Operating Instructions
GM35

Gas Analyzer,
Probe Version

Endress+Hauser
People for Process Automation

Described product

GM35

Probe version

GM35-1, GM35-2, GM35-3, GM35-4, GM35-5, GM35-6, GM35-7

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
- Installation
- Operation
- Maintenance work required for reliable operation

1.2 Scope of application

These Operating Instructions are only applicable for the measuring device described in the product identification.

They are not applicable to other Endress+Hauser measuring devices.

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

1.3 Target groups

This Manual is intended for persons installing, operating and maintaining the device.

Operation

The device may only be operated by qualified persons who, based on their device-specific training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

Installation and maintenance

Installation and maintenance may only be carried out by trained specialists familiar with the installation conditions.

Please observe the information at the beginning of the respective Sections.

1.4 Further information

- Purge air unit Operating Instructions
- Final inspection record

NOTE

► Observe all documents provided.

1.5 Symbols and document conventions

1.5.1 Warning symbols

Table 1: Warning symbols

Symbol	Significance
	Hazard (general)
	Hazard by electrical voltage
	Hazard by toxic substances

Symbol	Significance
	Hazard through acidic substances
	Hazard through pressure/temperature
	Hazard for environment and organisms

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

Table 2: Information symbols

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

1.6 Data integrity

Endress+Hauser uses standardized data interfaces, such as standard IP technology, in its products. The focus here is on the availability of the products and their properties.

Endress+Hauser always assumes the integrity and confidentiality of data and rights affected in connection with the use of the products are ensured by the customer.

In all cases, the customer is responsible for the implementation of safety measures suitable for the respective situation, e.g., network separation, firewalls, virus protection and Patch Management.

2 Safety information

2.1 Main operating information

NOTICE
Risk for system safety through work on the device not described in these Operating Instructions

Work on the device not described in these Operating Instructions or associated documents can lead to unsafe operation of the measuring system and therefore endanger plant safety.

► Only carry out the work described in these Operating Instructions or the corresponding documents on the device.

WARNING
Danger of ineffectiveness of the protective device

In case of nonobservance, persons or parts of the body to be protected are not detected.

► Pay special attention to all safety information in these Operating Instructions.

CAUTION
Hazard for persons and plant through unsafe operation of the measuring device

If the device is or could be in an unsafe state:

► Put the device out of operation.
► Disconnect the device from the main supply voltage and signal voltage.
► Secure the device against unallowed or unintentional start-up.

CAUTION
Risk of injury through incorrect lifting and carrying the device

Injuries can occur due to the weight and projecting enclosure parts when the equipment tips over or drops.

► Consider the device weight before lifting.
► Observe the regulations for protective clothing (e.g., safety shoes, non-slip gloves).
► Grip underneath the equipment when possible to carry it safely.
► Do not use projecting parts on the device to carry the device.
► Call in further personnel for assistance as required.
► Use a hoist or transport equipment as an option.
► Pay attention to the transport safety device.
► Clear obstacles that could cause falls and collisions out of the way.

2.2 Warning information on the device

Sender/receiver unit

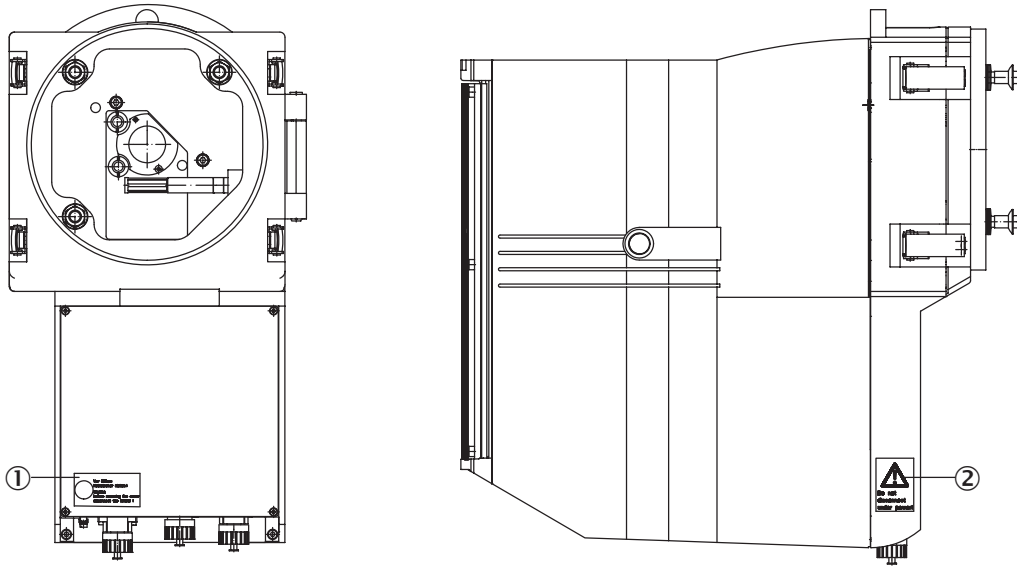


Figure 1: Sender/receiver unit from the front and right side

① Warning sign: Disconnect the power plug before opening the device.

② Do not disconnect under voltage.

2.3 Intended use

The device serves exclusively for emission and process monitoring of gases in industrial plants.

The device measures continuously directly in the gas duct (in-situ).

2.4 Responsibility of user

Designated users

see "Target groups", page 6.

Correct project planning

- This Manual presumes that the device has been delivered as specified during project planning and with the relevant delivery state of the device (see delivered system documentation).
  - ► If you are not sure whether the device corresponds to the state defined during project planning or to the delivered system documentation: Contact Endress+Hauser Service.

Correct use

- ► Use the device only as described in “Intended use”.
  The manufacturer bears no responsibility 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.
  Use only original spare parts and wear and tear parts from Endress+Hauser.
  If you do not observe this:
  - The manufacturer's warranty becomes void.
  - The device could become dangerous.

Special local requirements

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

Read the Operating Instructions

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

Retention of documents

These Operating Instructions:

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

3 Product description

3.1 Product identification

Product name	GM35
Device version	Measuring Probe Version
Manufacturer	Endress+Hauser SICK GmbH+Co. KG Bergener Ring 27 · D-01458 Ottendorf-Okrilla · Germany
Type plates	• Sender/receiver unit: On right side • On purge air fixture: On tube • Control unit: On right side

3.2 Product characteristics

- The device serves for continuous measurement of the gas concentrations in industrial plants..
- The device is an in-situ measuring device which means measuring is done directly in the gas carrying duct.
- Measuring components: CO_2, H_2O, CO
- Measuring principle:
  - Gas filter correlation
  - Interference filter correlation

3.3 Device variants

The following device variants are available depending on the measuring task and application:

Variant	Measured components
GM35-1	CO
GM35-2	CO, H_2O
GM35-3	CO, H_2O, CO_2
GM35-4	CO, CO_2
GM35-5	H_2O, CO_2
GM35-6	H_2O
GM35-7	CO_2

3.4 Layout and function

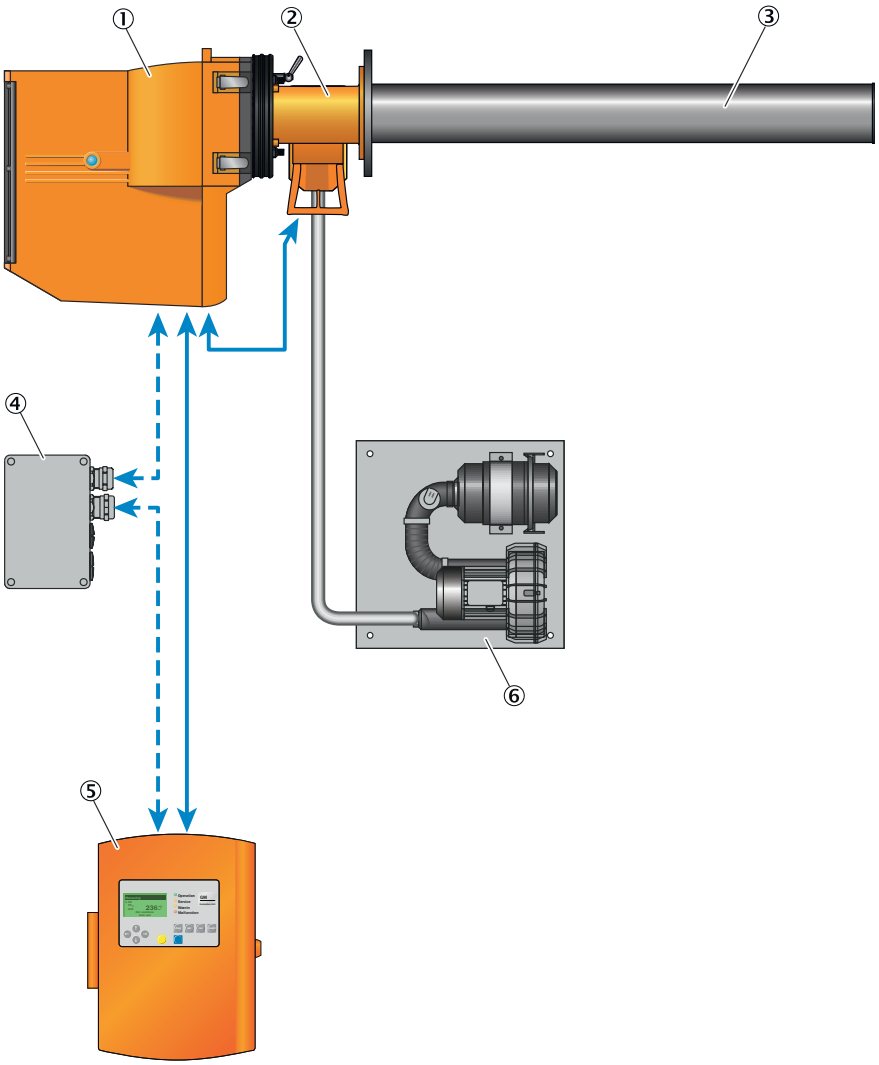


Figure 2: Measuring device components layout

↔ Connection lines
Purge air hose (only for GMP)
① Sender/receiver unit
② Purge air attachment, integrated pressure and temperature sensor
③ Probe tube
④ Connection unit
⑤ Control unit
⑥ Purge air unit (only for GMP)

The measuring device comprises the following components:

Sender/receiver unit

The sender/receiver unit contains the optical-electronic assemblies and determines the measured values of the concentration of the measuring component(s) of the measuring device.

Measuring probe

The measuring probe takes the sample gases at the measuring location and passes these to the sender/receiver unit for determination of the measured values. Two measuring probe versions are available for the different application conditions:

- Open GMP measuring probe with open measuring gap as measuring distance and purge air attachment.
- Gas-testable GPP measuring probe with ceramic filter for dry sample gases and test gas attachment.

Purge air attachments

The purge air attachments serve to attach the sender/receiver unit and reflector unit to the flanges with tube. They contain the purge air nozzles for connecting the purge air hoses of the purge air units and the connections for external sensors e.g., temperature or pressure sensors as well as the connections for purge air monitoring.

Control unit

The control unit serves as user interface, and prepares and outputs the measured values and performs control and monitoring functions.

These functions include the following:

- Output of measured values, computed data and operating states
- Communication with peripheral equipment
- Output of error messages and other status signals
- Control of automatic test functions and access during service work (diagnosis)

Flanges with tube

The flanges with tube are attached directly to the gas duct of the measuring point and serve to fit the purge air attachments of the sender/receiver unit and reflector unit. ANSI or DIN flanges can be used alternatively to the flanges supplied.

Purge air unit

The purge air unit supplies filtered ambient air to the purge air attachments and protects the optical surfaces of the sender/receiver unit and reflector unit from contamination and high gas temperatures.

NOTE

As standard, Endress+Hauser recommends a separate purge air unit for the sender/receiver unit when using the GMP measuring probe to ensure an optimal purge air supply.

If the supply of purge air is insufficient, hot and corrosive gases can destroy the measuring device within a few minutes.

Further information on the purge air unit, see Operating Instructions of the purge air unit.

3.5 Options

Connection unit

If the distance between the sender/receiver unit and and control unit is > 4 m, the connection can be established via the connection unit and a CAN bus line provided by the customer.

Total length of all CAN bus lines: max. 300 m.

Weather hoods

For the components sender/receiver unit, reflector unit and purge air unit when installing the measuring device outdoors.

Air heater for purge air supply

To avoid condensation in the purge air. An air heater is required when the difference between gas temperature and dew point temperature is too small.

The following formula serves as a guideline:

- Gas temperature [°C] – dew point temperature [°C] < abs. humidity [Vol.-%].
- Values are compared without considering the units of measure.

3.6 Check cycle

The check cycle serves to check the zero point and a reference point without feeding test gases. Here, a measuring sequence is run through to determine the zero and check point (usually 70 % of the measuring range end value).

“Function check” is signaled per digital output during output of the zero and reference point.

The output for each takes 90 s for the zero point, followed by the reference point.

- Unit and scaling for the current zero point according to the setting.
- Reference point is displayed as percentage scaled to 70 % of the measuring range.

3.7 Measuring probes

The measuring probe versions are compatible with all sender/receiver units. The sender/receiver unit is calibrated to the respective probe length on delivery.

Table 3: Measuring probes: Characteristics and application

Characteristic	Open GMP measuring probe	Gas-testable GPP measuring probe
Version	Measuring path open in flow direction; purge air guidance with outlet aligned 90° to gas flow	Gas-testable measuring probe with ceramic filter, for dry sample gas
Maximum process temperature	≤ +430 °C	≤ +430 °C
Gas test according to EPA regulation	No	Yes
Purge air supply required	Yes	No
Suitable for wet sample gas	Yes	No
Measurable components	CO_2, H_2O, CO	CO_2, H_2O, CO
Response time (t_{90})	> 5 s	> 120 s
Duct diameter	> 500 mm	> 380 mm
Dust load	≤ 3 g/m³ Relative to 1 m measuring distance, depending on application	≤ 30 g/m³
Probe lengths available	see "Dimension drawing, open GMP measuring probe", page 69	see "Dimension drawing, gas-testable GPP measuring probe", page 70
Available measuring distances	see "Dimension drawing, open GMP measuring probe", page 69	see "Dimension drawing, gas-testable GPP measuring probe", page 70

3.7.1 Open GMP measuring probe in detail

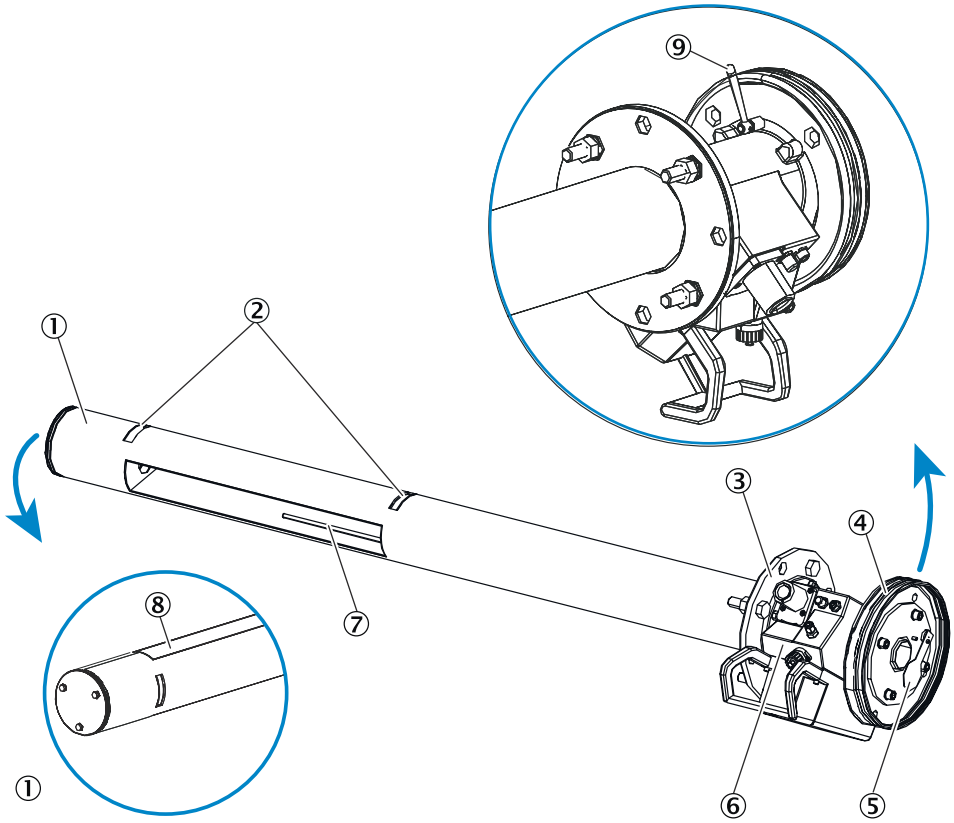


Figure 3: Open measuring probe GMP

① Probe end with reflector assembly
② Air slots: Purge air outlet 90° to gas flow (directed purge air)
③ Process flange: Attached to flange with tube (at installation location)
④ Device flange: Attached to sender/receiver unit
⑤ Locking device
⑥ Purge air attachment with connections (purge air, electric connection cables)
⑦ Integrated temperature sensor PT1000
⑧ Measuring gap
⑨ Lever for locking device

3.7.2 Gas-testable GPP measuring probe in detail

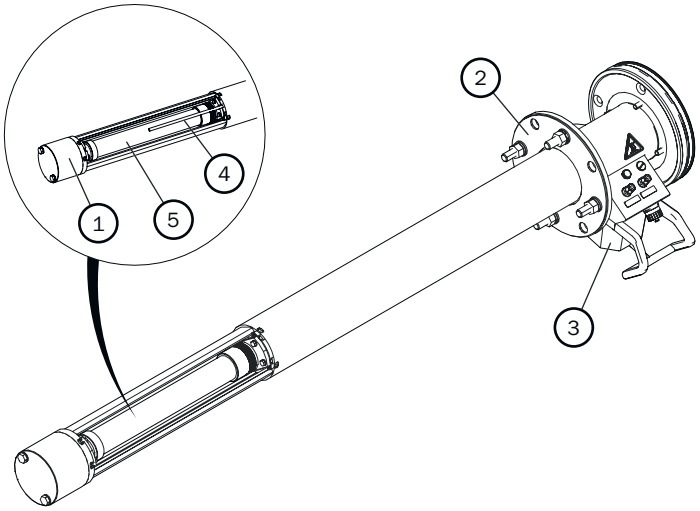


Figure 4: Gas-testable measuring probe GPP

① Probe end with reflector assembly
② Process flange: Attached to flange with tube (at installation location)
③ Test gas attachment with connections
④ Integrated temperature sensor PT1000
⑤ Filter element (gas permeable)

4 Transport and storage

4.1 Storage

- ► Clean all components of the measuring device (not the optical surfaces) with slightly moistened cleaning cloths. Use a mild cleaning agent here.
- ► Protect the openings of the sender/receiver-unit and measuring probe from atmospheric influences, preferably with the original transport safety devices.
- ► Pack all components for storage or transport. Preferably use the original packing.
- ► Store all components of the measuring device in a dry, clean area.

5 Mounting

5.1 Safety

WARNING
Risk of injury through improper assembly work

All assembly work must be carried out only by authorized persons who, based on their training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

CAUTION
Accident risk through inadequate fastening of the device

- ► Consider the device weight specifications when planning the fitting supports.
- ► Check the load capacity/condition of the duct on which the device is to be installed.

NOTICE
Damage to device and plant through unsecured parts during installation

During installation, parts of the device or flange can fall into the duct and cause damage.

- ► Secure all parts with wire.

NOTICE
Damage to the measuring device due to premature installation on the stack

Unsuitable ambient conditions in the measuring duct can damage the measuring device and make commissioning impossible.

- ► First install the measuring device on the stack after commissioning.

