# Operating Instructions
# **SFU100, SFU150**

Gas Sampling Unit
for maritime applications

Endress+Hauser
People for Process Automation

### Described product

Gas sampling unit

Variants

- SFU100 (for indoor use in maritime applications)
- SFU150 (for outdoor use in maritime applications)

### Manufacturer

Endress+Hauser SICK GmbH+Co. KG
Bergener Ring 27
01458 Ottendorf-Okrilla
Germany

### Legal information



### Original document

This document is an original document of Endress+Hauser SICK GmbH+Co. KG.

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# Contents

# 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 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 by high temperature |

| 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.

## 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<br>• Authorized welder (welding specialist)<br>• Service training, if necessary |
| Electrical installation | Qualified personnel:<br>• Trained customer<br>• Service | • General knowledge in measurement technology and specialist device knowledge<br>• Authorized electrician (skilled electrician or person with similar training)<br>• Service training |
| Initial commissioning<br>Recommissioning | Qualified personnel:<br>• Trained customer<br>• Service | • General knowledge in measurement technology and specialist device knowledge<br>• Service training |
| Maintenance | Operator<br>Qualified personnel:<br>• Trained customer<br>• Service | • General knowledge in measurement technology and specialist device knowledge<br>• Service training, if necessary |

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

# 3 Product description

## 3.1 Product identification

| | |
|---|---|
| Product name | SFU100<br>SFU150 |
| Device version | SFU100 (indoor use)<br>SFU150 (outdoor use) |
| Manufacturer | Endress+Hauser SICK GmbH+Co. KG<br>Bergener Ring 27 · 01458 Ottendorf-Okrilla · Germany |
| Type plate | The type plate is located on the underside of the enclosure. |

## 3.2 Layout and function

### 3.2.1 Gas sampling unit overview

**Overview**

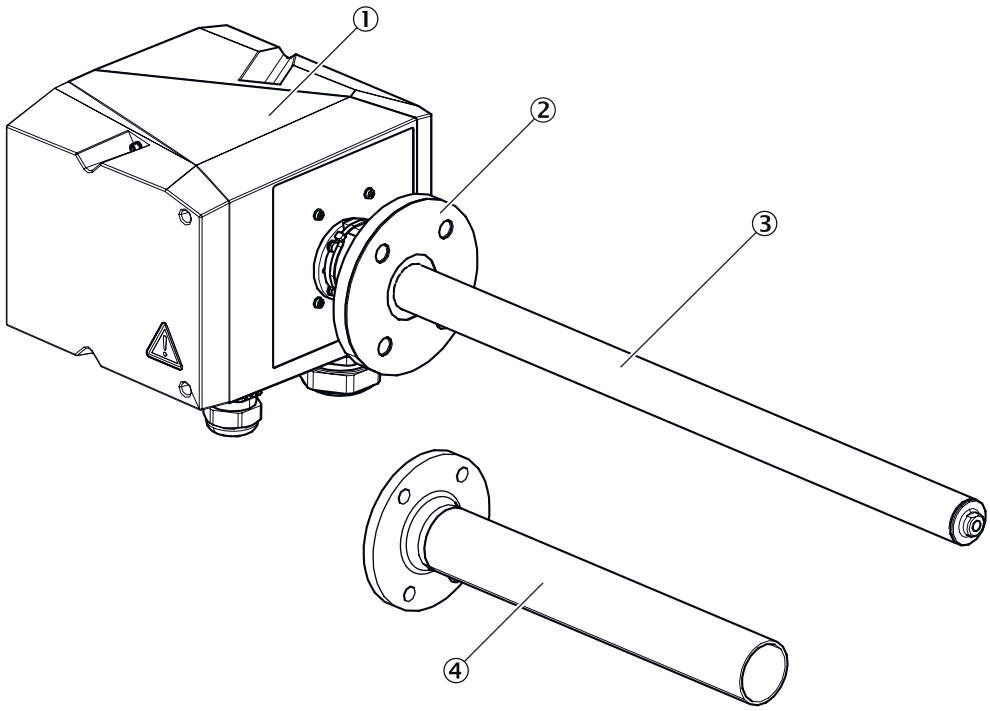



*Figure 1: Gas sampling unit overview*

① Gas sampling probe
② Adapter flange including seal
③ Gas sampling pipe
④ 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 backflush function cleans the filter and the gas sampling pipe.

**Characteristics**

- Certified for maritime applications:

- SFU100 for indoor use
- SFU150 for outdoor use

- Gas sampling pipe, unheated

**Supplementary information**

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

- Glass fiber filter 1 µm
- Gas sampling pipe 0.5 m, unheated
- Gas sampling pipe 0.8 m, unheated

### 3.2.2 Gas sampling probe

**Overview**

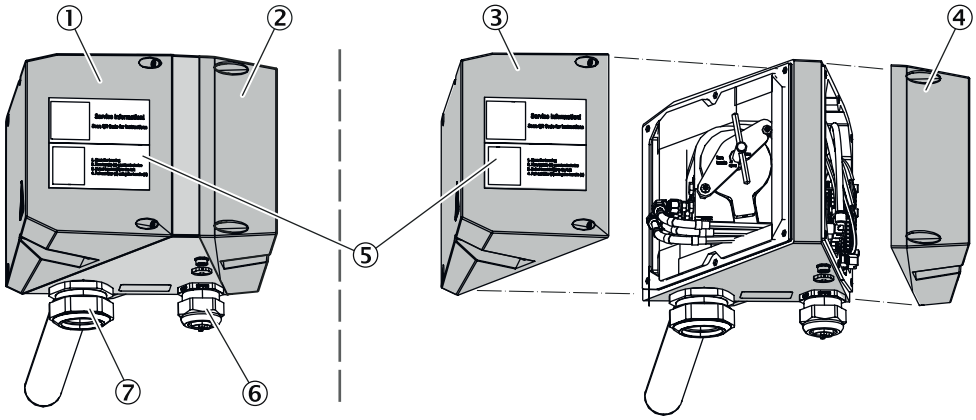



*Figure 2: View of enclosure closed – open*

① Enclosure side filter (“hot” enclosure side)
② Enclosure side connections (“cold” enclosure side)
③ Enclosure cover left, sample gas line
④ Enclosure cover right, hose bundle line
⑤ Filter maintenance sign
⑥ Cable gland hose bundle line
⑦ Cable gland sample gas line

**Characteristics**

- Gas sampling probe with pneumatics and electrics in one enclosure
- Left enclosure side with filter unit - heated
- Right enclosure side for electric 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 Tools required

- Set of open-end wrenches
- Set of screwdrivers
- Set of Allen keys
- Stripping tool
- Crimping pliers
- Hose cutter

