duct with ambient air before starting installation work.
- ► During installation work, wear protective clothing suitable or specified by the operating company.

Danger through caustic condensate

Health hazard due to toxic compounds in the condensate.

- ► Observe all safety regulations for the application.
- ► Take appropriate protective measures for work (e.g., by wearing a safety mask, protective gloves and acid resistant clothes).
- ► In case of contact with the skin or eyes, rinse the affected parts immediately with clear water and consult a doctor.

2.2 Warning information on device

The following warning symbols are located on the side of the enclosure:

Symbol	Significance
	Warning of general hazard
	Warning of hazard through hot surfaces

If you need to work on an assembly marked with such a symbol:

- ► Read the relevant Section in these Operating Instructions.
- ► Observe all the safety information in the relevant Section.

2.3 Intended use

The gas sampling unit is used for extracting a partial stream of a gas mixture (usually flue gas) from a line, stack or similar and for retaining particles that are contained in the gas stream. The gas sampling probe may only be used with suitable Endress+Hauser products.

2.4 Unintended use

The gas sampling unit is not approved for use in potentially explosive atmospheres.

2.5 Requirements on the personnel's qualification

Table 2: Qualification requirements

Tasks	User groups	Qualification
Mounting	Qualified personnel	• General knowledge in measurement technology and specialist device knowledge • Authorized welder (welding specialist) • Service training, if necessary
Electrical installation	Qualified personnel: • Trained customer • Service	• General knowledge in measurement technology and specialist device knowledge • Authorized electrician (skilled electrician or person with similar training) • Service training
Initial commissioning Recommissioning	Qualified personnel: • Trained customer • Service	• General knowledge in measurement technology and specialist device knowledge • Service training
Maintenance	Operator Qualified personnel: • Trained customer • Service	• General knowledge in measurement technology and specialist device knowledge • Service training, if necessary

Tasks	User groups	Qualification
Troubleshooting	Qualified personnel: • Trained customer • Service	• General knowledge in measurement technology and specialist device knowledge • Authorized electrician (skilled electrician or person with similar training) • Service training
Decommissioning		

3 Product description

3.1 Product identification

Product name	SFU200 SFU250
Device version	SFU200 (indoor use) SFU250 (outdoor use)
Manufacturer	Endress+Hauser SICK GmbH+Co. KG Bergener Ring 27 · D-01458 Ottendorf-Okrilla · Germany
Type plate	The type plate is located on the bottom of the housing.

3.2 Layout and function

3.2.1 Overview of gas sampling unit

Overview

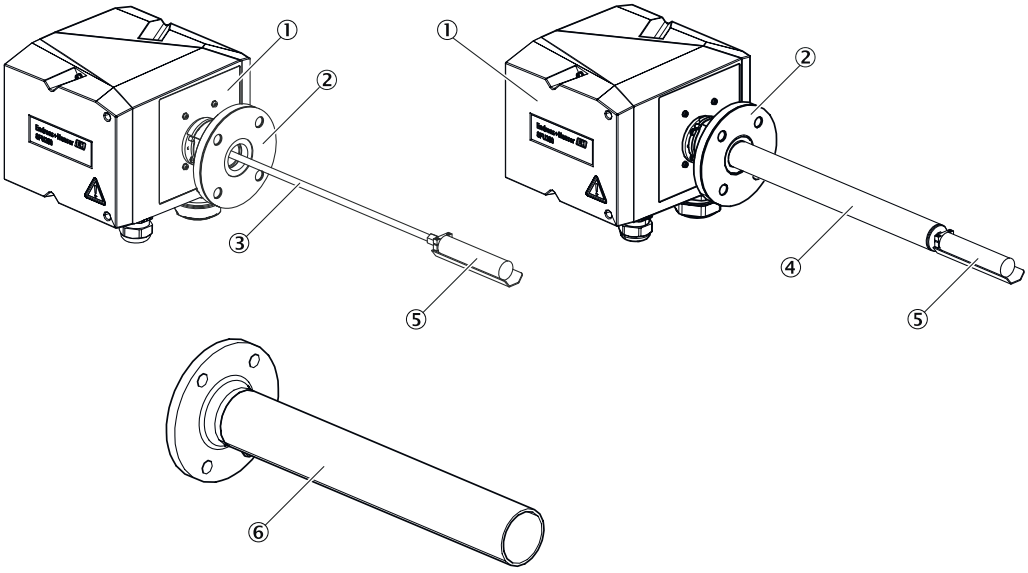


Figure 1: Overview: Heated and unheated gas sampling unit

① Gas sampling probe
② Adapter flange including seal
③ Gas sampling tube (unheated) with transition flange
④ Gas sampling tube (heated)
⑤ Pre-filter (optional)
⑥ Welding neck flange (accessory, optional)

Function

The gas sampling unit extracts sample gas from the sample gas duct, e.g. a stack, via the gas sampling pipe. After filtration, the sample gas is passed via a sample gas line to a measuring device for analysis.

Heating the sample gas prevents the gas mixture from condensing. A backpurge function cleans the gas sampling tube and the optional pre-filter during the process. Optionally, the filter in the gas sampling probe can also be backpurged.

Characteristics

- Certified for continuous emission monitoring systems in accordance with EN15267:
  - SFU200 for indoor use
  - SFU250 for outdoor use

Supplementary information

The gas sampling probe may only be combined with the following components:

- Gas sampling tube, unheated or heated
- Pre-filter 10 µm
- Pre-filter 2 µm
- Glass fiber filter
- Sintered metal filter
- Gold-plated sintered metal filter
- Fabric filter

3.2.2 Gas sampling probe

Overview

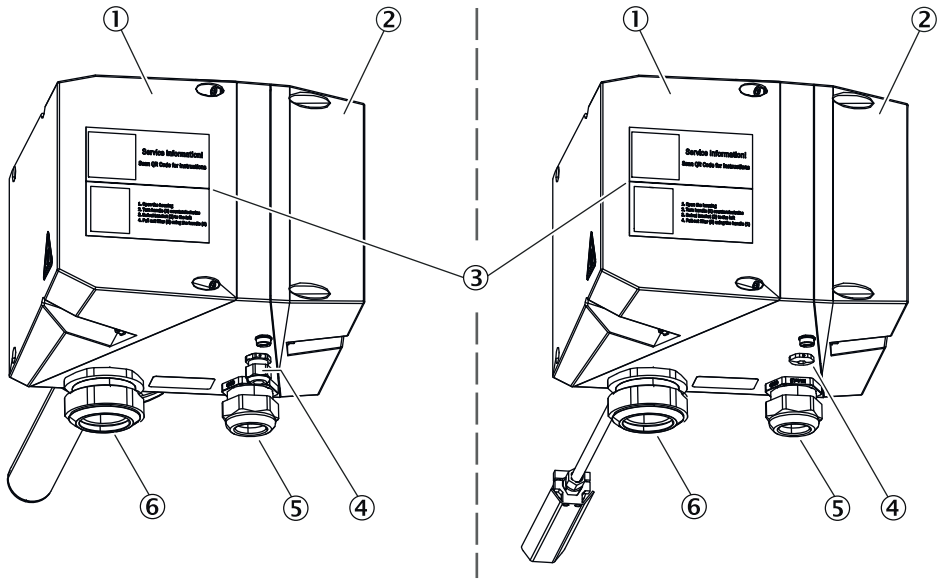


Figure 2: View of closed housing

① Left housing side, filter (“hot” housing side)
② Right housing side, connections (“cold” housing side)
③ Filter maintenance sign
④ Cable gland for heated gas sampling tube (Figure on the left) or dummy plug for unheated gas sampling tube (Figure on the right)
⑤ Cable gland for hose bundle line
⑥ Cable gland for sample gas line

Characteristics

- Gas sampling probe with pneumatics and electrics in one housing
- Left housing side with filter unit - heated
- Right housing side for electrical and pneumatic connections - unheated

4 Transport and storage

4.1 Storage

Protective measures for long-term storage

- Store in original packaging for as long as possible.
- Screw on the enclosure cover.
- Close cable glands and gas sampling connection (with sealing plugs).
- Select a dry, well-ventilated room for storage.
- If possible, wrap the device or device components individually (e.g. with stretch film).

5 Mounting and electrical installation

5.1 Safety

Qualification

Mounting may only be carried out by trained specialists.

The electronic installation may only be carried out by a trained electrician.

5.2 Required tools and auxiliary materials

- Set of torque wrenches with sockets and inserts
- Set of open-end wrenches or adjustable combination wrenches
- Set of screwdrivers
- Set of Allen keys
- Stripping tool
- Crimping pliers
- Hose cutter
- O-ring remover tool
- Assembly paste
- PTFE sealing tape

5.3 Scope of delivery

NOTE
Please see the delivery documents for the scope of delivery.

► Check the scope of delivery according to the order confirmation.
► Ensure the supply voltages indicated on the type plates correspond to the system conditions. Check all components for externally perfect delivery condition.

5.4 Installation sequence

5.4.1 Prerequisite for mounting

Important information

NOTICE
Observe compressed air supply!
The device must not be installed on the sample gas duct without compressed air supply.
► Establish the compressed air supply before installation.

NOTICE
Observe the voltage supply!
The device must not be operated on the sample gas duct without voltage supply.
► Before installing the gas sampling unit on the flange, the voltage supply must be ready to be switched on.

5.4.2 Overview of assembly steps

Overview

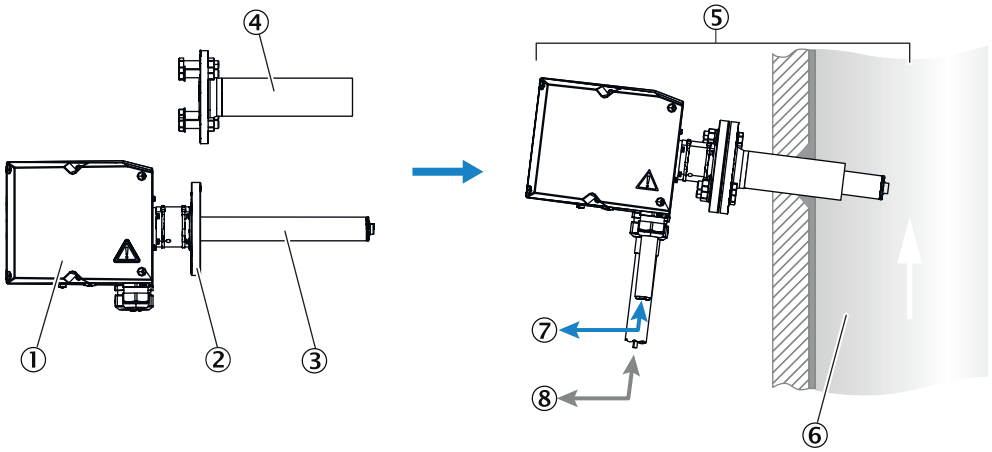


Figure 3: Gas sampling unit with welding neck flange: Fitting to the sampling point

① Gas sampling probe
② Adapter flange including seal
③ Gas sampling tube (heated version shown)
④ Welding neck flange
⑤ Gas sampling unit - fitted to the sampling point
⑥ Sample gas duct (e.g. stack)
⑦ Hose bundle line
⑧ Sample gas line

Procedure

Table 3: Overview of assembly steps

Step	Procedure	User group	Reference
1	Mounting the welding neck flange	Customer	see "Mounting specification for the welding neck flange", page 15
2	Assemble the supplied device components of the gas sampling unit before commissioning: • Fit the gas sampling probe to the gas sampling unit. • Fit the adapter flange to the gas sampling tube. • Assemble the filter. • Install the filter in the gas sampling probe.	Service or trained customer	see "Assembly of supplied device components", page 17 • see "Installing the heated gas sampling tube on the gas sampling probe", page 18 or see "Installing the unheated gas sampling tube on the gas sampling probe", page 21 • see "Installing the adapter flange on the heated gas sampling tube", page 20 or see "Installing the adapter flange on the unheated gas sampling tube", page 22 • see "Assembling the filter", page 23 • see "Installing the filter in the gas sampling probe", page 25
3	Make connections to the gas sampling unit: • Connect the hose bundle line. • Connect the sample gas line.	Service or trained customer	see "Making connections to the gas sampling unit", page 26 • see "Connecting the hose bundle line", page 28 • see "Connecting the sample gas line", page 30
4	Mount the device at the sampling point	Service	see "Fitting the gas sampling unit on the flange", page 35

5.4.3 Mounting specification for the welding neck flange

Important information

CAUTION
Risk to health through hot or noxious gases in the sample gas duct.