5.2 Tools required

- Fork or ring spanner set
- Insulated screwdriver set
- Allen key set, metric

5.3 Material required

- Optics cleaning wipes without detergent
- Personal protective equipment

5.4 Preparing the measuring point

Responsibility of the operator

- Determining the measuring point (e.g. determining a representative sampling point)
- Preparing the measuring point (e.g. load capacity of welded-on flange)

NOTICE
Basis for determining the measuring point:

- Preceding project planning
- Final inspection specifications for device
- Regulations of local authorities

5.5 Checking the scope of delivery

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

5.6 Installation sequence

5.6.1 Installation steps

Installation comprises two main steps:

1 Installing the required **device components** at the measuring point **before** commissioning.
2 Installing the **measuring device** at the measuring point (carried out by Endress+Hauser Service **during** commissioning).

NOTICE
GMP measuring probe device damage: To prevent contamination of the optical surfaces, the purge air must be connected immediately after installation.

Table 4: GMP measuring probe: Overview of installation steps before commissioning

Step	Procedure	Reference
1	Install the flange with tube.	see "Installing the flange with tube", page 19
2	Install the purge air unit.	see Purge air unit Operating Instructions
3	Connect the purge air unit electrically.	see Purge air unit Operating Instructions
4	Remove the transport safety devices of the measuring probe.	see "Removing the transport safety device of the GMP measuring probe", page 21
5	Install the measuring probe.	see "Fitting the measuring probe on the flange with tube", page 22
6	Put the purge air unit into operation.	see "Putting the purge air unit into operation", page 23
7	Fit the flange attachment on the measuring probe.	see "Fitting the flange fixture on the measuring probe", page 24
8	Fit the control unit.	see "Fitting the control unit", page 25

Table 5: GPP measuring probe: Overview of installation steps before commissioning

Step	Procedure	Reference
1	Install the flange with tube.	see "Installing the flange with tube", page 19
2	Remove the transport safety devices of the measuring probe.	see "Removing the transport safety device of the GPP measuring probe", page 22
3	Install the measuring probe.	see "Fitting the measuring probe on the flange with tube", page 22
4	Fit the flange attachment on the measuring probe.	see "Fitting the flange fixture on the measuring probe", page 24
5	Fit the control unit.	see "Fitting the control unit", page 25

5.6.2 Installing the flange with tube

Prerequisite

- Installation location was determined during the project planning.
- Stability of the duct wall has been checked.

DANGER

Health risk through hot or toxic gases/dusts in the measuring duct

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

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

NOTICE

Device damage through incorrect/missing insulation of the duct when the measuring duct is hot

- ► When the measuring duct is hot, plan the duct and flange insulation so that the device is protected against high temperatures.

NOTE

- Flange with tube dimensions: see "Dimension drawing, flange with tube, DN125", page 72

Installing the flange with tube

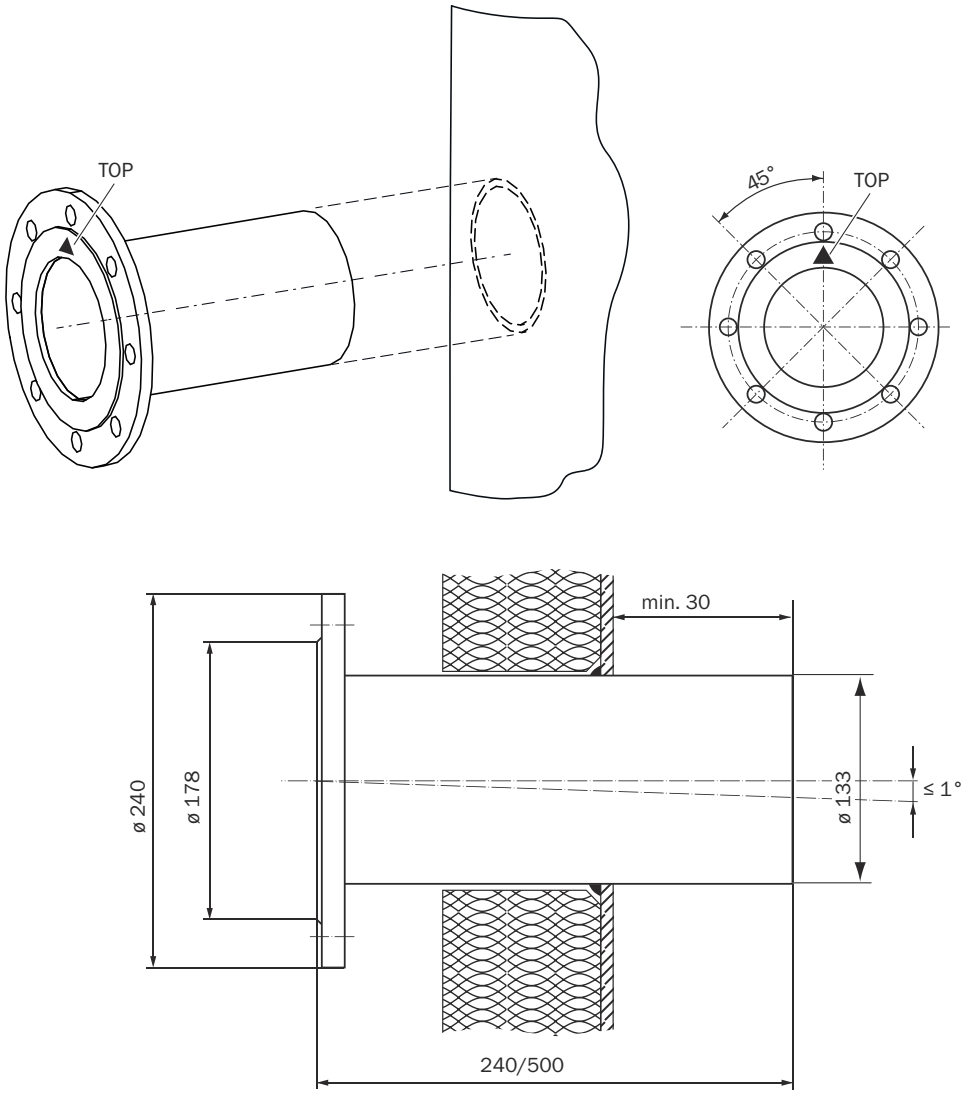


Figure 5: Flange with tube incl. orientation "TOP"

Steps

1. Cut openings on the gas duct for the flange with tube.
2. Position the flange with tube. Make sure:
   - Marking “TOP” must point vertically upwards independent of the gas duct angle.
   - The tube must project at least 30 mm into the gas duct.
   - Tube axis deviations between sender/receiver unit and reflector unit: Max. 1°
3. Attach the flange with tube.

NOTE
Other devices or fittings must not cut or interrupt the measuring device beam path.

Permanently fasten the flange with tube

Steps

1. Permanently weld or fasten the flange with tube.
2. If necessary, fit duct insulation around the flanges with tube to protect the measuring device from heat.

5.6.3 Installing the purge air unit

NOTE
For information on the purge air unit, see the Operating Instructions of the purge air unit (SLV4).

5.6.4 Connecting the purge air unit electrically

NOTE
For information on the purge air unit, see the Operating Instructions of the purge air unit (SLV4).

5.6.5 Removing the transport safety devices of the measuring probe

5.6.5.1 Removing the transport safety device of the GMP measuring probe

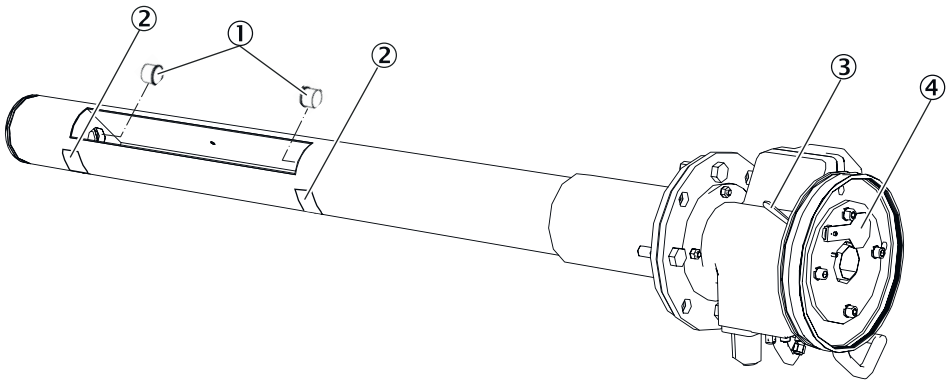


Figure 6: Transport safety device of the GMP measuring probe

① 2 × protective caps to cover the optics
② Protective stickers
③ Lever of locking device
③ Set the locking device to the “close” position

Steps

1. Remove the protective stickers.
2. Remove the protective caps.
3. Store the transport safety device.

5.6.5.2 Removing the transport safety device of the GPP measuring probe

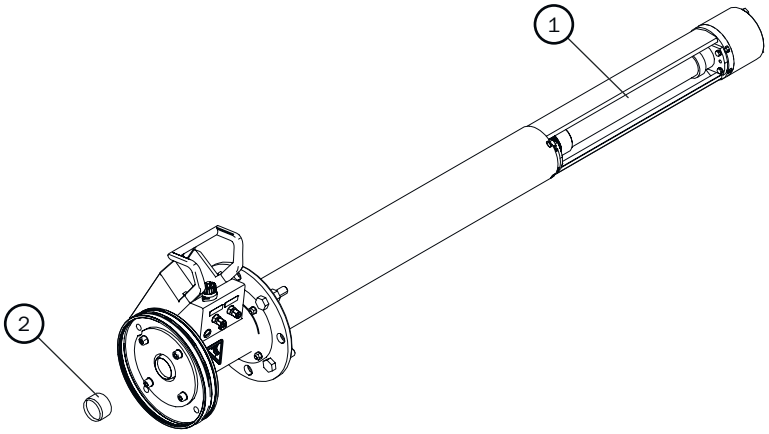


Figure 7: Transport safety device of the GPP measuring probe

① Filter with protective cover
② Protective cap for covering

Steps

1. Remove the protective cover of the filter.
2. Remove the protective cap.
3. Store the transport safety device.

5.6.6 Fitting the measuring probe on the flange with tube

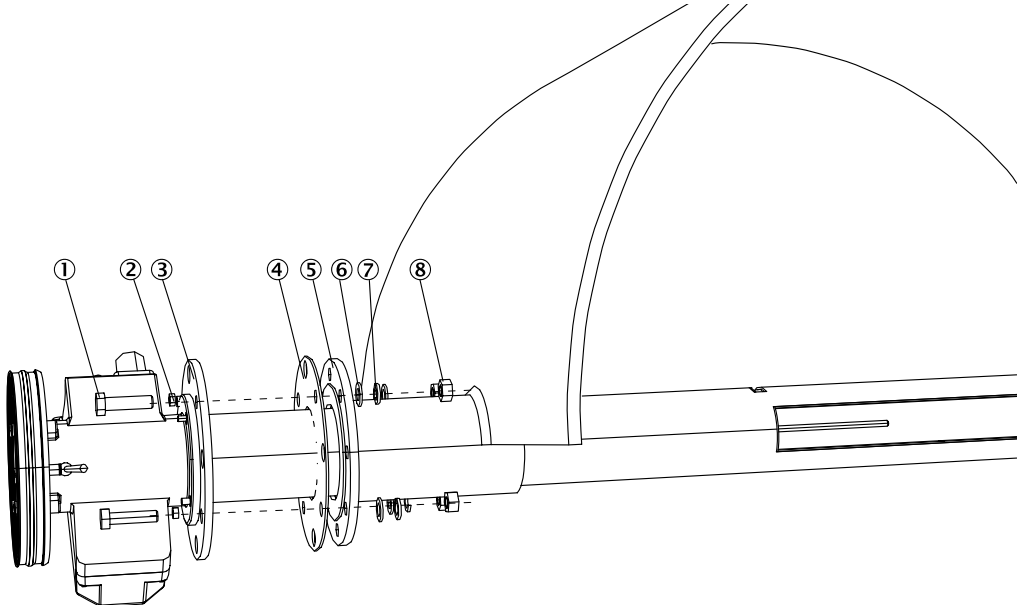


Figure 8: Fit the measuring probe with pre-fitted purge air attachment on the flange with tube (on the duct).

① M16 screw
② Washer
③ Flange
④ Flange seal
⑤ Flange with tube
⑥ Washer
⑦ Spring washer
⑧ Nut

Steps

1. Fit the measuring probe with pre-fitted purge air attachment on the flange with tube.
2. Tighten the nuts.

NOTE
The installation steps of the measuring probe on the flange with tube are identical for all measuring probes.

5.6.7 Putting the purge air unit into operation

NOTE
Electrical connections for the purge air unit, see Purge air unit Operating Instructions.

Preparation

Switch the power supply for the purge air unit on for a short time to check the function and to remove any dust that may have penetrated the purge air hose.

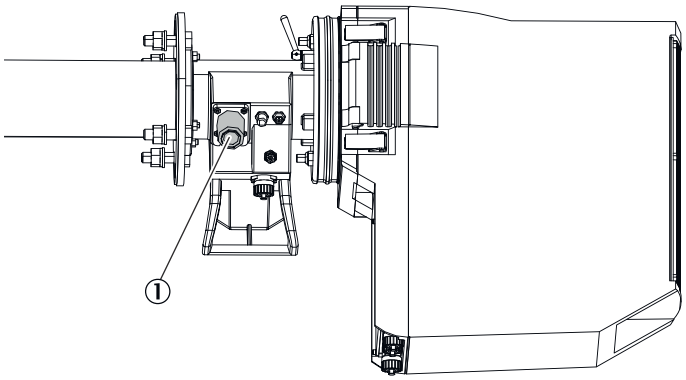


Figure 9: Purge air connection on purge air attachment of measuring probe

① GMP measuring probe: Purge air hose connection

Steps

1. Connect the purge air hose of the purge air unit with a hose clamp to the purge air bracket connection of the purge air attachment.
2. Switch on the purge air supply.

✓ Purge air supply is now activated and protects the measuring system against contamination and overheating.

NOTICE
Attach clearly visible warning information against unintentional switching off on all switching devices with which the purge air units can be switched off.

5.6.8 Fitting the flange fixture on the measuring probe

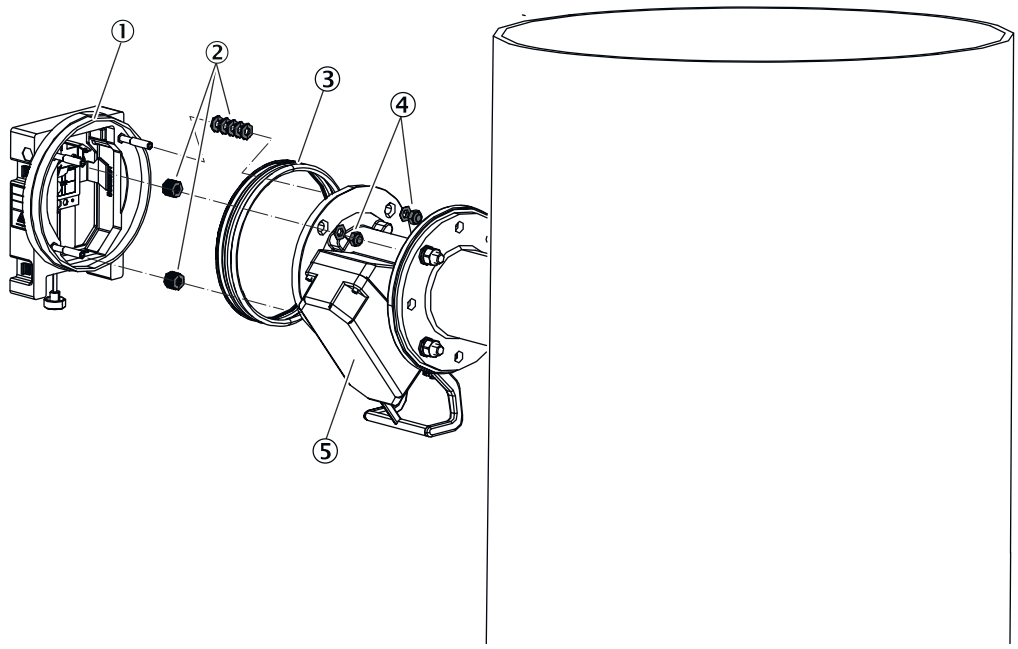


Figure 10: Fitting the flange fixture

① Flange fixture, sender/receiver unit
② Cup springs set (10 per fixture, positioned back-to-back)
③ Sealing ring
④ Lock nut with centering disc
⑤ Purge air attachment

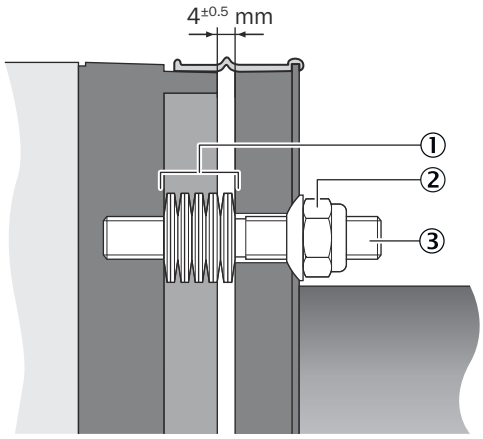


Figure 11: Detail view, alignment of cup springs

① Alignment of cup springs set
② Lock nut with centering disc
③ Threaded bolt, device flange

NOTICE
Cup springs must be used to enable correct alignment of the sender/receiver unit.
Do not use washers or other springs.

Steps

1. Place 10 cup springs, individually directed against each other, on each of the three threaded bolts on the device flange.
2. Pull the sealing ring over the flange of the measuring probe and hang it loosely over the purge air unit.

3. Push the device flange onto the measuring probe.
4. Position the centering discs.

NOTICE
Observe the direction of the centering disc: The convex side must fit into the groove on the purge air attachment.

5. Tighten the self-locking nuts with a wrench (19 mm) so that the cup springs are slightly compressed and an even gap of approx. 4 mm remains.

5.6.9 Fitting the control unit

Prerequisite

- Installation location already determined during project planning.
- Minimum line length of 4 m for the connection line to the measuring device.
- Maximum line length of 300 m for CAN bus connection between control unit and sender/receiver unit.
- The maximum line length of 300 m for all CAN bus and RS-485 connections has been considered.
- Good accessibility to the device, flat, vertical mounting surface.
- Weather hood, observe IP protection class.

Prepare the installation location

- Based on the control unit dimension drawing, ensure enough space is available at the planned installation location for assembly as well as opening the enclosure door.

Control unit AWE (sheet steel enclosure version)

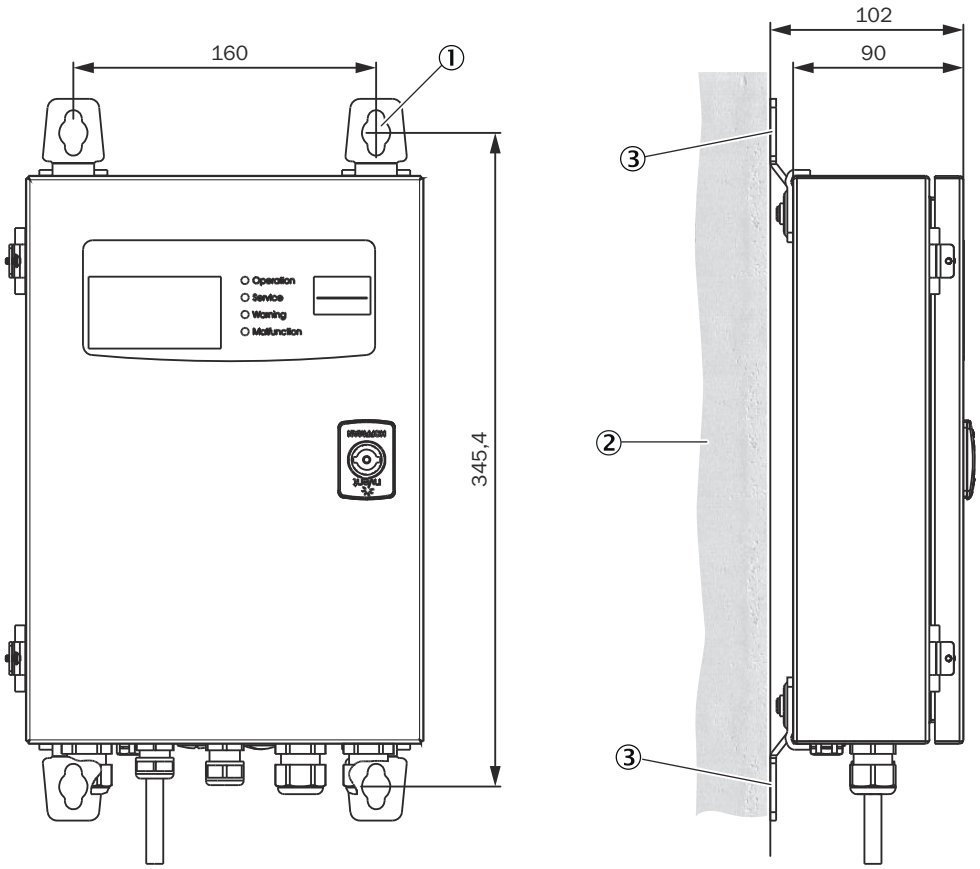


Figure 12: Fitting the control unit AWE, sheet steel enclosure (dimensions in mm)

① 4 × mounting holes, ø 7.2 mm
② Mounting surface
③ Fastening brackets

Steps
1. Drill the holes according to the installation drawing (Ø 7.2 mm for M8).
2. Fasten the control unit to the four fastening brackets.

