OPERATING INSTRUCTIONS

GM901

Carbon Monoxide Measuring Device, Cross-Duct Version

SICK
Sensor Intelligence.

Described product
Product name: GM901
Variant: Cross-Duct version

Manufacturer
SICK AG
Erwin-Sick-Str. 1 · D-79183 Waldkirch · Germany
Phone: +49 7641 469-0
Fax: +49 7641 469-1149
E-mail: info.pa@sick.de

Production location
SICK AG
Gisela-Sick-Str. 1 · 79276 Reute · Germany

Legal information

Original document
This document is an original document of SICK AG.

Contents

1 About this Document

Function of this document

These Operating Instructions describe the standard scope of delivery of the GM901 CO measuring device. They serve understanding the function and describe assembling, installing and commissioning as well as operating the GM901.

NOTE:
- Read the Operating Instructions before starting any work!
- Pay careful attention to all warning information.

Symbols used in this document

The following symbols are used in these Operating Instructions to identify important safety information for the user. They are located within the respective Sections where the information is required. Safety information, especially warnings, must be observed and followed.

WARNING:
Indicates potential hazards for persons, particularly through electrical equipment
- Always read and observe warnings with care.

NOTE:
Indicates endangerment of system components or a possible functional impairment.
- Always read and observe the information with care.

Contains additional information about the system or system components for the user and provides useful tips.

2 For your Safety

2.1 Intended use

The GM901 CO measuring device may only be used to monitor CO concentrations. If the device is used for any other purpose or changed in any way, also during assembly and installation, any warranty claims against SICK AG will be rendered invalid.

Persons responsible for safety must ensure that all potential risks of hazards are recognized and avoided in good time.

2.2 Permissible users

All planning, assembly, installation, commissioning, maintenance and repair work must be carried out by adequately instructed personnel only and checked by the responsible skilled persons.

Persons responsible for safety must ensure the following:

- All safety-relevant work is carried out by qualified personnel only.
- Qualified persons are those who, based on their training, experience or instruction as well as their knowledge of relevant standards, regulations, accident prevention rules and plant conditions, are authorized by those responsible for safety for personnel and the plant to carry out such work. It is crucial that these persons are able to identify and avoid potential hazards in good time.
- These persons have access to the documentation supplied with the system as well as the relevant technical documentation for all work carried out, and these persons adhere to the information in this documentation in order to prevent danger or damage.

2.3 Correct handling

To ensure safety precautions are observed and the device is used for its intended purpose, it is important that:

- The system be used in accordance with the technical data and specifications regarding permissible usage, assembly, connection, ambient, and operating conditions. These conditions are governed by the order documents, device user information (type plates etc.), as well as the documentation supplied with the system, which includes these Operating Instructions.
- Users act in accordance with local, system-specific conditions and with due consideration paid to operational hazards and specifications.
- All measures necessary for conservation of value are observed, e.g., during transport and storage and/or maintenance and inspection.

2.4 Troubleshooting precautions

The operator must ensure that:

- Maintenance personnel can be alerted immediately and at any time.
- Maintenance personnel are trained to be able to respond to malfunctions on the GM901 and correctly clear the operational malfunction involved.
- Suitable protective equipment, tools and auxiliary means are available at all times.
- Malfunctions are analyzed by qualified personnel, faults corrected, and operation optimized to prevent similar malfunctions in the future.

2.5 Basic measures to prevent property damage and injury to persons

Incorrect use or handling of the GM901 CO measuring device can cause personal injury or material damage.

▶ Therefore, in order to prevent damage, the relevant safety information and valid safety regulations must be observed.

If the GM901 is used as a sensor in combination with a regulating and control system, the operator must ensure that a failure or malfunction on the GM901 cannot lead to unallowed hazardous operating states or damage.

2.6 Environment-friendly behavior

The GM901 has been designed in accordance with ecological criteria. The subassemblies can be easily separated, sorted and recycled. All materials used in the GM901 are groundwater-neutral.

2.7 Responsibility for system safety

NOTICE: Responsibility for system safety

The person setting the system up is responsible for the safety of the system in which the device is integrated.

2.8 Protection against hazards through gases

2.8.1 Protective measures against escaping gases

- ▶ Wear protective clothing and a protective mask in the case of hot and/or aggressive measuring gases or high dust loads.
- ▶ Never open the enclosure or switch off the purge air feed without taking appropriate protective measures when the duct is pressurized.

2.8.2 Noxious gases in device/module

WARNING: Health risk through contact with toxic gases

The modules and devices contain enclosed potentially dangerous gases that can escape should a defect or leakage occur. See Table "Maximum gas amounts in SICK devices" for these gases.

Should a leakage occur, the concentrations inside the closed device could rise to a certain concentration. These concentrations are also shown in this Table.

- ▶ Check the condition of the seals on the device/module regularly.
- ▶ Always open the device only in good ventilation, especially when a leak of a device component is suspected.

Equipment/ module(s)	Gases	Max. total amount (ml)	Max. concentration inside the device when leaks occur (defect)
GM901	CO	10 ml	350 ppm

Table 1: Maximum gas amounts in SICK devices

2.8.3 Hot gases in ambient conditions with overpressure

- Purge air unit (SLV4)

WARNING: Risk of fire through hot gas escaping in installations with overpressure conditions

On installations with overpressure, the purge air hose can be severely damaged by escaping hot gas and can catch fire depending on the temperature.

On plants with overpressure and gas temperatures over 200 °C at the same time:

- ▶ Ensure reverse flow is prevented by fitting a (trip) flap or a valve.
- ▶ Regularly check the functionality of the reverse flow safeguard.

2.8.4 Behaviour by purge air failure

Certain configurations of the GM901 measuring system demand immediate or short term measures to protect the measuring system should the purge air supply fail.

2.9 Electrical safety

2.9.1 Protection against hazards through electrical equipment

GM901 system components include electrical equipment designed for use in industrial high-voltage plants where the relevant standards and regulations must be observed.

- ▶ Disconnect power lines before working on power connections or live parts.

2.9.2 Electrical safety through circuit breakers properly installed

WARNING: Endangerment of electrical safety during installation and maintenance work when the power supply is not switched off

An electrical accident can occur during installation and maintenance work when the power supply to the device or lines is not switched off using a power isolating switch/ circuit breaker.

- ▶ Before starting the work on the device, ensure the power supply can be switched off using a power isolating switch/circuit breaker in accordance with DIN EN 61010.
- ▶ Make sure the power isolating switch is easily accessible.
- ▶ An additional disconnecting device is mandatory when the power isolating switch cannot be accessed or only with difficulty after installation of the device connection.
- ▶ After completion of the work or for test purposes, the power supply may only be activated again by authorized personnel complying with the safety regulations

2.9.3 Electrical safety through lines with correct rating

WARNING: Endangerment of electrical safety through power cable with incorrect rating

Electrical accidents can occur when the specifications for replacement of a removable power cable have not been adequately observed.

- ▶ Always observe the exact specifications in the Operating Instructions (Technical Data Section) when replacing a removable power line.

2.9.4 Grounding the devices

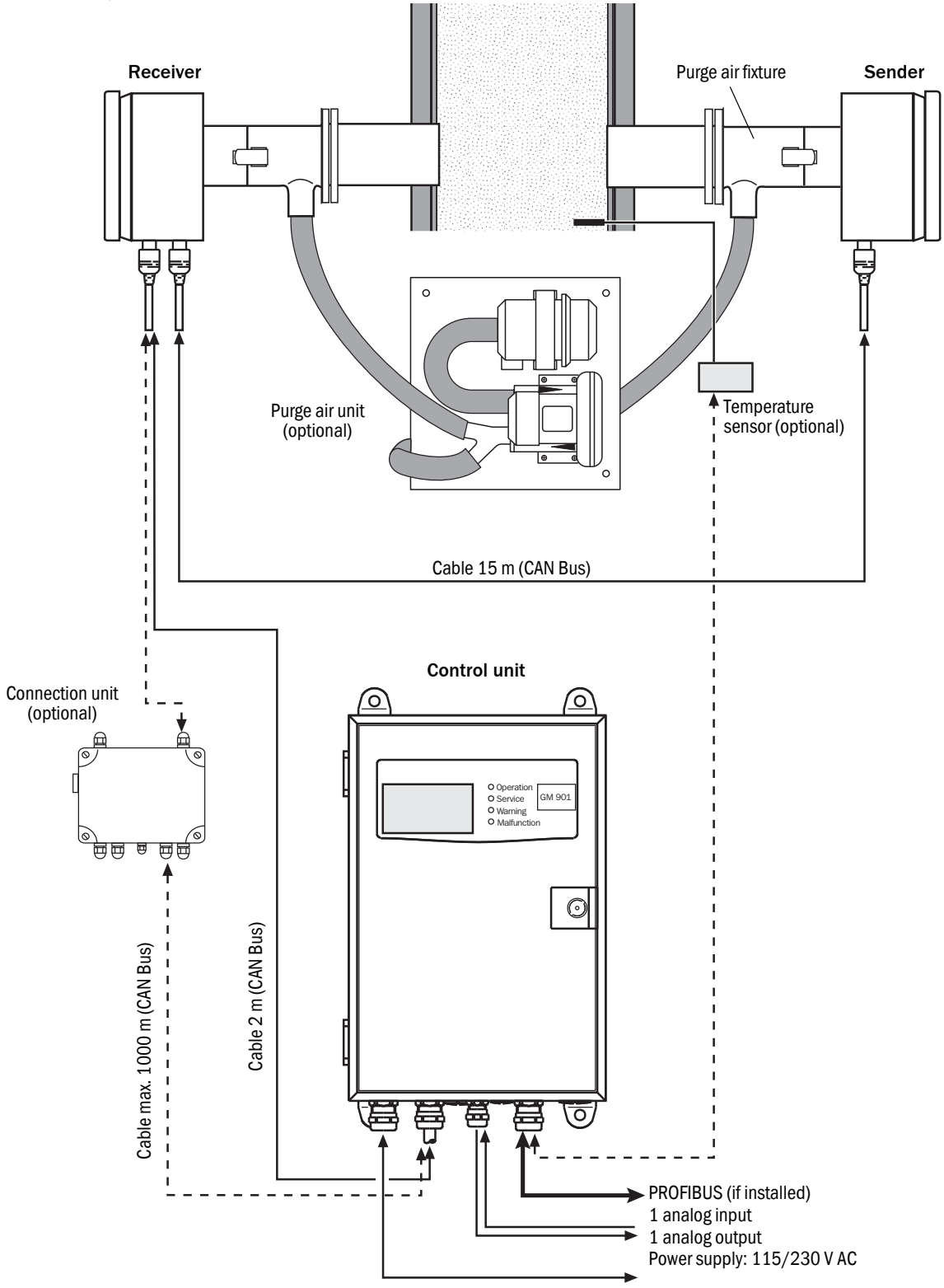
CAUTION: Device damage through incorrect or missing grounding

During installation and maintenance work, it must be ensured that the protective grounding to the devices and/or lines involved is effective in accordance with EN 61010-1.