The sample gas duct can contain hot or noxious gases which can escape when opening the duct-side flange. Even if the sample gas duct is out of operation during the installation, escaping gases can cause damage to health.

- ► Always put the sample gas duct or plant/plant section out of operation for the duration of the installation.
- ► If required, purge the area of the fitting location on the sample gas duct with ambient air before starting installation work.
- ► During installation work, wear protective clothing suitable or specified by the operating company.
- ► If the welding neck flange is not used immediately, seal the flange with a blanking plate to prevent gas from escaping from the gas duct.

NOTICE
Carrying out the welding work

- ► Welding work may only be carried out by qualified personnel.
- ► The weld around the flange pipe must be tight all the way around.

NOTICE
Condensation on the gas sampling pipe can cause damage to the gas sampling unit.

- ► Observe an installation angle of approx. 10° (inclined downwards) for the gas sampling pipe on the gas duct.

Prerequisites

- Minimum distance “b” must be available behind the gas sampling unit to be able to service and remove the gas sampling unit.
- The minimum distance of 100 mm between the flange plate of the welding neck flange and the wall of the gas duct must always be maintained, even with additional insulation or wall cladding.
- Sufficient accessibility around the probe must be ensured for operation. A side clearance of at least 500 mm is recommended.
- The optionally available welding neck flange must be shortened to the appropriate size before installation.
- Keep the distance between the flange plate and the wall of the gas duct to a minimum due to vibration resistance.
- The flange pipe must be welded tight all the way around.

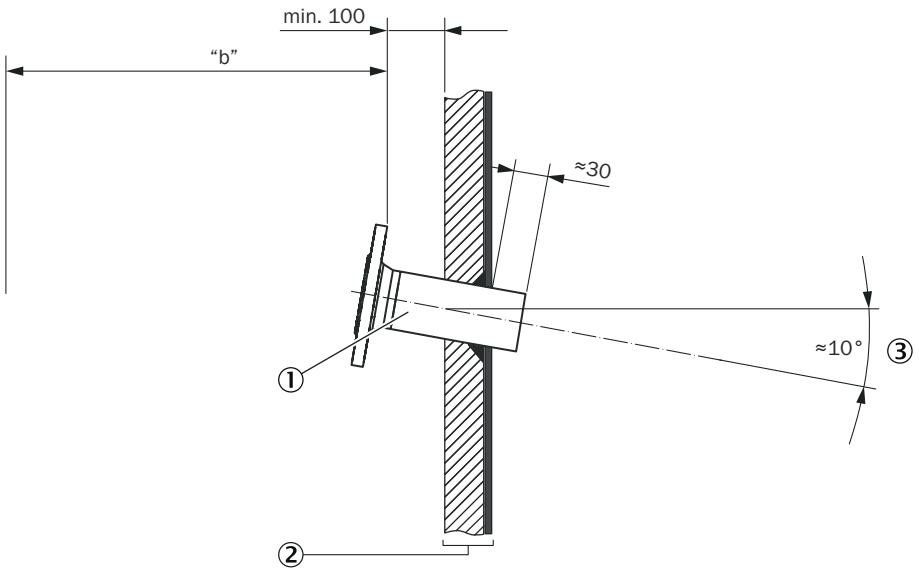


Figure 4: Welding neck flange fitting requirements

① Welding neck flange
② Wall of sample gas duct including insulation and cladding
③ Installation angle

Table 4: Minimum distance behind welding neck flange

Length of gas sampling tube	Minimum distance “b”
0.5 m	1.2 m
0.8 m	1.5 m
1.0 m	1.7 m
1.2 m	1.9 m
1.5 m	2.2 m
2.0 m	2.7 m

5.4.4 Assembly of supplied device components

Overview

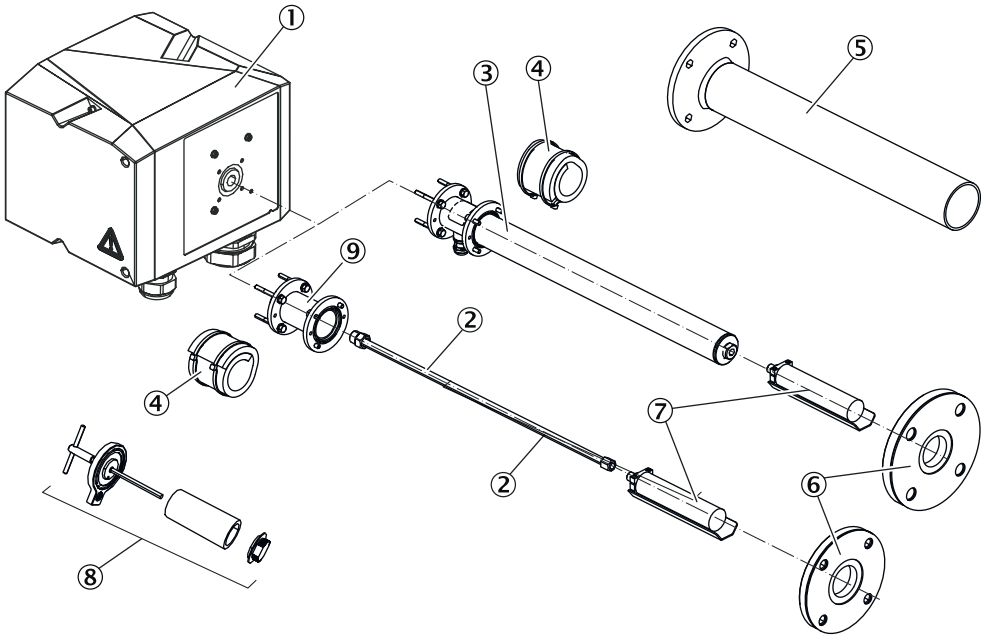


Figure 5: Scope of delivery of gas sampling unit assemblies

① Gas sampling probe
② Unheated gas sampling tube
③ Heated gas sampling tube
④ Hose insulation of gas sampling tube
⑤ Welding neck flange (accessory, optional)
⑥ Adapter flange including seals
⑦ Pre-filter (optional)
⑧ Filter (threaded filter holder and filter cartridge (single))
⑨ Transition flange (unheated gas sampling tube)

The device components are supplied individually packed:

- Gas sampling probe
- Gas sampling tube
- Adapter flange
- Filter holder
- Filter cartridge
- Optional: Welding neck flange
- Optional: Transition flange for unheated gas sampling tube
- Optional: Pre-filter

5.4.4.1 Installing the heated gas sampling tube on the gas sampling probe

Overview

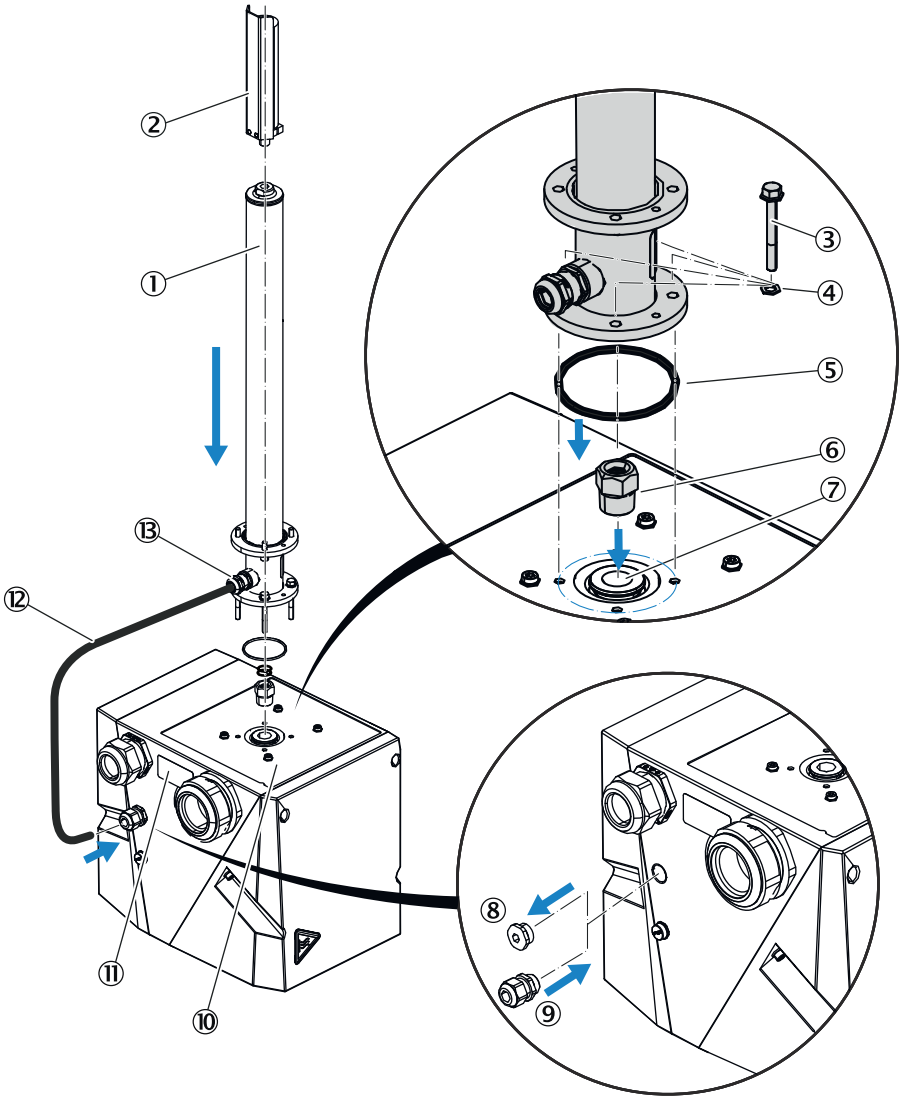


Figure 6: Installing the heated gas sampling tube on the gas sampling probe

① Gas sampling tube (heated)
② Pre-filter (optional)
③ Hexagon screws (50 mm)
④ U-Seal rings
⑤ O-sealing ring (gas sampling tube)
⑥ Probe tube connection
⑦ Screw connection for probe tube connection
⑧ Dummy plug
⑨ Cable gland for electrical connection (gas sampling probe)
⑩ Gas sampling probe housing
⑪ Filter unit type plate
⑫ Electrical connection cable
⑬ Cable gland for electrical connection (gas sampling probe)

NOTICE CHECK THE CORRECT POWER SUPPLY OF THE GAS SAMPLING TUBE!
The gas sampling tube is designed for 115 V or 230 V, depending on the version.
The correct voltage is specified on the type plate of the gas sampling tube. Connection to a wrong voltage will destroy the gas sampling tube.

NOTICE : REDUCTION OF IP PROTECTION WHEN USING OLDER GAS SAMPLING PROBES.
If an older gas sampling probe is combined with the new screw sets, the IP protection rating specified in these Operating Instructions is not achieved.

The IP protection rating of the gas sampling unit is determined by the gas sampling probe used. Observe the technical data in the corresponding Operating Instructions!

Procedure

1. Wrap three layers of PTFE sealing tape around the thread of optional pre-filter ②.

NOTE
Cut the PTFE sealing tape cleanly and straight at the end.