## 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 Mounting steps overview

#### Overview

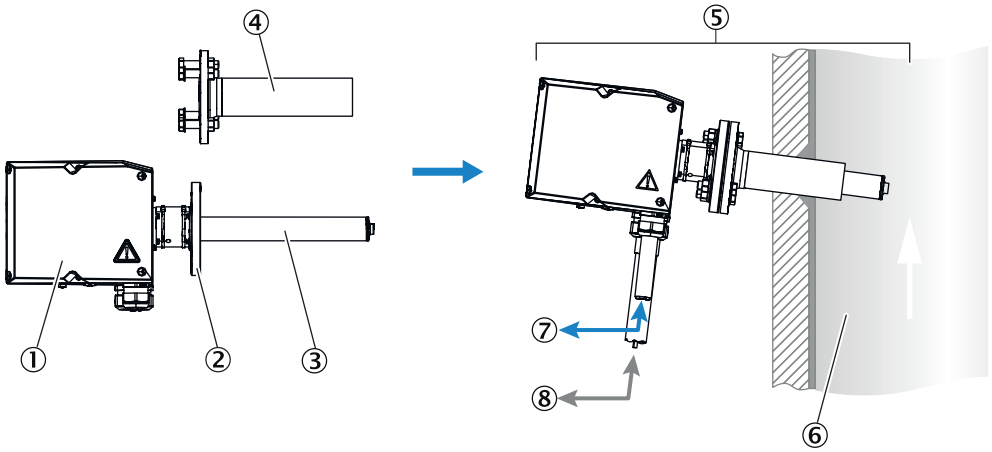



*Figure 3: Gas sampling unit with welding neck flange: Fitting to the sampling point*

① Gas sampling probe
② Adapter flange including seal
③ Gas sampling pipe
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

**Installation comprises two main steps:**

1 Mounting of the required **device components before** commissioning.
2 Mounting of the **device** at the sampling point (carried out by the Service **during** commissioning of the measuring device).

*Table 3: Mounting steps overview*

| Step | Procedure | User groups | Reference |
|---|---|---|---|
| 1 | Mounting the welding neck flange | Customer | see "Mounting specification for welding neck flange", page 15 |
| 2 | Assembly of the supplied device components of the gas sampling unit:<br>• Mounting the gas sampling pipe on the gas sampling probe.<br>• Mounting the adapter flange on the gas sampling pipe.<br>• Assembling the filter.<br>• Installing the filter in the gas sampling probe. | Service or trained customer | see "Assembly of supplied device components", page 17<br>• see "Mounting the gas sampling pipe on the gas sampling probe", page 18<br>• see "Mounting the adapter flange on the gas sampling pipe", page 19<br>• see "Assembling the filter", page 20<br>• see "Installing the filter in the gas sampling probe", page 21 |
| 3 | Making connections to the gas sampling unit:<br>• Connecting the hose bundle line.<br>• Connecting the sample gas line. | Service or trained customer | see "Making connections to the gas sampling unit", page 22<br>• see "Connecting the hose bundle line", page 23<br>• see "Connect the sample gas line", page 25 |

### 5.4.3 Mounting specification for 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 tube must be completely tight.

**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 70 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 700 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 to ensure vibration resistance.
- The flange tube must be welded completely tightly.

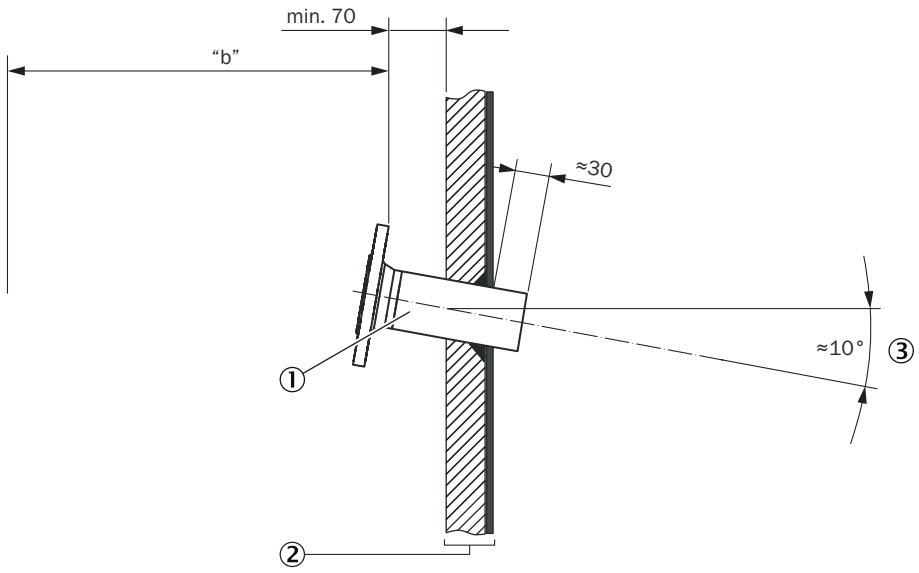



*Figure 4: Welding neck flange fitting requirements*

① Welding neck flange
② Sample gas duct wall including insulation and cladding
③ Installation angle

*Table 4: Minimum distance behind welding neck flange*

| Length of gas sampling pipe | Minimum distance “b” |
|---|---|
| 0.5 m | 950 mm |
| 0.8 m | 1,250 mm |

### 5.4.4 Assembly of supplied device components

**Overview**

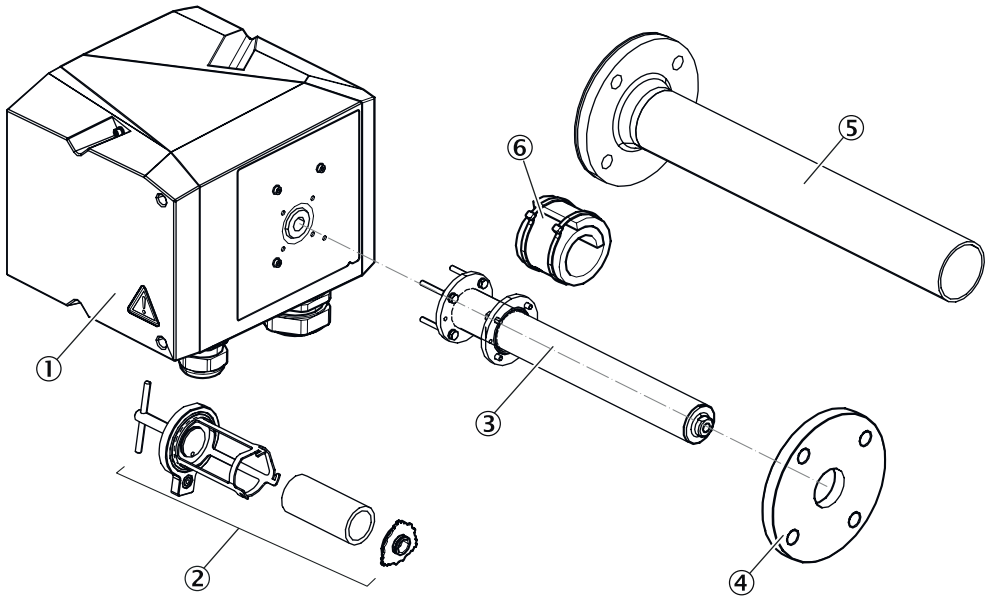



*Figure 5: Scope of delivery of gas sampling unit assemblies*

① Gas sampling probe
② Filter (filter holder and filter cartridge (single))
③ Gas sampling pipe
④ Adapter flange including seal
⑤ Welding neck flange (accessory, optional)
⑥ Hose insulation of gas sampling pipe

**The device components are supplied individually packed:**

- Gas sampling probe
- Gas sampling pipe
- Adapter flange
- Filter holder
- Filter cartridge
- Optional: Welding neck flange