3 Overview GM901

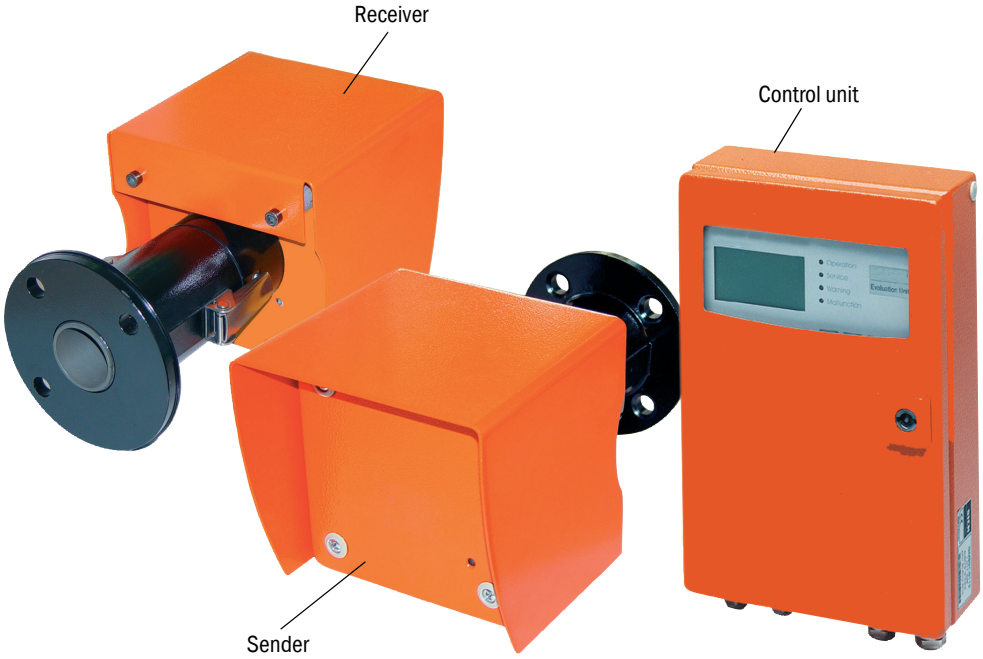
3.1 Device component overview

Fig. 1: Device component overview



3.2 Standard scope of delivery

Fig. 2:GM901 CO measuring device



The basic version of the GM901 comprises

- Sender
- Receiver
- Control unit with connection line (2 m)
- Sender-receiver connection line (15 m)

3.3 Optional accessories

- Connection unit for distances longer than 17 m up to 1000 m
- Purge air unit to protect the optical interfaces from sender and receiver
- Flanges
- Optical adjustment device
- CO test cells with holder (SPAN test)
- Adjustment bracket to create a zero path
- Dummy flange
- Temperature sensor PT 100

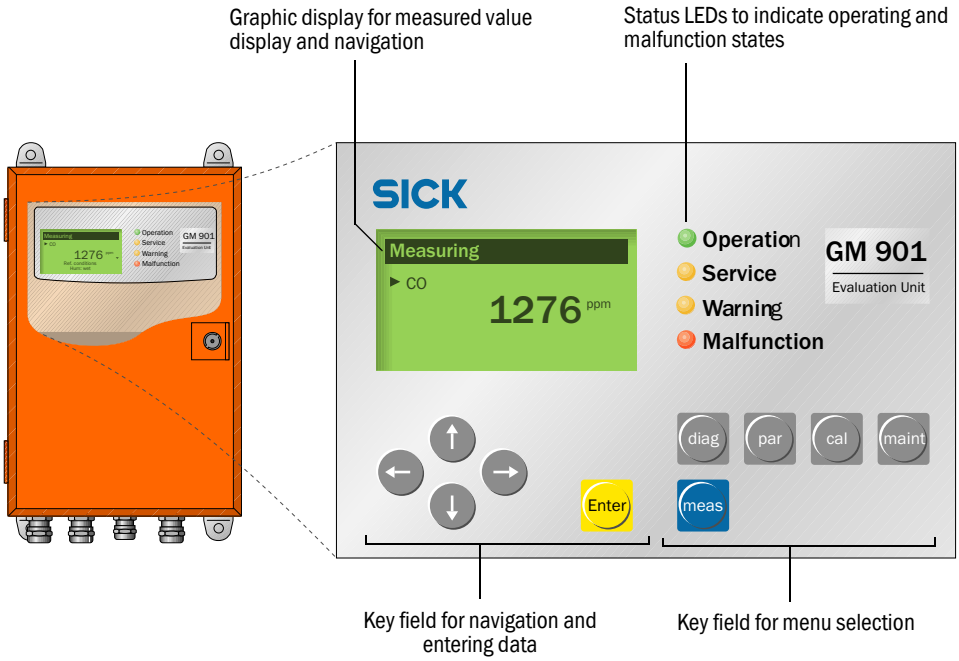
3.3.1 Control unit

The control unit serves as user interface, and prepares and outputs the measured values and performs control and monitoring functions. The EvU can be positioned close to the sender; It can also be located up to about 1000 meters from the sampling point, e.g., installed in the switch center or monitoring center of the industrial plant.

Display and operating elements of the control unit

The control unit serves to display, enter and set parameters and control functions on the system. The operating panel with the display, status indicators and key field is accessible when the enclosure door is opened.

Fig. 3:Display and operating elements on the control unit



3.3.2 PROFIBUS interface (if installed)

PROFIBUS connects the process control level (e.g., central computer, host, control room) to the measuring device. Measured values, status states and error messages are queried cyclically via the PROFIBUS. The GM901 supports PROFIBUS-DP-V1 with transfer rates from 9.6 to 187 kBit/s. A device master file (GSD) is available for the control unit to define the interface. This contains specifications on device manufacturer, identification number, transfer rates available, etc. This GSD (Profile GSD) of the device can be easily used during project planning for the PROFIBUS.

A unique 7 bit device address (1-127) serves to identify PROFIBUS participants and can be entered when setting control unit parameters. Addresses 126 and 127 are reserved and must not be used.

NOTE:
A terminator (terminating resistor) must be plugged to the final device.

Measured values provided

Measured values provided by the GM901 are defined in the device master file (GSD) as input channels for the process control level (AI). The following Table shows the measured variables with the respective assigned units of measure:

Measured variable	CO
CO	ppm
CO	mg/m3 scaled
CO	mg/m3 a.c.

4 Assembly

4.1 Safety information for assembly

4.1.1 Information on lifting and carrying

CAUTION: Risk of injury through incorrect lifting and carrying the device

Injuries can occur due to the weight and projecting enclosure parts when the device tips over or drops. Observe the following information to avoid such accidents:

- Do not use protruding parts on the enclosure to carry the device (apart from the wall fixture or carrying grips).
- *Never* lift the device using the open device door.
- Consider the device weight before lifting.
- Observe the regulations for protective clothing (e.g., safety shoes, non-slip gloves)
- Grip underneath the device when possible to carry it safely.
- Use a hoist or transport device as an option.
- Use the help of a second person when necessary.
- Secure the device during transport.
- Before transporting, ensure obstacles that could cause falls or collisions are cleared away.

4.1.2 Information on assembly (wall fitting)

CAUTION: Accident risk through inadequate fastening of the device

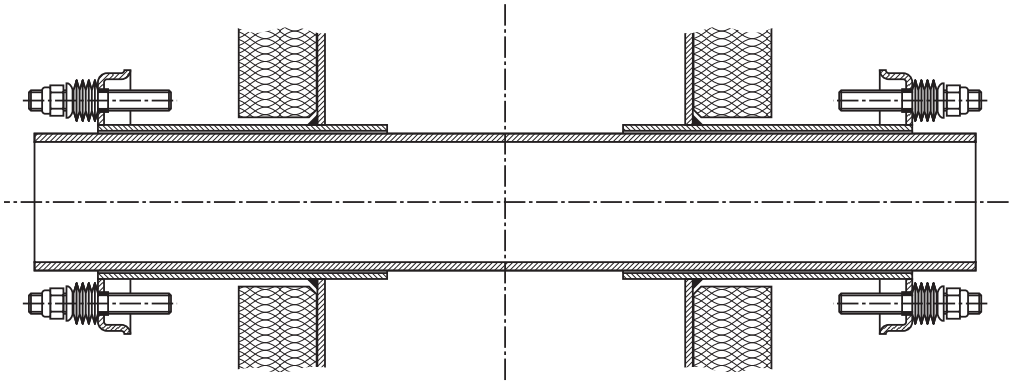
- Consider the weight of the device when selecting fastenings.
- Check the load capability/state of the wall/rack on which the device is to be fitted.

4.2 Fitting the flange with pipe

Important information on installing the flanges with tube

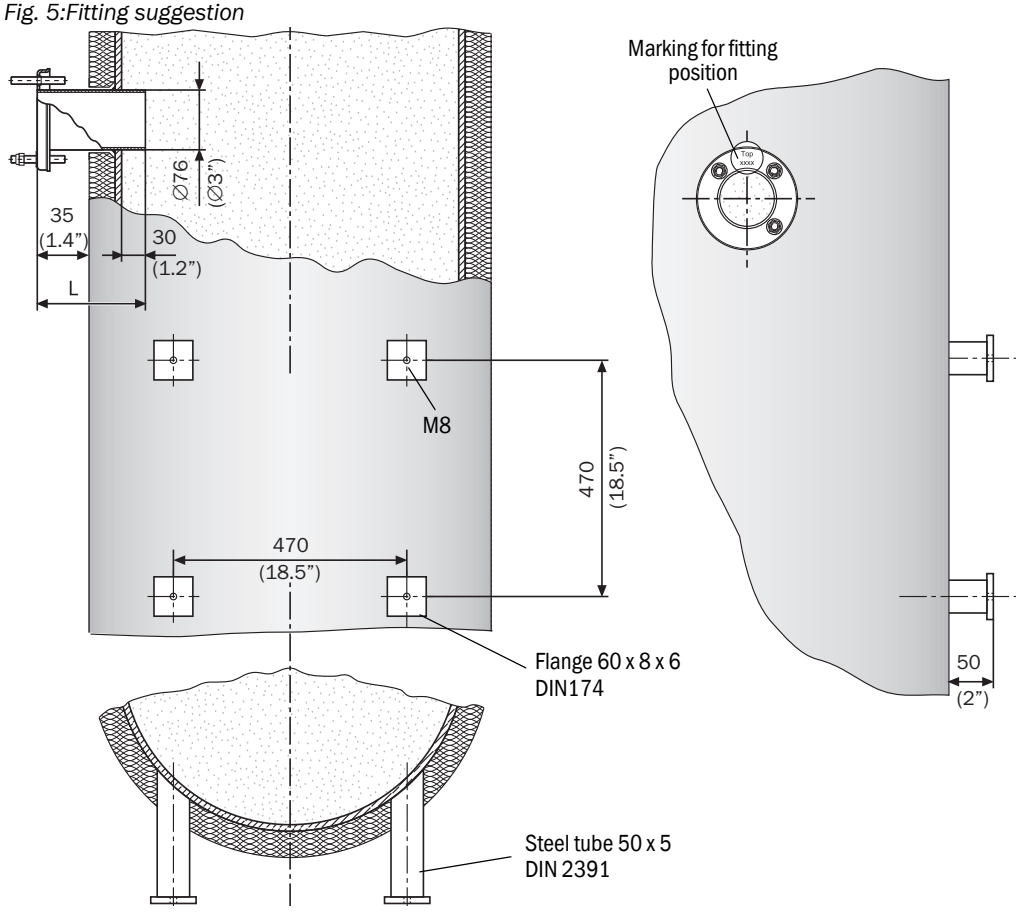
- The axes of the flanges with tube must be aligned carefully to each other during assembly. The angle deviation must be under 1°. Plan suitable reinforcements or support constructions on thin-walled steel ducts.
- On easily accessible measuring paths up to 2 m, the flanges with tube can be aligned using a suitable auxiliary tube (for standard flange diameter 70 mm).

Fig. 4:Auxiliary tube to align the flanges on measuring paths under 2 m



Use an optical adjustment device on longer or not easily accessible measuring paths.

Fig. 5:Fitting suggestion

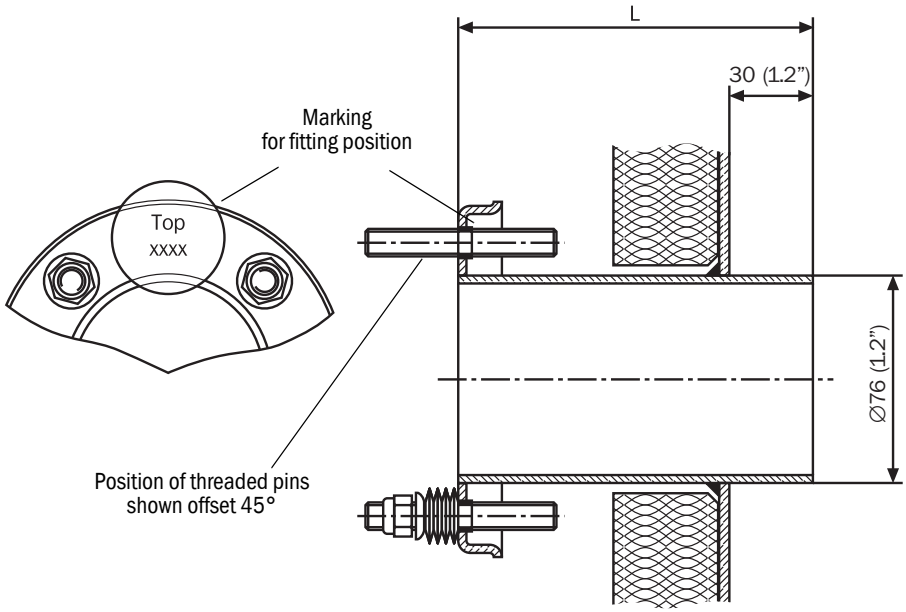


4.2.1 Installing the standard flange

NOTE: Damage to the duct opening possible!
Make sure parts cut off do not fall into the duct

- Mark the assembly position of the “flange with tube”, cut a hole with a blowtorch
- The supports for the “flange with tube” should protrude approx. 30 mm into the duct. If necessary, adjust the tube supports
- Tack-weld the flange with tube and maintain the exact measuring path flange-flange and dimensions for the “Top” marking of the fitting position.