2. Screw optional pre-filter ② with the deflector plate in the direction of flow onto the tip of gas sampling tube ① and tighten by two full turns using a wrench.
3. Wrap three layers of PTFE sealing tape around probe tube connection ⑥ ($1\,/_2$ NPT external thread) and screw into corresponding screw connection ⑦ of the gas sampling probe and tighten by two full turns using a wrench.
4. Place O-sealing ring (gas sampling tube) ⑤ on the housing of gas sampling probe ⑩.
5. Place gas sampling tube ① with the groove over O-ring ⑤ and ensure that it is positioned correctly.
6. Fasten gas sampling tube ① with four 50 mm hexagon head screws (SW10) ③. Place U-Seal ring ④ under each screw head and then tighten the screws.
   NOTICE | Tightening torque = 7.3 Nm max.
7. Unscrew dummy plug ⑧ and insert and tighten the cable gland for electrical connection (gas sampling probe) ⑨.
   NOTICE | Tightening torque = 4.5 Nm max.

NOTE
Carefully store the unscrewed dummy plug in its original packaging. This is required if the gas sampling unit is to be operated with an unheated gas sampling tube again at a later date.

8. Insert electrical connection cable ⑫ into cable gland (gas sampling probe) ⑨ and connect it to the terminal blocks in accordance with the adhesive label on the housing cover.
9. Tighten the cable gland.
   NOTICE | Tightening torque = 4.5 Nm max.
10. Affix the enclosed type plate of the gas sampling tube below the type plate of filter unit ⑪.
    NOTICE | Clean and dry the bonding surface before bonding.

5.4.4.2 Installing the adapter flange on the heated gas sampling tube

Overview

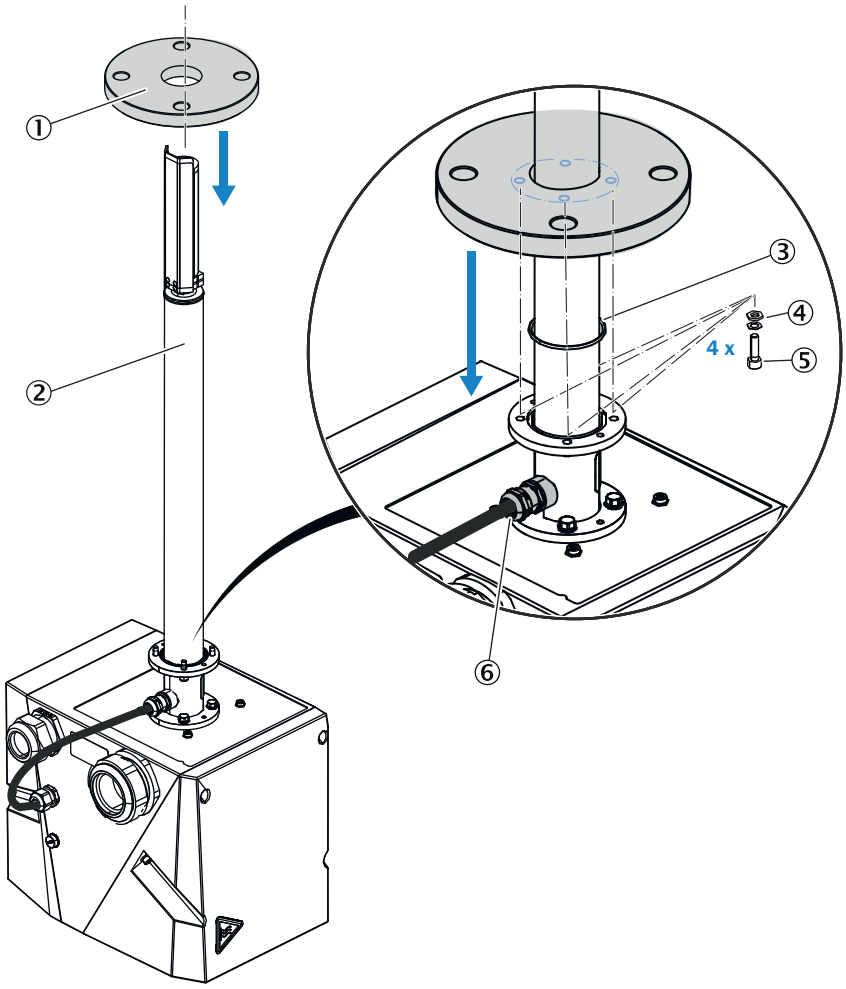


Figure 7: Installing the adapter flange on the heated sampling tube

① Adapter flange
② Heated gas sampling tube
③ O-sealing ring (adapter flange)
④ Spring washer and washer
⑤ Hexagon screws (16 mm)
⑥ Cable gland for electrical connection (gas sampling tube)

Procedure

1. Place O-sealing ring (adapter flange) ③ in the corresponding groove in the intermediate flange of the gas sampling tube and ensure it is positioned correctly.
2. Slide adapter flange ① over gas sampling tube ②.
3. First fit each of the four 16 mm hexagon head screws ⑤ with a spring washer ④ and then with a washer ④. Then insert and tighten the hexagon head screws.
   NOTICE | Tightening torque = 7.3 Nm

5.4.4.3 Installing the unheated gas sampling tube on the gas sampling probe

Overview

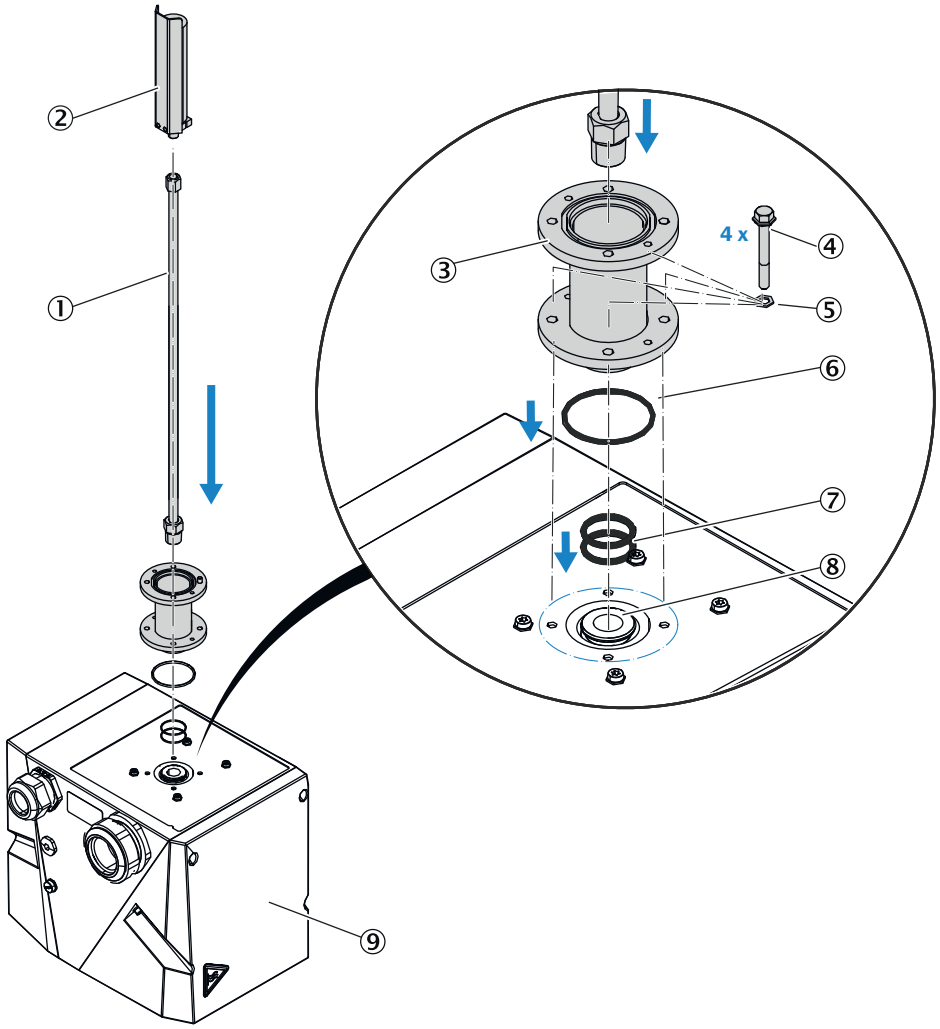


Figure 8: Installing the unheated gas sampling tube on the gas sampling probe

① Gas sampling tube (unheated)
② Pre-filter (optional)
③ Transition flange
④ Hexagon screws (50 mm)
⑤ U-Seal rings
⑥ O-sealing ring (gas sampling probe)
⑦ O-sealing rings (transition flange)
⑧ Probe tube connection housing
⑨ Gas sampling probe housing

Procedure

1. Insert two O-rings ⑦ into the two O-ring grooves of the flange plate outer neck.

NOTE
To simplify assembly, a high-performance assembly paste can optionally be applied to the O-seal rings or the O-seal ring insertion chamfers.

NOTICE | Wear disposable gloves when using the assembly paste.

2. Wrap three layers of PTFE sealing tape around the thread of gas sampling tube ① ($_{1/2}$ NPT external thread) and screw it into the screw connection of probe tube connection ⑧ and tighten it hand-tight using a wrench.

NOTE
Cut the PTFE sealing tape cleanly and straight at the end.

3. Slide O-ring ⑥ over the gas sampling tube and place it on the housing of the gas sampling probe and position it correctly at the threaded holes.
4. Slide transition flange ③ over the gas sampling tube and place it with the groove over O-sealing ring ⑥ and ensure it is positioned correctly.
5. Press the transition flange in until it is fully seated.
6. Fasten the gas sampling tube with four 50 mm hexagon head screws (SW10) ④. Place a U-Seal ring ⑤ under each screw head and then tighten the screws.
   NOTICE | Tightening torque = 7.3 Nm max.
7. Wrap three layers of PTFE sealing tape around the thread of optional pre-filter ②.
8. Screw pre-filter ② onto the tip of gas sampling tube ① and tighten hand-tight with a wrench.