### 5.4.4.1 Mounting the gas sampling pipe on the gas sampling probe

**Overview**

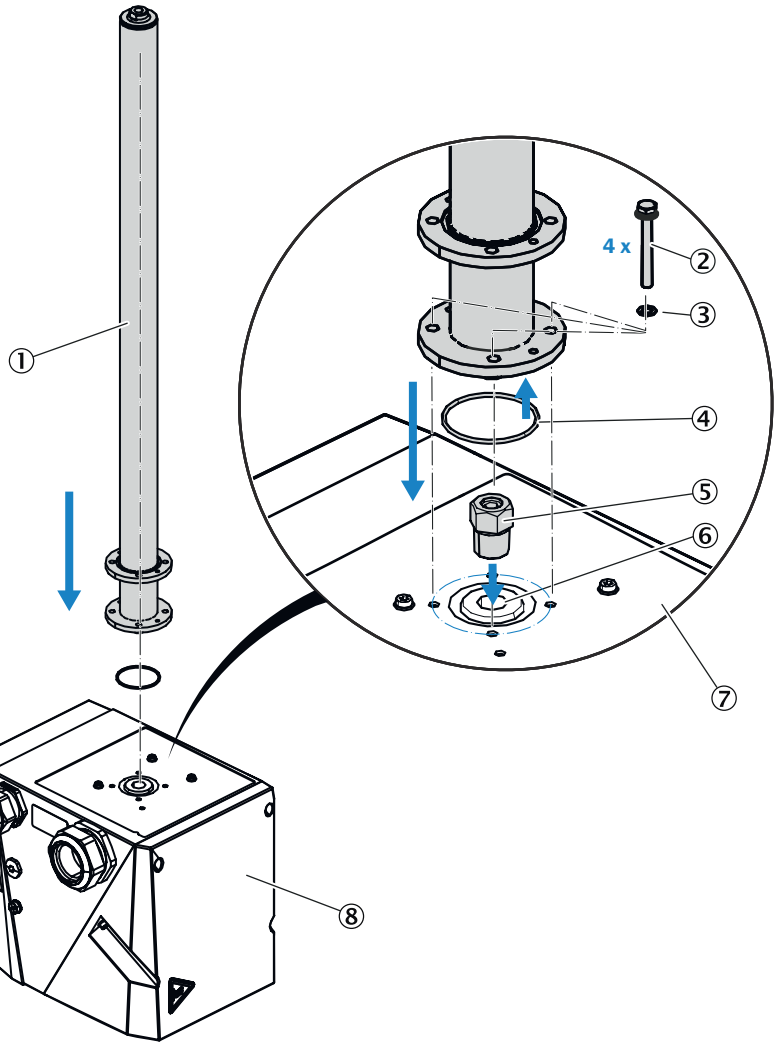



*Figure 6: Mounting the gas sampling pipe on the gas sampling probe*

① Gas sampling pipe
② Hexagon screw with flange
③ U-Seal sealing ring
④ O-sealing ring (gas sampling pipe)
⑤ Probe tube connection
⑥ Probe tube connection to enclosure
⑦ Detail: Position the gas sampling pipe
⑧ Gas sampling probe enclosure

**Prerequisites**

**NOTICE**
The flange of the gas sampling pipe contains a transport lock in the area of the welding assembly to prevent damage caused by vibrations. A cable tie with a sticker indicates that the transport lock should be removed before mounting.

**Procedure**

1. Wrap probe tube connection ⑤ ($^1/_2$ NPT external thread) mit Teflon sealing tape (3 turns) and screw it into the corresponding screw connection ⑥ of the gas sampling probe.
2. Place O-sealing ring ④ in the corresponding groove in the intermediate flange of the gas sampling pipe and ensure it is positioned correctly.
3. Attach gas sampling pipe ① to enclosure ⑧ of the gas sampling probe (until it makes contact).
4. Attach the 4 hexagon head screws (SW10) ② with U-Seal sealing rings ③ and tighten.
   **NOTICE** | Tightening torque = 7.3 Nm max.

### 5.4.4.2 Mounting the adapter flange on the gas sampling pipe

**Overview**

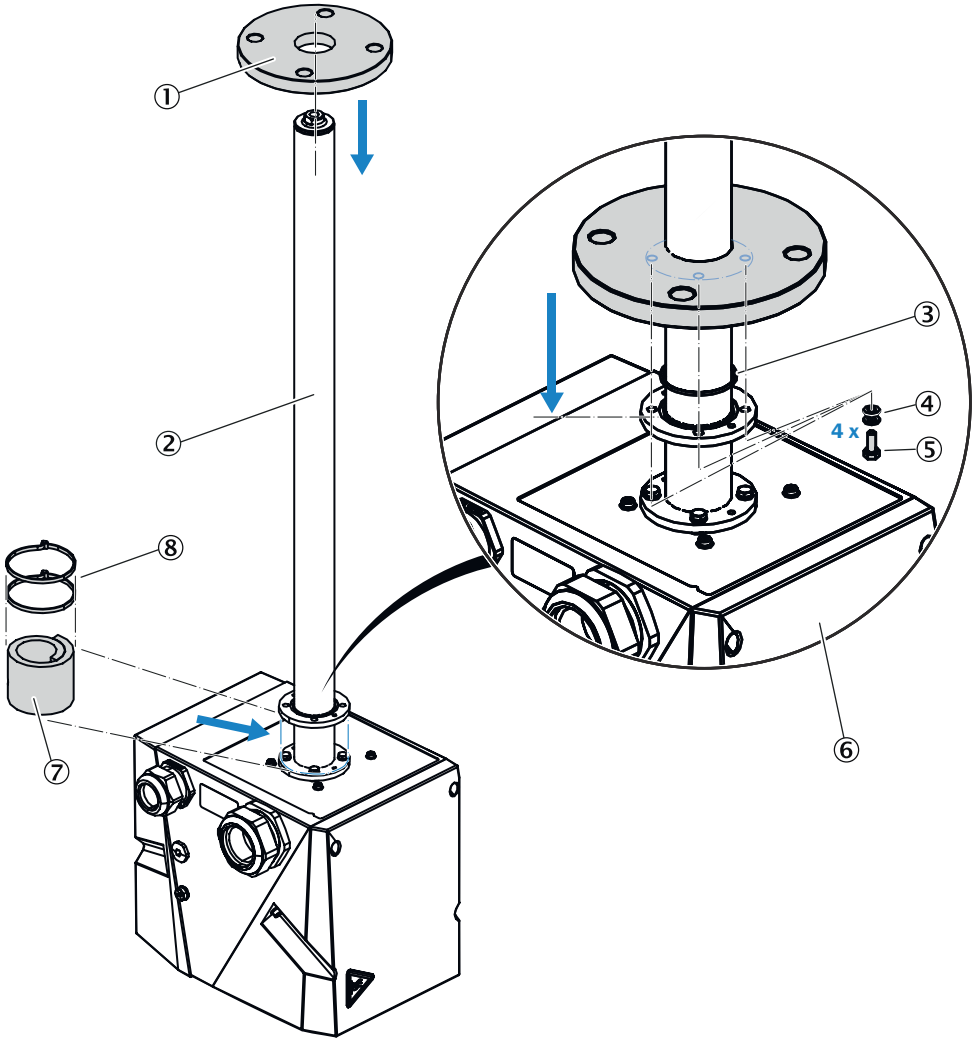



*Figure 7: Mounting the adapter flange on the sampling pipe*

① Adapter flange
② Gas sampling pipe
③ O-sealing ring adapter flange
④ Spring washer, washer
⑤ Hexagon screw
⑥ Detail: Fasten the adapter flange
⑦ Hose insulation for gas sampling pipe
⑧ Hose tie

**Procedure**

1. Place O-ring ③ in the corresponding groove in the intermediate flange of the gas sampling pipe and ensure it is positioned correctly.
2. Guide adapter flange ① over gas sampling pipe ②.
3. Fit the 4 screw fastenings (hexagon screws ④ and O-ring ⑤) and tighten accordingly.
   **NOTICE** | Tightening torque = 7.3 Nm
4. Wrap hose insulation (red) ⑦ around the gas sampling pipe and secure with 2 hose ties ⑧.