Fig. 6:Flange with tube, standard version



Standard flange with tube		
L [mm]	Part No.	Material
130	2 017 845	ST37
240	2 017 847	ST37
130	2 017 846	1.4571
240	2 017 848	1.4571
500	2 017 849	ST37
500	2 017 850	1.4571

- To align the flange with tube on-site: Use a tube (Fig. 4) or the adjustment device.

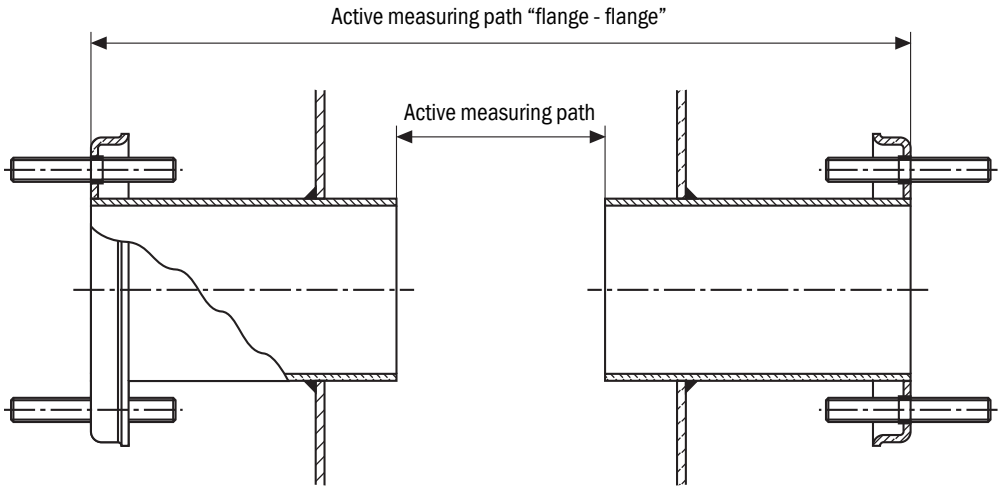
Fig. 7:Aligning the flange using an optical adjustment device

- ▶ Position the light source and the receiver part as described in Fig. 7 when using the adjustment device

1 Align flange No. 1 until the light spot of the light source appears centered in the adjustment circle of the receiver part. Tack-weld flange 1.
2 Reposition the adjustment device swapped
3 Align flange No. 2 and tack-weld
During welding and alignment work, make sure the planned flange-to-flange measuring path is observed exactly when a zero path has already been ordered or delivered. Otherwise the zero path must be adapted, see see “Creating the zero path”, page 36.

4.2.2 Measuring path definition

Fig. 8:Active measuring path “flange - flange”



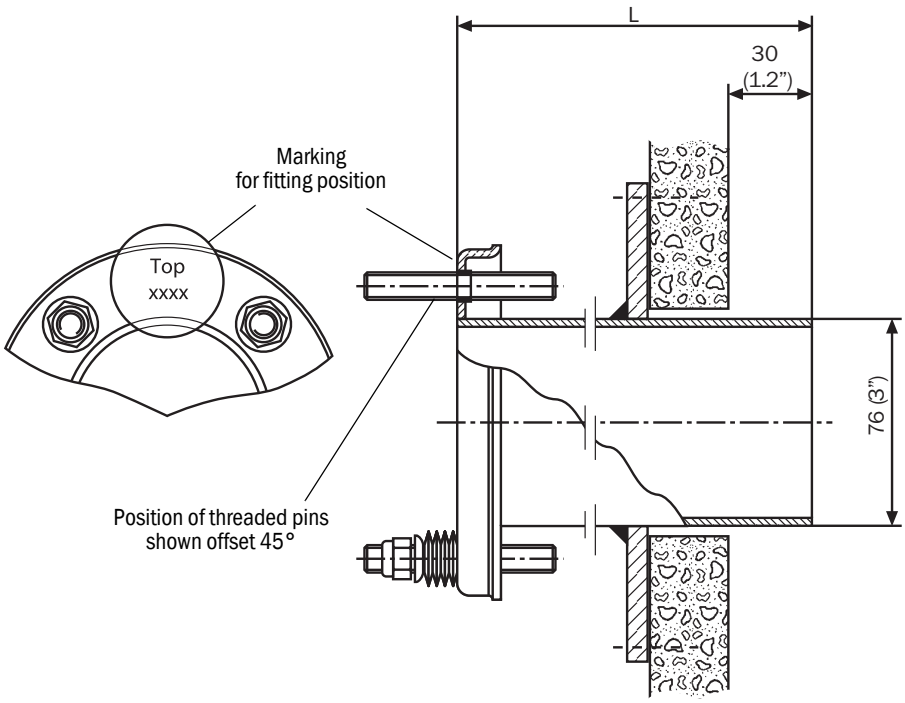
The “flanges with tube” must be aligned exactly within 1°.

- ▶ Correct the alignment when necessary. Circular-weld to finish
- ▶ Determine and note the exact flange-flange distance and the active measuring path length (definition, see Fig. 8). Keep the measures available for commissioning

4.2.3 Assembly variant for brick stacks

For brick ducts, attach a suitable anchor plate to the stack wall and then weld the flanges with tube on.

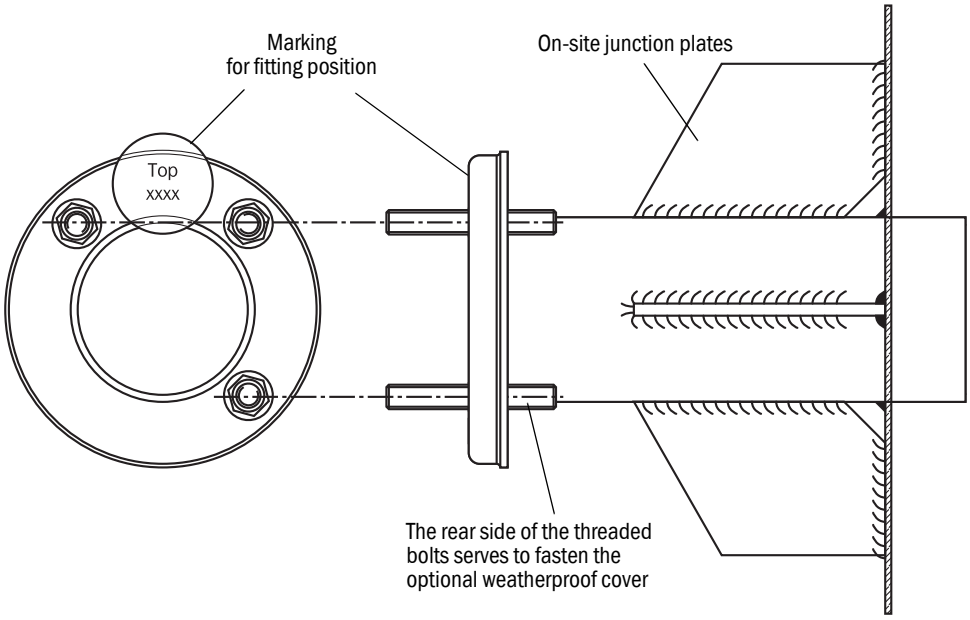
Fig. 9:Flange with tube for brick stacks



4.2.4 Assembly variant for thin-walled ducts

Weld junction plates on on-site for reinforcement of ducts with thin walls or at fitting locations subject to vibrations.

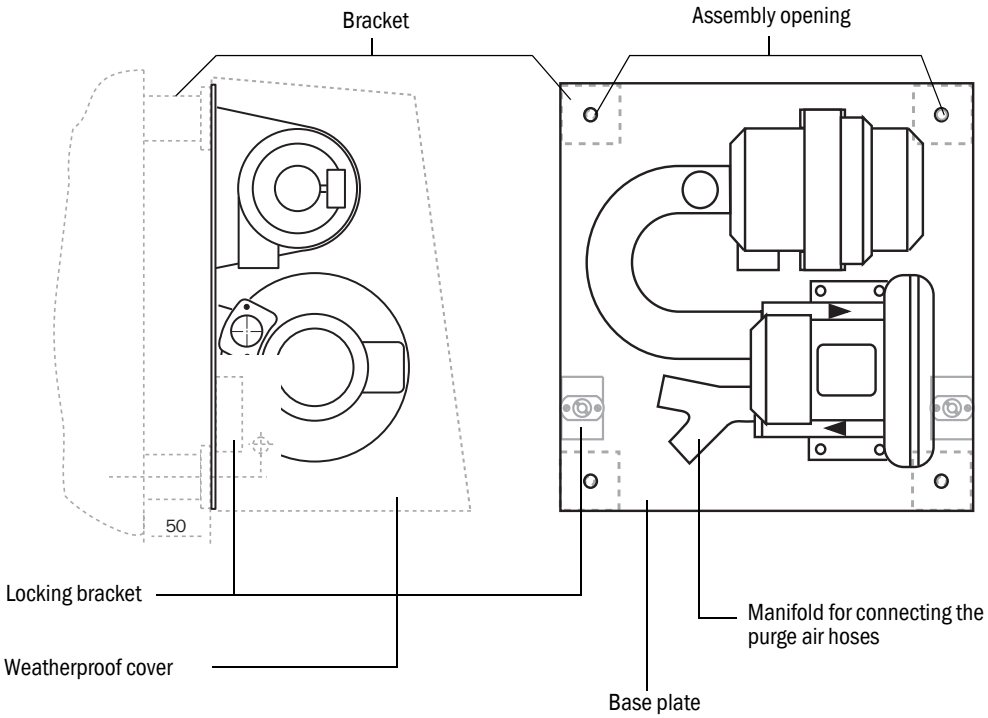
Fig. 10:Example for reinforced fitting location



4.3 Installing the purge air unit

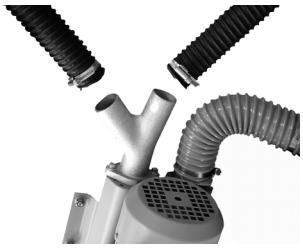
NOTE:
Observe the fitting recommendation when installing the purge air unit, see Fig. 5, page 15.

Fig. 11:Fitting the purge air unit SLV 4



- ▶ Prepare and attach the holders according to the fitting recommendation (see Fig. 5, page 15).
- ▶ Secure the base plate with the purge air unit with 4 screws

Fig. 12:Installing the purge air hoses



- ▶ Prepare the hose lengths:
- – Cut the purge air hoses to the same length and fasten to the manifold with hose clamps
- ▶ Close off the hose ends when the purge air unit is not going to be used for a longer period.