Control unit AWE (cast metal enclosure version)

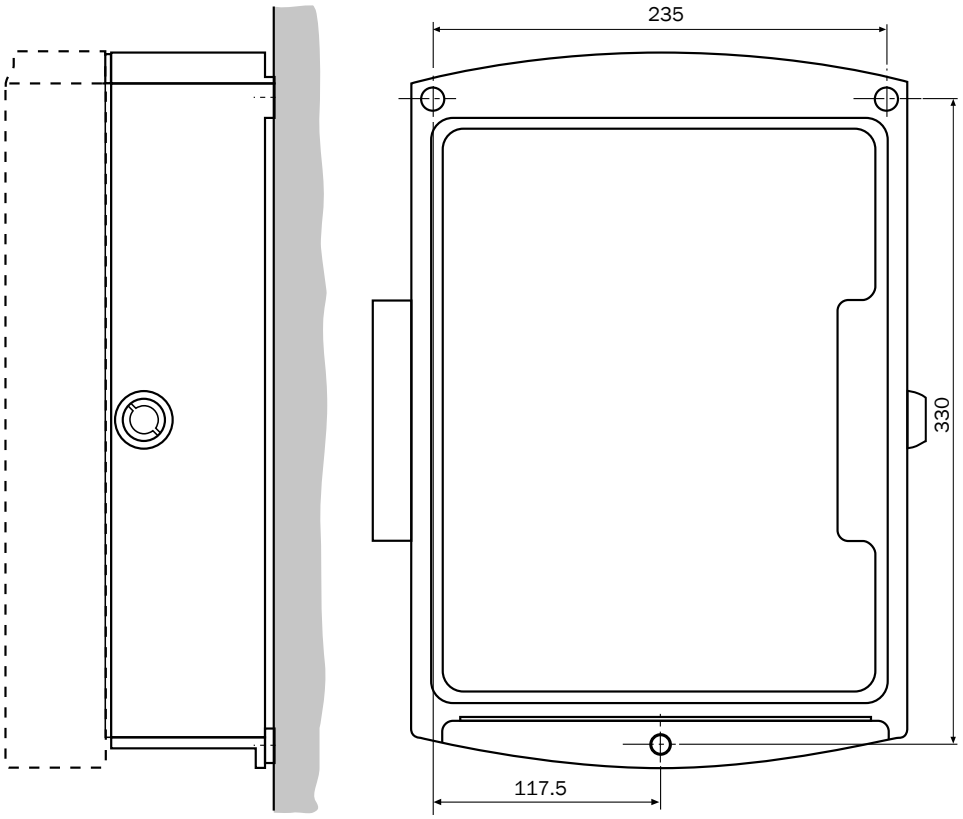


Figure 13: Fitting the control unit AWE, cast metal enclosure (dimensions in mm)

Steps
1. Drill the holes according to the installation drawing (Ø 7.2 mm for M8).
2. Fasten the control unit to the three fastening brackets.

5.6.9.1 Fitting the control unit at a greater distance (option)

To be used when the distance between the control unit and the sender/receiver unit is greater than 19 m

Prerequisite

- Connection unit — sender/receiver unit: 4 m CAN bus line (in scope of delivery)
- Connection unit — control unit: 6-pole line (provided by customer) suitable for prefabricated extension line (option) or CAN bus

NOTE
The total length of the CAN bus connections may be up to 300 m.

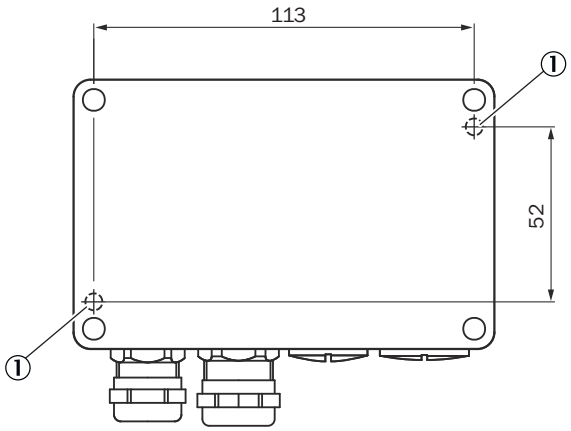


Figure 14: Fitting the connection unit (dimensions in mm)

① Mounting hole (Ø 5 mm)

Steps

Install the connection unit

1. Drill the holes according to the installation drawing (Ø 5 mm for M4).
2. Remove the enclosure cover. To do this, unscrew the 4 screws.
3. Screw the enclosure tightly to the two mounting holes.

6 Electrical installation

6.1 Safety

DANGER
Danger to life through electric shock

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

- ► Before starting work on the device, ensure the voltage supply can be switched off in accordance with the valid Standard using a power isolating switch/circuit breaker.
- ► Make sure the disconnector switch is easily accessible.
- ► An additional disconnecting device is mandatory when the power disconnector switch cannot be accessed or only with difficulty after installation of the device connection.
- ► Switch off the voltage supply before starting any work on the device.
- ► After completion of the work or for test purposes, calibration of the power supply may only be activated again by authorized personnel complying with the safety regulations.

WARNING
Endangerment of electrical safety through power cable with incorrect rating

Electrical accidents can occur when the specifications for installation of a power line have not been adequately observed.

- ► Always observe the exact specifications in the Operating Instructions (see "Technical data", page 64) for installation of a power line.

DANGER
Electrical accident due to improper performance of the electrical work

The electrical work described in these Operating Instructions requires specialist knowledge. Electrical work can lead to serious electrical accidents if not carried out properly.

- ► Only let the work described in the following be carried out by electricians familiar with potential hazards.

NOTICE
Risk of device damage

Electronic components are accessible when the enclosure is open. The circuit board can be severely damaged when a contact is not grounded when the power supply is switched on.

- ► First switch the power supply on when the sender/receiver unit and the control unit are closed.

NOTICE
Pay attention to connection values for power supply

The control unit AWE is configured to 230 V AC on delivery.

- ► For 115 V AC, plug the respective bridges as shown on the connection plate of the control unit AWE.

NOTICE
Device damage through short circuit on the device

When power supply is available, signal short circuits can occur and damage the internal electronics. This is also valid for plug connections.

- ► Clean work is required. Do not leave any metal cuttings in the device.

6.2 Tools required

- Phillips screwdriver set
- Multimeter
- Control cabinet key

6.3 Overview of electrical connection steps

Connecting is done in two main steps:

1 **Before** commissioning: Make the connections for the **device components** at the measuring point.
2 **During** commissioning: Create the remaining necessary connections **on the measuring device** at the measuring point (will be carried out by Endress+Hauser Service **during** commissioning).

Table 6: Overview of electrical connection steps

Step	Procedure	Reference
1	Lay lines.	see "Connection overview", page 30
2	Connect control unit.	see "Electrical connection of the control unit", page 31
3	Optional: Connect the connection unit.	see "Connecting the connection unit (option)", page 35

6.4 Connection overview

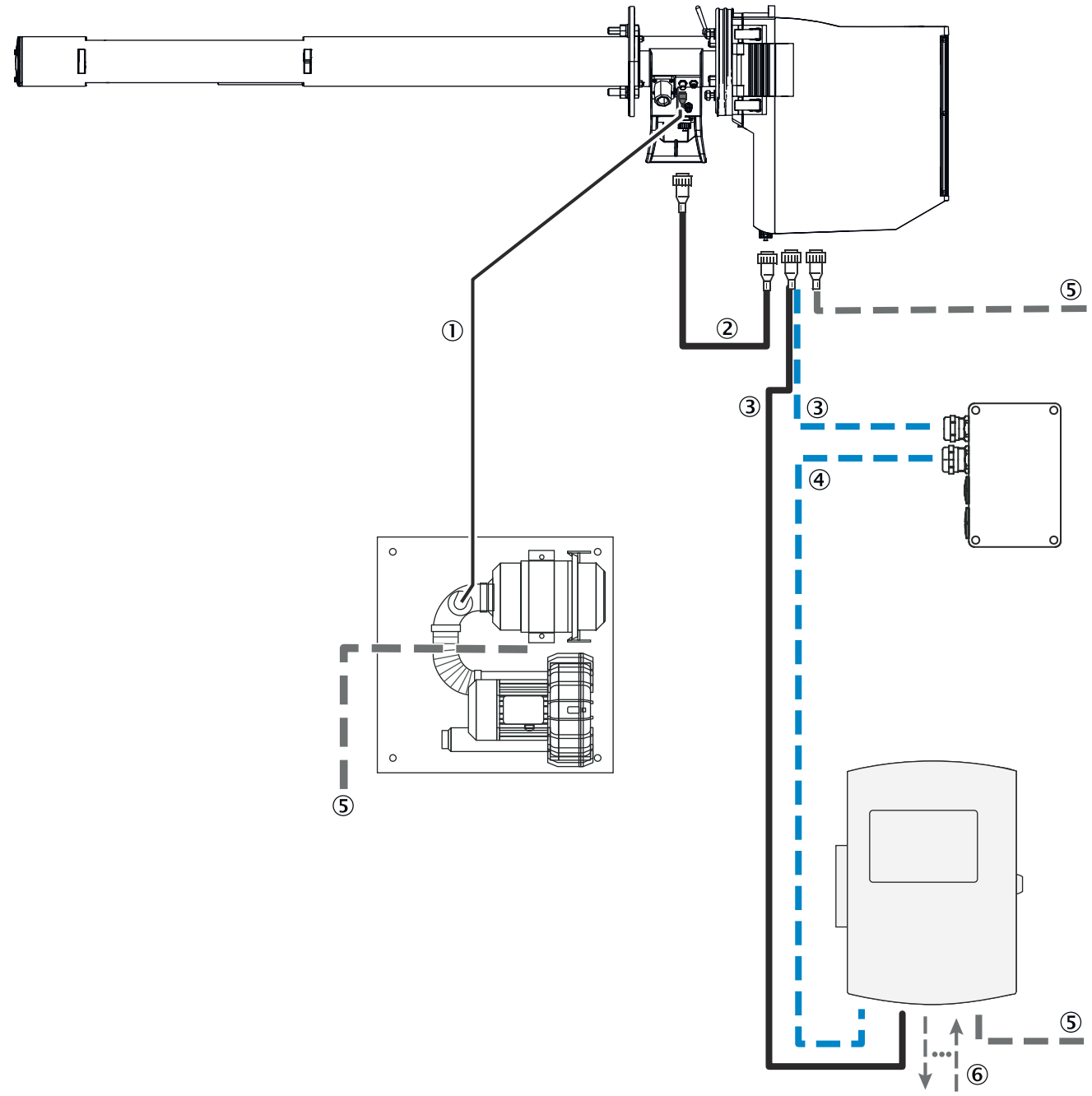


Figure 15: Electrical wiring of device components

— Standard scope of delivery
– – – Option
– – – Provided by customer

① Connection line, purge air attachment and low-pressure monitor purge air unit (only for GMP measuring probe)
② Connecting line, sender/receiver unit and purge air attachment
③ Connection line, sender/receiver unit and control unit or connection unit (option)
④ Line (extension), connection unit (option) and control unit
⑤ Power supply, sender/receiver unit, provided by customer
Power supply, purge air unit, provided by customer (only for measuring probe GMP) Power supply, control unit, provided by customer
⑥ Signal lines, control unit (provided by customer)

6.4.1 Lines overview

Table 7: Lines overview

No.	Line	Length [m]	Scope of delivery	Specification
①	Purge air attachment, sender/receiver unit — purge air unit low-pressure monitor (open line end)	5	Included	Prefabricated with plug-in connector, open line end
②	Sender/receiver unit — purge air attachment (CAN bus)	0.8	Included	Prefabricated with plug-in connector
③	Sender/receiver unit — control unit (CAN bus) or Sender/receiver unit — connection unit (option)	4	Included	Prefabricated with plug-in connector, open line end
④	Connection unit (option) — control unit (CAN bus)	Max. 300	Option	Open line ends, 5 × 0.5 mm^2
⑤	Power supply • Sender/receiver unit • Purge air unit • Control unit		Not included	4 x 1.5 mm^2
⑥	Control unit: Signal lines to system periphery		Not included	Each 0.5 mm^2

6.4.2 Laying lines

- Do not lay power supply and signal lines immediately next to each other.
- Close off open ends of prefabricated lines with the protective caps against weather effects until device installation.
- Install separate power supply cables and circuit breakers for:
  - Purge air units
  - Control unit
  - Connection unit (option)
- Carry out installation of all lines according to valid local regulations.
- Wire cross-section specifications are recommendations. The cross-sections of lines for analog and digital signals and for the power supply must not be reduced. The CAN bus lines from the scope of delivery must be used.
- Signal lines from the control unit to the connection terminals of the customer's status/message devices can be added later as required.

6.5 Electrical connection of the control unit

Standard cabling

For standard cabling, the device must be installed near the measuring point so that the cabling can be carried out with the supplied 4 m CAN bus line.

Connection lines to the CAN bus extensions are optionally available.

6.5.1 Correct connection of the CAN bus line

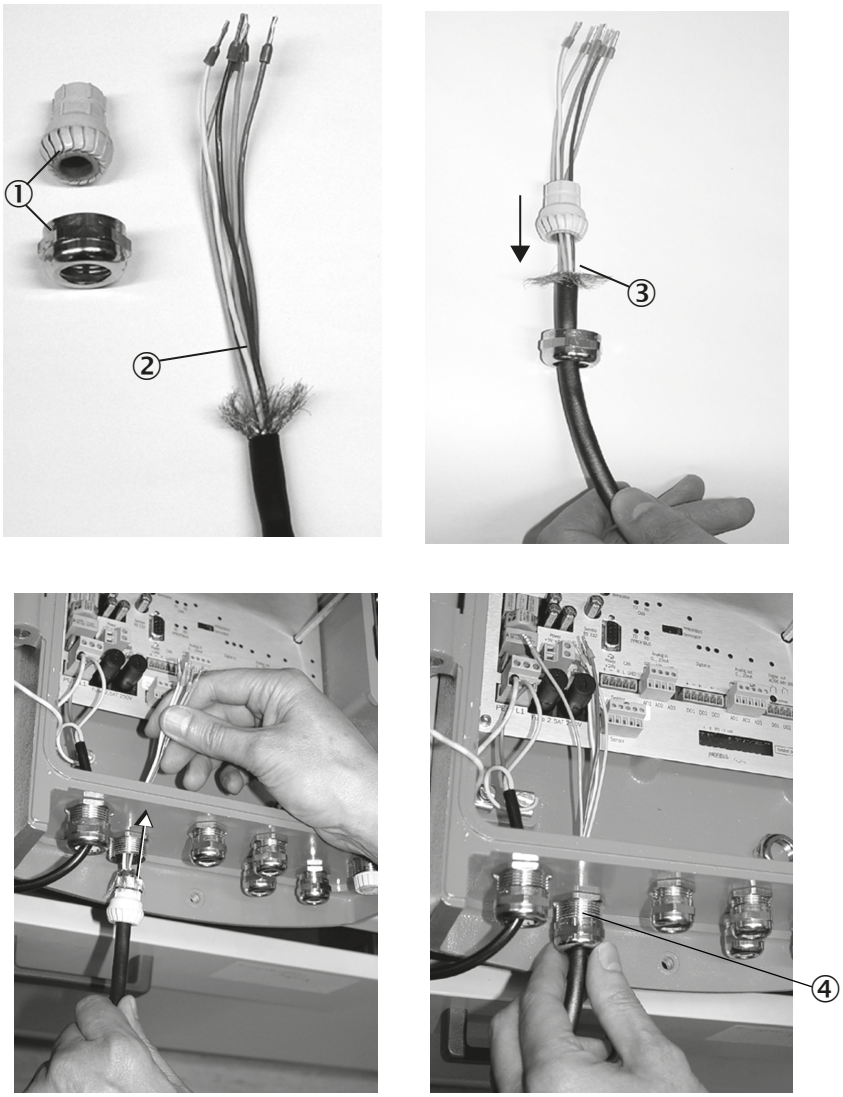


Figure 16: CAN bus line fitted correctly (shown on the AWE)

① M screw fitting on the control unit
② CAN bus line
③ CAN bus line shielding
④ M screw fitting fitted in the control unit

6.5.2 Connecting the control unit electrically

NOTE
The analog input assignment shown in the following Chapters is the factory setting.This setting may not be changed.