### 5.4.4.3 Assembling the filter

**Overview**

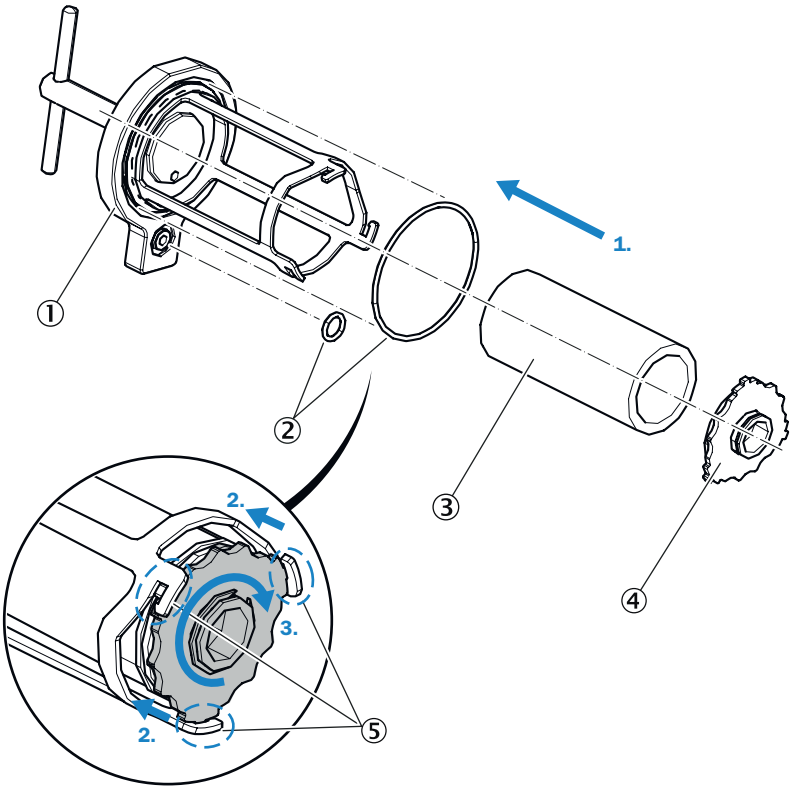



*Figure 8: Assembling the filter*

① Filter holder
② O-sealing rings
③ Filter cartridge
④ Filter cover bayonet catch
⑤ Filter cover fastening (retaining lugs)

**Procedure**

1. Position both O-sealing rings ② in the groove.
2. Insert filter cartridge ③ into filter holder ①.
3. Fit filter cover with bayonet catch ④.
4. Press the bayonet catch in filter holder direction ⑤ (marked with arrows) and turn clockwise until all retaining lugs are correctly seated.
   **NOTICE** | Ensure the filter cover fastening (retaining lugs) is correctly seated.

### 5.4.4.4 Installing the filter in the gas sampling probe

**Overview**

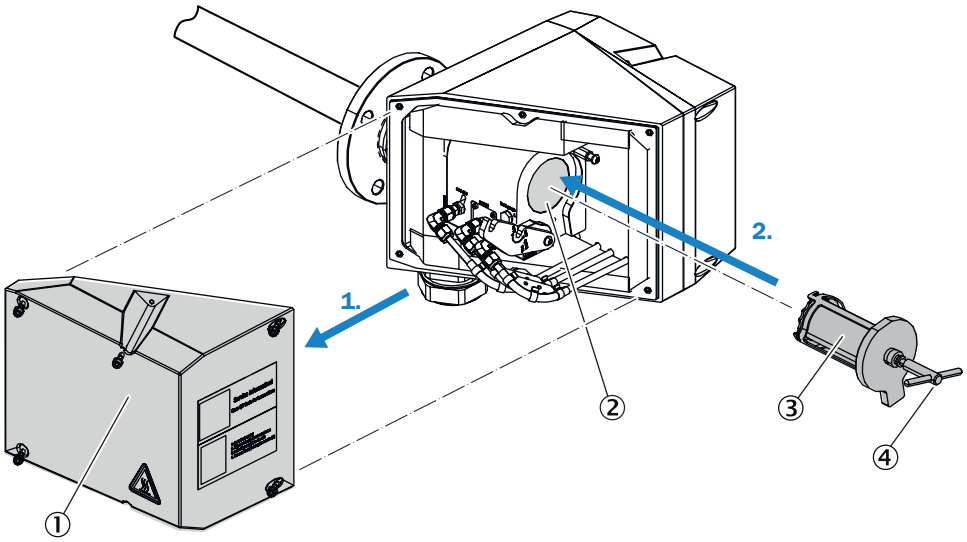
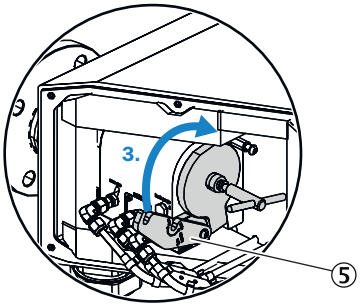



*Figure 9: Inserting the filter in the gas sampling probe*

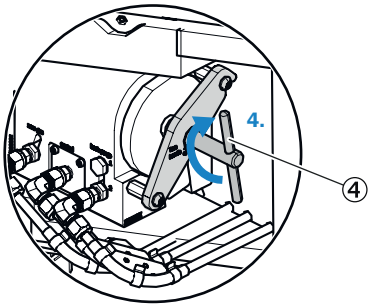
① Enclosure cover left, sample gas line
② Filter placement
③ Filter (assembled)
④ Rotary handle of filter

**Procedure**

1. Remove enclosure cover, sample gas line ①.
2. Insert filter ③ into gas sampling probe ② using rotary handle ④.
3. Swivel mounting bracket ⑤ clockwise until the pin sinks completely into the recess in the mounting bracket.




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




5. Reattach enclosure cover, sample gas line ①.
   **NOTICE** | Tightening torque for enclosure screws: 3 Nm.

### 5.4.5 Making connections to the gas sampling unit

#### Overview

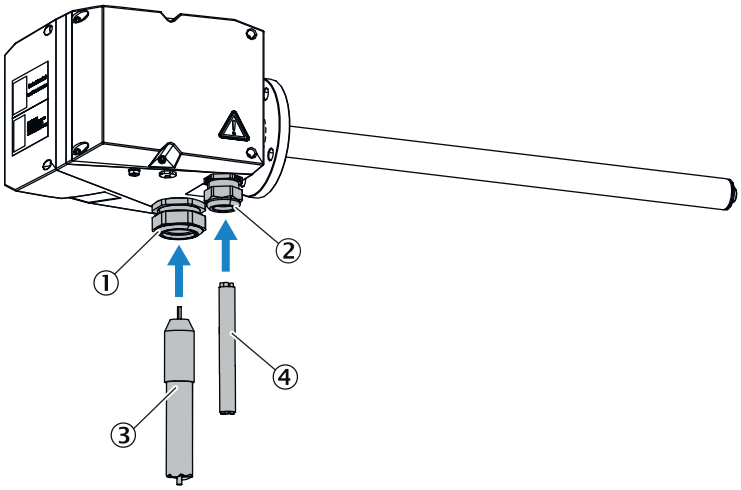



*Figure 10: Connections to the gas sampling unit*

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

#### Related topics

- see "Ambient conditions", page 36

### 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. If possible, leave a piece as “reserve”.
- Do not damage internal cables when stripping.