For option weatherproof cover

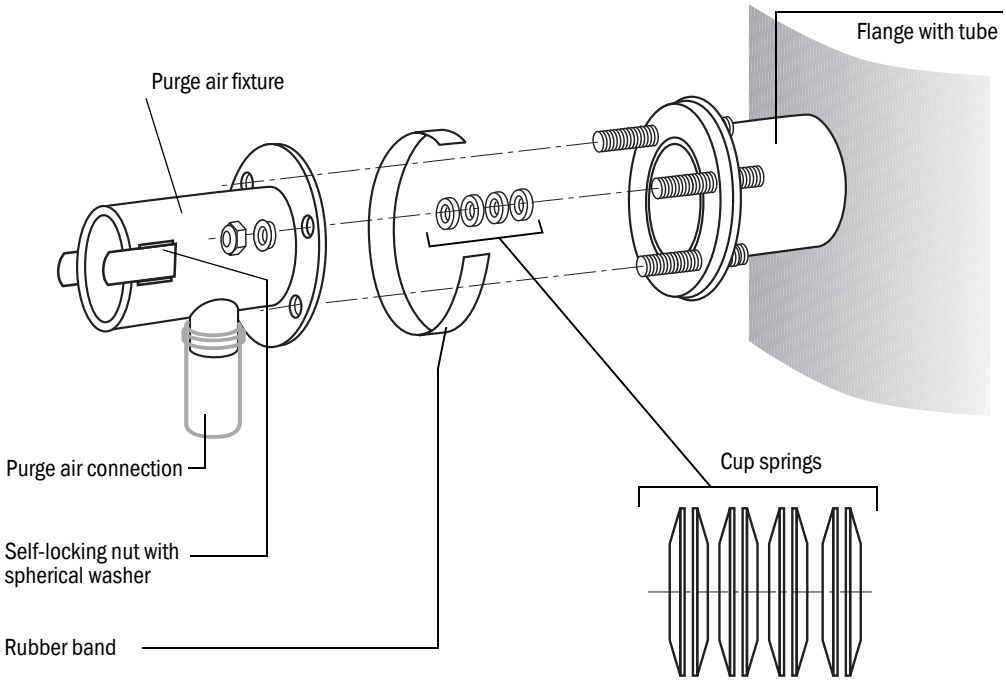
The weatherproof cover comprises the cover and a lock set for fastening.

- ▶ Fit the locking bracket with the screws on the base plate of the purge air unit
- ▶ Put the cover on from above
- ▶ Insert the side lock bolts in the counterparts, rotate and latch into place

4.4 Installing the GM901 CO measuring device

Adjust the GM901 beforehand to ensure trouble-free installation and, most important, commissioning. A CO-free environment must be available for this zero adjust. The adjustment can be made directly at the sampling point when the plant is switched off and the duct free from CO (see “Starting zero adjust”, page 36).

Fig. 13:Installing the purge air fixtures on the flange with tube



1 Purge unit is installed, see “Installing the purge air unit”, page 19
2 Push the purge air hoses onto the purge air fixtures and fasten with hose clamps.
3 Switch the power supply for the purge air unit on, see “Electrical connection of the purge air motor”, page 28
4 Check that purge air is available on the purge air fixtures of the sender and receiver
5 Pull the rubber band onto the flange with tube
6 Push 4 cup springs on each of the 3 threaded bolts
7 Position the purge air fixtures of the sender and/or receiver on the flange
8 Push spherical washers onto the 3 threaded bolts
9 Turn in the self-locking nuts (SW17) and tighten so that a gap of 8.5...10 mm is between both flange plates
10 Pull the rubber band over this connection gap.

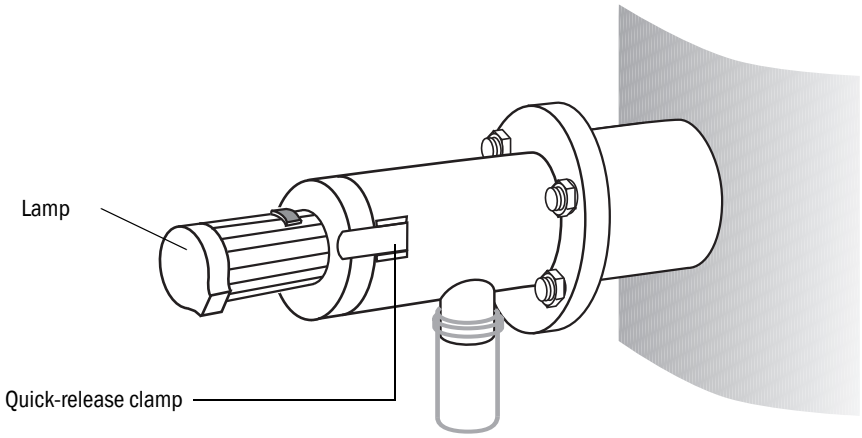
4.4.1 Aligning the optical axis

An adjustment device with a lamp and an optional adjustment tube are available for simple alignment of the purge air fixtures.

Fig. 14:Adjustment device (option)

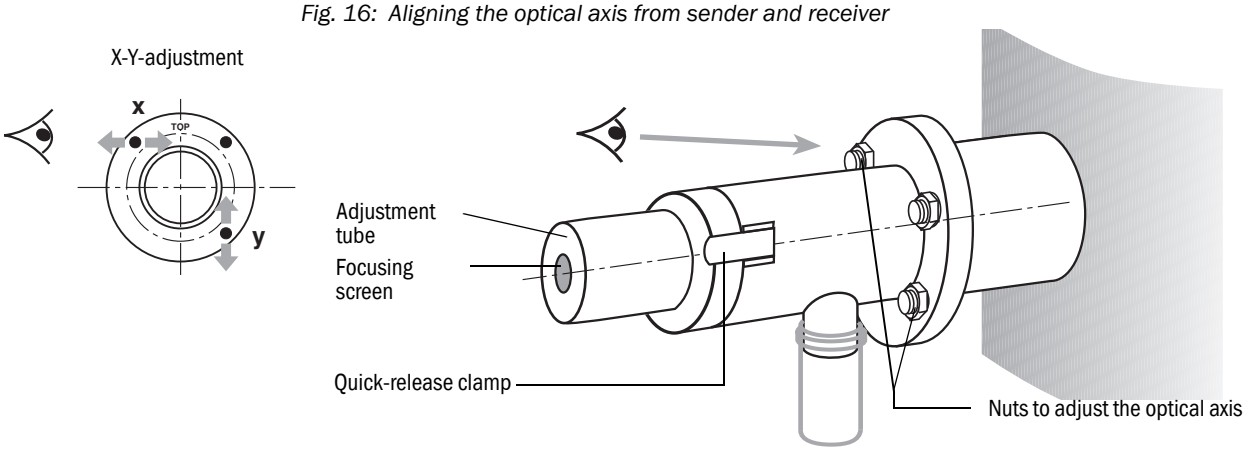
▶ Fasten the lamp on the sender over the quick-release clamps on the purge air fixture.

Fig. 15:Optical adjustment device (lamp)



▶ Fasten the adjustment tube on the receiver over the quick-release clamps on the purge air fixture

Fig. 16: Aligning the optical axis from sender and receiver



On the receiver

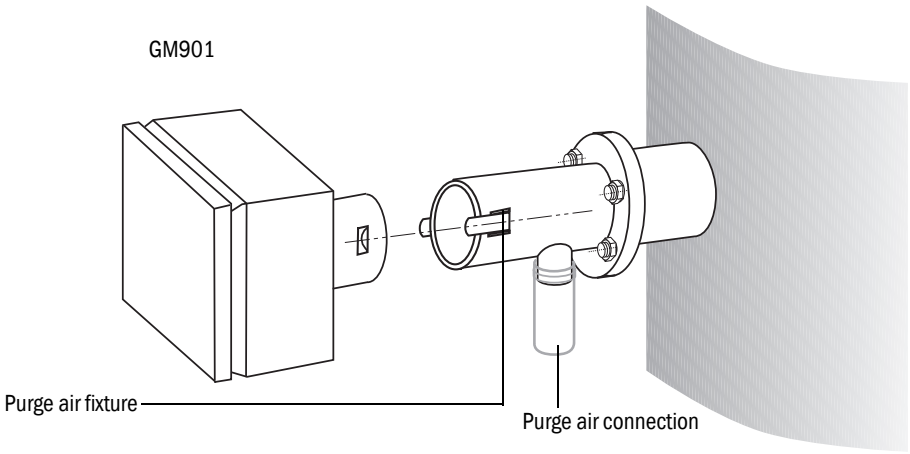
- ▶ Tighten the 2 nuts on the horizontal adjustment (X) and vertical adjustment (Y) so that the light spot is shown centered on the focusing screen of the adjustment tube.
- ▶ Swap the optical adjustment device on the purge air fixtures of the sender and/or receiver

On the sender

- ▶ Tighten the 2 nuts on the horizontal adjustment (X) and vertical adjustment (Y) so that the light spot is shown centered on the focusing screen of the adjustment tube.
- ▶ Check the adjustment of the purge air fixtures again on both sides.

4.4.2 Installing the sender and receiver

Fig. 17:Fastening the GM901

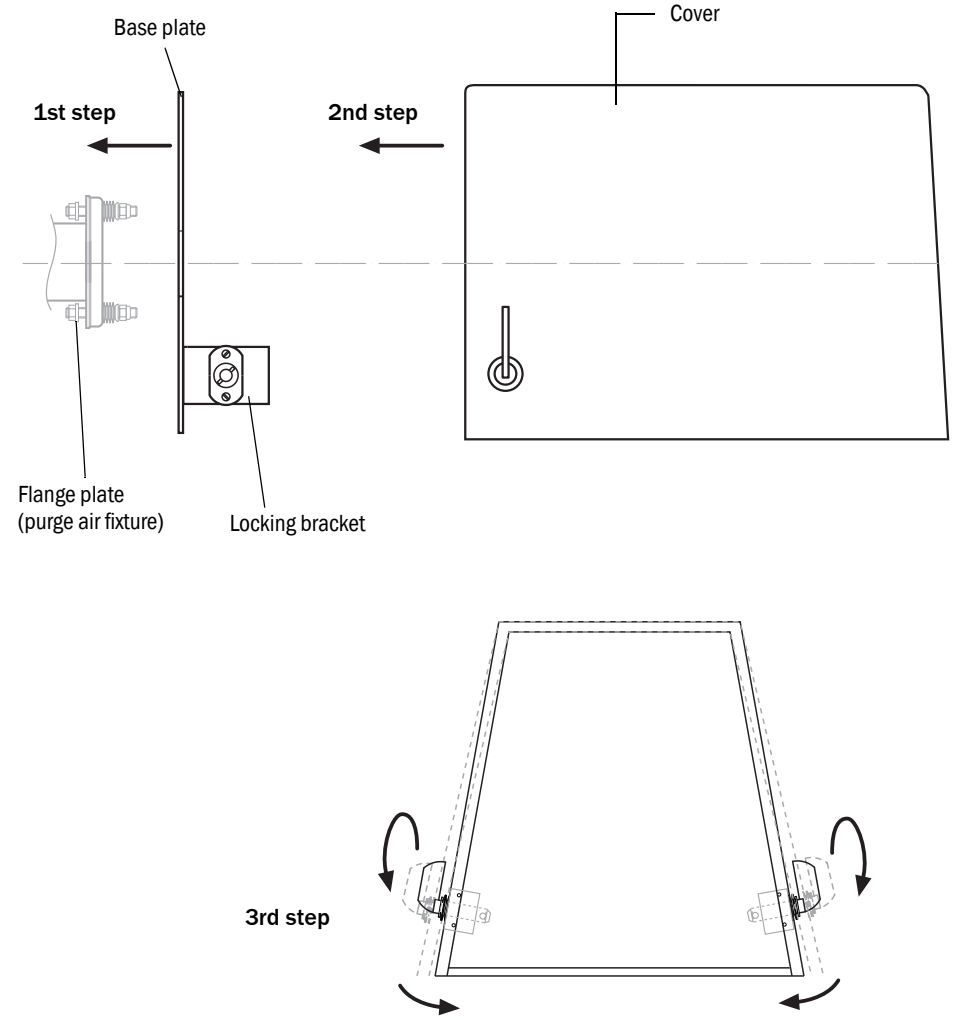


- ▶ Remove the optical adjustment device and fasten the sender and receiver using the quick-release clamps

4.4.3 Installing the weatherproof cover for the GM901

The optionally available weatherproof cover comprises a base plate (with locking bracket) and a cover.