5.4.4.4 Installing the adapter flange on the unheated gas sampling tube

Overview

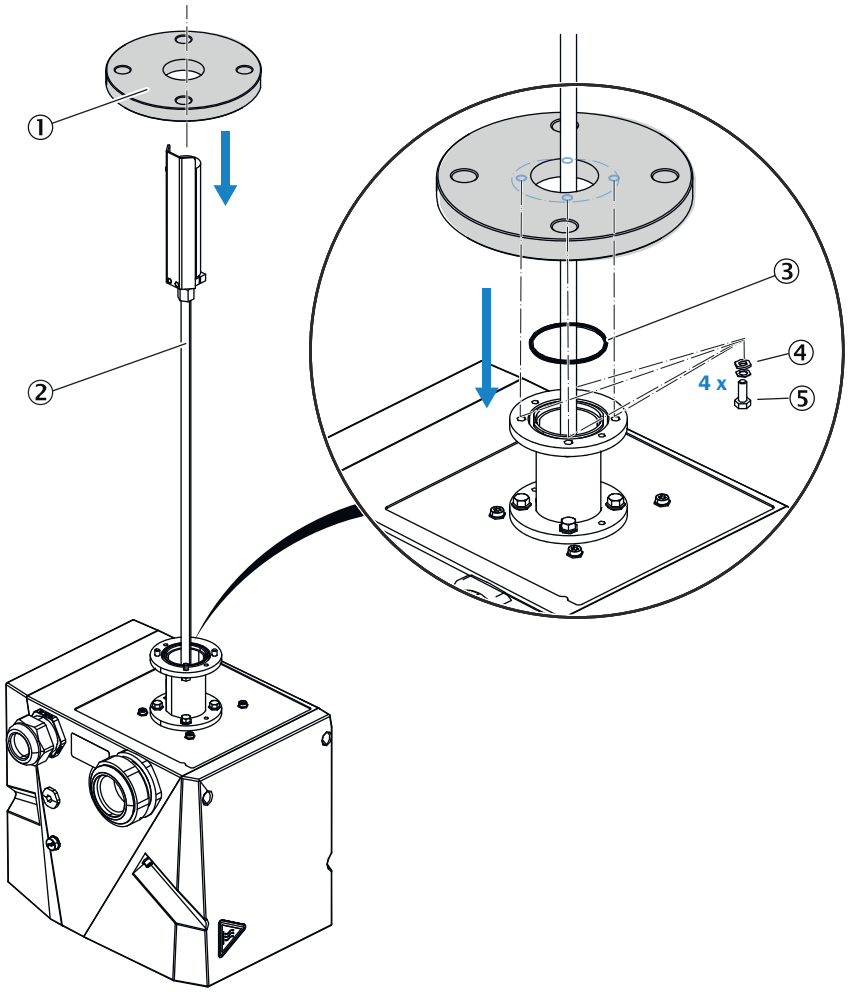


Figure 9: Installing the adapter flange on the unheated sampling tube

① Adapter flange
② Gas sampling tube (unheated)
③ O-sealing ring adapter flange
④ Spring washer and washer
⑤ Hexagon screws (16 mm)

Procedure

1. Place O-ring (adapter flange) ③ in the corresponding groove in the intermediate flange of the gas sampling tube and ensure that it is positioned correctly.
2. Slide adapter flange ① over gas sampling tube ②.
3. First fit each of the four 16 mm hexagon head screws ⑤ with a spring washer ④ and then with a washer ④, then insert and tighten them.
   NOTICE | Tightening torque = 7.3 Nm

5.4.4.5 Assembling the filter

Overview- Assembling the glass filter

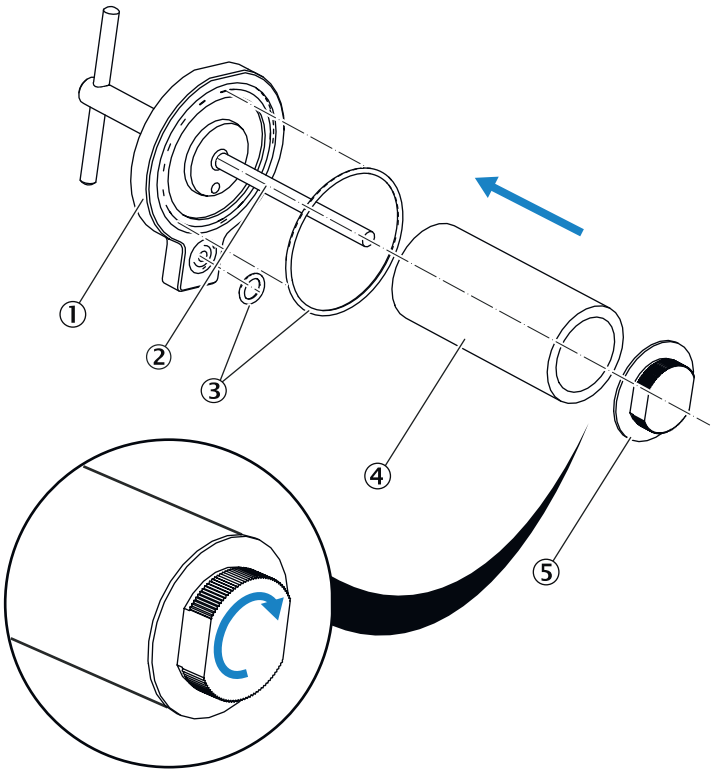


Figure 10: Assembling the glass filter

① Filter holder
② Threaded rod
③ O-sealing rings
④ Filter cartridge (glass fiber)
⑤ Threaded cap

Procedure

1. Place two O-sealing rings ③ so that they fit into the grooves of filter holder ①.
2. Slide filter cartridge ④ over threaded rod ② and place it on the filter holder.
3. Screw threaded cap ⑤ onto the threaded rod until it rests on the filter cartridge, and tighten it by hand.

Overview- Assembling the metal or fabric filter

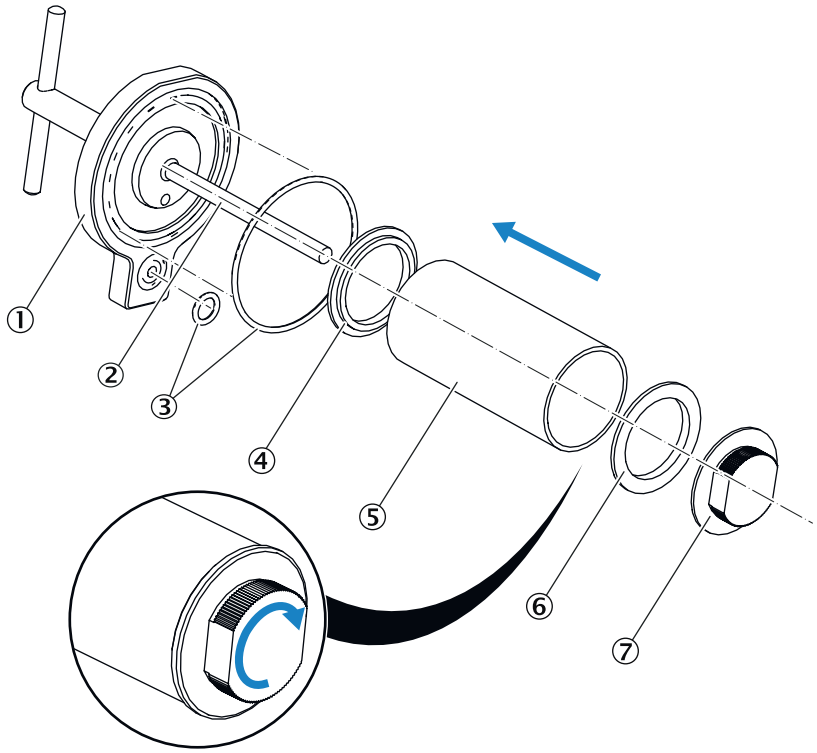


Figure 11: Assembling the metal or fabric filter

① Filter holder
② Threaded rod
③ O-sealing rings
④ Washer (filter holder)
⑤ Filter cartridge (metal or fabric)
⑥ Washer (filter cartridge)
⑦ Threaded cap

Procedure

1. Place two O-sealing rings ③ so that they fit into the grooves of filter holder ①.
2. Before installing the filter cartridge, slide washer (filter holder) ④ over the threaded rod and insert it into the filter holder.
3. Slide filter cartridge ⑤ over threaded rod ② and place it on the washer (filter holder) inserted earlier.
4. Place washer (filter cartridge) ⑥ onto the filter cartridge so that it fits properly.
5. Screw threaded cap ⑦ onto the threaded rod until it rests on the filter cartridge and tighten by hand.

5.4.4.6 Installing the filter in the gas sampling probe

Overview

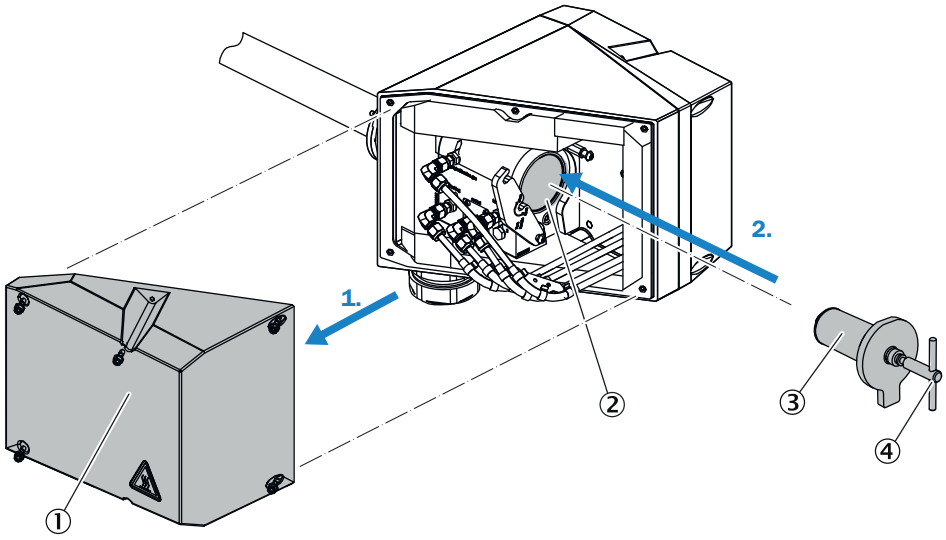
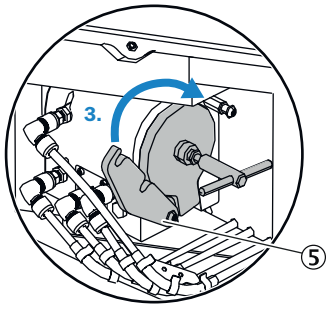


Figure 12: Inserting the filter in the gas sampling probe

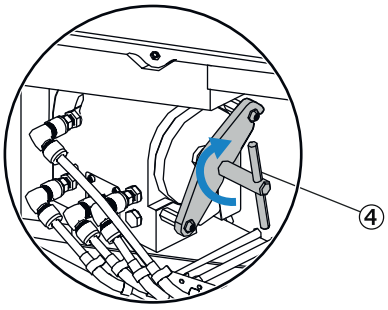
① Housing cover left (“hot” housing side)
② Filter placement
③ Filter (assembled)
④ Rotary handle filter

Procedure

1. Remove left filter housing cover (“hot” housing side) ①.
2. Insert filter ③ into gas sampling probe ② using rotary handle ④.
3. Swivel retaining bracket ⑤ clockwise until the pin sinks completely into the recess in the retaining bracket.



4. Tighten rotary handle ④ of the filter clockwise by hand.



5. Reattach left filter housing cover (“hot” housing side) ①.
   NOTICE | Tightening torque for housing screws: 3 Nm.

5.4.5 Making connections to the gas sampling unit

Overview

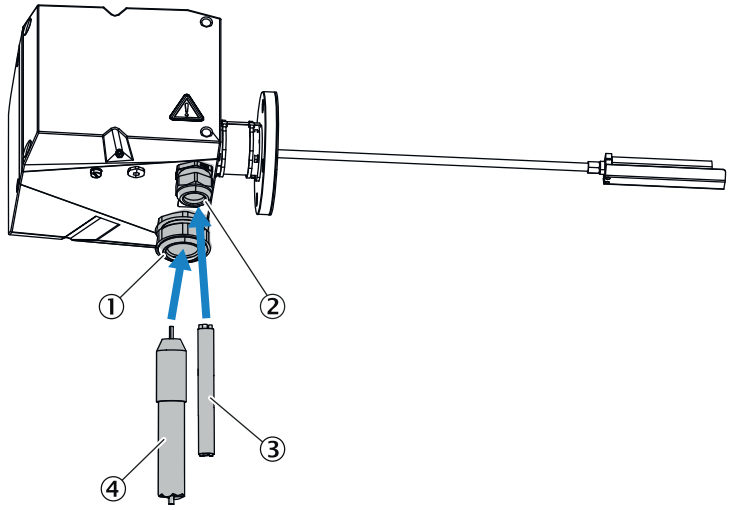


Figure 13: Connections on the gas sampling unit (unheated)

① Cable gland for sample gas line
② Cable gland for hose bundle line
③ Hose bundle line
④ Sample gas line

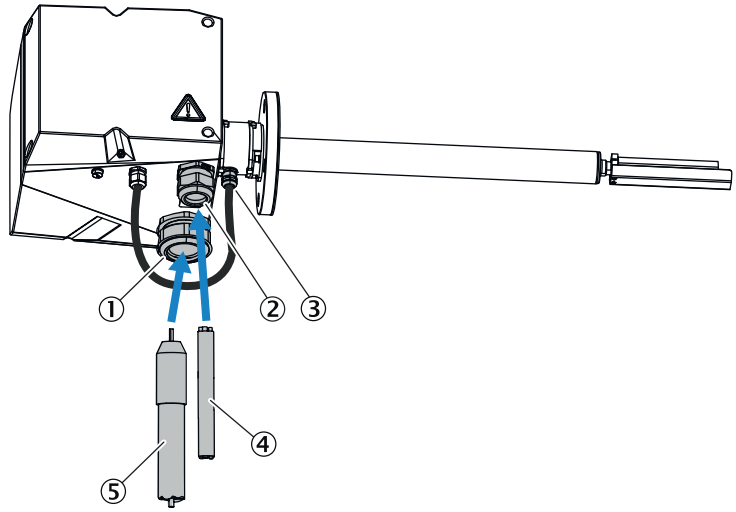


Figure 14: Connections on the gas sampling unit (heated)

① Cable gland for sample gas line
② Cable gland for hose bundle line
③ Cable gland for heating of gas sampling tube
④ Hose bundle line
⑤ Sample gas line

Important information

NOTICE

- ► Observe the ambient conditions of the gas sampling unit.
- ► When laying the sample gas line and hose bundle line, provide sufficient length for pulling the gas sampling unit out of the flue gas duct.
- ► All connections must match the connections in the measuring device.