Control unit AWE

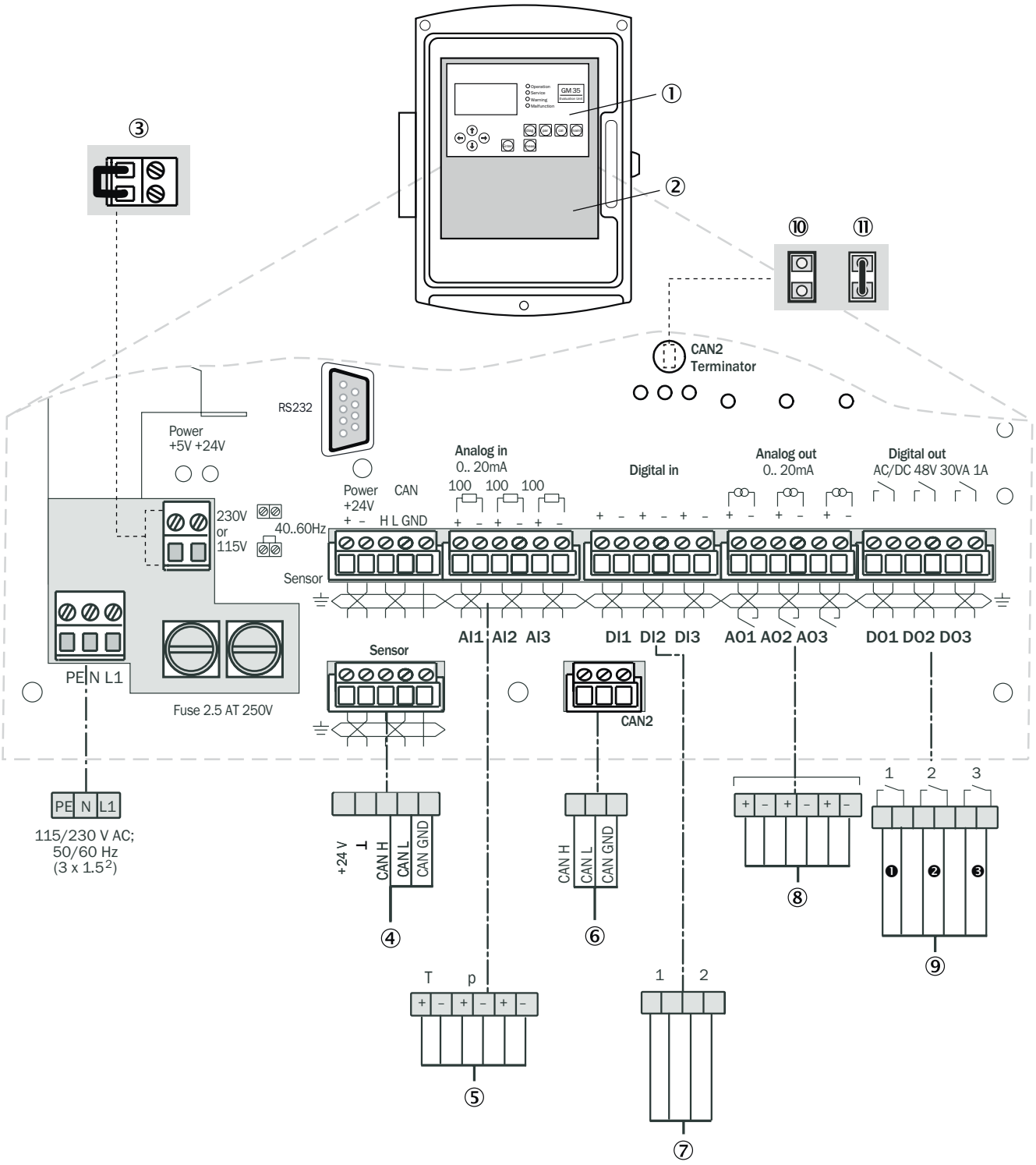


Figure 17: Electrical wiring of control unit AWE

① Circuit board, operating elements
② Connections circuit board
③ Plug this bridge for 115 V or 120 V power supply
④ CAN H + L, twisted pair, shielded. Connection for sender/receiver unit or connection unit
⑤ Analog inputs: 0 ... 20 mA (6 × 0.5²)
⑥ CAN H + L, twisted pair, shielded. Connection for SCU
⑦ Digital inputs: Potential-free contacts (6 × 0.75²)
⑧ Analog outputs: 0 ... 20 mA (6 × 0.75²)
⑨ Digital outputs: 48 V AC 60 VA, 1 A (6 × 0.75²)

❶ Failure (NC contact)

❷ Maintenance request (NO contact)

❸ Function control (NO contact)

⑩ For SCU connection: Jumper not connected (not activated)

⑪ For SCU connection: Jumper connected (activated)

CAN bus line: Color marking of wiring

Wiring	Color code
CAN-H	Yellow
CAN-L	Green
CAN GND	Brown
0 ... 20 mA	White
GND	Black

Steps

1. Ensure the power supply has been installed according to the specification (observe country-specific requirements) and is switched off.
2. Unlock the door lock with the control cabinet key. Open the enclosure door of the control unit.
3. Lead the connection line for power supply through the line duct and wire connections L1, N and PE (protective ground).
4. Lead the connection line from the measuring device through the line duct and wire on.
5. Lead the signal lines for the analog and digital inputs and outputs through the line duct at the bottom of the enclosure and wire on.

6.5.3 Connecting the grounding conductor on the control unit

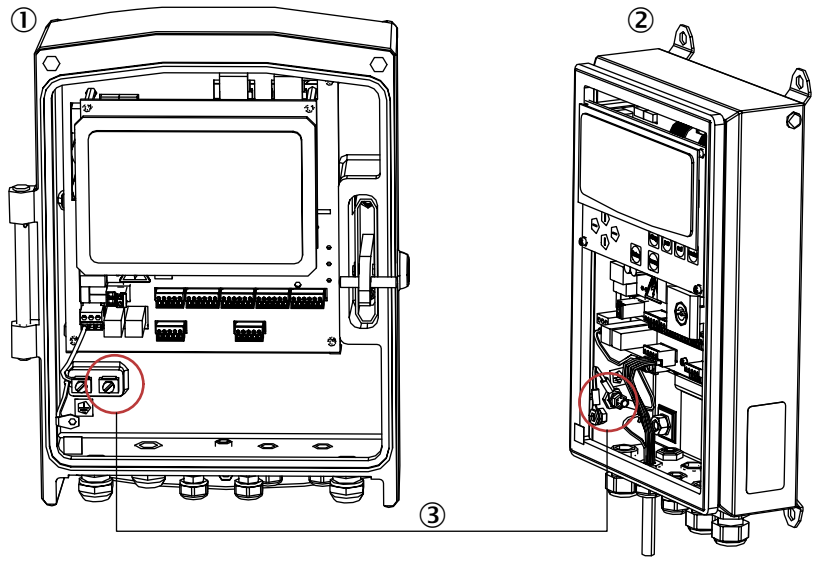


Figure 18: Connection for grounding conductors

① Control unit AWE (cast metal enclosure version)

② Control unit AWE (sheet steel enclosure version)

③ Connection for grounding conductor

Steps

1. Lead the potential equalization (4 mm²) of the plant ground with one eyelet over the bolt.
2. Position and tighten the M6 nut.

6.6 Connecting the connection unit (option)

NOTE CAN BUS WIRING PROJECT PLANNING
The following options are available for wiring the CAN bus connection between sender/receiver transceiver unit and control unit:

- Standard cable, 4 m, prefabricated.
- Connection unit with ready-made, 4 m long line to the sender/receiver unit; wiring to the control unit is done with the customer's cable.

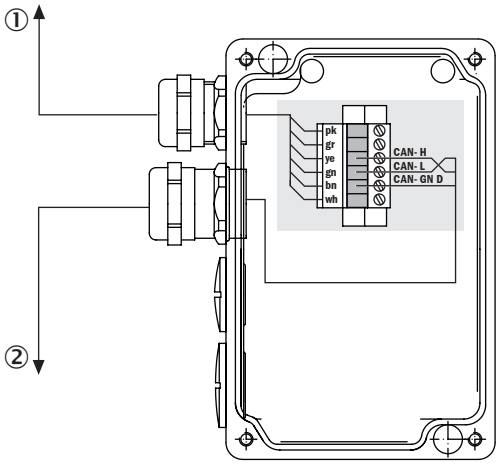


Figure 19: Connection unit electrical connection

① Connection line to sender/receiver unit
M screw fitting (Ø 5 ... 10)

② Connection line to control unit
M screw fitting (Ø 6 ... 12)

NOTE
The maximum line length between the connection unit and control unit is 300 m.

Steps

1. Determine no voltage is applied.
2. Lead CAN line for the sender/receiver unit through right M screw fitting ① to the terminal strip.
3. Lead CAN line for the control unit through M screw fitting ② to the terminal strip.
4. Connect shielding on the M screw fitting on the enclosure.
5. Connect the wires.
6. Connect the respective signals in the control unit and connection unit.

NOTICE
The CAN-H and CAN-L lines must be twisted pairs.

CAN bus line: Color marking of wiring

Wiring	Color code
CAN-H	Yellow
CAN-L	Green
CAN GND	Brown
0 ... 20 mA	White
GND	Black

7 Commissioning

7.1 Safety

Technical knowledge needed / requirements for commissioning

NOTICE

- You are basically familiar with the device.
- You are familiar with conditions at the installation location, especially possible hazards through the gases in the gas duct (hot/dangerous to health). You are capable of recognizing and preventing danger by possibly escaping gases.

When one of these requirements is not met:

► Contact Endress+Hauser Customer Service or your local Endress+Hauser representative.

Grounding

NOTICE

Device damage through incorrect or missing grounding

It must be ensured during installation and maintenance work that the protective grounding of the device or cables involved is established in accordance with EN 61010-1.

7.2 Requirements

- Operating Instructions for purge air supply
- Final inspection protocol
- Documentation Checklist
- Measuring device switched on (2 hours warm-up phase)

7.3 Tools required

- Fork or ring spanner set
- Optical alignment tool (not included in standard scope of delivery)

7.4 Material required

- Optics cleaning wipes without detergent

7.5 Commissioning steps overview

Commissioning comprises two main steps:

1 Installation and connection of the measuring device at the measuring point
2 Fine optical alignment with internal alignment tool

Table 8: Commissioning steps

Step	Procedure	Reference
1	Remove the transport safety devices.	see "Removing the transport safety device of the sender/receiver unit", page 37
2	**Only for GMP:** Ensure the purge air supply is in operation.	see "Putting the purge air unit into operation", page 23
3	Fitting the sender/receiver unit on the flange fixture.	see "Fitting the sender/receiver unit on the flange fixture", page 37
4	Connect the sender/receiver unit electrically.	see "Connecting the sender/receiver unit with measuring probe", page 38
5	Carry out fine optical adjustment.	see "Fine optical alignment", page 39

Step	Procedure	Reference
6	Fit the weather hood (option).	see "Fitting the weather hood (option)", page 41
7	Start measuring operation.	see "Starting measuring operation", page 42

7.6 Removing the transport safety device of the sender/receiver unit

NOTE
The front cover of the sender/receiver unit is clamped between the flange fixture and the enclosure.

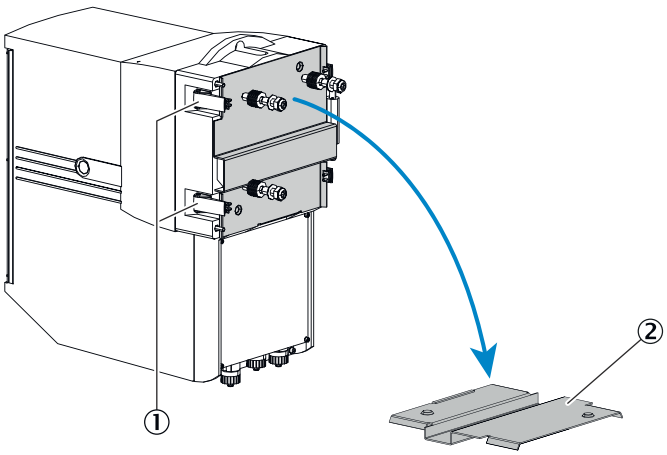


Figure 20: Transport safety device

① Quick-release fasteners
② Protective cover for sender/receiver unit

Steps

1. Remove protective sticker.
2. Remove the protective plate to the front cover:
   a) Open the quick-release fasteners. Swivel the flange fixture open.
   b) Remove the protective cover.
3. Check the transport safety device for damage.
4. Store the transport safety device.

7.7 Fitting the sender/receiver unit on the flange fixture

WARNING
Risk of injury when the device drops down
The weight of the device can cause it to drop down and cause injuries during the work described in this Section.

► Carry out assembly work on parts of the device together with another person when necessary.

Sender/receiver unit

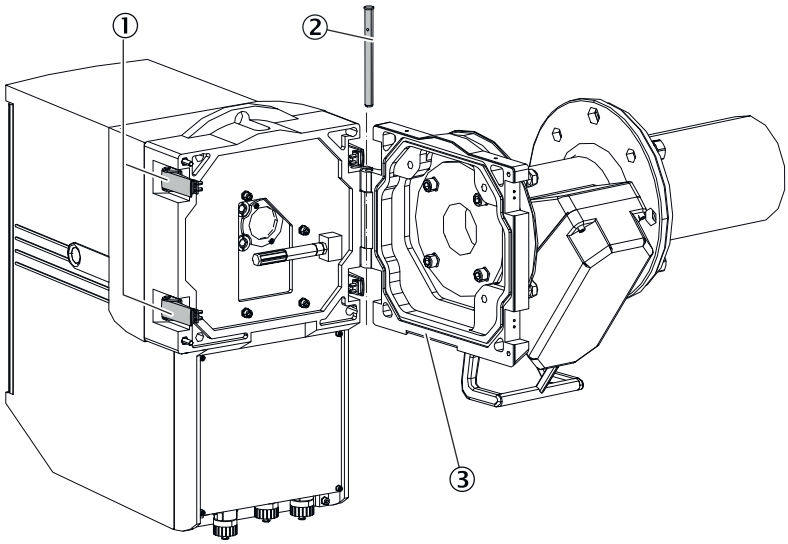


Figure 21: Fitting the sender/receiver unit on the flange fixture

① Quick-release fasteners
② Hinge pin
③ Flange fixture

Steps

1. Insert the sender/receiver unit into the hinge.
2. Insert the pin from the top downwards through the hinge.
3. Fold the sender/receiver unit flange fixture together.
4. Close the quick-release fasteners.

7.8 Connecting the sender/receiver unit with measuring probe

Sender/receiver unit with GMP measuring probe

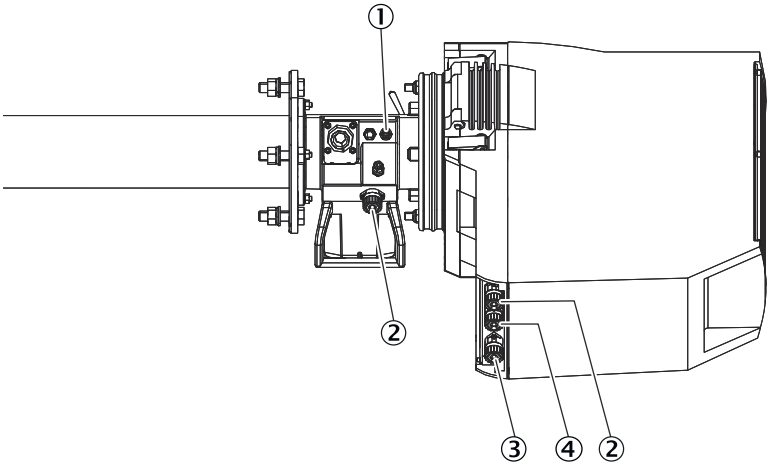


Figure 22: Electrical connections on sender/receiver unit with GMP measuring probe

① Purge air unit low-pressure monitor connection
② Connection of purge air attachment — sender/receiver unit connection line
③ Power supply line connection
④ Connection of sender/receiver unit connection line to control unit

Steps

NOTE
Connection overview see "Connection overview", page 30

1. Connect the purge air unit low-pressure monitor.
2. Connect the connection line between the sender/receiver unit and the GMP measuring probe.
3. If necessary, connect the connection line to the connection unit (option).
4. Connect the connection line to the control unit.
5. On the measuring probe: Set the lever of the locking device to “Open”.

Sender/receiver unit with GPP measuring probe

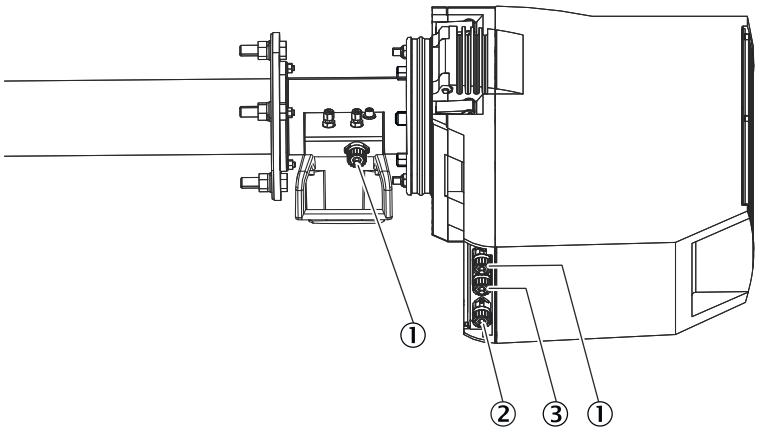


Figure 23: Electrical connections on sender/receiver unit with GMP measuring probe

① Connection of purge air attachment — sender/receiver unit connection line
② Connection of sender/receiver unit connection line
③ Connection of sender/receiver unit connection line to control unit

Steps

NOTE
Connection overview see "Connection overview", page 30

1. Connect the connection line between the sender/receiver unit and the purge air attachment of the GPP measuring probe.
2. If necessary, connect the connection line to the connection unit (option).
3. Connect the connection line to the control unit.
4. Connect the power supply to the measuring probe.

7.9 Fine optical alignment

The measuring function requires that the optical axis of the reflector assembly of the measuring probe (probe version) or the reflector unit (cross duct) is precisely aligned with the light beam of the sender/receiver unit. The optical alignment and control is carried out via:

- Control unit
- Visor on the sender/receiver unit:

The device is equipped with an automatic beam tracking system which ensures optimum alignment of the sender/receiver unit and reflector unit or measuring probe at all times during normal measuring operation - even under changing system conditions.

The automatic beam tracking has to be adjusted just once.

Prerequisite

- Device has warmed up to operating temperature (approx. 2 hours).

Description of the alignment tool on the sender/receiver unit

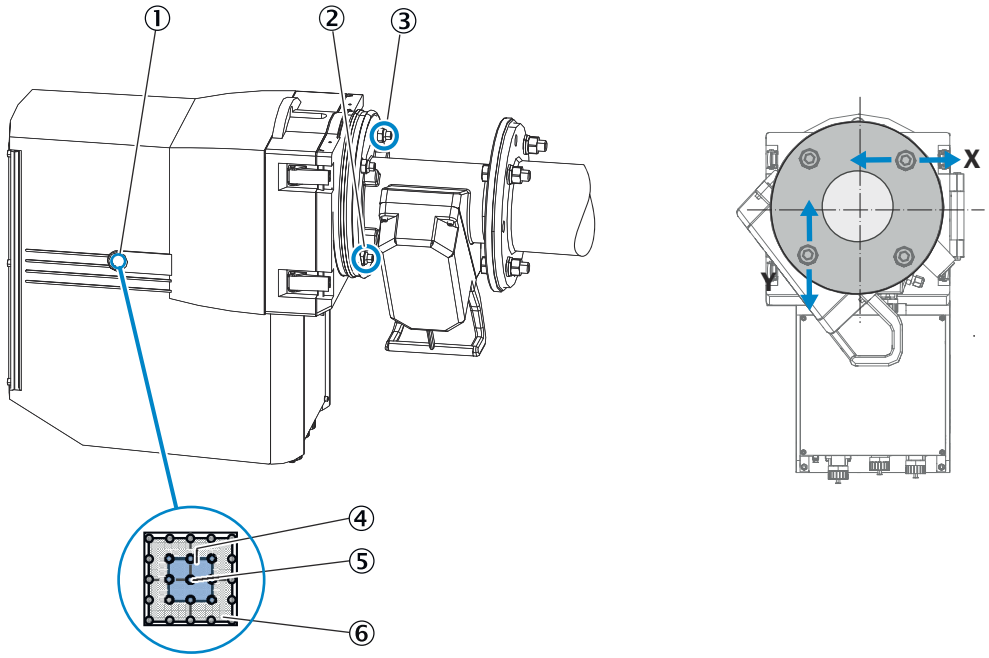


Figure 24: Fine optical alignment on the sender/receiver unit

① Visor for fine optical alignment:
5 × 5-LED matrix for displaying the light beam on the reflector element
② Nut for vertical adjustment (Y)
③ Nut for horizontal adjustment (X)
④ Visor: LED field for valid alignment
⑤ Visor: LED field for optimum alignment
⑥ LED matrix:LED field in case of invalid alignment

On the control unit:

Start optical alignment

1. Press button “maint”.
2. Select “Adj. Opt. Align”.

✓ The values for the horizontal and vertical position (dx, dy) of the light beam are displayed on the reflector element.

✓ Signal for optical alignment is sent to the control center. For devices with automatic beam tracking, the optical reference position is now approached.

On the sender/receiver unit:

Alignment with visor

3. Align the position of the light spot. To do this, use a 19 mm wrench to adjust the nuts for X and Y alignment on the device flange so that the light spot is imaged in the valid LED field of the visor; ideally in the central LED.

On the control unit:

Adjust optical alignment precisely

4. Check on the display that the values for dx and dy are ≤ ±0.1.

NOTE

- dx value: Horizontal position or adjustment
- dy value: Vertical position or adjustment
- Values A, B, C and D are values of device-internal parameters. These should each be in the range of 350 ... 450.