Fig. 18:Fastening the weatherproof cover for the GM901



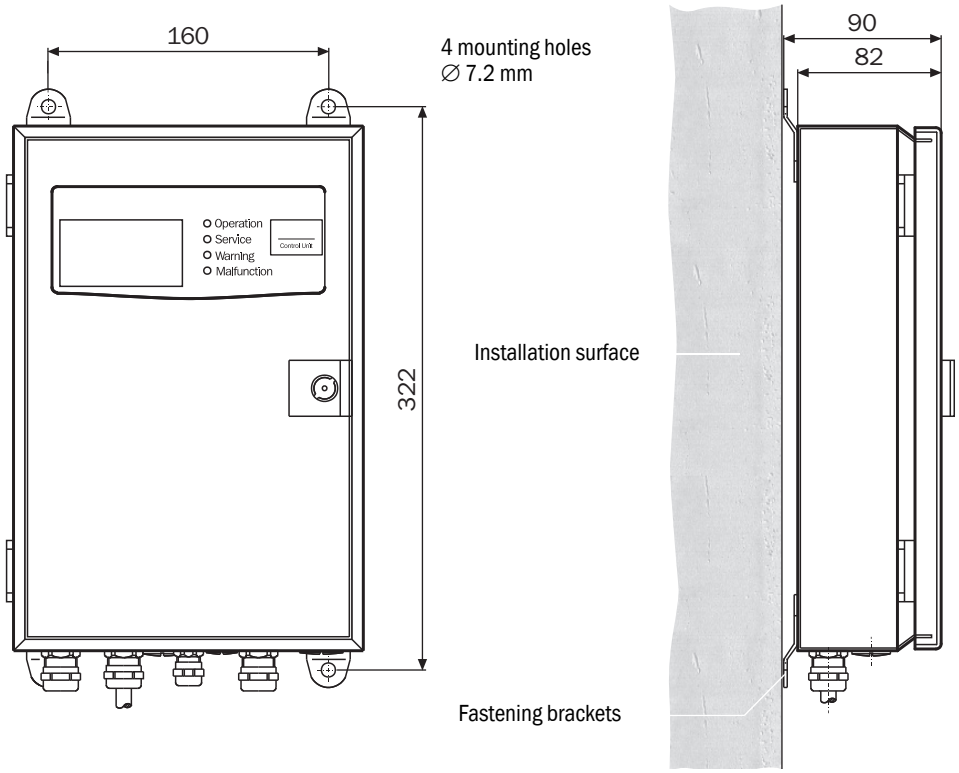
1 Push the base plate onto the side of the flange with tube and screw it to the duct-side surface of the flange plate (purge air fixture) with the threaded bolts provided
2 Position the cover on the base plate from the top; hold the cover panels slightly apart at the side at the same time
3 Insert the side holding catches into the counterpieces, twist and lock in

4.5 Installing the control unit

Ensure easy access without problems. In particular, make sure the swivel door of the control unit can be opened without hindrance after fitting.

- Install the control unit on an easily accessible, flat, vertical surface protected from the weather.
- Drill mounting holes ∅7.2 mm (for M8) at the fitting location according to the Drilling plan.
- Attach the control unit at the installation location using the 4 planned fastening brackets with suitable screws.

Fig. 19:Installing the control unit



5 Electrical Installation

5.1 Electrical installation project planning

The customer must carry out the installation and final wiring on-site if not otherwise agreed with SICK.

Important information for electrical installation

- The standard version of the GM901 has one single purge air unit. For high duct overpressure (> 10 mbar), a more powerful fan or one purge air unit each for the sender and receiver can be used divergent from the standard version.
- A large range of purge air motors with varying performance and different power connections are available. Before starting installation, check the versions and number of purge air units delivered and change circuit planning accordingly!
- The power connection for the control unit and purge air motor must be fixed on-site.
- Install and secure a separate power supply for the control unit and for the purge air unit.
- Install a dedicated power circuit breaker switch, with a motor circuit breaker when possible, for the purge air unit in the vicinity of the measuring devices.
- Position a clearly visible warning sign to secure the switch against unintentional switch-off.
- A protective phase failure switch is recommended for 3-phase motors.

Electrical protection

- Accessories: Control unit of GM901

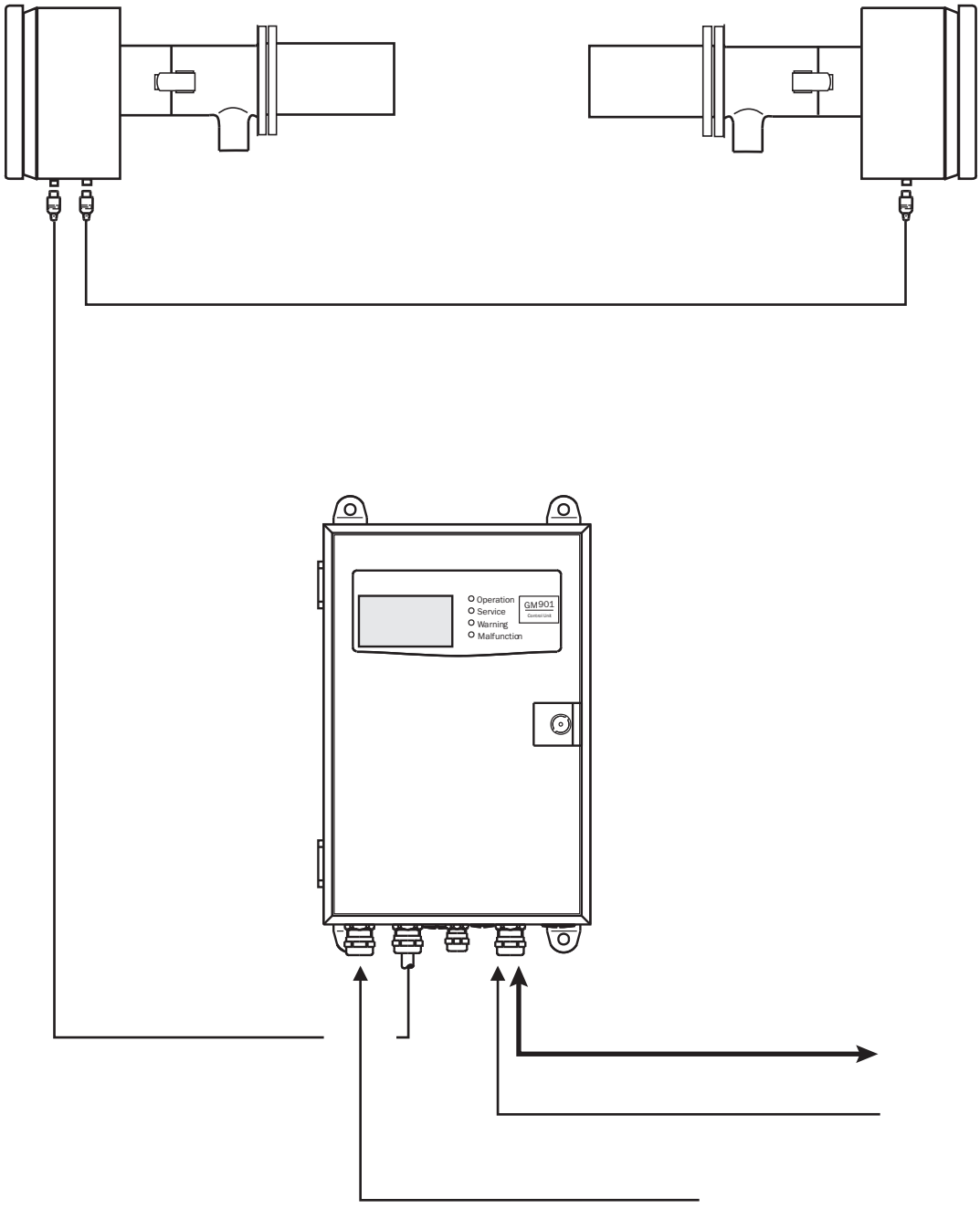
Insulation:	Protection class 1 in accordance with EN 61140
Insulation coordination:	Overvoltage category II in accordance with DIN EN 61010-1.
Contamination:	Degree of contamination II in accordance with DIN EN 61010-1

To be provided by the customer on-site:

- The main power supply for the GM901 as well as for the purge air unit (3-phase)
- Signal cable according to task definition
- PE conductor for the connection on the outside of the control unit (to comply with the EMC regulations)

5.2 Electrical wiring for the standard version

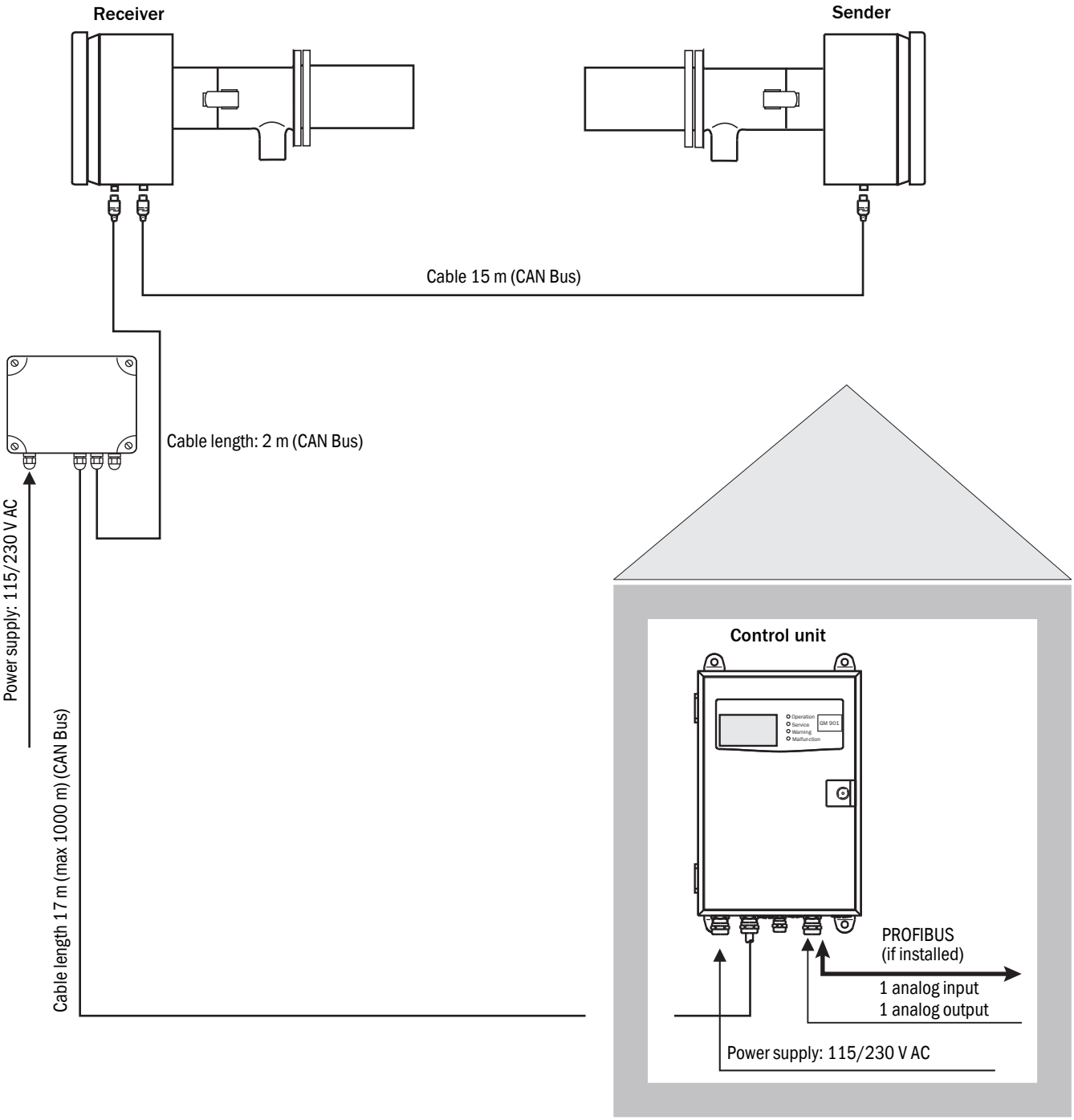
Fig. 20: Electrical connections GM901 (Standard)



▶ Connect the system components as shown in Fig. 20.