NOTICE
The device may only be operated with the hose bundle line provided for this purpose.

Related topics

- see "Ambient conditions", page 45

5.4.5.1 Preparing the hose bundle line

Important information

NOTICE
The hose bundle line must be cut and stripped correctly.
- Do not cut too short.
- Do not damage internal cables when stripping.

Overview

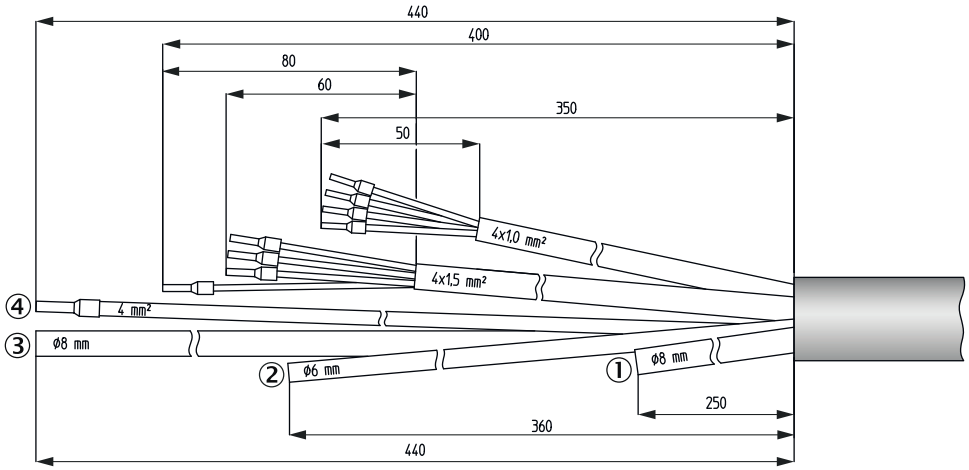


Figure 15: Assembling the hose bundle line

① Black
② White
③ Blue
④ Green/yellow

Procedure

1. Remove 500 mm of the hose bundle line sheath.
   - Cut the hoses at right angles with a hose cutter.
   - Avoid damaging the lines and hose lines.
2. Cut the flexible wires to the required length.
3. Press the ferrules onto the ends of the flexible wires.

5.4.5.2 Connecting the hose bundle line

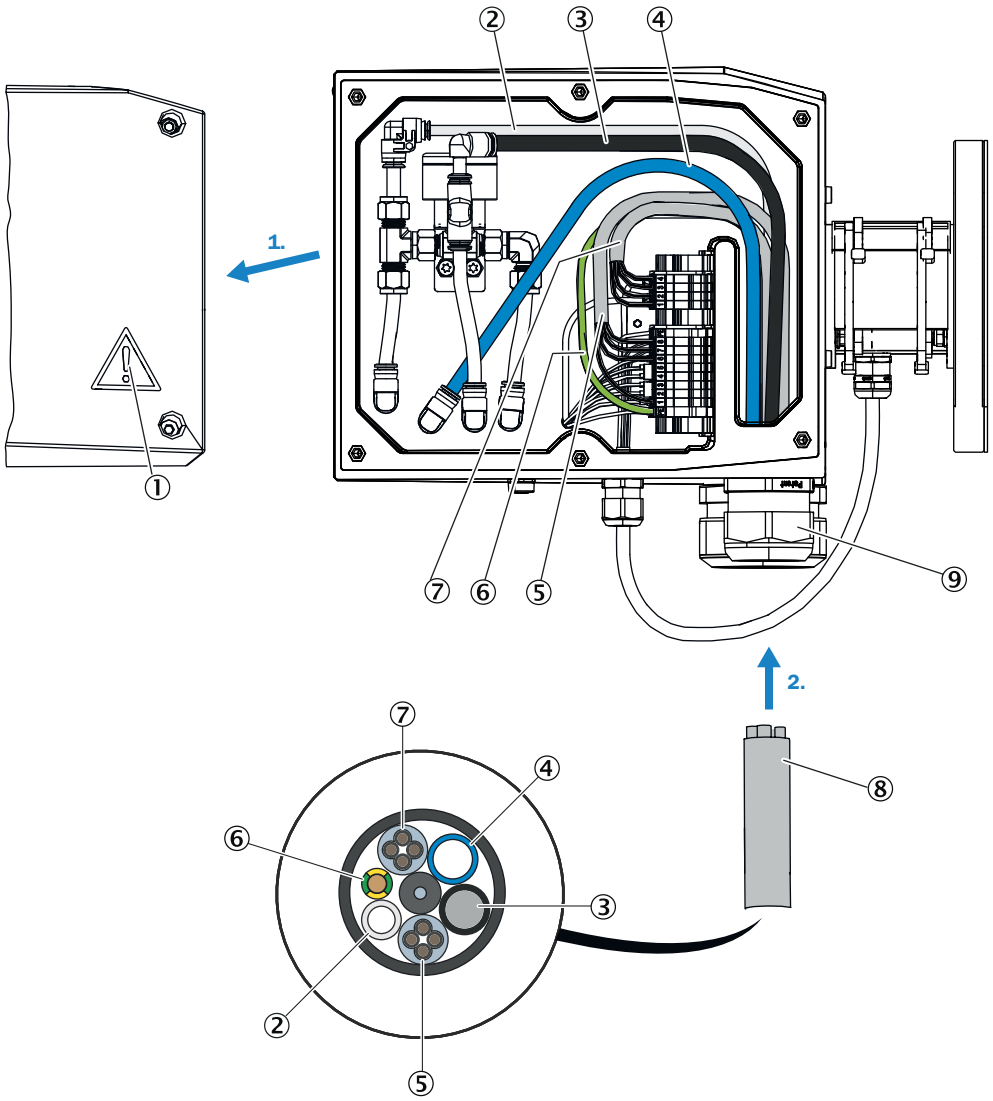


Figure 16: Hose bundle line

① Housing cover on the right (“cold” housing side)
② PTFE hose DN4/6
③ PA hose black DN6/8
④ PA hose blue DN6/8
⑤ Signal cable
⑥ Grounding conductor
⑦ Power supply
⑧ Hose bundle line
⑨ Cable gland for hose bundle line

No.	Name	Function	Dimension
②	PTFE hose (white)	Zero gas	DN 4/6
③	PA hose (black)	Control air main valve	DN 6/8
④	PA hose (blue)	Backpurge air	DN 6/8
⑤	Signal cables (Pt100)	Wires 1 and 2: Gas sampling filter Wires 3 and 4: Heated probe tube (optional)	4 x 1.0 mm²
⑥	Grounding conductor (green/yellow)	Grounding	1 x 4.0 mm²

No.	Name	Function	Dimension
⑦	Power supplies	Wires 1 and 2: Gas sampling filter Wires 3 and 4: Heated probe tube (optional)	4 x 1.5 mm²

Important information

NOTICE
All connections must match the connections in the measuring device.

NOTICE
Switching the power supply to 115 V:
► Reposition the jumpers in terminal strip X1 according to the connection diagram in the cover.

Procedure

1. Remove the right housing cover (“cold” housing side) ①.
2. Guide the hose bundle line into the housing through cable gland ⑨ provided for this purpose.
3. Make gas connections:
   - Black hose ③: Main valve
   - Blue hose ④: Backpurge
   - White hose ②: Zero gas/span gas
4. Connect the electrical cables according to the wiring diagram in housing cover (inside) ①.
5. Tighten the cable gland of the hose bundle line.
   NOTICE | Tightening torque: 10 Nm
6. Reattach right housing cover (“cold” housing side) ①.
   NOTICE | Tightening torque for housing screws: 3 Nm

Further topics

- see "Preparing the hose bundle line", page 27

5.4.5.3 Connecting the sample gas line

Overview

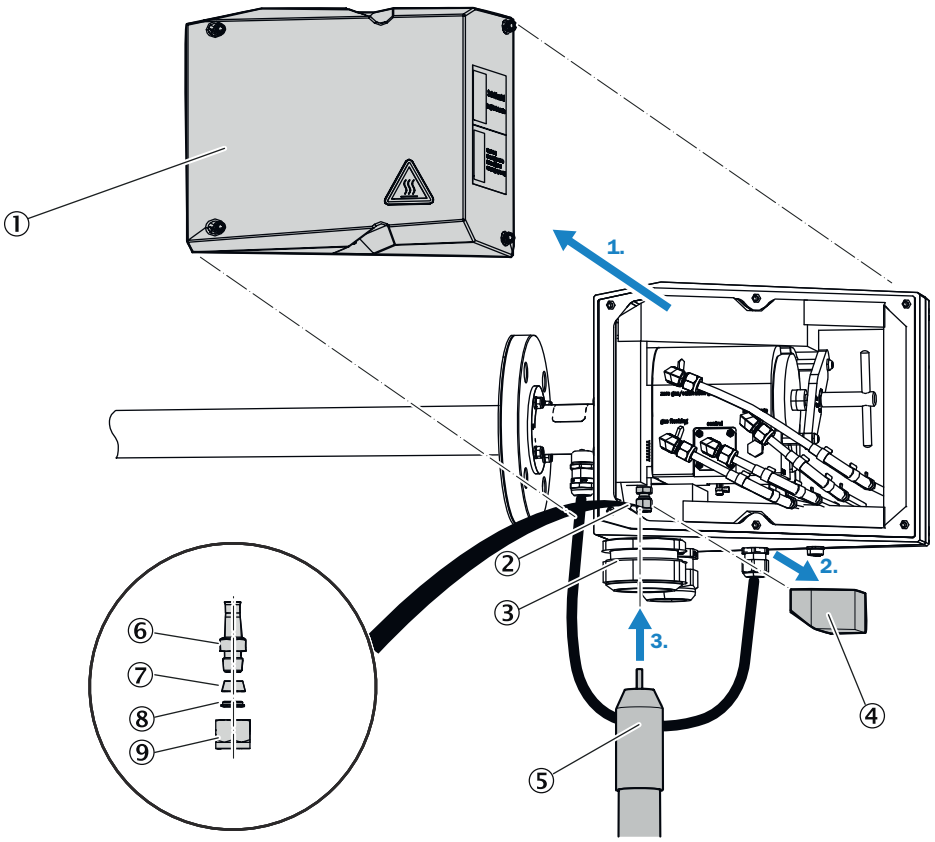


Figure 17: Connecting the sample gas line to the gas sampling unit

① Housing cover left (“hot” housing side)
② Clamping ring screw connection
③ Cable gland for sample gas line
④ Insulation of sample gas line
⑤ Sample gas line - connection side of gas sampling unit (without electrical connections)
⑥ Screw connection adapter
⑦ Front clamping ring
⑧ Rear clamping ring
⑨ Nut

Prerequisites

- The sample gas line is laid correctly in accordance with the specifications in the Operating Instructions for the respective measuring device.