5. If not, adjust the two nuts on the device flange until these values are reached.

7.10 Fitting the weather hood (option)

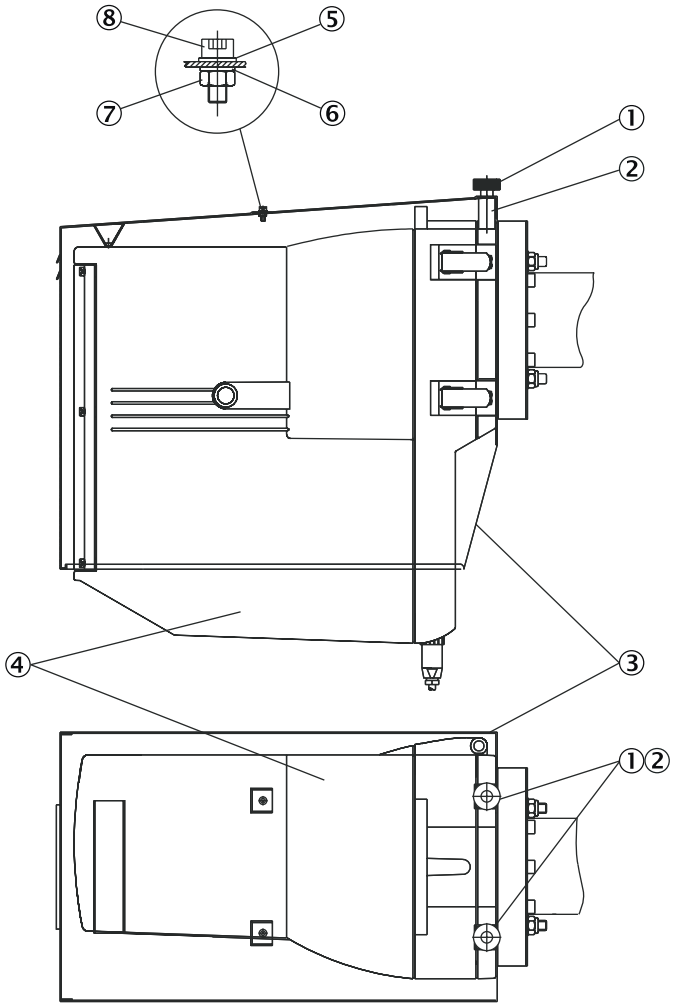


Figure 25: Fitting the weather hood for the sender/receiver unit

① Knurled nut
② Spacer bolt
③ Weather hood
④ Sender/receiver unit
⑤ Washer
⑥ Spring washer
⑦ Nut
⑧ Screw

Material required

- Fast curing epoxy resin two-component adhesives

Steps

1. Glue the two spacer bolts supplied onto the flange fixture of the sender/receiver unit each at a distance of 85 mm from the center.
2. Seal the two unused mounting holes in the center of the weather hood with dummy screws.
3. Place the weather hood on the sender/receiver unit.

✓ The threads of the spacer bolts protrude through the front mounting holes of the weather hood.

4. Secure the weather hood in position with the two knurled nuts.

7.11 Starting measuring operation

NOTE

The device is delivered from the factory with the parameter settings specified by the customer when ordering. When these parameter specifications match the parameters during commissioning, measuring operation can be started after fine optical alignment.

The device can be configured to meet the plant conditions when required.

Steps

Starting measuring operation

1. Press button “Meas”.

✓ The device switches to Measuring mode.

Check status LEDs, malfunction and warning messages.

NOTE

Quick check of Measuring screens on the LC display of the control unit:

► Using the Operating Instructions, see "Operating and display elements", page 43.

When malfunction or warning messages are present:

► If the error cause cannot be cleared: Contact Endress+Hauser Service.

7.11.1 Operating states

Message on display	Meaning
DOWNLOAD	Download new software (for Service purposes only)
INIT	Intialization of control unit
INITIALISATION	Initialization of sender/receiver unit
MAINTENANCE	Maintenance mode (no measurement)
MEASURING	Measuring operation
MEASURING LD	Measuring operation; beam length tracked (line locking done)
MEASURING LL	Measuring operation with active tracking of laser beam length (line locking)
SIGNAL_ADJUST	Adjusting amplification to changed transmission

8 Operation

8.1 Operating and display elements

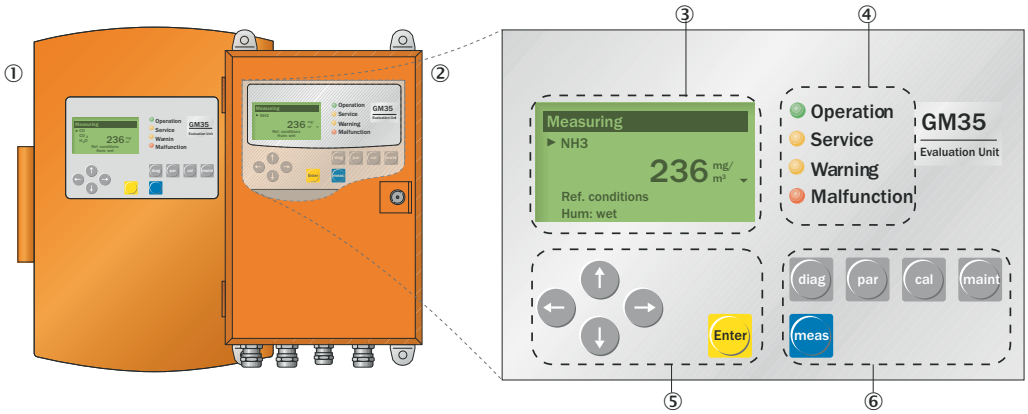


Figure 26: Operating and display elements

① Control unit AWE, cast metal enclosure

② Control unit, AWE, sheet steel enclosure

③ Display for

- All current measured values
- Computed value
- Menu navigation

④ Status LEDs indicating operating and fault conditions

⑤ Function buttons for menu navigation and input

⑥ Function buttons for menu selection

Status LEDs

Table 9: Significance of Status LEDs

LED	Significance
OPERATION	• Measuring mode • Device is switched on. Power voltage available.
SERVICE	• Service mode
Warning	• Warning message • At least one warning message pending. • Read the warning message, see Diagnosis mode (diag)
MALFUNCTION	• Device malfunction • At least one malfunction message pending. • Read the malfunction message, see Diagnosis mode (diag)

8.2 Control unit menu tree

NOTE
Menu texts are shown in **English**.

8.2.1 Menu tree, Measuring

Menu level		Explanation
Measuring		Measure • Current measured values: Depending on device version • Reference variables (wet, dry)

8.2.2 Menu tree, Diagnosis

Menu level			Explanation
Diagnosis			**Diagnosis**
Malfunction			Current error messages (plain-text)
Warning			Current warning messages (plain-text)
Sensor values	GM35	VIS AMP	Display of diagnostic values and control values
	CO		
	H2O		
	Probe	Cross-Duct OH	Cross-Duct version • Sender/receiver unit (OH) • Reflector unit
		Cross-Duct Refl	
Check values	CO CO2 H2O		Current monitored sensor values (amplification setting, internal temperature control, control values, etc.)
Show Opt. Align			Displays the optical alignment

8.2.3 Menu tree, Parameters

Menu level	Explanation
Parameters	**Parameters**

Menu level			Explanation
Settings			Parameter settings/display of system components
	Configuration	Components Probe	Measuring components: CO or CO_2, H_2O CAN connection (probe or cross-duct)
	Phys. Units	ppm Ref. conditions	Setting for units and reference values for individual gases
	Average	Avg. Time	Setting for averaging time for device
	Meas. Distance	Active Tube 1 Tube 2	Measuring distance
	Temperature	Source Subst. Unit	Setting for temperature: Source (probe/replacement/AI1), unit (K, °C, °F)
	Pressure	Source Subst.	Setting for pressure: Source (probe/replacement/AI2)
	Analog Out	Live zero Output1 Output2 Output3	Setting for analog outputs: Live Zero, component display area, cycle output
	Analog In	Input1 Input2 Input3	Setting for analog inputs: e.g. AI1, unit (K, °C, °F), live zero (0, 2, 4 MA, read range)
	Check Cycle	Rep. time	Setting for check cycle interval: 1 ... 1440
	Regress. Funct.	Regress. Funct.	Regress function for components: CO_2, H_2O Span: 0.5 ... 1.99 Zero: 0 ... ±9999.9
Device	Serial Number Software Revision		Retrieval of device information: Serial number and software version
Service	Calibration CO Calibration CO_2 Calibration H_2O		Service area for calibration of measuring components

8.2.4 Menu tree, Calibration

Menu level			Explanation
Calibration			**Calibration**
Check Cycle			Check cycle for test purposes, e.g. after maintenance activities
	Zero Adjust		Zero point determination, e.g., during commissioning or maintenance tasks
	Boxmeasuring		Checking measuring components with test gas using a gas adjustment unit
	Manual Test	Zero gas	Manual test with zero gas Adjustment of device-internal pressure and temperature measurement to reference measurements

8.2.5 Menu tree, Maintenance

Menu level			Explanation
Maintenance			**Maintenance**
Maintenance			Maintenance operation: On, off
Adj. Opt. Align.			Optical alignment function for the sender/receiver unit and reflector unit
Analog Out	AO 1:		Testing the analog outputs
	AO 2:		
	AO 3:		
Test Analog In	AI 1:		Testing the analog inputs
	AI 2:		
	AI 3:		
Test Relay	Relay 1		Testing the relay outputs
	Relay 2		
	Relay 3		
Test Digital In	DI 1		Testing the digital inputs
	DI 2		
	DI 3		
Reset System			Restarting the measuring system
Reset Parameter			Resetting parameters to factory settings ⚠ All settings will be overwritten!

9 Maintenance

9.1 Safety

DANGER
Danger to life through electric shock

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

- ► Before starting work on the device, ensure the voltage supply can be switched off in accordance with the valid Standard using a power isolating switch/circuit breaker.
- ► Make sure the disconnector switch is easily accessible.
- ► An additional disconnecting device is mandatory when the power disconnector switch cannot be accessed or only with difficulty after installation of the device connection.
- ► Switch off the voltage supply before starting any work on the device.
- ► After completion of the work or for test purposes, calibration of the power supply may only be activated again by authorized personnel complying with the safety regulations.

DANGER
Risk of injury due to electrical accident

- **If the device must be opened for adjustment or repair:**
  - ► Disconnect the device from all voltage sources beforehand.
- **If the device must be live during work:**
  - ► Have this work performed by skilled persons who are familiar with the possible hazards. If internal components are removed or opened, live parts may be exposed.
- **If liquid has penetrated electrical equipment components:**
  - ► Take the device out of operation. Disconnect the power voltage at an external point (e.g. pull out the power cable). Then call the manufacturer's service or appropriately trained skilled persons to have the device repaired.
- **If safe operation with the device is no longer possible:**
  - ► Take the device out of operation. Secure against unauthorized startup.
- Do not interrupt the protective conductor connections inside or outside the device.

WARNING
Health risk through contact with toxic gases

The modules and devices contain enclosed, potentially dangerous gases that can escape should a defect or leak occur. Concentrations inside the closed unit can rise up to 350 ppm.

- CO: 10 ml maximum total amount

- ► Check the unit regularly for the condition of the seals.
- ► Only open the device when good ventilation is available, especially when a leak of one of the device components is suspected.

WARNING
Risk of chemical burns/poisoning through caustic/toxic residues on components with sample gas contact

After the device has been decommissioned or removed from the measuring duct, process gas residues can exist as deposits on components with sample gas contact (e.g., gas filter, gas-carrying lines etc.). These residues can be odorless or invisible depending on the gas mixture in the duct. Without protective clothing, contact with such contaminated components can lead to severe burns or poisoning.

- ► Take appropriate protective measures for work (e.g., by wearing a safety mask, protective gloves and acid resistant clothes).
- ► In case of contact with skin or the eyes, rinse immediately with clear water and consult a doctor.
- ► Decontaminate all contaminated components according to regulations after disassembly.

NOTICE
Risk of device damage when the purge air is switched off too soon

Hot and contaminated gas can cause device damage when the purge air is switched off when the device is still in the gas duct.

- ► Do not switch the purge air unit off as long as the measuring device is still in the gas duct.

9.2 Maintenance plan

NOTICE
There is a risk of damage to the device when the maintenance intervals are not observed.

Table 10: Maintenance intervals

Interval[1)]	Maintenance work	Reference
1W	Check measured values in the control area are plausible	see "Menu tree, Diagnosis", page 44
1M	Visual control of the system	see "Visual check", page 49
	Clean windows.	see "Cleaning optical surfaces", page 50
	Check optical alignment	see "Fine optical alignment", page 39
	Check IR source	see "Checking the function of the IR source", page 53
	Check and/or clean purge air unit	see "Cleaning the purge air unit", page 53 and purge air unit Operating Instructions
1Y	Check analyzer with span gas	Normally carried out by Endress+Hauser Service.

1) 1W = Weekly, 1M = Monthly, 1Y = Yearly

9.2.1 Maintenance protocol

Log the following data:

- Maintenance dates
- Work done
- Special observations
- Required consumables and spare parts

9.2.2 Expendable, wearing and spare parts

Contact Endress+Hauser Service.

9.3 Preparatory work

NOTE
Some maintenance tasks will cause the measuring device to switch to malfunction

► Activate Maintenance mode before starting the work.

NOTE

► Ensure good accessibility to the device in accordance with valid accident prevention regulations.
► Provide suitable work platforms/pedestals.

9.4 Visual check

All device components

► Check enclosures for mechanical damage.
► Check enclosures for soiling and clean.
► Check all lines for damage. Pay attention to chafe marks and kinks on line ducts.
► Check all hose fittings for tight seat.
► Check all electrical connections are free from corrosion and have a tight seat.
► Check grounding conductors are free from corrosion.
► Check flanges and screw fittings for tight seat.

Control unit

► Check for moisture outside and inside the enclosure.
► Check inspection window for soiling and clean.
► Check LEDs.
► If the control unit is damaged (e.g. LC display failure): Contact Endress+Hauser Service.

Weather hood

► Check condition of the weather hood from the outside and inside.

9.5 Removing the sender/receiver unit

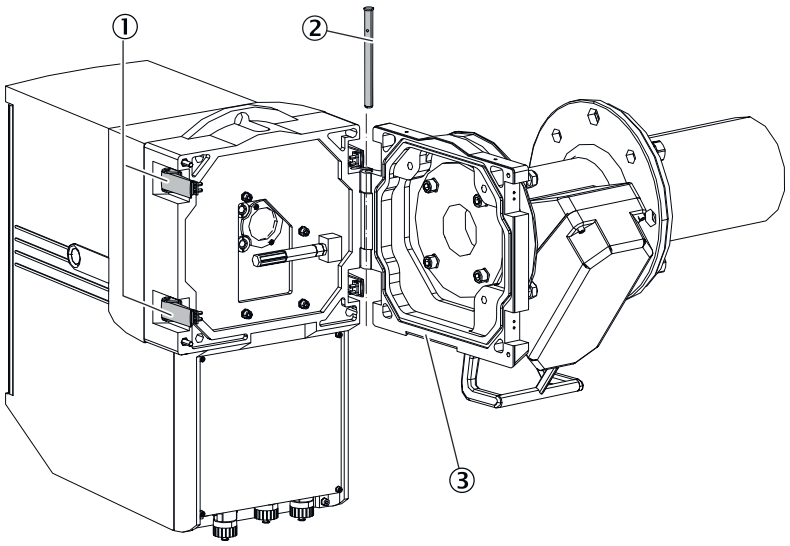


Figure 27: Removing the sender/receiver unit

① Quick-release fasteners
② Hinge pin
③ Flange fixture

Steps

1. Switch device off.
2. Release the quick-release fasteners to open the sender/receiver unit .
3. Immediately attach the cover on the device flange opening.
4. Pull out the hinge pin (in the direction of the arrow) to release the hinge between the sender/receiver unit and device flange.
5. Carefully remove the sender/receiver unit.
6. Place the sender/receiver unit in a safe place, protected from weather and dust.

9.6 Cleaning optical surfaces

CAUTION
Sample gases can cause injuries when working on the device.

► Before starting work, read the safety information in the Section “Commissioning”.

NOTICE

► Do not use cleaning agents. Residues can falsify measuring results.

Material required

- Optics cleaning cloth
- Demineralized water

9.6.1 Cleaning the optical surface of the sender/receiver unit

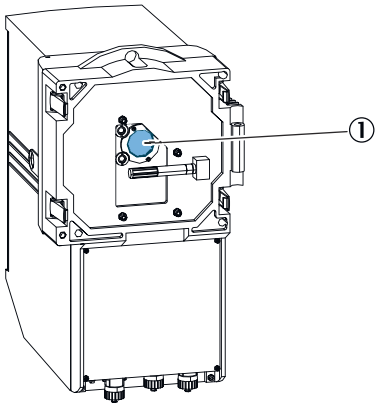


Figure 28: Optical surface of the sender/receiver unit

① Optical surface

Steps

1. Switch device off.
2. Open the sender/receiver unit enclosure and swing open by releasing the quick-release fasteners.
3. Remove hinge pin upwards.
4. Remove the sender/receiver unit.
5. If required: Clean optical surface with optics cloth and demineralized water.
6. Close the enclosure immediately after cleaning to protect the cleaned optical surface against moisture and dust.
7. Refit the sender/receiver unit on the device flange of the measuring probe.

9.6.2 Cleaning the optical surface of the GMP measuring probe

NOTICE

► Do not use cleaning agents. Residues can falsify measuring results.

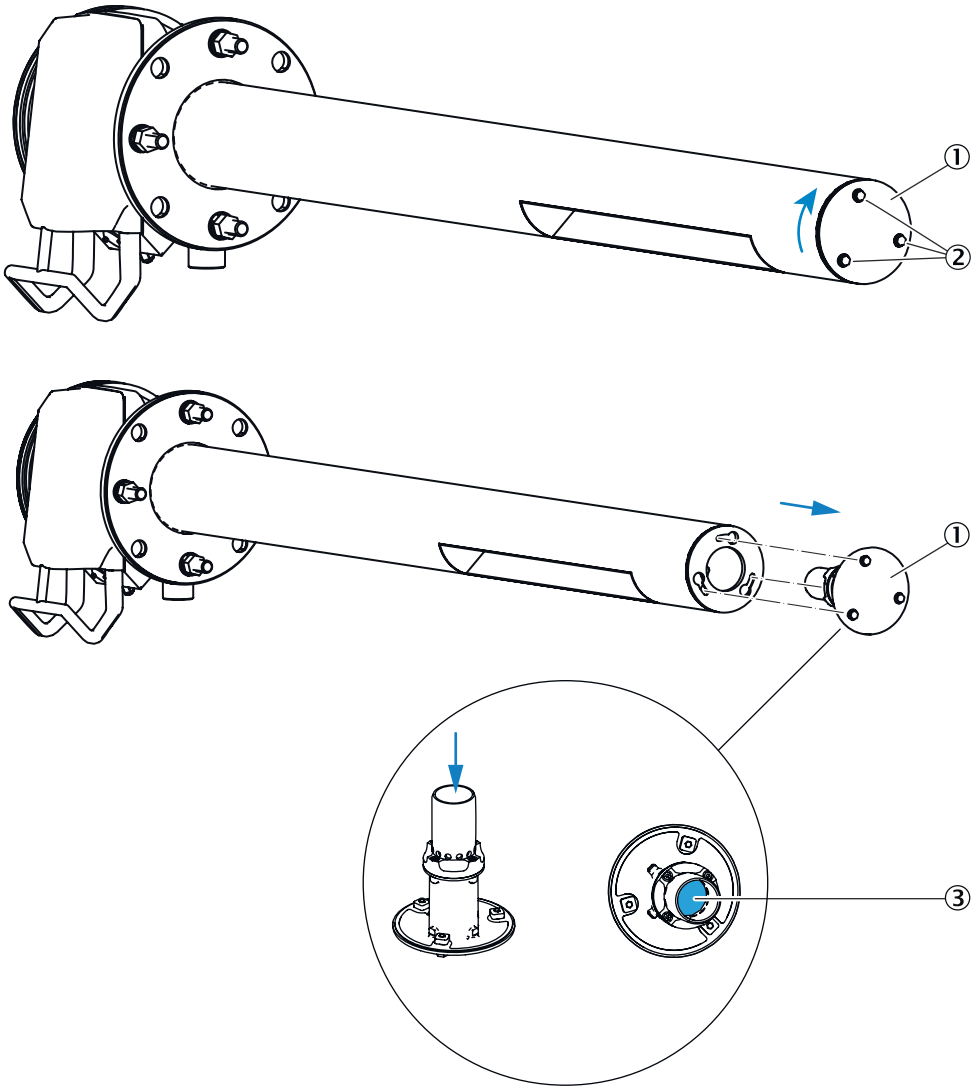


Figure 29: Optical surface of the GMP measuring probe

① Probe cover
② Screws
③ Optical surface

Steps

1. Switch the device off. Allow the measuring probe to cool down to room temperature.
2. Loosen the screws on the probe cover.
3. Loosen the probe cover from the bayonet catch with a clockwise rotation and remove it.
4. Blow dirt off the optical surface with compressed air.
5. If required: Clean the optical surface with optics cleaning cloth and demineralized water.
6. Replace the probe cover. Turn to the left as far as it will go.
7. Tighten the screws on the probe cover.