5.3 Electrical wiring with connection unit

Fig. 21: Connection unit for distances up to 1000 m



▶ Connect the system components as shown in Fig. 21.

5.4 Electrical connection of the purge air motor

Various motors can be connected to the purge air unit. Compare the power voltage and power type against the type plate on the purge air motor before connecting. Only connect when these match!

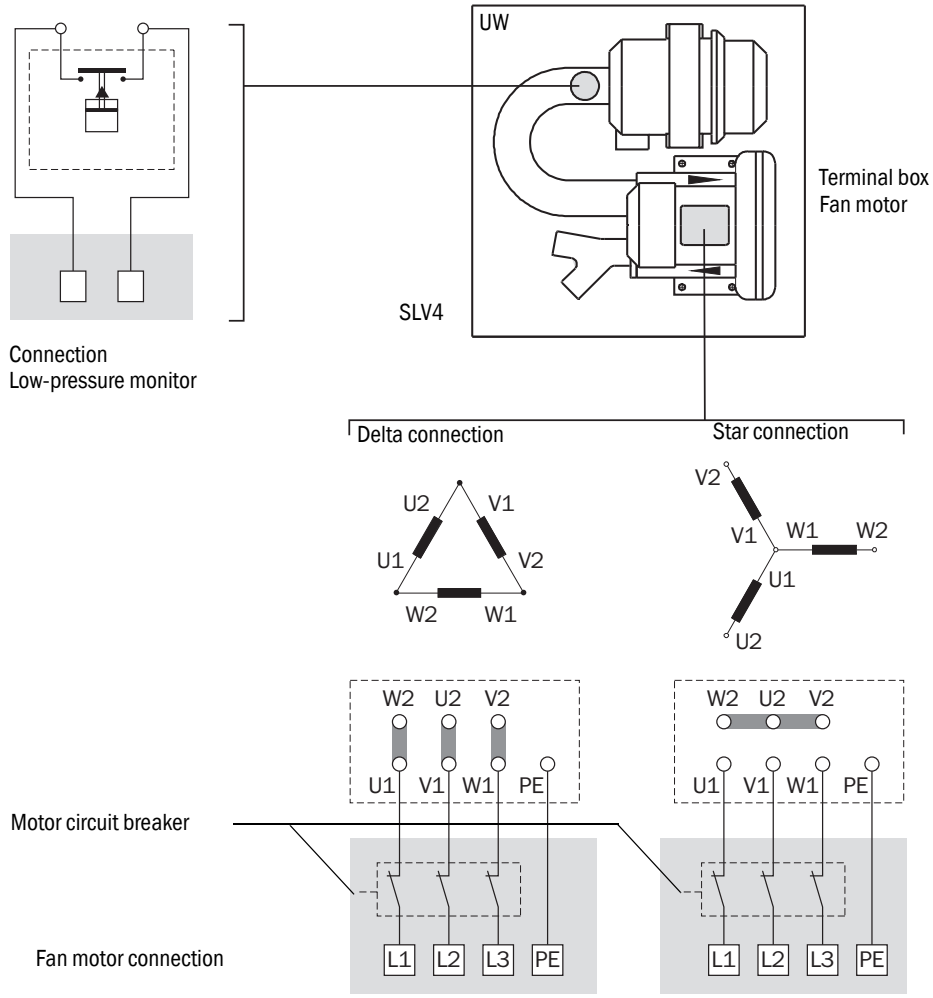
Purge air supply technical data

	Rated voltage V AC	Rated current A	Output kW	Motor type	Part No.
50 Hz	D 200 ... 240 Y 345 ... 415	D 2.6 Y 1.5	0.4	2BH1300-7AH16	1 012 409 with 10 m hose 1 012 424 with 5 m hose
60 Hz	D 220 ... 275 Y 380 ... 480	D 2.6 Y 1.5	0.5		

WARNING: Power voltage!
Switch the power voltage off before starting work. Observe safety regulations

- ▶ Switch the power voltage off
- ▶ Connect the purge air motor according to the specifications in the terminal box and the description delivered

Fig. 22:Electrical connection of the purge air supply



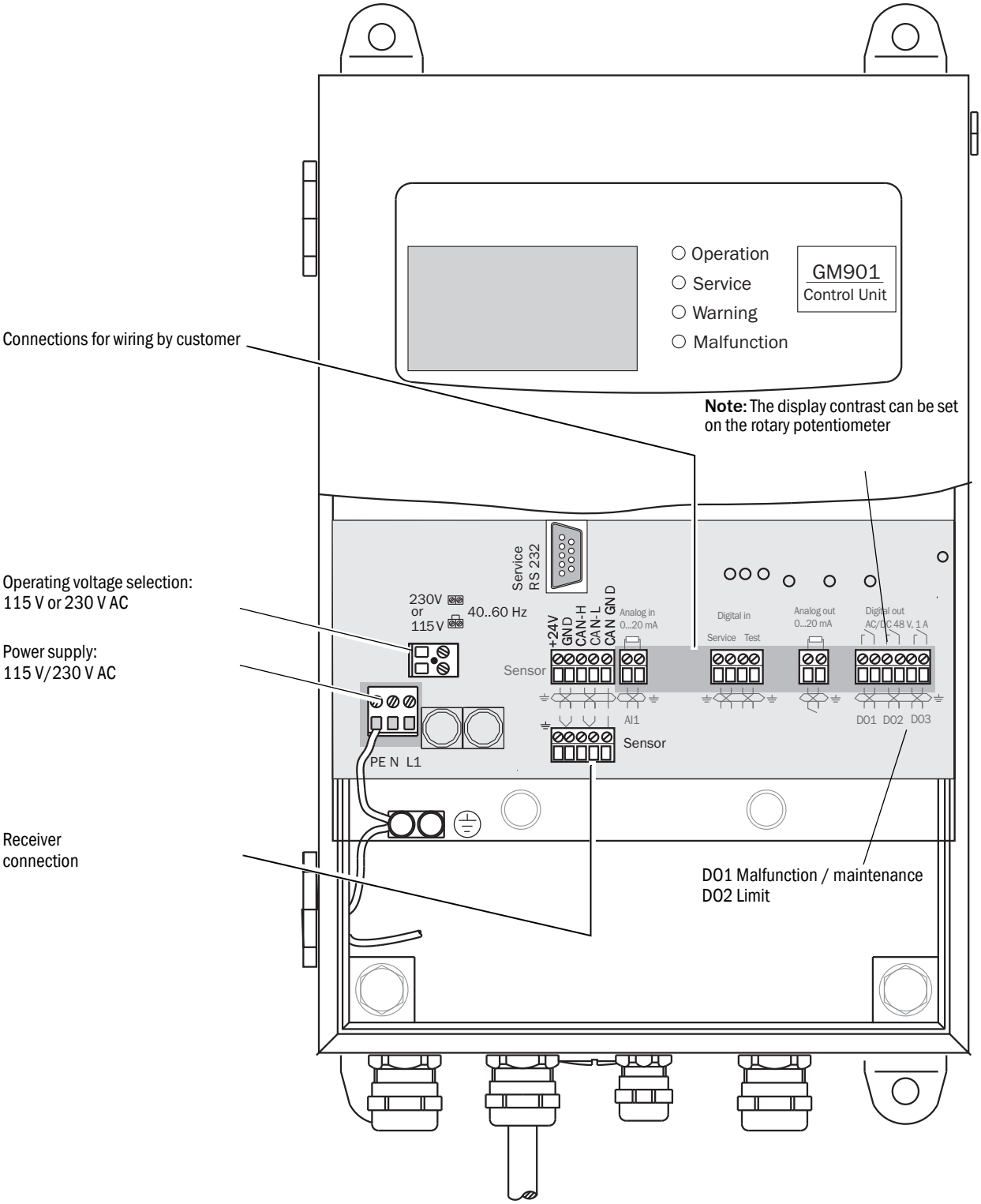
- ▶ Switch the motor on and check the rotation direction: An arrow on the face side of the compressor shows the correct rotation direction. Switch the connections when necessary
- ▶ Check the function of the motor circuit breaker - when installed - and set it to a value 10% higher than the rated current. Rated current, see type plate.
- ▶ Connect the purge air motor

NOTE: Motor rotation direction!

Check the motor rotation direction! No air may escape from the intake opening. When the rotation direction is incorrect, the purge air fan suctions gas from the duct which can severely damage the measuring device as well as the purge air unit. Switch the voltage connections on the motor when necessary.

5.5 Electrical wiring: Control unit – standard

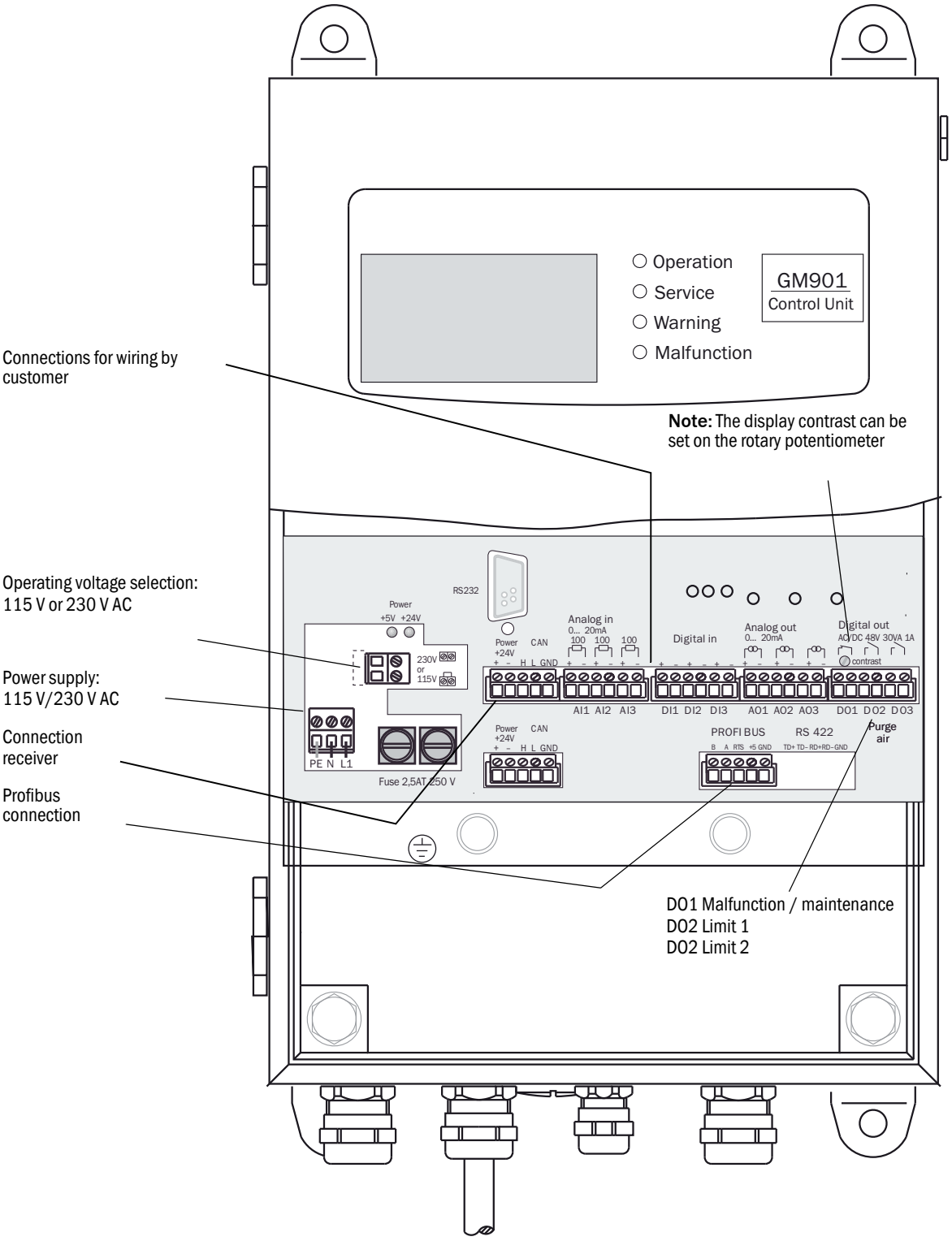
Fig. 23: Electrical connections on the control unit - standard (on-site)



The control unit is delivered from the factory as 230 V AC version.