Procedure

1. Remove left housing cover (“hot” housing side) ①.
2. Remove insulation ④ before clamping ring screw connection ②.
3. Remove the protective cap from sample gas line ⑤ (end without electrical connections).
4. Insert the sample gas line (end without electrical connections) through the cable gland of sample gas line ③ into the housing.
5. Push the sample gas line into clamping ring screw connection ② as far as it will go.
6. Screw the sample gas line tight on the clamping ring screw connection.
   ► For first screwing (clamping ring still loose):
   - Fit the clamping ring in the following order and tighten the nut hand-tight: Screw connection adapter ⑥ – front clamping ring ⑦ – rear clamping ring ⑧ – nut ⑨

- Hold the sample gas line on the front collar with the second open-end wrench and tighten the clamping ring by 1¼ turns.

► For subsequent screw connection: (clamping ring tight): Hold the sample gas line at the front collar with the second open-end wrench and tighten the clamping ring by ¼ turns.

7. Tighten the cable gland of sample gas line ③.
   NOTICE | Tightening torque: 8 Nm.
8. Reattach left housing cover (“hot” housing side) ①.
   NOTICE | Tightening torque for housing screws: 3 Nm.

6 Commissioning

Qualification

Commissioning may only be carried out by Service or trained Customer Service.

NOTICE

Before commissioning, ensure the filter is installed in the gas sampling probe. Operation without a filter will destroy the device.

► Only install the filter holder and filter element together.

WARNING

Risk of injury due to heavy load.

Depending on the length of the gas sampling tube, the device has a weight of at least 14 kg.

► Use proper lifting techniques or auxiliary equipment to lift or move the device.
► Lift the device by the device base.
► If necessary, work together with another person.

6.1 Backpurging the fine filter (installation option)

The filter of the gas sampling unit is automatically backpurged before each operation. Depending on the configuration, a different filter is cleaned:

- **Standard configuration (back purge 1):** The gas sampling unit is configured at the factory so that the optional pre-filter is purged.
- **Optional configuration (back purge 2):** If the gas sampling unit is used without a pre-filter, it is recommended to change the configuration to the connection **back purge 2**. This uses the backpurge function to clean the internal fine filter of the gas sampling unit.

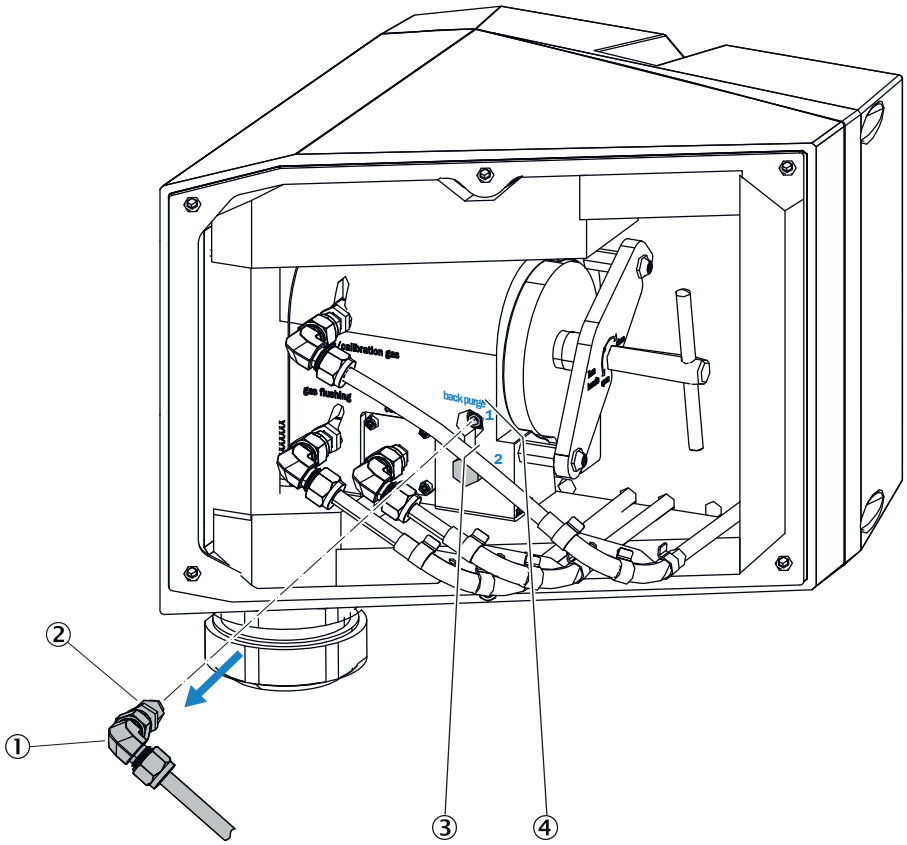


Figure 18: Backpurging the fine filter (installation option)

① Backpurge hose
② Adapter backpurge hose
③ Screw plug G1/8 with sealing ring
④ Non-return valve G1/8 with sealing ring

Procedure

1. Remove the left housing cover (“hot” housing side).
2. Loosen and remove screw plug ③ from the connection **back purge 2** using a torque wrench (SW 14).
3. Unscrew adapter ② of the backpurge hose from non-return valve ④.
4. Loosen and remove non-return valve ④ from the connection **back purge 1** using a torque wrench (SW 14).
   NOTICE | Ensure that both the non-return valve and the connection thread are free of residues. All remnants of the old PTFE sealing tape must be carefully removed to ensure that the valve functions properly.
5. Residues of the PTFE sealing tape from the flashback.
6. Insert screw plug (including sealing ring) ③ into the now free connection **back purge 1** and tighten to a torque of 9 Nm using the torque wrench.
7. Wrap the non-return valve (including sealing ring) with three layers of PTFE sealing tape and insert ④ into the connection **back purge 2** and tighten with the torque wrench.
   NOTICE | Tightening torque = 9 Nm max.
8. Screw adapter ② of the backpurge hose back into the non-return valve.

✓ The internal fine filter is cleaned during backpurging.

NOTE

To restore the connection to the standard configuration, carry out the above steps in reverse order. The non-return valve must be refitted in the connection **back purge 1** and the screw plug in the connection **back purge 2**.

6.2 Fitting the gas sampling unit on the flange

Overview

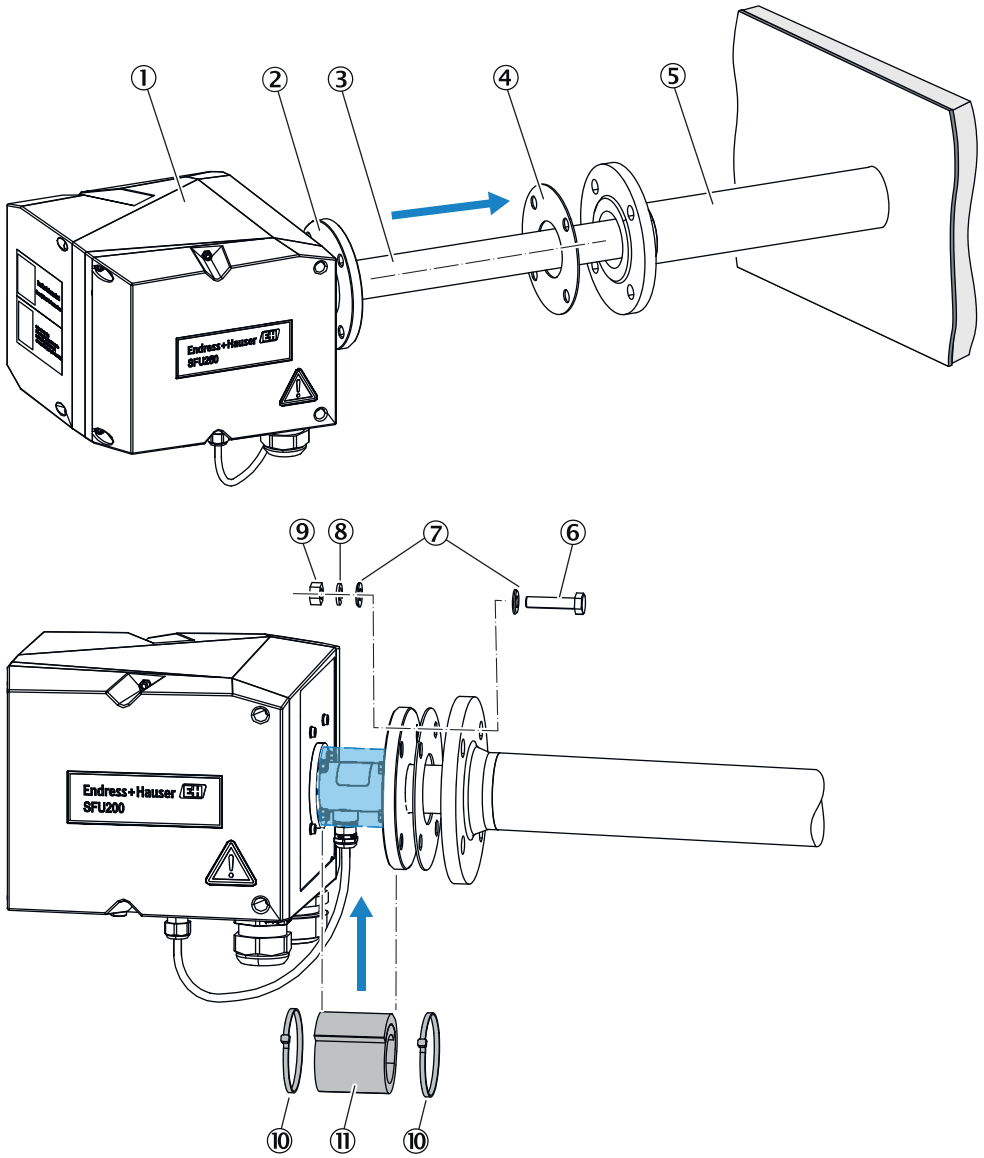


Figure 19: Gas sampling unit on welding neck flange (schematic diagram)

① Gas sampling unit (assembled)
② Adapter flange
③ Gas sampling tube (heated version shown)
④ Flange seal
⑤ Welding neck flange
⑥ Screw
⑦ Washer
⑧ Spring washer
⑨ Nut
⑩ Cable ties
⑪ Hose insulation

Important information

CAUTION
Risk to health through hot or noxious gases in the sample gas duct.

The sample gas duct can contain hot or noxious gases which can escape when opening the duct-side flange. Even if the sample gas duct is out of operation during the installation, escaping gases can cause damage to health.

- ► Always put the sample gas duct or plant/plant section out of operation for the duration of the installation.
- ► If required, purge the area of the fitting location on the sample gas duct with ambient air before starting installation work.
- ► During installation work, wear protective clothing suitable or specified by the operating company.
- ► If the welding neck flange is not used immediately, seal the flange with a blanking plate to prevent gas from escaping from the gas duct.

WARNING
Risk of injury due to heavy load.

Depending on the length of the gas sampling tube, the device has a weight of at least 14 kg.

- ► Use proper lifting techniques or auxiliary equipment to lift or move the device.
- ► Lift the device by the device base.
- ► If necessary, work together with another person.

NOTICE
Risk of contamination of the gas sampling unit

- ► Install the gas sampling unit on the flue gas duct just before switching on the measuring device.

Prerequisites

- Gas sampling unit is completely and correctly assembled and connected.
- The compressed air supply and power supply are ready to be switched on.