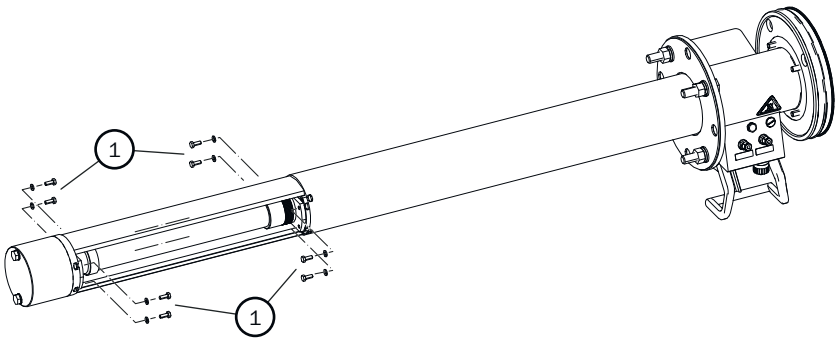
9.6.3 Cleaning the optical surface of the GPP measuring probe

NOTICE

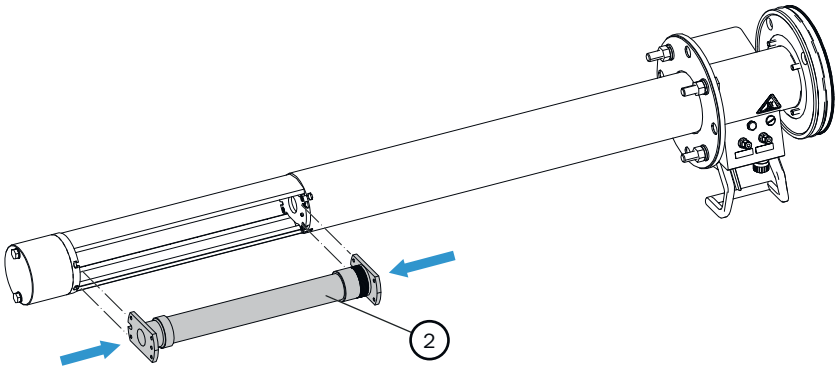
► Do not use cleaning agents. Residues can falsify measuring results.

Steps

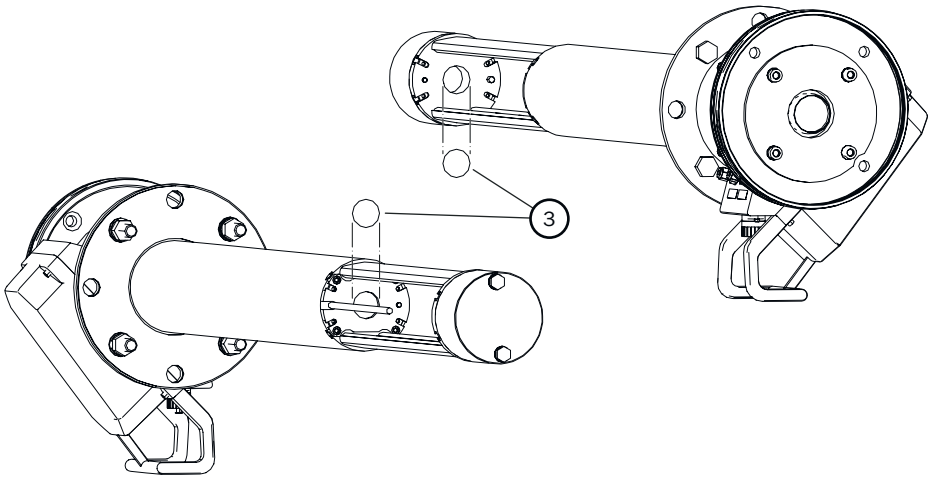
1. Switch the device off. Allow the measuring probe to cool down to room temperature.
2. Remove 8 screws ① at the filter element.



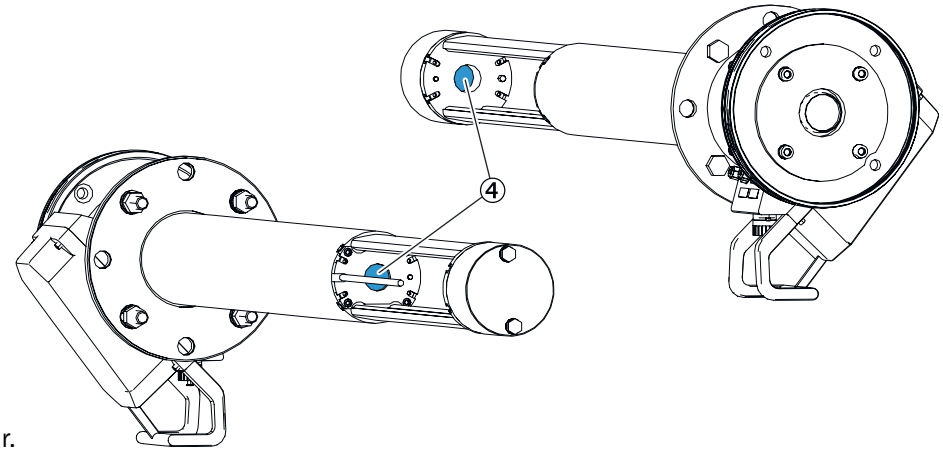
3. Press filter element ② together and take it out.



4. Remove seals ③ at the top and bottom. Make sure that no residues remain.



5. Blow dirt off optical surfaces ④ at the top and bottom with compressed



air.

6. If required: Clean the optical surfaces with an optics cleaning cloth and demineralized water.
7. Insert new seals at the top and at the bottom.
8. Press the filter element together and push it in carefully. Make sure that the seals are not damaged.
9. Screw in and tighten 8 screws on the filter element.

9.7 Cleaning the control unit

The device operates maintenance-free during operation.

Depending on the installation location, the following preventive maintenance work may be required for the device at regular intervals:

Table 11: Maintenance work

Maintenance work	Interval	To be carried out by
Clean enclosure and operator panel.	Cleaning interval depending on ambient conditions and climate	Qualified personnel
Check screw fittings and plug connections.	Depending on the installation location or operational requirements	Authorized electrician (authorized skilled electrician or person with similar training)

9.8 Cleaning the purge air unit

NOTE
For information on the purge air unit, see the Operating Instructions of the purge air unit (SLV4).

9.9 Checking the function of the IR source

Control unit AWE

1. Press the “diag” button.
2. Select menu Sensor Values → GM35 general → VIS AMP MR.

✓ Current sensor value is displayed.
✓ The value for the amplification: Max. 255

NOTE
Perform a zero point adjustment after installing a new IR source module.

10 Troubleshooting

10.1 Safety

WARNING
Health risk through contact with toxic gases

The modules and devices contain enclosed, potentially dangerous gases that can escape should a defect or leak occur. Concentrations inside the closed unit can rise up to 350 ppm.

- CO: 10 ml maximum total amount

► Check the unit regularly for the condition of the seals.
► Only open the device when good ventilation is available, especially when a leak of one of the device components is suspected.

DANGER
Hazard by voltage

Lines in the subassemblies of the measuring system are live and can cause serious injuries through electric shock when touched.

► Disconnect the subassemblies or lines involved from the power supply during installation, maintenance and repair work.

WARNING
Risk of chemical burns/poisoning through caustic/toxic residues on components with sample gas contact

After the device has been decommissioned or removed from the measuring duct, process gas residues can exist as deposits on components with sample gas contact (e.g., gas filter, gas-carrying lines etc.). These residues can be odorless or invisible depending on the gas mixture in the duct. Without protective clothing, contact with such contaminated components can lead to severe burns or poisoning.

► Take appropriate protective measures for work (e.g., by wearing a safety mask, protective gloves and acid resistant clothes).
► In case of contact with skin or the eyes, rinse immediately with clear water and consult a doctor.
► Decontaminate all contaminated components according to regulations after disassembly.

CAUTION
Safety when dismantling the sender/receiver unit with mounted measuring probe from the gas duct

► Safe pulling out of the measuring probe from the gas duct requires:
- A safe working platform at the measuring point
- Free space on the working platform for pulling out the measuring probe (note the dimensions of the sender/receiver unit and the measuring probe)
- At least 2 persons
- Personal protective equipment in accordance with plant regulations
- Cleaning material (cloth/brush) to remove coarse dirt from the measuring probe when it is pulled out
- Protective cover for the process flange on the duct side
- Suitable support to be able to place the sender/receiver unit with mounted measuring probe and connected plug connectors protruding at the bottom side safely and without damage on the ground
- Alternatively, the angle flange that may have been used during commissioning is particularly suitable as support during maintenance work. However, high sample gas temperatures or restricted space conditions (duct insulation) may limit the use of the angle flange.
- Coordination of maintenance work and associated interruption of measuring operation with persons responsible for operation of the plant

10.2 Monitoring and diagnostic system

The device has an integrated system that continually checks the operating state of the sender/receiver unit and the control unit. Corresponding messages are displayed for deviations from the normal state and recorded in the devices for later evaluation. Messages for the two system components are categorized into warning and malfunction messages depending on the effects to be expected:

Significance of warning messages

- Measuring results are not (yet) directly influenced by a deviating system state.
- Observance and clearance of the cause(s), e.g., through maintenance measures, are necessary to prevent subsequent errors or device damage

Significance of malfunction messages

- Measuring operation is no longer possible or no longer reliable.

NOTE
Warning and malfunction messages are stored in the built-in message memory of the control unit.

10.3 Device not functioning

Table 12: Device not functioning

Possible cause	Measure
Power supply not connected.	Check power lines and connections.
Main power supply failure.	Check power supply (e.g. socket, external disconnecting device).
Internal operating temperatures are incorrect.	Check whether error messages exist.
Internal software not functioning.	Can only occur with complex internal malfunctions or after strong external influences (e.g., strong electromagnetic interfering pulse). Switch device off. Switch back on again after a few seconds.

10.4 Clearing malfunctions on the control unit

Table 13: Possible causes and clearance

Malfunction	Possible cause	Clearance
Malfunction LED blinks, (Warning LED possibly on)	Plain-text error messages indicate possible causes.	1. Press the “diag” button to trigger Diagnostic mode. 2. Call menu Malfunction (and/or Warning). 3. Check and clear the specified malfunction.
Control unit not responding.	Supply voltage not set correctly.	1. Check supply voltage setting. 2. Replace fuse if necessary.
	Power supply on evaluation unit incorrect.	1. Provide power supply from plant. 2. Check connections on system components and reconnect if necessary.
	Defective fuse	1. Check fuse in control unit. 2. Replace fuse if necessary.
	Cause cannot be determined.	1. Disconnect all system components from the power supply. Reconnect one at a time. 2. Check CAN bus line from the control unit to the sender/receiver unit or to the connection unit.
	Malfunction occurs again.	1. Replace the last connected component. Consult Endress+Hauser Service.
	24V/5V supply defective	1. Check 24V/5V supply. 2. Replace control unit or printed circuit board. 3. Contact Endress+Hauser Service.
Display output: Corrupt Parameters: Reset Memory	Inconsistent data detected in parameter memory	1. Press Enter. ✓ A system restart is performed. This resets the parameters to the factory settings. 2. If necessary, reconfigure individual parameters 3. If the error message appears again: Replace control unit. 4. Contact Endress+Hauser Service.

10.4.1 Communication error between control unit and receiver

Error message: "Sensor Communication"

The receiver sends data continually to the control unit, an error message is generated automatically when no data is received there.

Check following connections:

1 Control unit -> receiver.
2 Line connection on the plug-in terminal in the control unit.
3 Cable to receiver.
4 Outer plug-in connector on receiver.
5 Inner plug-in connector in receiver.

10.5 Malfunction messages

NOTE
This Table also contains recommended solutions that should only be carried out by specially trained personnel.

Table 14: Malfunction messages

Message	Description	Clearance
CDOH: No communication SLV	CAN connection between control unit and purge air attachment of the sender/receiver unit is interrupted.	► Check CAN connection. Repair if necessary.
CDR: No communication SLV	CAN connection between control unit and purge air attachment of the reflector unit is interrupted.	

Message	Description	Clearance
CO Ampl. max	CO measuring amplifier is above its modulation range.	► Check optical alignment , see "Fine optical alignment", page 39. ► Check contamination of the optical surfaces. Clean if necessary, see "Cleaning optical surfaces", page 50. ► If not successful, contact Endress+Hauser Service.
CO com.	No connection between CO module and CO module.	► Check lines and plugs. Repair if necessary. ► If not successful, contact Endress+Hauser Service.
CO CUVETTE com.	No connection between CO module and CO cell motor	► Contact Endress+Hauser Service.
CO CUVETTE range	• CO duct in the reference cycle outside the expected range • CO cell possibly leaking	
CO div. zero	Adjustment data of CO module invalid.	
CO EEPROM	CO module parameter record invalid	► Contact Endress+Hauser Service.
CO Motor fault	Motor fault of CO filter wheel	► Contact Endress+Hauser Service.
CO No signal	• CO signals too low, no measurement possible • Dust content too high • CO detector or IR source defective • CO, H_2O measurement ducts continue running.	► Check contamination of the optical surfaces. Clean if necessary, see "Cleaning optical surfaces", page 50. ► Check optical alignment , see "Fine optical alignment", page 39. ► Have IR source or measuring module replaced. Contact Endress+Hauser Service.
CO Sig. High	CO signals distorted, CO_2, H_2O measuring ducts continue running.	► Contact Endress+Hauser Service.
CO temp. detec.	Temperature of CO detector outside tolerance	► Contact Endress+Hauser Service.
El too hot SLV	Electronics too hot	► Improve cooling of sender/receiver unit.
Filter com.	No connection between CO_2-, H_2O module and control filter motor	► Contact Endress+Hauser Service.
H2O Ampl. Max	CO_2-, H_2O measuring amplifier above its modulation range.	► Check optical alignment , see "Fine optical alignment", page 39. ► Check contamination of the optical surfaces. Clean if necessary, see "Cleaning optical surfaces", page 50. ► Contact Endress+Hauser Service.
H2O CUVETTE com.	No connection between CO_2-, H_2O module and cell motor.	► Contact Endress+Hauser Service.
H2O div. Zero	Adjustment data of CO_2/H_2O module invalid.	► Contact Endress+Hauser Service.
H2O EEPROM	Parameter record of CO_2/H_2O module invalid	
H2O Motor fault	Motor fault of CO_2/H_2O filter wheel	► Contact Endress+Hauser Service.
H2O No signal	• H_2O signals too low, no measurement possible • Dust content too high • H_2O detector or IR source defective • CO mesuring duct still running.	► Check contamination of the optical surfaces. Clean if necessary, see "Cleaning optical surfaces", page 50. ► Check optical alignment , see "Fine optical alignment", page 39. ► Have IR source or measuring module replaced. Contact Endress+Hauser Service.
H2O Sig. High	CO_2/H_2O measuring signal distorted.	► Contact Endress+Hauser Service.
H2O temp. detec.	CO_2/H_2O detector temperature outside tolerance	► Contact Endress+Hauser Service.

Message	Description	Clearance
Mirror adj. End	Automatic beam tracking at end stop, further tracking not possible	► Check optical alignment , see "Fine optical alignment", page 39. ► If not successful, contact Endress+Hauser Service.
Mirror com.	No communication to automatic beam tracking, measurement continues.	► Contact Endress+Hauser Service.
Sensor communication	No connection between control unit and analyzer	► Check CAN connection. Repair if necessary.
VISOR com.	No connection between CO_2/H_2O module and visor unit	► Check lines and plugs. Repair if necessary. ► If not successful, contact Endress+Hauser Service.
VISOR fault	Visor unit data or signals distorted	► Check optical alignment , see "Fine optical alignment", page 39.
VISOR init.	Basic setting of visor unit invalid.	► Contact Endress+Hauser Service.
VISOR No signal	• Visor signals too low • Dust content too high • IR source defective • Measurement continues.	► Check contamination of the optical surfaces. Clean if necessary, see "Cleaning optical surfaces", page 50. ► Check optical alignment , see "Fine optical alignment", page 39. ► If not successful, contact Endress+Hauser Service.
Zero com.	No connection between CO_2/H_2O module and motor of zero point reflector	

10.6 Warning messages

Table 15: Warning messages

Message	Description	Clearance
Air purge low SLV	Volume flow is below the set threshold.	► Check purge air supply (blower, hoses), change filter on purge air blower if necessary, see Purge Air Supply Manual.
Chopper freq.	Chopper wheel frequency outside tolerance.	► Replace lamp module. ► If not successful, contact Endress+Hauser Service.
CD: Filter watch SLV	Purge air unit low-pressure monitor switches on binary input.	► Check purge air supply (blower, hoses), change filter on purge air blower if necessary, see Purge Air Supply Manual.
CD: P No Signal SLV	No signal from pressure sensor	► Check connection and line connections of the pressure sensor on the purge air attachment. Repair if necessary.
CD: P out of range SLV	Sample gas pressure < 500 or > 1200 hPa/mbar.	► Check or replace pressure sensor.
CD: T Air Sign. SLV	Sensor break or no temperature sensor (purge air temperature) connected.	► Check connection and line connection of the temperature sensor (purge air temperature) on the purge air attachment. Repair if necessary.
CD: [t] No Signal SLV	Sensor break or no temperature sensor (flue gas temperature) connected.	► Check connection and line connection of the temperature sensor (flue gas temperature) on the purge air attachment. Repair if necessary.
CO Low sig.	• Contamination of the CO measuring duct • Dust content too high • IR source aged	► Check contamination of the optical surfaces. Clean if necessary. , see "Cleaning optical surfaces", page 50 ► Check optical alignmentsee "Fine optical alignment", page 39 ► If not successful, contact Endress+Hauser Service.
CO not ready	• CO measurement not ready yet. • Signal distorted. • The device is in the warm-up phase.	► Wait until the operating temperature is reached (30 minutes). ► If not successful, contact Endress+Hauser Service.

Message	Description	Clearance
CO2 Reference	Deviation of control value measurement too large	► Perform maintenance. ► Contact Endress+Hauser Service.
H2O Low sig.	• Contamination of the H_2O measuring duct • Dust content too high • IR source aged	► Check contamination of the optical surfaces. Clean if necessary. , see "Cleaning optical surfaces", page 50 ► Check optical alignmentsee "Fine optical alignment", page 39 ► Contact Endress+Hauser Service.
H2O not ready	• CO_2-, H_2O measurement not ready yet. • Signal distorted. • The device is in the warm-up phase.	► Wait until the operating temperature is reached (30 minutes). ► Contact Endress+Hauser Service.
H2O Reference	Deviation of control value measurement too large	► Perform maintenance. ► Contact Endress+Hauser Service.
HYGRO com	No connection between CO_2-, H_2O module and humidity sensor.	► Check line connection and correct seating of the plug connection; Repair if necessary. ► Switch to default value. ► Contact Endress+Hauser Service.
HYGRO internal	No communication to the internal humidity sensor • Sensor defective/line break	► Check line connections. ► Exchange sensor.
MIRROR adj.	Automatic beam tracking: Optical axis tilt greater than trackable range	► Check optical alignment, see "Fine optical alignment", page 39
MR Adjustment	Visor unit shows deviation (> 0.5 from nominal position)	► Check optical alignment, see "Fine optical alignment", page 39
Software version	Software of control unit and sender/receiver unit not compatible	► Install latest software. ► Contact Endress+Hauser Service.
VISOR amplifier	Amplifier in visor at limit. The amplifier control takes place in the control cycle; maximum value 255.	► Check contamination of the optical surfaces. Clean if necessary. , see "Cleaning optical surfaces", page 50

10.7 Repairing inadequate purge air supply

NOTE
For information on the purge air unit, see the Operating Instructions of the purge air unit (SLV4).