**Overview**

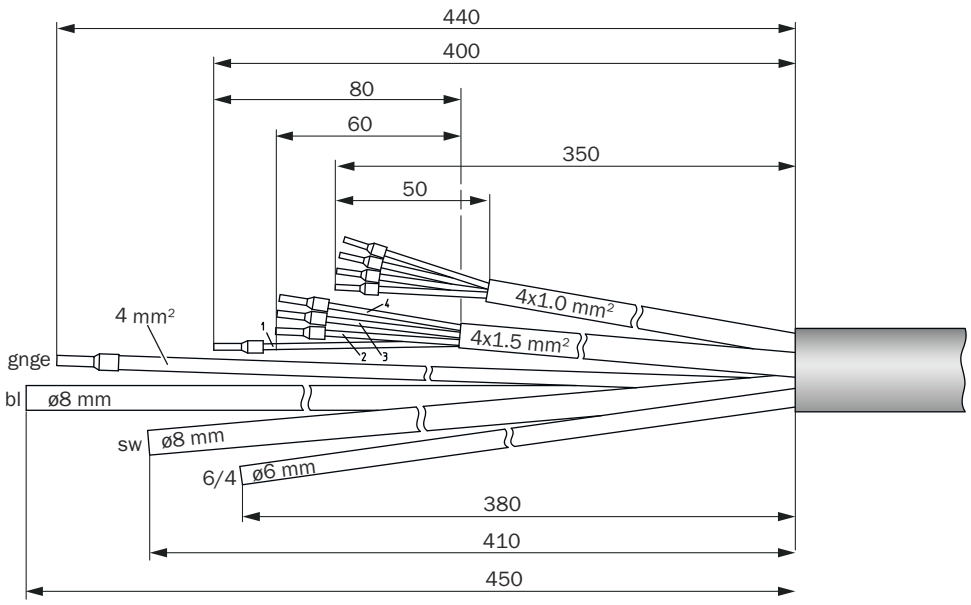



*Figure 11: Assembling the hose bundle line*

**Procedure**

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

### 5.4.5.2 Connecting the hose bundle line

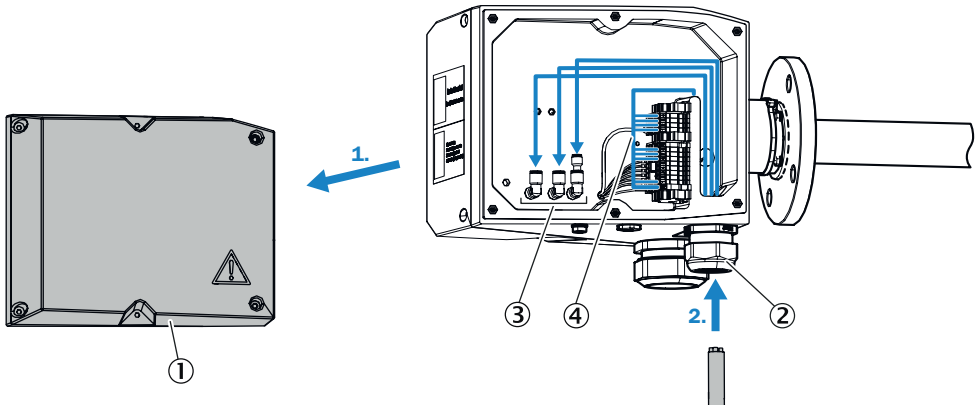



*Figure 12: Connecting the hose bundle line*

① Enclosure cover right, hose bundle line
② Cable gland hose bundle line
③ Gas connections
④ Electrical cable connections

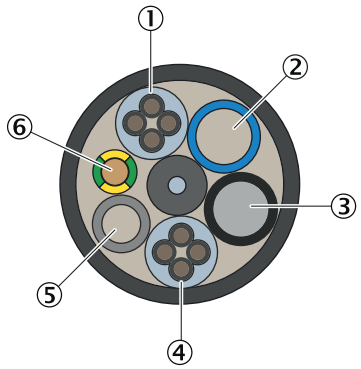



*Figure 13: Hose bundle line*

① Voltage supply
② PA hose blue DN6/8
③ PA hose black DN6/8
④ Signal line
⑤ PTFE hose DN4/6
⑥ Grounding conductor

| No. | Designation | Function | Dimension |
|---|---|---|---|
| ① | Voltage supplies | Wires 1 and 2: Gas sampling filter<br>Wires 3 and 4: Probe tube (optional) | 4 x 1.5 mm² |
| ② | PA hose (blue) | Purging air | DN 6/8 |
| ③ | PA hose (black) | Control air main valve | DN 6/8 |
| ④ | Signal lines (Pt100) | Wires 1 and 2: Gas sampling filter<br>Wires 3 and 4: Probe tube (optional) | 4 x 1.0 mm² |
| ⑤ | PTFE hose (white) | Zero gas | DN 4/6 |
| ⑥ | Grounding conductor (green/yellow) | Grounding | 1 x 4.0 mm² |

**Important information**

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

**NOTICE**
**Change of voltage supply to 115 V:**
► Reconnect jumpers in terminal strip X1 accordingly.

**Procedure**

1. Remove enclosure cover, hose bundle line ①.
2. Insert the hose bundle line into the enclosure through cable gland provided ②.
3. Make gas connections ③:
   - Tube, black: Main valve
   - Tube, blue: Backflush
   - Tube, white: Zero gas/test gas
4. Connect electrical cables ④ in enclosure cover (inside) ① according to the connection diagram.
5. Tighten the screw connection of the strain relief.
   **NOTICE** | Tightening torque: 8 Nm
6. Reattach enclosure cover, hose bundle line ①
   **NOTICE** | Tightening torque for enclosure screws: 3 Nm