Procedure

1. Slide flange seal ④ over gas sampling tube ③.
2. Push gas sampling unit ① with gas sampling tube ③ into welding neck flange ⑤. The hose outputs of the gas sampling unit must point downwards.
3. Attach adapter flange ② to welding neck flange ⑤ using the 4 screw connections (M12 screws).
   - Order (starting from the stack): Screw ⑥ - washer ⑦ - welding neck flange ⑤ - flange seal ④ - adapter flange ② - washer ⑦ - spring washer ⑧ - nut ⑨.
4. Lay hose insulation ⑪ around the gas sampling tube.
5. Attach two cable ties ⑩ to the left and right of the cable gland between the flange plates and then tighten them.
6. Switch on the power supply to the measuring device.
7. Check the temperature of the gas sampling probe on the display of the measuring device or Sopas ET.

7 Maintenance

7.1 Maintenance plan

Overview

This Maintenance plan describes the maintenance work specified by the manufacturer.

Perform checks in accordance with the guidelines to be applied by the operator in accordance with the intervals described therein.

Important information

NOTICE

► Use only original spare parts and wear and tear parts from the manufacturer.

Maintenance intervals

Table 5: Overview of maintenance intervals

Interval[1)]	Maintenance work	Comment
1 W	Regular checks	see "Regular checks", page 38
	• Check the gas sampling filter by checking the gas flow on the analyzer display. • Replace the gas sampling filter if the measuring device displays a corresponding message.	See the Operating Instructions of the Analysis System.
6 M	• Replace the gas sampling filter. • Clean the housing.	See the Operating Instructions of the Analysis System.
2 Y[2)]	• Replace the non-return valve. • Clean the gas sampling pipe. • Clean the sample gas line.	See the Operating Instructions of the Analysis System.

1) 1 D = Daily, 1 W = Weekly, 1 M = Monthly, 3 M = Every 3 months, 4 M = Every 4 months, 6 M = Every 6 months, 1 Y = Yearly, 2 Y = Every 2 years
2) Maintenance must be performed by Service, service partner or certified customer.

Related topics

- see "Consumable, wearing and spare parts", page 37

7.2 Consumable, wearing and spare parts

Table 6: Spare parts of gas sampling unit SFU200/SFU250

Description	SFU200	SFU250	Part No.
Glass fiber filter	X	X	2142143
Sintered metal filter	X	X	2143694
Gold-plated sintered metal filter	X	X	2143695
Fabric filter	X	X	2143693
Pre-filter 2 µm	X	X	5321499
Pre-filter 10 µm	X	X	5321500
Rocker arm valve	X	X	2143712
Control valve	X	X	2142144
Non-return valve EMI	X	X	2143696
Hose (heating side)	X	X	2142153
Housing cover seals	X	X	2142154
Filter holder	X	X	2152756
Housing cover, left	X		2142156
Housing cover, right	X		2143834

Description	SFU200	SFU250	Part No.
Painted housing, cover left		X	2142899
Painted housing, cover right		X	2144867

7.3 Regular checks

7.3.1 Checking the device components

Procedure

Checking the system

1. Check the gas sampling filter:
   ► Check the gas flow rate on the analyzer display, see Operating Instructions of the Analysis System.
2. Replace the gas sampling filter if the measuring device displays a corresponding message.
   ► See the Operating Instructions of the Analysis System.
3. Check all fastening screws for tight fit.
4. Check the sample gas line and hose bundle line for damage.
5. Check the connection of the sample gas line and hose bundle line for tight fit.
6. Check gas sampling unit for cleanness, dryness and damage.
7. Check all connections for tight fit.

7.4 Cleaning

7.4.1 Cleaning the housing of the gas sampling probe

Carefully wipe the housing of the gas sampling probe with a slightly damp cloth.

7.4.2 Cleaning the gas sampling tube

NOTE
Contact Endress+Hauser Service.

7.5 Maintenance work

7.5.1 Replacing the gas sampling filter

Overview

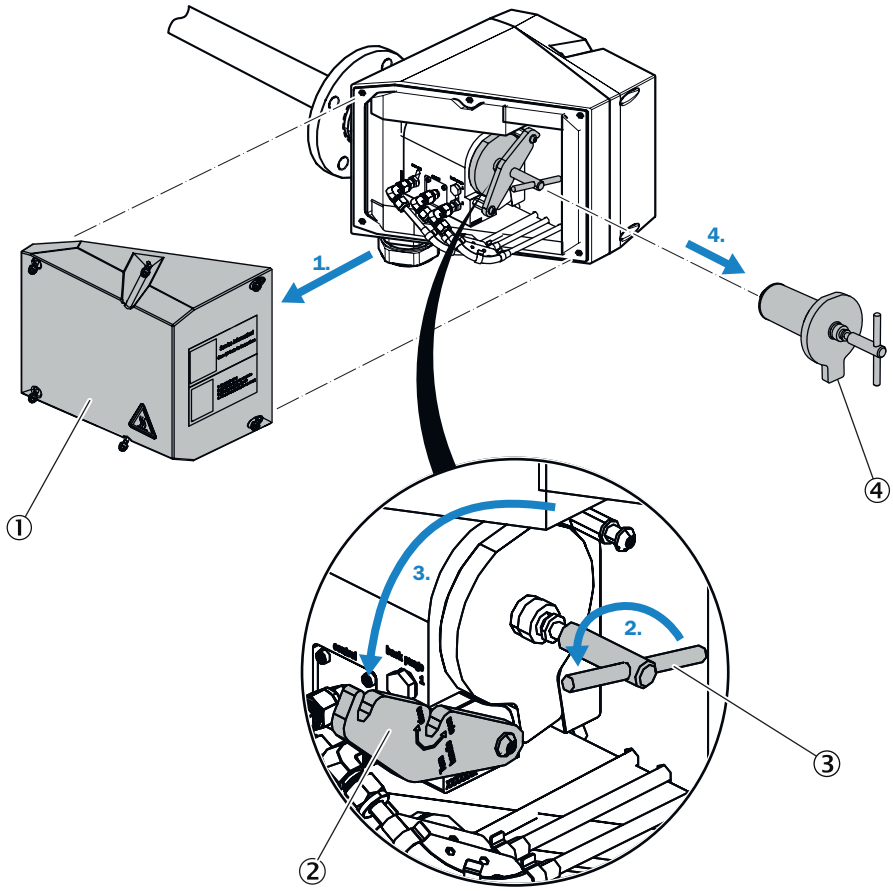


Figure 20: Replacing the filter element

① Housing cover left (“hot” housing side)
② Mounting bracket
③ Rotary handle
④ Filter

Important information

CAUTION
Danger of burns due to hot surfaces

- ► Wear suitable protective clothes, for example, heat-resistant gloves.
- ► Switch off the device and allow the components to cool down.

NOTICE | Always use new O-rings when replacing the filter (see "Assembling the filter", page 23).

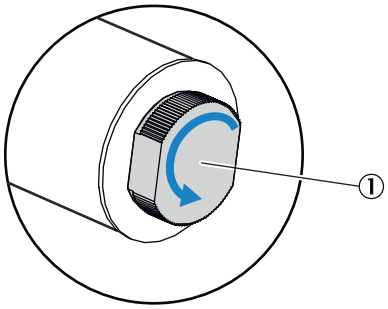
Procedure

Remove filter

1. Remove left housing cover (“hot” housing side) ①.
2. Loosen rotary handle of filter element ③ counterclockwise.
3. Swivel retaining bracket ② counterclockwise.

4. Pull out filter ④ using rotary handle ③.
   NOTICE | Allow the filter holder to cool down before replacing the filter cartridge and the O-sealing rings.

Replace the filter cartridge, O-sealing rings and washers, if necessary



① Threaded cap

1. To remove the filter cartridge from the filter holder, turn threaded cap ① to the left and remove it.
2. **Only for sintered metal or fabric filters**: Remove the upper washer.
3. Remove the used filter cartridge.
4. **Only for sintered metal or fabric filters**: Remove the lower washer.
5. Use the plastic tool to remove the O-sealing rings from the filter holder plate.
   NOTICE | Removing the O-sealing rings with sharp-edged metal tools will damage the sealing surface.
   ► Only use the plastic tool supplied in the maintenance kit to remove the O-sealing rings.
6. Assemble the filter with a new filter cartridge, new O-sealing rings and, if necessary, new washers (see "Assembling the filter", page 23).

Install the filter with a new filter cartridge

Install the filter in the gas sampling probe (see "Installing the filter in the gas sampling probe", page 25).

Further topics

- see "Assembling the filter", page 23
- see "Installing the filter in the gas sampling probe", page 25
- see "Consumable, wearing and spare parts", page 37

7.5.2 Replacing the non-return valve

NOTE
Contact Endress+Hauser Service.

8 Troubleshooting

8.1 Safety

Requirements on the maintenance personnel

- Only allow a skilled electrician to work on the electrical system or electrical assemblies.
- The technician must be familiar with the exhaust gas technology of the operator's plant (hazard by overpressure and toxic and hot flue gases) and be able to avoid hazards when working on gas ducts.
- The technician must be trained with respect to gas lines and their screw connections and have the necessary specialist knowledge (be able to ensure gas-tight connections).

8.2 Possible malfunctions

Malfunction	Possible cause	Clearance
Sample gas flow decreases.	Filter element dirty.	Replace the filter element.
	Condensate formation due to cooled sample gas	Contact Endress+Hauser Service.
Span gas flow decreases	Compressed air too low	Check the pressure (see "Installation", page 46).
	Non-return valve or control valve defective	Contact Endress+Hauser Service.
Purge gas flow decreases	Compressed air too low	Check the pressure (see "Installation", page 46).
	Control valve or rocker arm valve defective	Contact Endress+Hauser Service.
Malfunction of rocker arm valve	Compressed air too low	Check the pressure (see "Installation", page 46).
	Defective rocker arm valve	Contact Endress+Hauser Service.
Contaminated or corroded gas paths	Defective or missing filter element	• Replace the filter element. • Contact Endress+Hauser Service.
Leaky gas path	• Contaminated instrument air • Main valve or non-return valves contaminated or damaged • Loose hose connections	Check the instrument air purity. • Contact Endress+Hauser Service.
Leaky housing	• Seal damaged. • Cover not placed correctly. • Screws not sufficiently tightened	Replace the housing seal.
Gas sampling probe does not heat.	• Not connected correctly. • Connections corroded. • Triggered temperature limiter	• Check connections • Check power supply • Contact Endress+Hauser Service.
	No external power supply	

9 Decommissioning

9.1 Switching off

NOTE
The gas sampling unit is supplied with voltage and compressed air via the connected measuring device or analyzer system.

► To switch off, use the Operating Instructions for the measuring device or contact Service.

9.2 Disassembly

Requirements

- The device is switched off.

Material required

- Flange cover
- Personal protective equipment

Dismantling the gas sampling unit

WARNING
Risk of injury through device components under pressure
Lines can remain pressurized even after shutdown. The sudden escape of pressure or toxic gases from the exhaust pipe can lead to serious injuries.

► Before disassembly, ensure the system is completely depressurized.
► Loosen the lines slowly and carefully.
► Wear suitable protective equipment.

1. Switch off external compressed air.
2. Loosen and remove the screw connections of the adapter flange with the welding neck flange.
3. Pull out and remove the gas sampling probe with gas sampling tube and adapter flange with seal from the welding neck flange.
4. Close the flange opening on the gas duct with a cover.
   NOTICE | If the device is only to be shut down temporarily, the process can be ended after this step. In this case, the gas inlet of the gas sampling unit must be closed.
5. Loosen the connections of the sample gas line and remove the line.
6. Loosen the connections of the hose bundle line and remove the line.
7. Remove the gas sampling unit.
8. Store the gas sampling unit dry and dust-free in its original packaging (storage temperatures see "Ambient conditions", page 45).