10.8 Corrosion on flange

Table 16: Possible causes and clearance

Possible errors	Possible causes	Clearance
Corrosion on flange	Unsuitable materials	► Check project planning.

11 Decommissioning

11.1 Safety

Required technical knowledge

NOTICE

- You are basically familiar with the device.
- You are familiar with conditions at the installation location, especially possible hazards through the gases in the gas duct (hot/dangerous to health).
- You are capable of recognizing and preventing danger by possibly escaping gases.

When one of these requirements is **not** met:

► Contact Endress+Hauser Service or your local Endress+Hauser representative.

Gas

DANGER
Hazard through gas escaping when the sender/receiver unit is swiveled out

Overpressure in the gas duct can cause hot and/or noxious gases to escape when the sender/receiver unit is swiveled out.

► Take appropriate safety measures: Only then swing open the sender/receiver unit.
► Set the lever on the purge air attachment to the "Close" position.

DANGER
Danger to life by leaking hot and toxic gases

Hot and/or noxious gases can escape during work on the gas duct, depending on the plant conditions.

► Work on the gas duct may only be performed by skilled technicians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

Hot measuring probe

CAUTION
Risk of burns when touching the hot measuring probe

When temperatures in the sample gas duct are high, the removed measuring probe remains hot for a long time.

► Wear protective clothing when working on the hot measuring probe.
► Faster cooling of the measuring probe can be achieved by keeping the purge air supply switched on for the time being.

Device damage

NOTICE
Risk of device damage when the purge air is switched off too soon

Hot and contaminated gas can cause device damage when the purge air is switched off when the measuring device is still fitted in the gas duct.

► Do not switch the purge air unit off as long as the measuring device is still in the gas duct.

11.2 Removing the device

CAUTION
Safety when dismantling the sender/receiver unit with mounted measuring probe from the gas duct

► Safe pulling out of the measuring probe from the gas duct requires:
- A safe working platform at the measuring point
- Free space on the working platform for pulling out the measuring probe (note the dimensions of the sender/receiver unit and the measuring probe)
- At least 2 persons
- Personal protective equipment in accordance with plant regulations
- Cleaning material (cloth/brush) to remove coarse dirt from the measuring probe when it is pulled out
- Protective cover for the process flange on the duct side
- Suitable support to be able to place the sender/receiver unit with mounted measuring probe and connected plug connectors protruding at the bottom side safely and without damage on the ground
- Alternatively, the angle flange that may have been used during commissioning is particularly suitable as support during maintenance work. However, high sample gas temperatures or restricted space conditions (duct insulation) may limit the use of the angle flange.
- Coordination of maintenance work and associated interruption of measuring operation with persons responsible for operation of the plant

NOTE
Quick-release fasteners at the sender/receiver unit on the measuring duct

- When the GMP measuring probe is used: Do not open the quick-release fasteners.
- When using the GPP measuring probe and/or with negative pressure in the sample gas duct: Quick release fasteners can be opened.

Material required	Required for
Personal protective equipment	Protection when working on the stack or hot or aggressive sample gases
Angled flange or other suitable support	For safe storage of the sender/receiver unit with mounted measuring probe and screwed cables
Flange cover	Covering the flange
Brush, cleaning cloth	Cleaning the measuring probe

Removing the measuring device

Steps

1. Remove weather hood when fitted.
2. Loosen the locking sleeves of the three plug-in connectors on the underside of the sender/receiver unit and disconnect the plug-in connectors.
3. Loosen the cable clamp for the grounding conductor and disconnect the line.
4. Switch purge air supply off. Remove purge air hose.
5. Let the measuring probe cool down for approx. 30 minutes.
6. Remove the sender/receiver unit. see "Removing the sender/receiver unit", page 49.
7. Unscrew the flange fixture on the flange. Pull out the measuring probe and lay it down..
8. Close off the flange on the gas duct with a cover..
9. Clean the measuring probe under consideration of all protective measures.

Information on storage

see "Storage", page 17.

11.3 Preparing the device ready for shipping

Before shipping:

- ► Contact your local Endress+Hauser representative.
- ► Your Endress+Hauser representative can advise you whether the defective device can be repaired locally or whether it would more advantageous for you to return the device for repair.
- ► Observe the following when returning the device to Endress+Hauser:
  - Flat rates for repairs (concerning duration and costs)
  - Safety protection for the transport
  - Replacement devices or putting the device back into operation by Endress+Hauser Service

NOTICE
Correct device preparation for return delivery

- ► Clean all device components.
- ► Use the original packaging for the transport.
- ► Complete the Non-Risk Declaration (NRD) and lay these clearly visible in the packaging.

Without the Non-Risk Declaration, the device will either be cleaned by a third-party company at the customer's expense or the package will not be accepted.

Clean the device before returning

Prerequisite: Switch device free from voltage.

NOTICE
Close the enclosure before cleaning so that no fluid can penetrate.

Clean surfaces and parts with media contact:

- ► Remove loose contamination with compressed air.
- ► Remove adhering contamination with a mild soap solution and a soft cloth.

NOTE
Cleaning agents not to be used

- High-pressure cleaners
- Aggressive mechanical or chemical cleaning agents

- ► Clean optical surfaces.

11.4 Environmentally compatible disposal

The device should be disposed as industrial waste.

NOTICE

- ► Observe relevant local conditions for disposal of industrial waste.

WARNING
Disposal of subassemblies containing residual substances which are harmful to the environment

The following subassemblies could contain substances that have to be disposed of separately:

- Electronics: Capacitors, rechargeable batteries, batteries
- Display: Liquid of LC-Display

11.4.1 Removing the battery

To remove the battery, the AWE control unit must be dismounted.

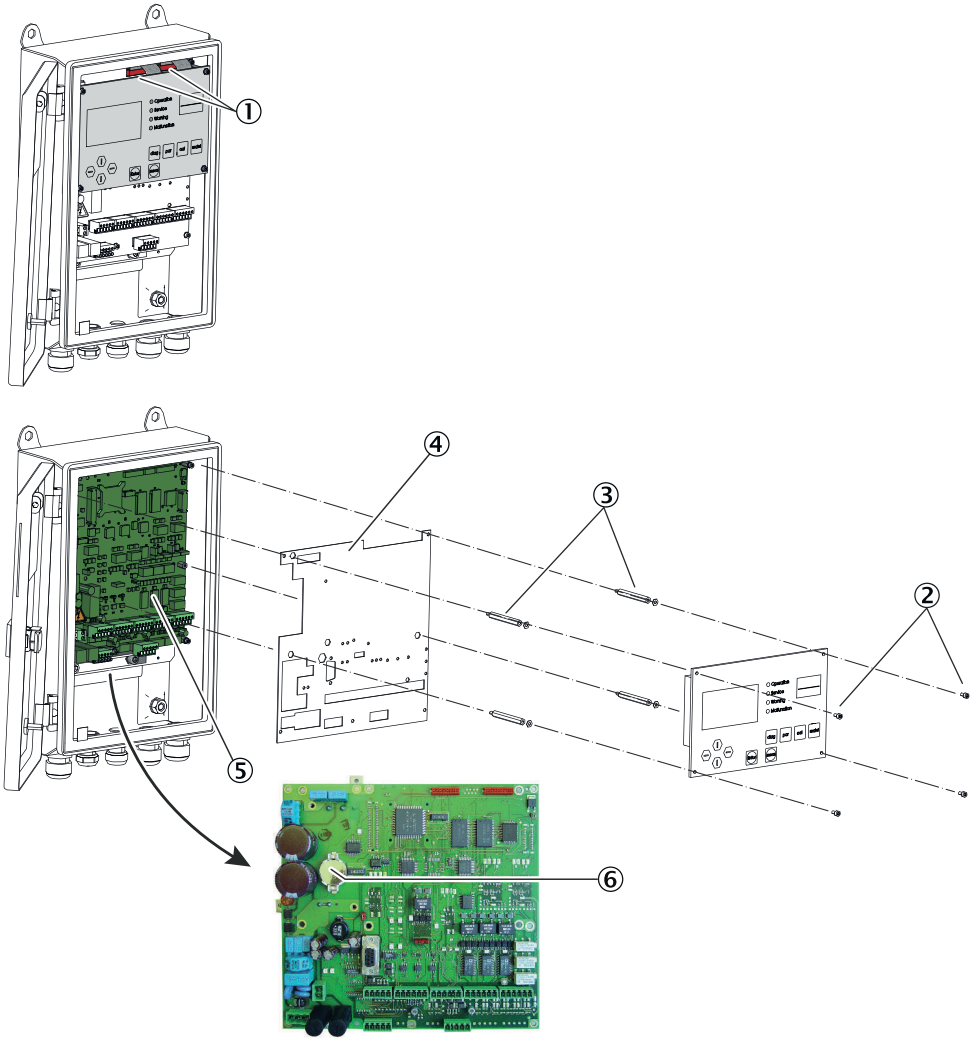


Figure 30: Removing the control unit

Steps

1. Disconnect the complete device (control unit and sender/receiver unit) from the power supply.
2. Open control unit with control cabinet key.
3. Disconnect plug connections ①.
4. Remove the display:
   - Remove 4 × 2.5 mm screws ②.
   - Pull off the display.
5. Remove 4 × 5.5 mm spacer bolts ③.
6. Remove cover plate ④.
7. Remove button cell ⑥ from electronic board ⑤.

12 Technical data

12.1 GM35 system

Table 17: Technical data System GM35

Description	In-situ gas analyzer for emission monitoring and process measurement
Measured variables	CO, CO_2, H_2O
Performance-tested measured variables	CO, CO_2, H_2O
Measuring principles	Gas filter correlation, Interference filter correlation
Measuring ranges	CO: • 0 … 180 ppm / 0 … 20,000 ppm CO_2: • 0 … 22.5 Vol.-% / 0 … 100 Vol.-% H_2O: • 0 … 25 Vol.-% / 0 … 100 Vol.-% Measuring ranges refer to 1 m measuring distance. Measuring ranges depending on application and device version
Certified measuring ranges	CO: • 0 … 75 mg/m³ / 0 … 2,000 mg/m³ CO_2: • 0 … 15 Vol.-% H_2O: • 0 … 25 Vol.-% Cross-Duct and GMP versions are performance-tested.
Zero point drift	± 2%: relative to upper measuring range value
Reference point drift	± 2%: in maintenance interval (6 months), relative to upper measuring range value
Use	Indoor and outdoor
Altitude	Max. 2000 m (above sea level)
Ambient temperature	–20 °C … +50 °C Temperature change maximum ±10 °C/h
Storage temperature	–40 °C … +55 °C
Ambient humidity	≤ 96% relative humidity, non-condensing
Conformities	EN 15267 (MCERTS)
Electrical safety	CE
Overvoltage category	II
Degree of contamination	2
Assembly	Mounting flange, DN125, PN6 Mounting flange, ANSI, 5"
Control functions	Automatic check cycle for zero and reference point
Options	Control unit SCU (only for non-Ex areas)

12.2 Sender/receiver unit

Table 18: Technical data, GM35 sender/receiver unit

Description	Analyzer unit of measuring system
Degree of protection	IP66
Dimensions (W × H × D)	291 mm × 527 mm × 529 mm
Weight	29 kg

Power supply	• Voltage: 115 V AC / 230 V AC, ±10% (line voltage fluctuation) • Frequency: 48 ... 62 Hz • Power input: ≤ 350 W

12.3 Open GMP measuring probe

Table 19: Technical data, open GMPmeasuring probe

Description	Measuring probe in open design version with integrated purge air guidance system
Measuring distance	see Dimension drawing
Accuracy	• Pressure sensor: 1 % • Temperature sensor: 1 %
Process temperature	≤ +430 °C
Process pressure	–60 ... +30 hPa, depending on purge air supply
Dust load	≤ 3 g/m³ Relative to 1 m measuring distance, depending on application
Degree of protection	IP66
Dimensions (W × H × D)	see Dimension drawing
Weight	see Dimension drawing
Material, media contact	Stainless steel 1.4571, stainless steel 1.4539
Power supply	Supply via sender/receiver unit
Auxiliary gas connections	Purge air: Hose nozzle 40 mm
Built-in components	• Flow monitor for purge air monitoring • Temperature sensor PT1000 • Pressure sensor

12.4 Gas-testable GPP measuring probe

Table 20: Technical data, gas-testable GPP measuring probe

Description	Measuring probe with gas permeable filter element for adjustment with test gas
Measuring distance	see Dimension drawing
Accuracy	• Pressure sensor: 1% • Temperature sensor: 1%
Process temperature	≤ +430 °C
Process pressure	–120 ... +200 hPa
Dust load	≤ 30 g/m³
Degree of protection	IP65
Dimensions (W × H × D)	see Dimension drawing
Weight	see Dimension drawing
Material, media contact	Stainless steel 1.4571, stainless steel 1.4539, ceramic, PTFE
Power supply	Supply via sender/receiver unit
Auxiliary gas connections	Test gas: Clamping ring screw connection 1/4"
Built-in components	• Temperature sensor PT1000 • Pressure sensor

12.5 Control unit, AWE, sheet steel enclosure

Table 21: Technical data, control unit, AWE, sheet steel version

Description	The control unit serves as user interface, for data processing and output as well as control and monitoring functions.

Degree of protection	IP65
Analog outputs	**3 outputs:** • 0/4 ... 20 mA, 500 Ω • Electrically isolated
Analog inputs	**1 input:** • 0 ... 20 mA, 100 Ω
Digital outputs	**3 relay contacts:** • 48 V AC, 1 A, 60 W / 48 V DC, 1 A, 30 W • Preset for malfunction, maintenance and function check
Digital inputs	**3 inputs:** • +24 V
Serial	✓ • Type of field bus integration; RS-232 • Function: Proprietary Service Interface
CAN bus	✓ Function: Internal System bus
Display	LC-Display Status LEDs: Operation, Service, Warning, Malfunction
Input	Arrow buttons Function buttons
Operation	Menu-guided operation via LC-display and membrane keyboard
Version	Sheet steel enclosure
Dimensions (W × H × D)	210 mm × 381.4 mm × 108 mm
Weight	4.7 kg
Power supply	• Voltage: 115 V / 230 V AC, ±10% (line voltage fluctuation) • Frequency: 50 Hz / 60 Hz • Power input : ≤ 50 W
Battery	• Type: Button cell 3V CR2032 • Chemical system: Lithium-ion (Li-ion)

12.6 Control unit, AWE, cast metal enclosure

Table 22: Technical data, control unit, AWE, cast metal version

Description	The control unit serves as user interface, for data processing and output as well as control and monitoring functions.
Degree of protection	IP67
Analog outputs	**3 outputs:** • 0/4 ... 20 mA, 500 Ω • Electrically isolated
Analog inputs	**1 input:** • 0 ... 20 mA, 100 Ω
Digital outputs	**3 relay contacts:** • 48 V AC, 1 A, 60 W / 48 V DC, 1 A, 30 W • Preset for malfunction, maintenance and function check
Digital inputs	**3 inputs:** • +24 V
Serial	✓ • Type of field bus integration; RS-232 • Function: Proprietary Service Interface
CAN bus	✓ Function: Internal System bus
Display	LC-Display Status LEDs: Operation, Service, Warning, Malfunction

Input	Arrow buttons Function buttons
Operation	Menu-guided operation via LC-display and membrane keyboard
Version	Cast metal enclosure
Dimensions (W × H × D)	289 mm × 370 mm × 138 mm
Weight	8.6 kg
Power supply	• Voltage: 115 V / 230 V AC, ±10% (line voltage fluctuation) • Frequency: 50 Hz / 60 Hz • Power input : ≤ 50 W
Battery	• Type: Button cell 3V CR2032 • Chemical system: Lithium-ion (Li-ion)

12.7 Connection unit

Table 23: Technical data, connection unit

Description	To extend the CAN bus connection with a line provided by the customer
Degree of protection	IP65
Dimensions (W × H × D)	125 mm × 103 mm × 57 mm
Weight	3 kg

12.8 Dimension drawing, sender/receiver unit

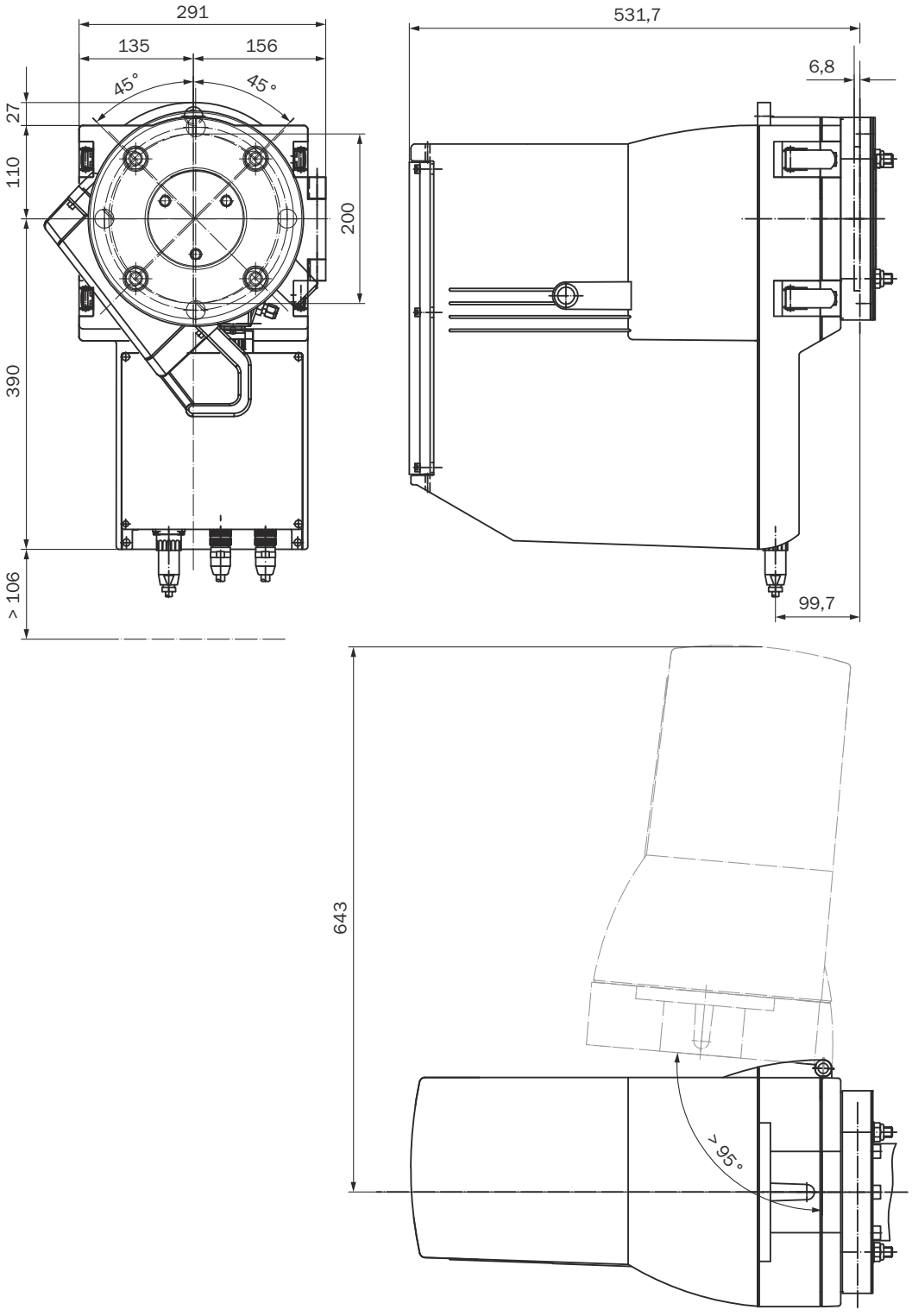


Figure 31: GM35 sender/receiver unit (all dimensions in mm)