5.6 Electrical wiring: Control unit – PROFIBUS

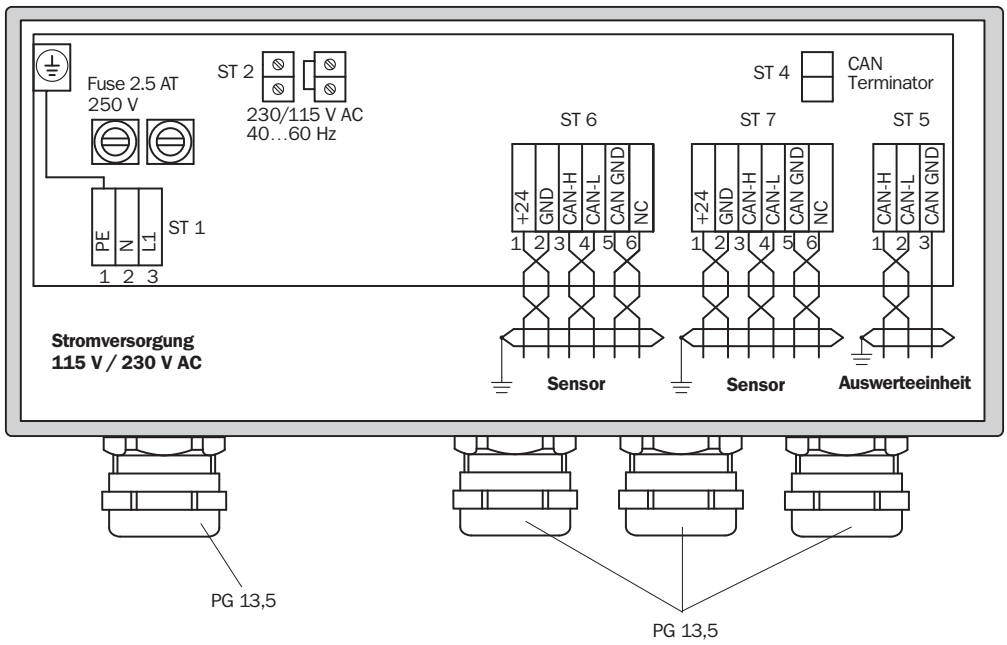
Fig. 24: Electrical connections on the control unit - PROFIBUS (on-site)



The control unit is delivered from the factory as 230 V AC version.

5.7 Electrical connections of the control unit

Fig. 25:Electrical connections of the control unit



Connection on the control unit – terminal strip ST 5

Cable length max. 1000 m

CAN-H / CAN-L / CAN GND

Connection on the GM901 receiver – terminal strip ST 6 or ST 7

Standard cable (2 m)

+24 V	RS
GND	GR
CAN-H	YE
CAN-L	GN
CAN-GND	BR

6 Commissioning

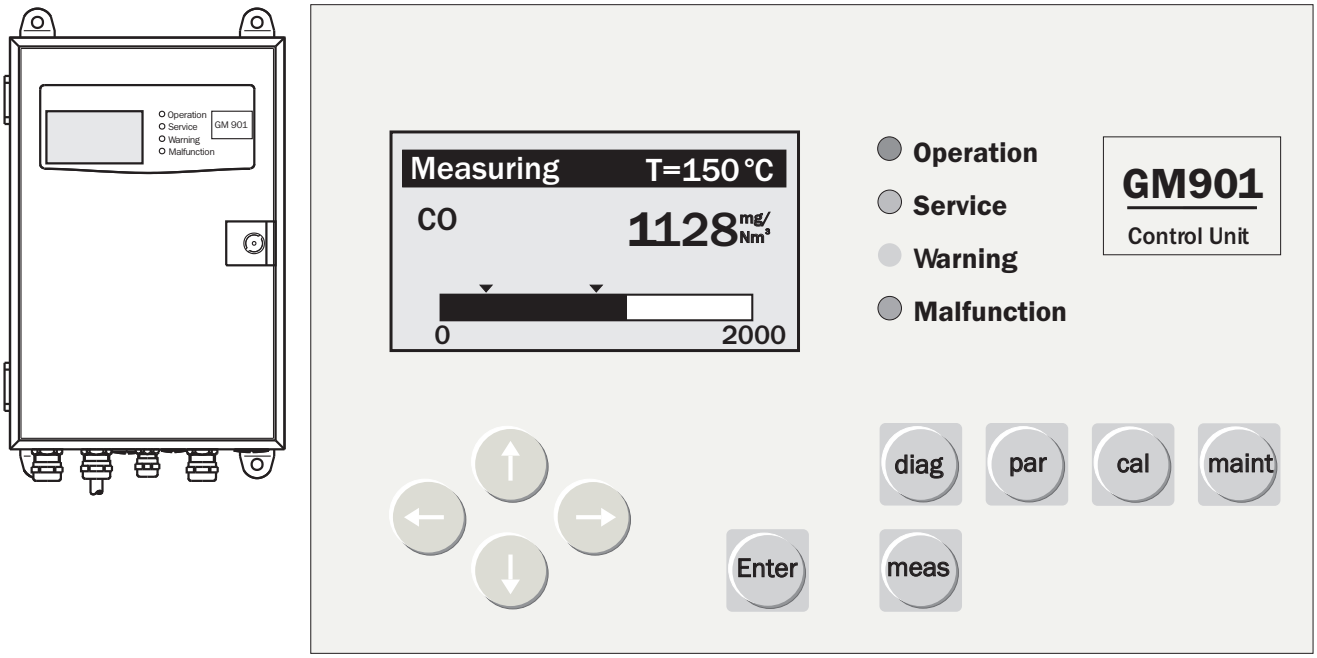
6.1 Requirements for commissioning

The following work must be completed or checked again before commissioning:

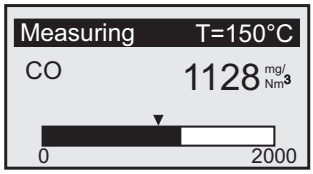
- Check the electric installation
- Check and function tests (fan rotation direction) of the purge air unit (option)
- Flange alignment
- Check (measure) the active measuring path, see “Measuring path definition”, page 17

6.2 Operating panel of the control unit

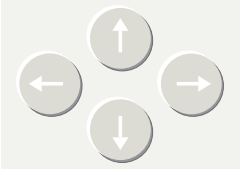
Fig. 26: Operating panel of the control unit



6.2.1 Display

	T=150 °C	Measured value of an external temperature sensor or an internal adjustable default value
	1128 mg/Nm3	Current measured value
	0	Measuring range start value
	2000	Measuring range end value, adjustable
	t	Adjustable limit value

6.2.2 Arrow keys

	**Arrow keys** To edit units, digits

6.2.3 Function keys and submenus

diag	**Diagnosis** • Malfunction / Malfunction message • Warning / Warning messages • Sensor values / Display of sensor measured values for error diagnosis	
par	**Parameters** • Settings / Setting parameters	
	– Physical Unit	3 physical units selectable: ppm, mg/m³ N, mg/m³
	– Normalization	Moisture correction
	– Response time	Time setting from 5 s to 360 s
	– Measuring range	Measuring range adjustable from 100 ppm to 20,000 ppm
	– Limit value	Limit value freely adjustable in the selected measuring range
	– Meas. Distance	Measuring path adjustable from 100 mm to 10000 mm
	– Temperature	Exhaust gas temperature: As analog input or fixed value
	• Device data	
	– Serial number	Serial number
	– Software Revision	Software version
	– Configuration	Control unit configuration
	• Service	
	– Calibration Values	Calibration values, device-specific
cal	**Calibration** • Zero Adjust / zero point adjust • SPAN-Test / SPAN tst	
maint	**Maintenance** • Reset system / Restart the system • Maint-Mode / Maintenance operation • Test Analog output / Checking the current value of the analog output • Test Relays / Relay test • Reset Parameter / Reset parameters to the basic settings	
meas	**Measuring operation (Measurement)** • Measuring	

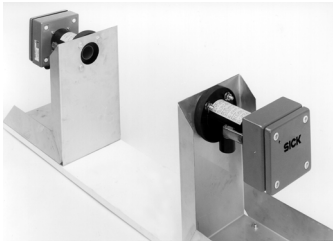
6.3 Zero adjust

6.3.1 Prerequisites for zero adjust

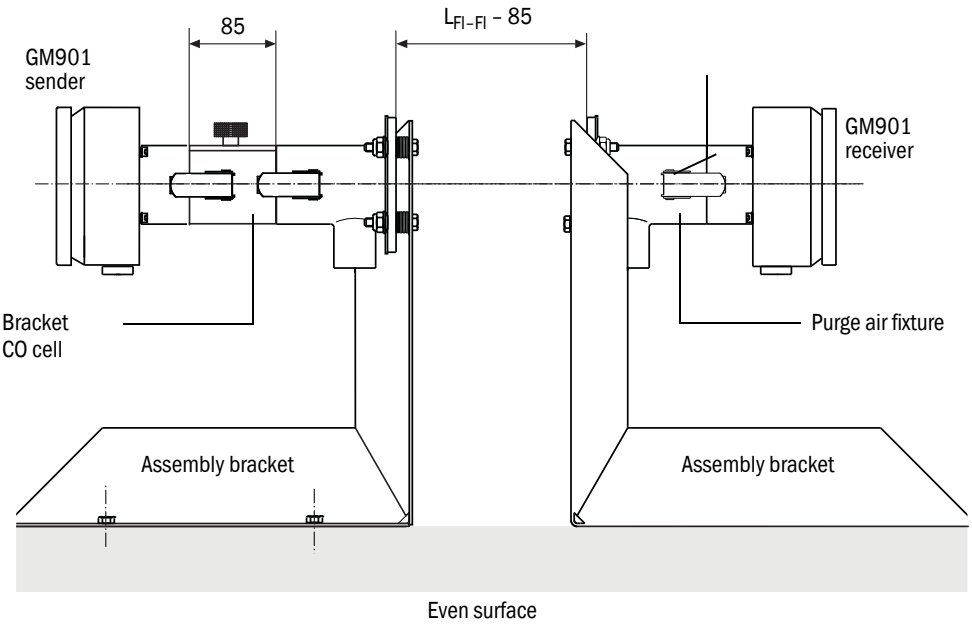
- Carry out the zero adjust **only** before initial commissioning or recommissioning! The environment must be free from CO. The adjustment can be made directly at the sampling point when the plant is switched off and the duct free from CO. If this is not possible, carry out the zero adjust with the sender and receiver of the GM901 on the assembly brackets.
- The system is stable after a warm-up phase of approx. 30 minutes after switching the power supply on.
- Never align the assembly brackets during zero adjust!

NOTE:
The purge air fixtures of the GM901 must be readjusted on the duct, see “Installing the GM901 CO measuring device”, page 20! Setting the measuring path alters the device parameters and therefore this value must be set before the zero adjust (see “Measuring path flange - flange and active measuring path”, page 46).