Related topics

- see "Mounting and electrical installation", page 13

9.3 Disposal

Important information

NOTE
The following assemblies contain substances that may have to be disposed of separately:

- All parts with media contact can be contaminated with harmful substances.

Disposal of device

The device can easily be disassembled into its components which can then be sent to the respective raw material recycling facilities.

- Dispose of electronic components as electronic waste.
- Check which materials having contact with the exhaust gas must be disposed of as hazardous waste.
- Dispose of the filter cartridge as hazardous waste.

10 Technical data

10.1 Dimensions of gas sampling unit

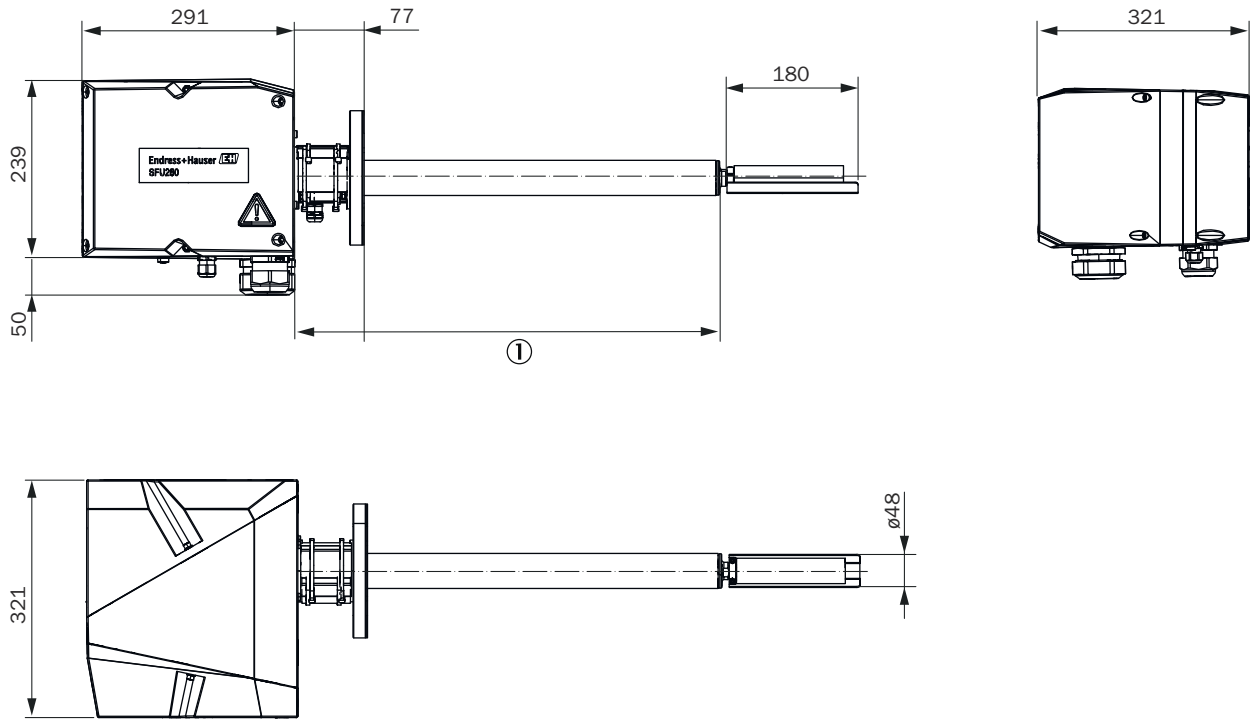


Figure 21: Dimensional drawing of heated gas sampling unit (dimensions in mm)

① L= Length of gas sampling tube in the version ordered (see "Gas sampling unit", page 45)

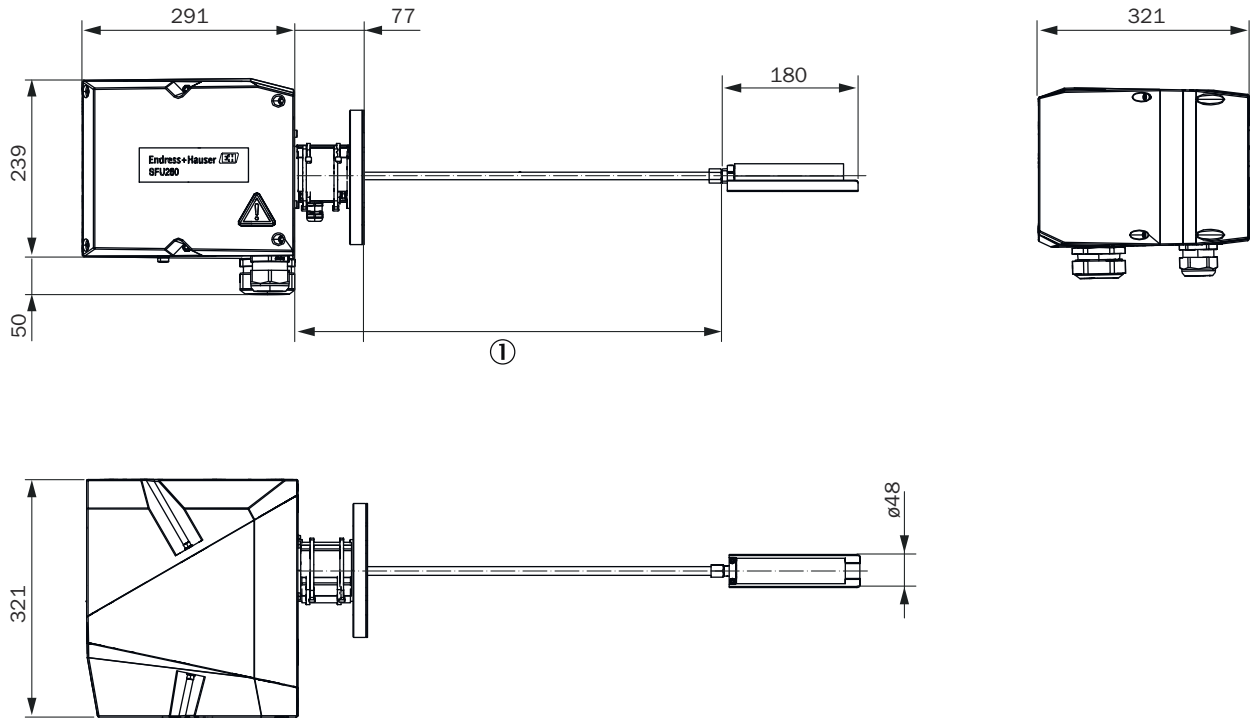


Figure 22: Dimension drawing of unheated gas sampling unit (dimensions in mm)

① L= Length of gas sampling tube in the version ordered (see "Gas sampling unit", page 45)

10.2 Ambient conditions

	SFU200	SFU250
Installation site	Indoor installation (inside buildings)	Outdoor installation (painted housing; outside buildings)
Installation height	up to 2,000 m above sea level	
Degree of contamination	4	
Ambient temperature (operation)	• –20 °C to +50 °C (with standard hose bundle line) • –20 °C to +60 °C (with hose bundle line GL)	
Ambient temperature (storage)	-20 °C to +70 °C	
Relative humidity	< 90% (without condensate)	
Air pressure	850-1100 hPa	

10.3 Gas sampling unit

	SFU200	SFU250
Design	PU foam housing	
Dimensions • Gas sampling probe	see Dimension drawing • 300 x 330 x 300 mm	
Dimensions • Gas sampling tube	**Unheated gas sampling tube:** • Variant: L = 300 mm, Ø = 20 mm • Variant: L = 600 mm, Ø = 20 mm • Variant: L = 900 mm, Ø = 20 mm • Variant: L = 1100 mm, Ø = 20 mm • Variant: L = 1300 mm, Ø = 20 mm • Variant: L = 1600 mm, Ø = 20 mm • Variant: L = 2100 mm, Ø = 20 mm **Heated gas sampling tube:** • Variant: L = 500 mm, Ø = 48 mm • Variant: L = 800 mm, Ø = 48 mm • Variant: L = 1000 mm, Ø = 48 mm • Variant: L = 1500 mm, Ø = 48 mm • Variant: L = 2000 mm, Ø = 48 mm	
Dimensions • Pre-filter	• Pre-filter 2 µm: L= 180 mm, Ø = 35 mm • Pre-filter 10 µm: L= 180 mm, Ø = 35 mm	
Installation	Housing, flange mounting	
Weight	11.5 kg (with filter and filter holder)	
Ingress protection rating	IP54	IP66
Impact resistance	IK08	
Compliances	EN15267-3	
Housing material	• Polyurethane foam • Stainless steel	• Polyurethane foam with UV-resistant coating • Stainless steel
Gas sampling tube material	1.4404	
Filter material	• Glass fiber filter • Sintered metal filter • Gold-plated sintered metal filter • Fabric filter **Optional:** • Pre-filter 2 µm; 1.4539 • Pre-filter 10 µm; 1.4539	
Housing fastening	Screw fittings	

	SFU200	SFU250
Housing seal	Silicone	
Seals in contact with gas	PTFE, FKM, FFKM, graphite	
Material in contact with gas	• Nickel-plated aluminum • Stainless steel • Filter material	
Process gas temperature	• Unheated gas sampling probe: Max. +550 °C • Heated gas sampling probe: Max. +200 °C	
Gas temperature in filter	Max. 200 °C (protected by safety temperature limiter)	
Heating up time	Approx. 1.0 h (from room temperature to +200 °C)	
Flammability	• Needle flame test: IEC 60695-11-5:2016-12	

10.4 Installation

	SFU200	SFU250
Pipes: • Main valve • Zero and span gas line • Backpurge • Sample gas line	Diameter: • 8 mm (hose) • 6 mm (hose) • 8 mm (hose) • 6 mm (tube)	
Compressed air • Main valve • Zero gas • Span gas • Backpurge	 • 5-7 bar • 3-4 bar • 3-4 bar • 5-7 bar	
Flange	• DN 50 PN 16 • DN 65 PN 6 • DN 65 PN 16 • DN 80 PN 16 • DN 100 PN 16 • ANSI 4" 150 lbs	
Fitting position	Welding neck flange with a downward inclination of 10°, housing cable outlets downwards	

Hose bundle lines

	Hybrid line standard	Hybrid line GL
Material number	6025049	6058993
Sheath material	PVC	PUR
Layout	• 2x PA hose 8/6 mm • 1x PTFE hose 6/4 mm • 1x wire 4 mm^2 • 1 x line 4x 1.0 mm^2 • 1x line 4x 1.5 mm^2	
Ambient temperature (hose bundle line fixed installation)	-40 to +70 °C	-40 to +90 °C
Ambient temperature (hose bundle line flexible installation)	-5 to +60 °C	-30 to +90 °C
Cable diameter	Approx. 30 mm	Approx. 27 mm
Minimum bending radius (hose bundle line fixed installation)	12x cable diameter	5x cable diameter
Minimum bending radius (hose bundle line flexible installation)	18x cable diameter	10x cable diameter

Cable glands

Connection	Type	Size	Clamping range	Tightening torque
Sample gas line	Plastic	M63	46-56 mm	8 Nm
Hose bundle line	Plastic	M40	22-32 mm	10 Nm
Probe tube heating	Plastic	M20	6-12 mm	4.5 Nm

10.5 Power supply

Voltage supply	SFU200	SFU250	Probe heating (optional)
Power voltage	1~: 115/230 V AC; +10%, –15%		
Power frequency	50-60 Hz		
Net shape	TN-S or IT		
Power consumption	Max. 450 VA		Max. 350 VA (0.5 m tube length) or 450 VA (tube length > 0.5 m)
Protection class:	I		
Overvoltage category	2		

8031285/1XGM/V1-1/2026-07

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