**Further topics**

- see "Preparing the hose bundle line", page 22

### 5.4.5.3 Connect the sample gas line

**Overview**

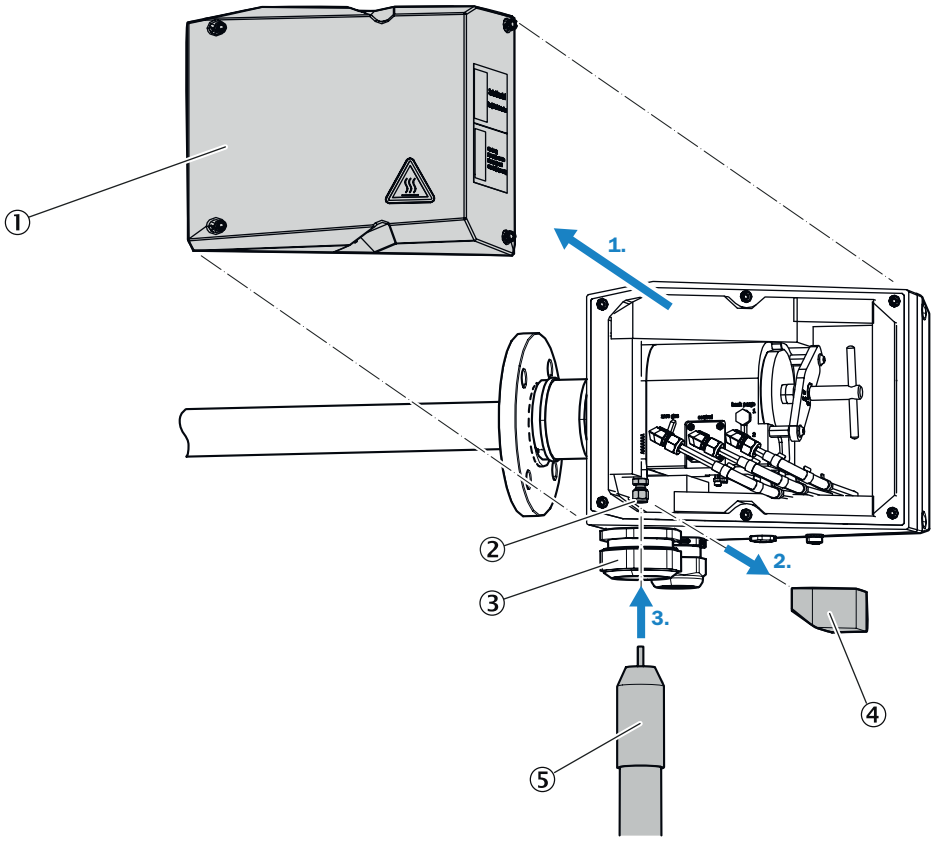



*Figure 14: Connect the sample gas line to the gas sampling unit*

① Enclosure cover left, sample gas line
② Clamping ring screw connection
③ Cable gland of sample gas line
④ Sample gas line insulation
⑤ Sample gas line - connection side of gas sampling unit (without electrical connections)

**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 enclosure cover, sample gas line ①.
2. Remove insulation ④ before clamping ring screw connection ②.
3. Remove the protective cap from the sample gas line (end without electrical connections).
4. Insert the sample gas line (end without electrical connections) into the enclosure through sample gas line screw connection ③ .
5. Push sample gas line ⑤ 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 initial screwing (clamping ring loose):
   - Tighten the clamping ring hand-tight.
   - Hold the screw fitting body with a second open-end wrench and tighten the clamping ring 1¼ turns.

- ► For subsequent screwing: (Clamping ring tight): Hold the screw fitting body with a second open-end wrench and tighten the clamping ring ¼ turn.

7. Tighten the screw connection of the strain relief.
   **NOTICE** | Tightening torque: 8 Nm.
8. Reattach enclosure cover, sample gas line ①.
   **NOTICE** | Tightening torque for enclosure 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.

## 6.1 Fitting the gas sampling unit on the flange

### Overview

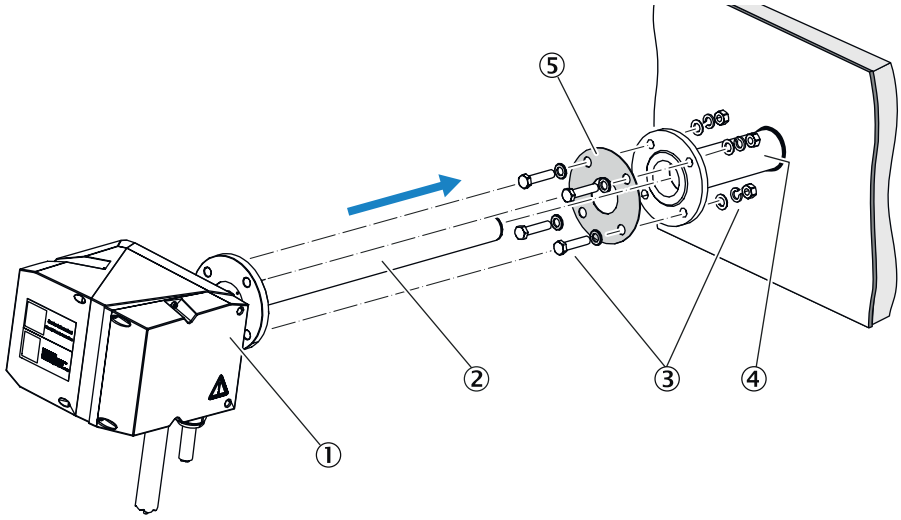



*Figure 15: Gas sampling unit on welding neck flange (schematic diagram)*

① Gas sampling unit (assembled)
② Gas sampling pipe
③ Screw fittings
④ Welding neck flange
⑤ Flange seal

### 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**
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.
- Compressed air supply is activated and voltage supply is ready to be switched on.

**Procedure**

1. Push flange gasket ⑥ over gas sampling pipe ②.
2. Push gas sampling unit ① with gas sampling pipe ② into welding neck flange ⑤. The hose outlets of the gas sampling unit must point downwards.
3. Fasten the adapter flange with 4 screw connections ③ (M12 screws) to welding neck flange ⑤.
   - Sequence (starting from the gas sampling pipe): Screw – washer – adapter flange – flange seal – welding neck flange – washer – spring washer – nut.

   **NOTICE** | Tightening torque: 60 Nm
4. Switch on the voltage supply to the measuring device.
5. Check the temperature of the gas sampling probe on the measuring device.

# 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 30 |
| | • Check the gas sampling filter by checking the gas flow on the analyzer display.<br>• Replace the gas sampling filter if the gas flow shown in measuring operation <120 l/h. | See Operating Instructions for analyzer system, e.g. MARSIC300. |
| 4 M | Replace the gas sampling filter. | See Operating Instructions for analyzer system, e.g. MARSIC300. |
| 2 Y[2)] | • Replace the non-return valve.<br>• Clean the gas sampling pipe.<br>• Clean the sample gas line.<br>• Clean the enclosure. | See Operating Instructions for analyzer system, e.g. MARSIC300. |

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 29

## 7.2 Consumable, wearing and spare parts

*Table 6: Spare parts gas sampling unit SFU100/SFU150*

| Description | SFU100 | SFU150 | Part No. |
|---|---|---|---|
| Glass fiber filter | X | X | 2142143 |
| Control valve | X | X | 2142144 |
| Maritime non-return valve | X | X | 2142152 |
| Hose (heating side) | X | X | 2142153 |
| Enclosure cover seals | X | X | 2142154 |
| Filter holder | X | X | 2122232 |
| Enclosure cover, left | X | | 2142156 |
| Enclosure cover, right | X | | 2142157 |
| Painted enclosure, left cover | | X | 2142899 |
| Painted enclosure, right cover | | X | 2142900 |

## 7.3 Regular checks

### 7.3.1 Checking the device components

**Procedure**

System check

1. Check the gas sampling filter:
   ► Check the gas flow rate on the analyzer display, see Operating Instructions of the analyzer system, e.g. MARSIC300.
2. Replace gas sampling filter when the gas flow shown in measuring operation <120 l/h.
   ► See Operating Instructions for analyzer system, e.g. MARSIC300.
3. Check all fixing screws for tight fit.
4. Check sample gas line for damage.
5. Check 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 electrical connections for tight fit.
8. Perform a leak tightness check:
   ► The leak tightness check is carried out via the connected analyzer system.
   ► See Operating Instructions of the analyzer system, e.g. MARSIC300.