12.9 Dimension drawing, open GMP measuring probe

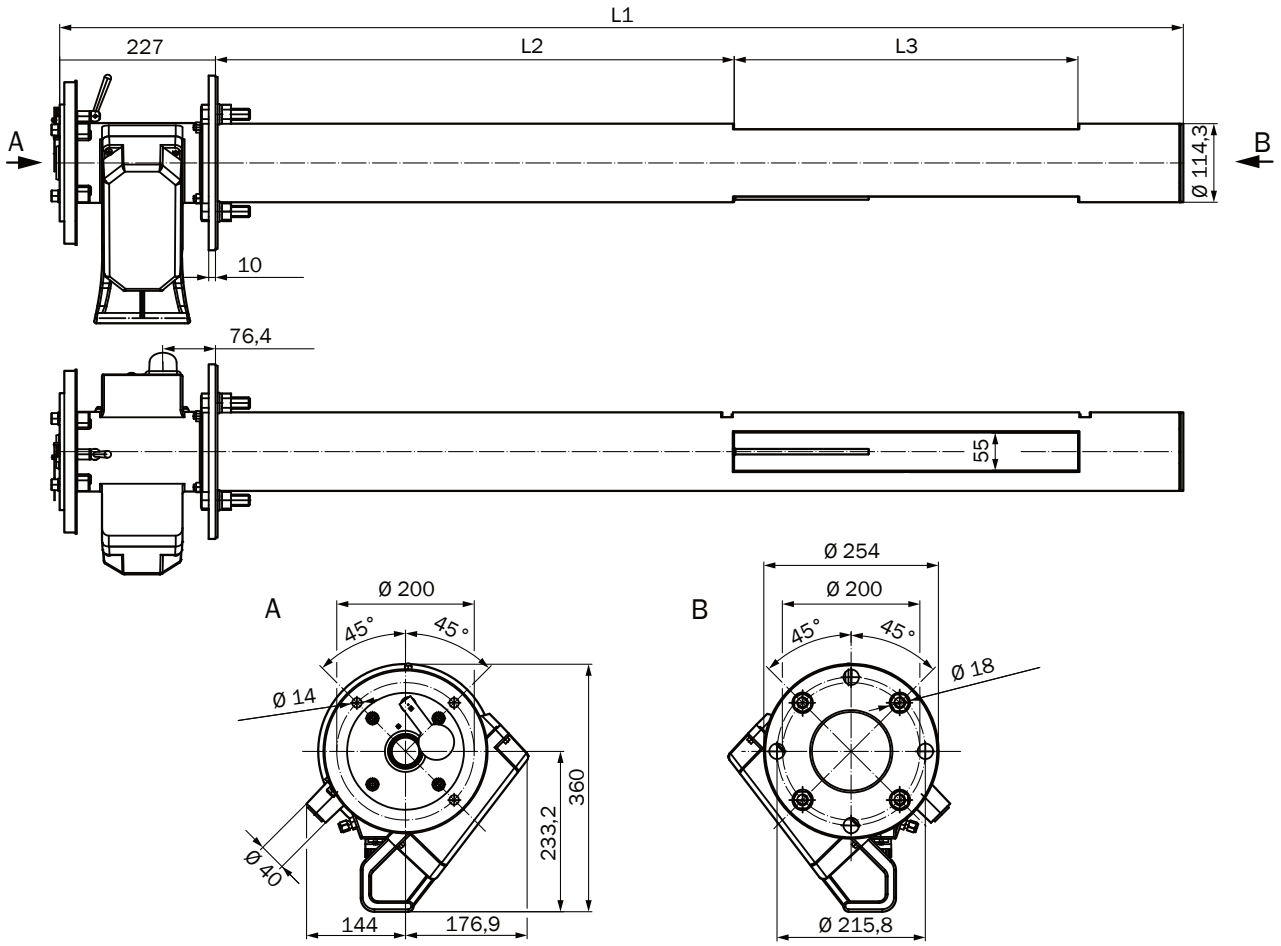


Figure 32: GMP measuring probe (all dimensions in mm)

Table 24: Versions of the GMP measuring probe

GMP measuring probe		L3							
		250	500	750	1.000	1.250	1,500	1.750	
Probe length, nominal	L1	L2							Weight
900	935	296	–	–	–	–	–	–	21
1.500	1.644	1,005	755	505	255	–	–	–	24
2.000	2.128	1.489	1.239	989	739	489	239	–	30
2,500	2,628	1,988	1,738	1,488	1,238	988	738	488	35
All length dimensions in mm, all weights in kg									
Application-specific lengths on request									

12.10 Dimension drawing, gas-testable GPP measuring probe

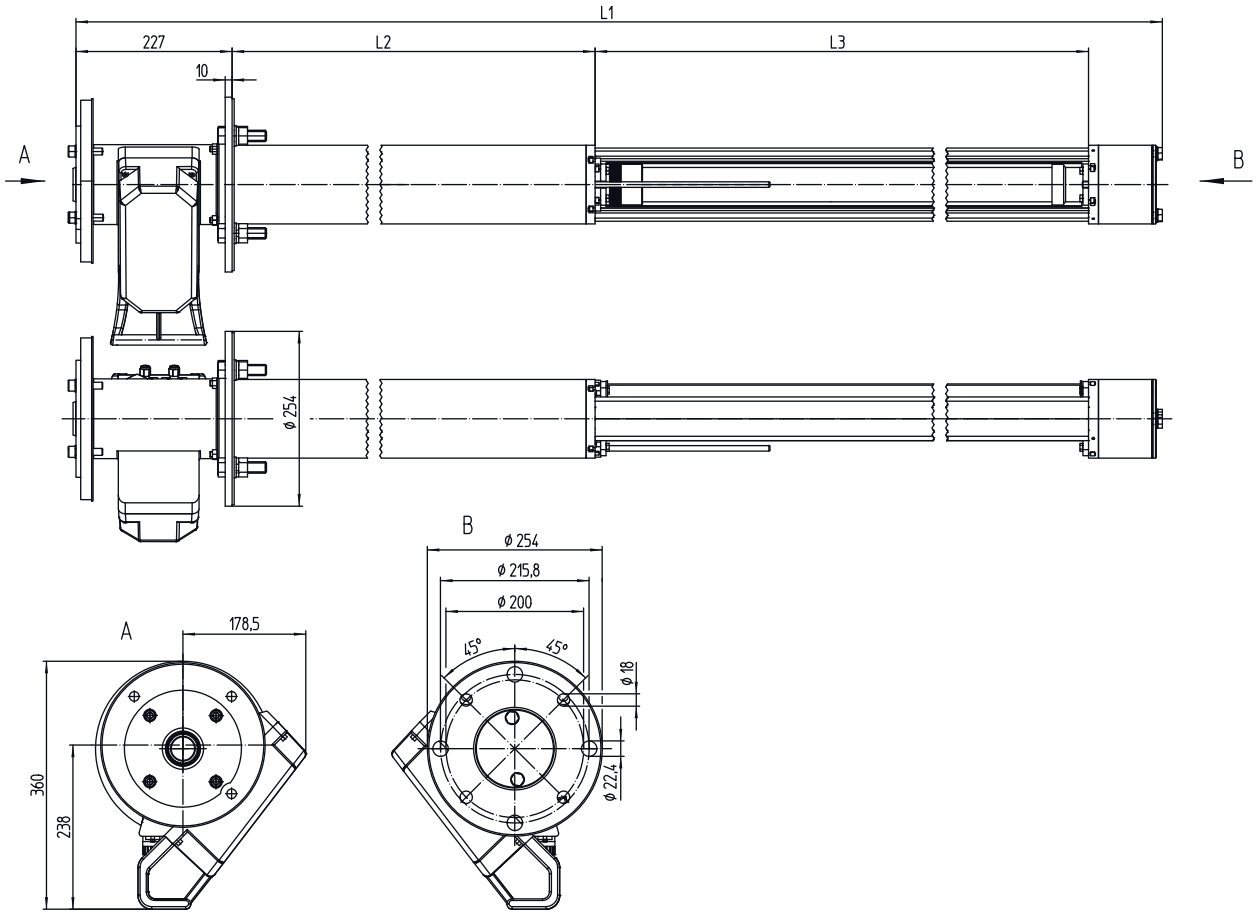


Figure 33: GPP measuring probe (all dimensions in mm)

Table 25: GPP measuring probe versions

GPP measuring probe		Length L3				
		227	477	727	977	
Probe length, nominal	L1	L2				Weight
900	914	353	103	–	–	27
1.500	1,624	1,063	813	563	313	35
2.000	2,108	1,547	1,297	1,047	797	42
2,500	2,608	2,047	1,797	1,547	1,297	50
All lengths in mm, all weights in kg						
Application-specific lengths on request						

12.11 Dimension drawing, control units

Control unit AWE (sheet steel enclosure version)

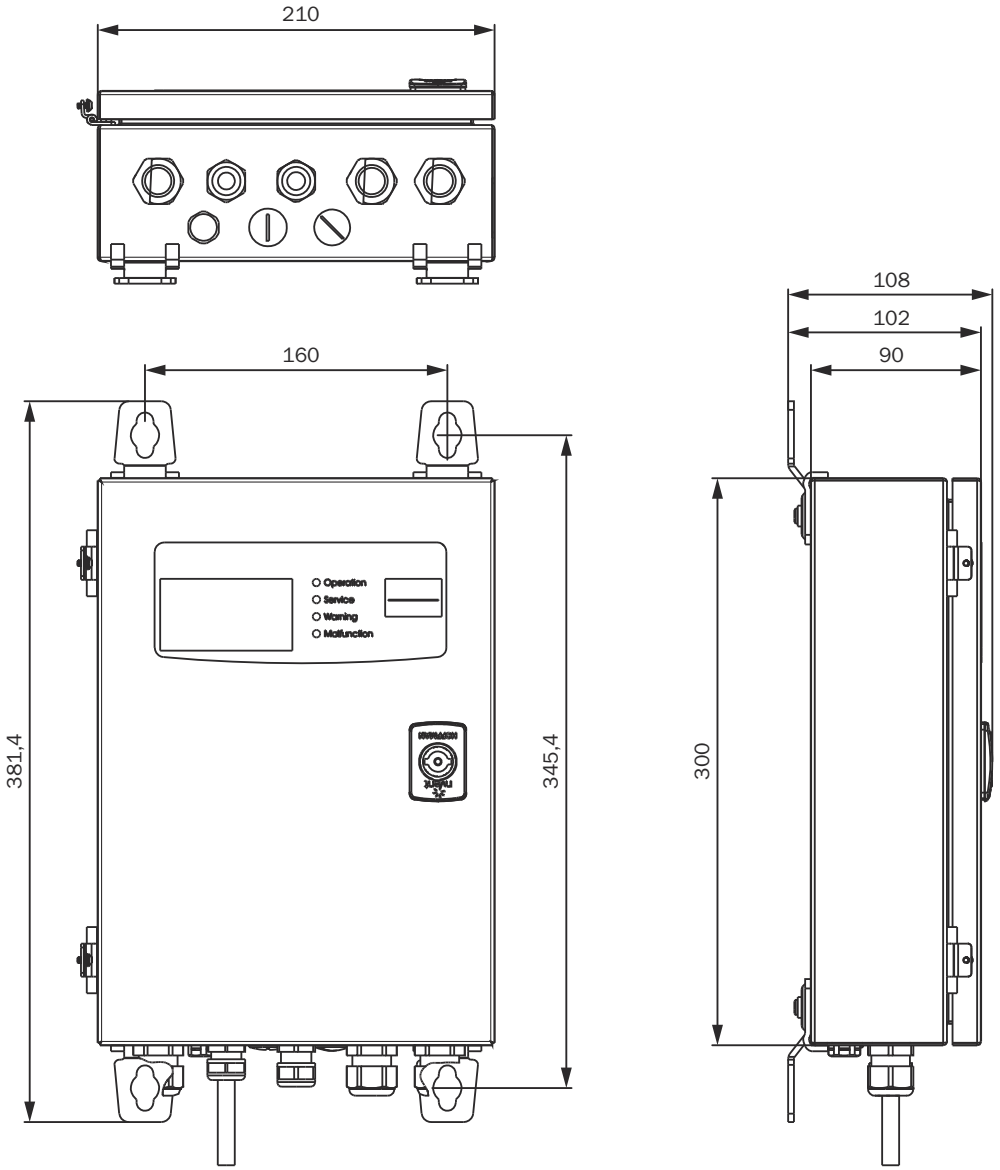


Figure 34: Control unit AWE (sheet steel enclosure version), dimensions in mm

Control unit AWE (cast metal enclosure version)

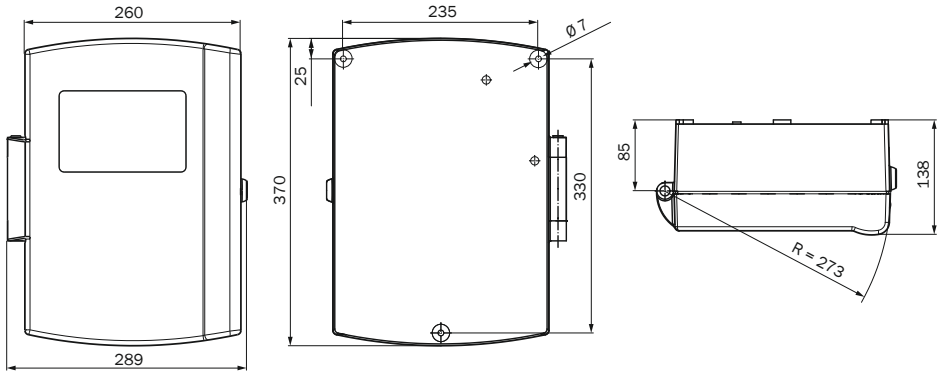


Figure 35: Fitting the control unit AWE (sheet steel enclosure version), dimensions in mm

12.12 Dimension drawing, flange with tube, DN125

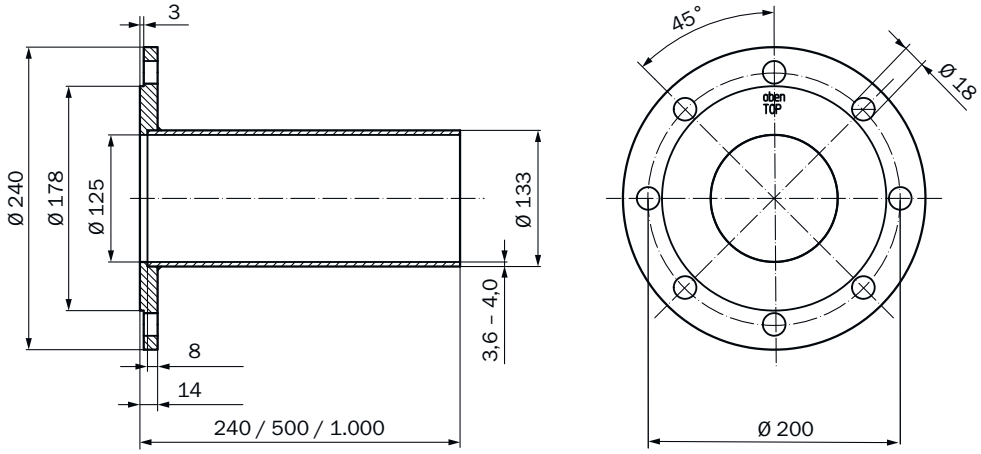


Figure 36: Flange with tube, DN125 (dimensions in mm)

12.13 Dimension drawing, connection unit

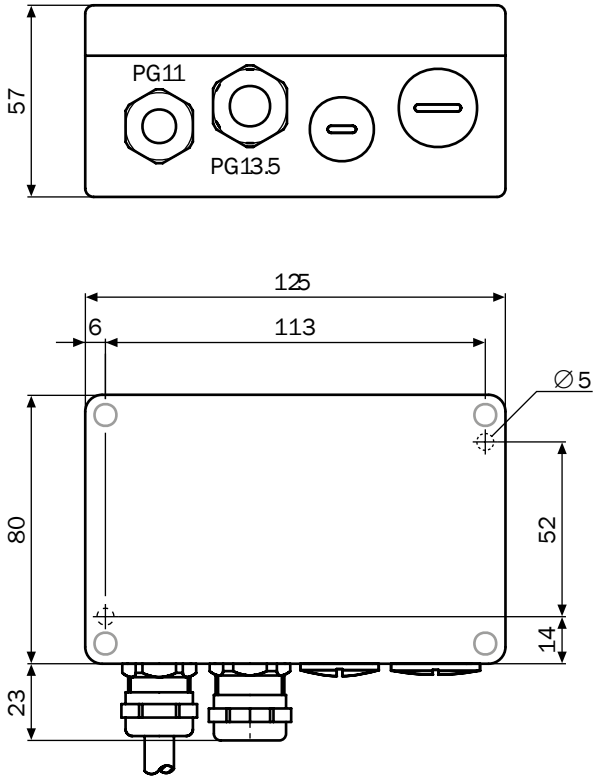


Figure 37: Dimensions, connection unit (dimensions in mm)

12.14 Dimension drawing, weather hoods

Weatherproof cover for sender/receiver unit

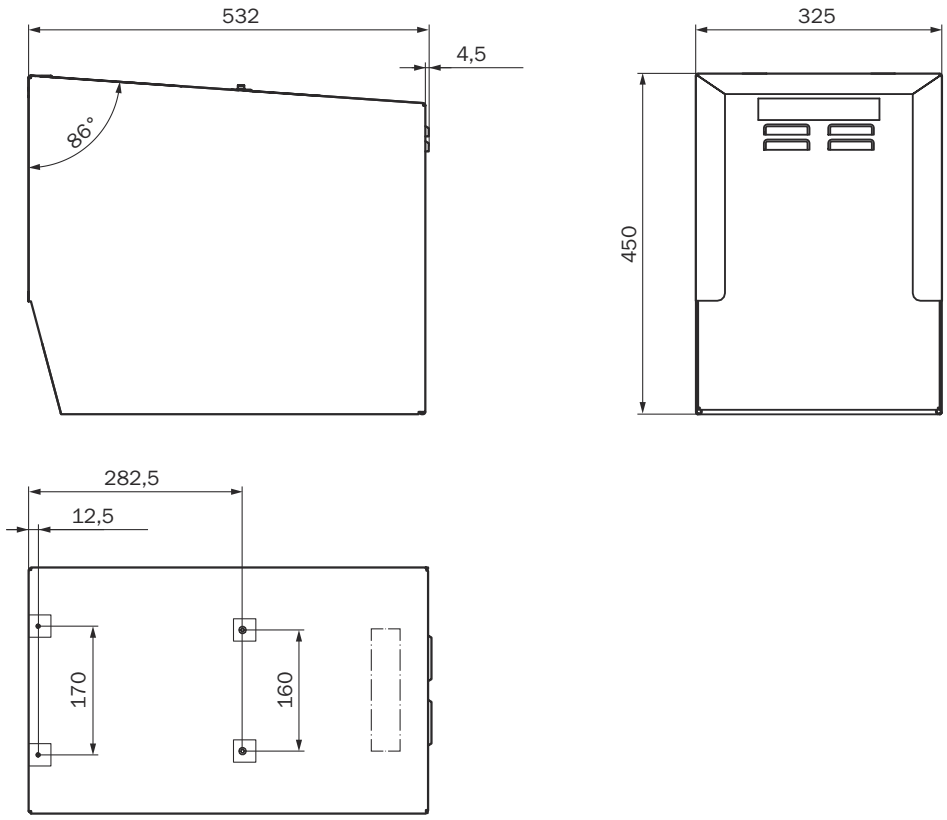


Figure 38: Weather hood for sender/receiver unit (dimensions in mm)

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