### 7.3.2 Replacing the gas sampling filter

**NOTE**
see "Replacing the filter element", page 31

### 7.3.3 Replacing the non-return valve

**NOTE**
Contact Service.

### 7.3.4 Cleaning the gas sampling pipe

**NOTE**
Contact Service.

### 7.3.5 Cleaning the housing of the gas sampling probe

**NOTE**
Contact Service.

## 7.4 Cleaning

### 7.4.1 Replacing the filter element

**Overview**

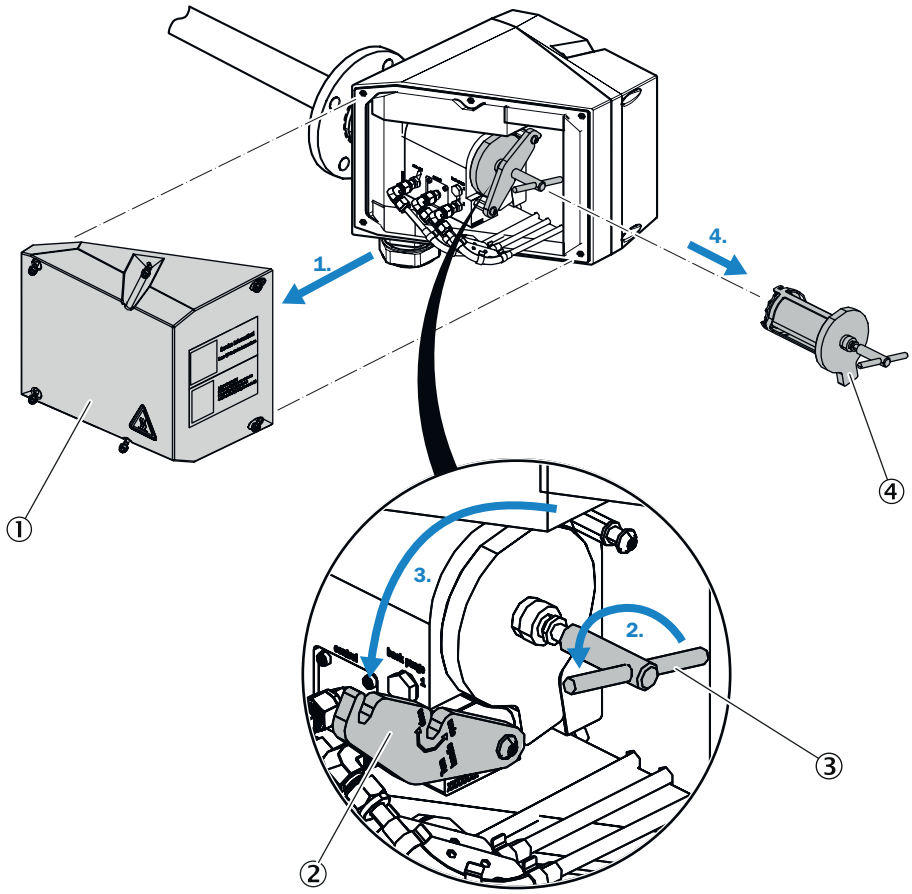



*Figure 16: Replacing the filter element*

① Enclosure cover left, sample gas line
② Mounting bracket
③ Rotary handle
④ Filter

**Important information**

**CAUTION DANGER OF BURNS DUE TO HOT SURFACES**
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**
Maintenance work on gas sampling unit:

- ► Maintenance work may only be carried out when the measuring device is switched off.
- ► Switching off or decommissioning the measuring device, see the relevant Operating Instructions.

**Procedure**

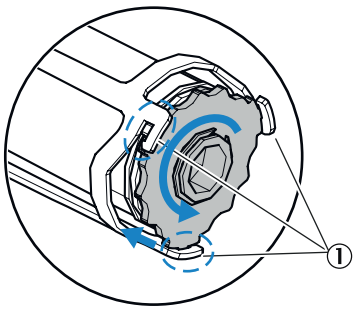
Removing the filter

1. Remove enclosure cover, sample gas line ①.
2. Loosen rotary handle of filter element ③ counterclockwise.

3. Swivel mounting bracket ② counterclockwise.
4. Pull out filter ④ using rotary handle ③.

### Replacing the filter cartridges and O-sealing rings

1. Remove the filter cartridge from the filter holder: Press the filter cover with bayonet catch downwards (marked with arrows) and turn to the left.




2. Remove the used filter cartridge and the two used O-sealing rings from the plate of the filter holder.

   **NOTICE** | Removing the O-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-rings.
3. Place the new filter cartridge in the filter holder. Press the filter cartridge onto the plate as far as it will go.
4. Place the new O-sealing rings in the corresponding grooves of the filter holder.
5. Fit the filter cover with bayonet catch, press the bayonet catch in the direction of the filter holder and turn clockwise until all retaining lugs are correctly seated.

   **NOTICE** | Ensure the filter cover fastening (retaining lugs) is correctly seated.

### Installing the filter with a new filter element

1. Insert filter ④ completely into the filter housing.
2. Swivel mounting bracket ② clockwise.
3. Turn the rotary handle of filter element ③ clockwise to tighten.
4. Reattach enclosure cover, sample gas line ①.

   **NOTICE** | Tightening torque of screws: 3 Nm.

**Further topics**

- see "Assembling the filter", page 20
- see "Consumable, wearing and spare parts", page 29

# 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 contaminated. | Replace the filter element. |
| | Condensate formation due to cooled sample gas | Check temperature values. |
| Contaminated or corroded gas paths | Defective or missing filter element | • Replace the filter element.<br>• Contact Service. |
| Leaky gas path | • Contaminated instrument air<br>• Contamination or damage to main valve or non-return valves | Check the purity of the instrument air. |
| | | • Replace the main valve and non-return valve.<br>• Contact Service. |
| Leaky enclosure | Damaged seal | Replace the enclosure seal. |
| Gas sampling probe does not heat. | • Not connected correctly.<br>• Connections corroded. | • Check connections.<br>• Check voltage supply.<br>• Contact 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 Shutdown

### Prerequisites

- The device is switched off.

### Procedure

1. Ensure the gas sampling unit cannot be contaminated (e.g. by pulling out the gas sampling pipe).
2. Switch off compressed air (external).
3. Seal gas inlets and outlets gas-tight.

### Related topics

- Switch the device off: see "Switching off", page 34

## 9.3 Disassembly

### Material required

- Flange cover
- Personal protective equipment

### Dismantling the gas sampling unit

1 Loosen and remove the screw connections of the adapter flange with the welding neck flange.
2 Pull out and remove the gas sampling probe with gas sampling pipe and adapter flange with seal from the welding neck flange.
3 Close the flange opening on the gas duct with a cover.
4 Loosen the connections of the sample gas line and remove the line.
5 Loosen the connections of the hose bundle line and remove the line.
6 Remove the gas sampling unit.

### Related topics

- see "Mounting and electrical installation", page 13

## 9.4 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 pipeline 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

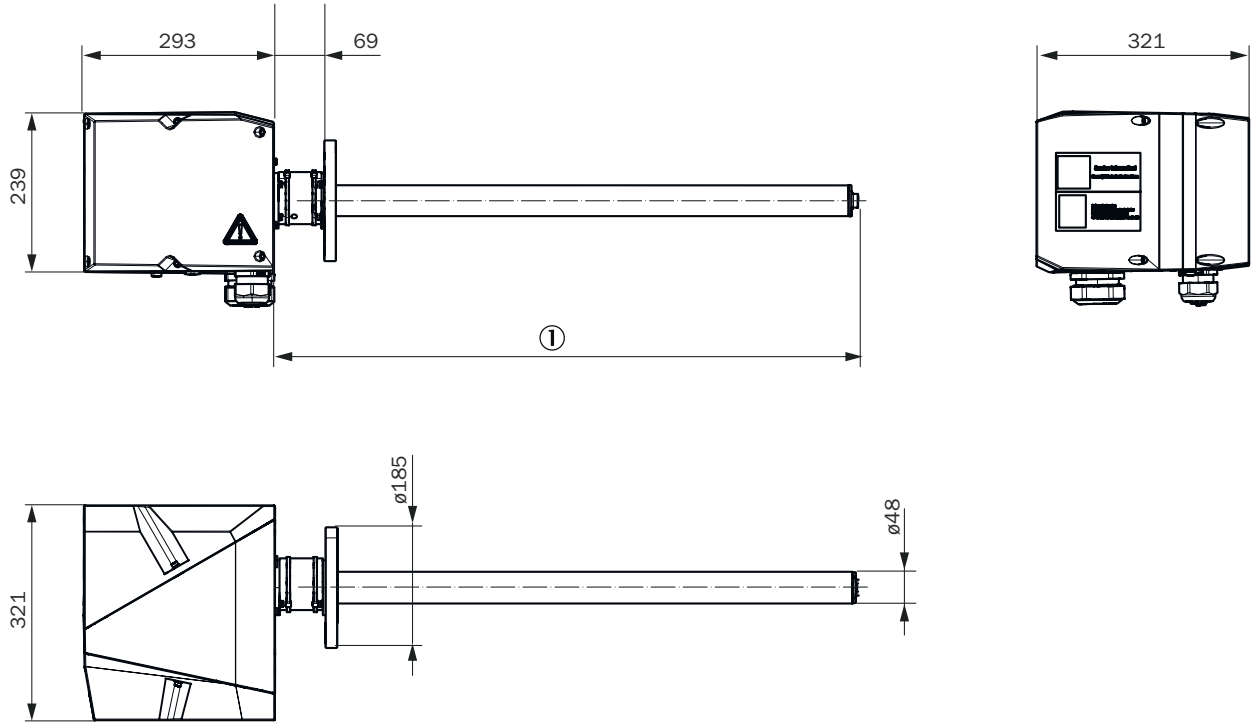



*Figure 17: Dimension drawing of gas sampling unit (dimensions in mm)*

① L= 576 mm with gas sampling pipe 0.5 m
L= 876 mm with gas sampling pipe 0.8 m

## 10.2 Ambient conditions

| | SFU100 | SFU150 |
|---|---|---|
| Installation site | Indoor installation (inside buildings) | Outdoor installation (painted enclosure; outside buildings) |
| Installation altitude | Up to 2,000 m above sea level | |
| Degree of contamination | 4 | |
| Ambient temperature (operation) | –25 °C ... +55 °C | |
| Ambient temperature (storage) | –20 °C ... +70 °C | |
| Relative humidity | < 90% (without condensation) | |
| Air pressure | 850 ... 1100 hPa | |

## 10.3 Gas sampling unit

| | SFU100 | SFU150 |
|---|---|---|
| Design | PU foam enclosure | |
| Dimensions<br>• Gas sampling probe<br>• Gas sampling pipe | See Dimension drawing<br>• 300 x 330 x 300 mm<br>• Variant: L = 500 mm, Ø = 48 mm<br>• Variant: L = 800 mm, Ø = 48 mm | |
| Installation | Mounting enclosure, flange mounting | |
| Weight | 11 kg (without flange and gas sampling pipe) | |

| | SFU100 | SFU150 |
|---|---|---|
| Ingress protection rating | IP54 | IP66 |
| Impact resistance | IK08 | |
| Material, general | Polyurethane foam | Polyurethane foam with UV-resistant coating |
| Gas sampling pipe material | 1.4547 / 254 SMO | |
| Filter material | Micro glass fiber 0.1 µm | |
| Enclosure fastening | Screw fittings | |
| Enclosure seal | Silicone | |
| Seals in contact with gas | PTFE, FKM, FFKM, graphite | |
| Material in contact with gas | Nickel-plated aluminum<br>Glass fiber<br>Stainless steal | |
| Process gas temperature | Max. +550 °C | |
| Gas temperature in filter | Max. 225 °C (secured via safety temperature limiter) | |
| Gas temperature for probe heating | $Temp_{nom}$: +185 °C<br>$Temp_{max}$: +200 °C | |
| Heating up time | Approx. 1.0 h (from room temperature to +185 °C) | |
| Flammability | • Flame retardant<br>• Self-extinguishing<br>• Needle flame test: IEC 60695-11-5:2016-12 | |

## 10.4 Installation

| | SFU100 | SFU150 |
|---|---|---|
| Pipes:<br>• Main valve<br>• Zero gas<br>• Backflush<br>• Sample gas line | Diameter:<br>• 8 mm (hose)<br>• 6 mm (hose)<br>• 8 mm (hose)<br>• 6 mm (hose) | |
| Screw fitting<br>• Hose bundle line<br>• Sample gas line | • Plastic, M63, clamping range: 46 … 52 mm, tightening torque: 8 Nm<br>• Plastic, M40, clamping range: 22 … 32 mm, tightening torque: 10 Nm | |
| Hose bundle line (hybrid line GL)<br>• Ambient temperature<br>• Line diameter<br>• Minimum radius | Sheath material: PUR<br>• –30 °C … +90 °C<br>• Approx. 27 mm<br>• Fixed installation: 5x line diameter<br>Movable: 10x line diameter | |
| Compressed air<br>• Main valve<br>• Zero gas<br>• Backflush | • 5 … 7 bar<br>• 2.5 … 3 bar<br>• 5 … 7 bar | |
| Flange | • DN 50 PN 16<br>• DN 65 PN 6<br>• DN 65 PN 16<br>• DN 80 PN 16<br>• ANSI 4" 150 lbs | |
| Fitting position | Welding neck flange with a downward inclination of 10°, line outlets of enclosure downwards | |

## 10.5 Power supply

| Voltage supply | SFU100 | SFU150 |
|---|---|---|
| Power voltage | 1-phase: 115/230 V AC; +10%, –15% | |
| Power frequency | 50 … 60 Hz (power system: TN-S or IT) | |
| Power consumption | Max. 450 VA | |
| Protection class | I | |
| Overvoltage category | 2 | |

# 11 Annex

## 11.1 Conformities

| Location classes (DNV-CG-0339) | SFU100 | SFU150 |
|---|---|---|
| Temperature | B | D |
| Humidity | B | B |
| Vibration | B | B |
| Enclosure | B | C |

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