Fig. 27: Zero path of the GM901



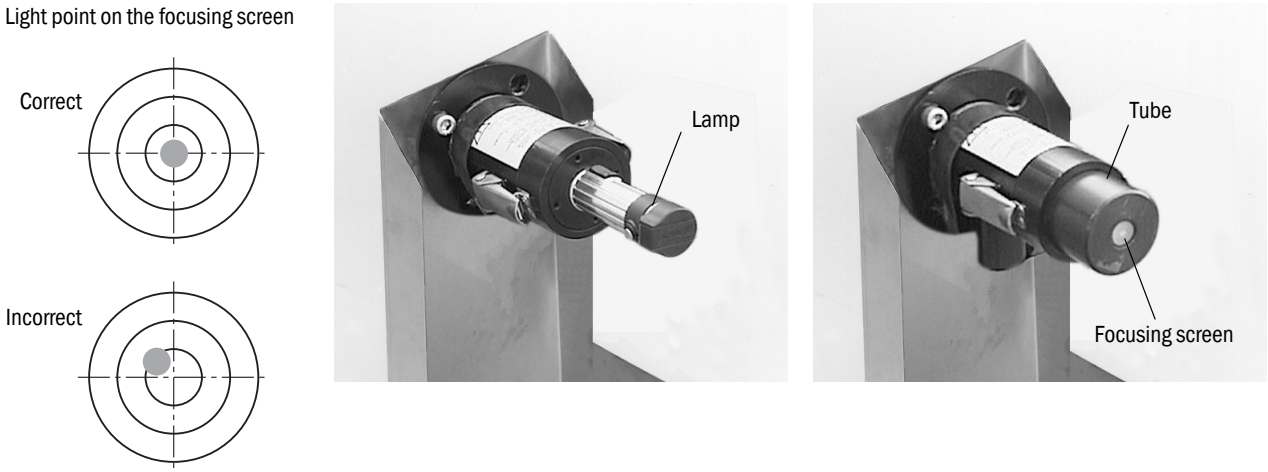
L_{Fl-Fl}... Measure - flange - flange of the duct measuring path



6.3.2 Creating the zero path

- Have the assembly bracket for zero adjust ready
- Remove the purge air fixtures from the sender and receiver, and secure them on the assembly bracket (available as an option).
- Attach the holder for the CO cell, e.g., on the sender; but do **not** use a cell filled with CO when a sensitivity test is also planned.
- Adjust the assembly bracket to the flange - flange (cell holder) measure minus 85 mm of the duct measuring path as shown in Fig. 27.
- Align the purge air fixtures optically using the adjustment device
- Fasten the sender and receiver on the purge air fixtures

Fig. 28: Alignment using the adjustment device (lamp, tube)



NOTE:
Do not change the alignment of the assembly brackets.

6.3.3 Starting zero adjust

- Press CAL on the operating panel of the control unit to start the zero adjust (see “Zero adjust”, page 56).

6.3.4 Fitting the GM901 CO measuring device on the duct

- Remove the sender and receiver from the purge air fixtures
- Remove the holder for the CO cells
- Remove the purge air fixtures from the assembly bracket
- Keep the zero path parts such as assembly bracket, holder for CO cells in a safe place
- Mount the GM901 at the sampling point, see “Installing the sender and receiver”, page 22.
- Manual SPAN test (optional) for linearity control

6.3.5 Test cells

Test cells are available depending on the application-specific measuring range, measuring path and test point (e.g., 70%).

6.3.6 Determining the test values

Determine the test concentration (test cell value) using the following formula:

TW [ppm · m] = MB [ppm] · x · S[m]

TW	=	Test value
MB	=	Full scale
S	=	Measuring path
x	=	Test point position

To convert mg/m³ N to ppm: 1 mg/m³ N = 0.8 ppm

Example:

Full scale	MB = 1500 ppm
Active measuring path	S = 4 m
Test point at 70% of the MB	x =0.7

- TW [ppm · m] = MB [ppm] · x · S[m]
- TW [ppm · m] = 1500 [ppm] · 0.7 · 4 [m]
- TW [ppm · m] = 4200 [ppm · m]

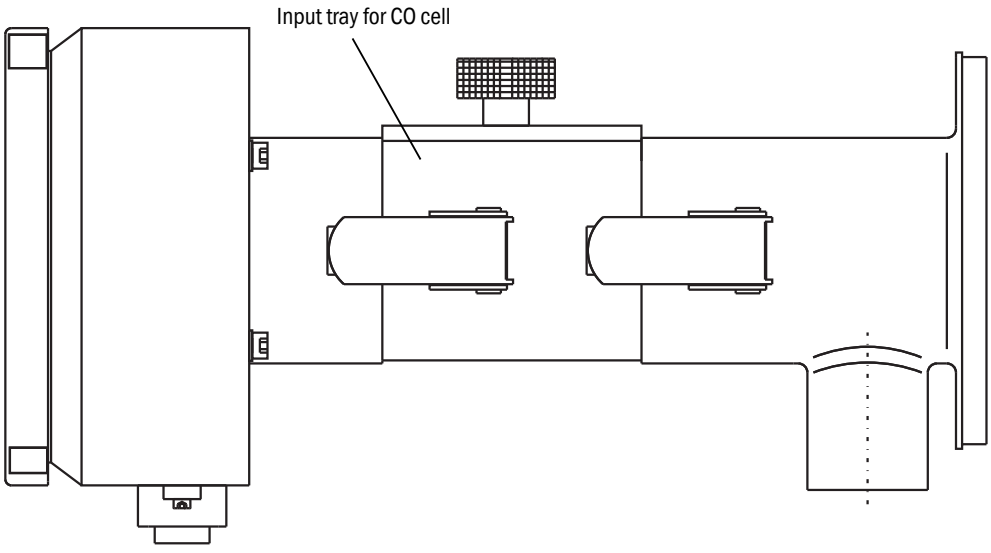
▶ The test cell should have the value 4200 ppm · m.

6.3.7 Perform the SPAN tests

▶ Preparations for performing the SPAN test, see “SPAN Test”, page 58
▶ Insert the test cell holder on the sender

NOTE:
Do not insert a cell filled with CO yet.

Fig. 29:GM901 sender with test cell holder



▶ Press CAL on the operating panel of the control unit to start the zero adjust (see “SPAN Test”, page 58) and follow the instructions displayed.

6.4 Default parameters set

Parameter settings	
Physical unit	mg/Nm3
Normalization	wet
Response time	24 s (parameter setting) Note: The actual total response time is 30 s due to the Median Filter default value of 11 which adds 6 s to the response time.
Measuring range	1000 mg/Nm³
Limit value	1000 mg/Nm³

Measuring distance	
Flange - flange	2500 mm
Active measuring distance	2000 mm

Temperature	
Substitute	150 °C
External	Yes
Scale low	0 °C
Scale high	250 °C
Input low	4.0 mA
Input high	20.0 mA

Humidity	
Substitute	0.0 % (Vol.)
Active measuring distance	2000 mm

Pressure	
Substitute	1013 hPa

Analog Out	
Live zero	4 mA

Calibration	
Span	1.00
Zero	+000

Median Filter	
Size	11 Note: The default value 11 adds 6 seconds to the response time (see “Median Filter”, page 53).

Device parameters	
Serial number	_ _ _ _ _ _ _ _ *Entered during final inspection*

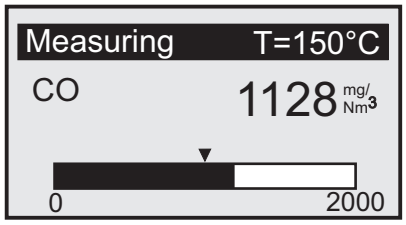
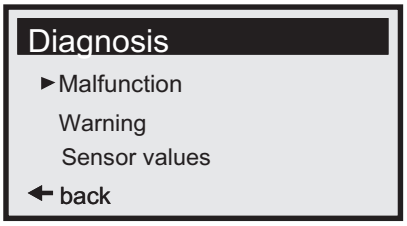
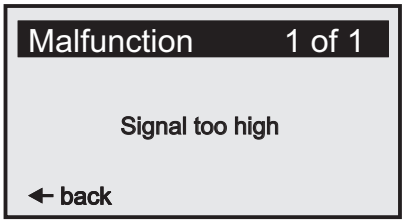
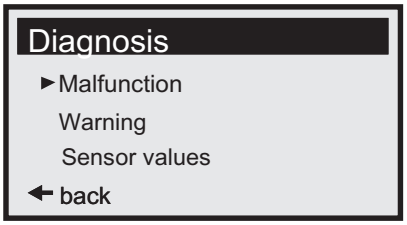
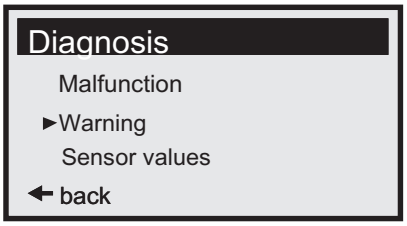
Software Revision	
Sensor unit	_ _ _ _ _ _ _ _ _ _ _ _ *Current software version*
Control unit	_ _ _ _ _ _ _ _ _ _ _ _ *Current software version*
Configuration	_ _ _ _ *Control unit type code*

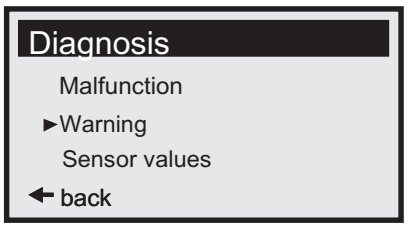
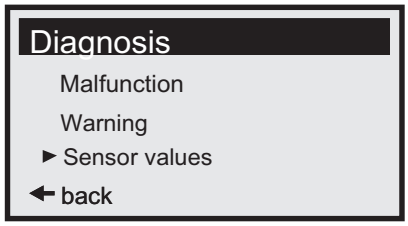
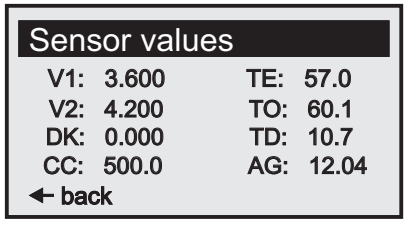
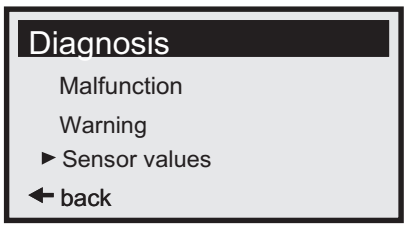
Service	
C1	Determined during zero adjust
C2	Determined during zero adjust
C3	
C4	Factory data assigned to the GM901 receiver.
C5	
C6	(Individual for each device)
C7	
C8	

7 Configuring

7.1 Diagnosis

- *Return or Cancel:* Press “**Arrow left**“ (back)
- *Return at any time to Measuring mode:* Press “**meas**“

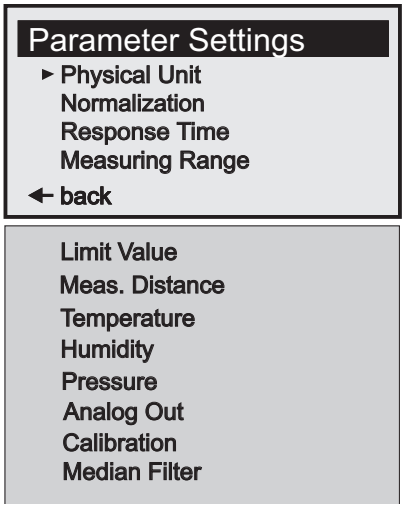
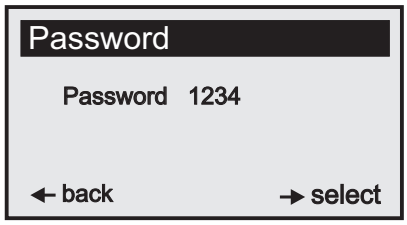
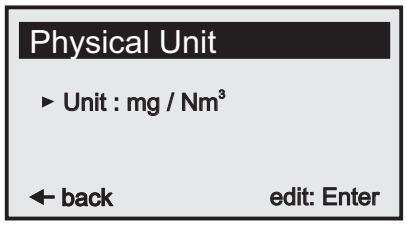
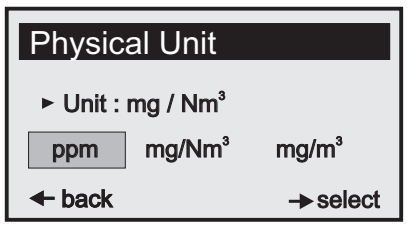
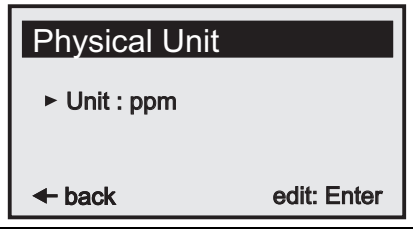
Display	Action	Note
	Press “**diag**“	Display switches to Diagnosis mode
	▶ Select “Malfunction” with “**Arrow down**“ ▶ Press “**Enter**“	Displays malfunction messages
	▶ Press “**Arrow left**“ (back)	Displays possible malfunctions, see “Malfunctions”, page 71
		
	▶ Select “Warning” with “**Arrow down**” ▶ Press “**Enter**”	Displays warning messages
	▶ Press “**Arrow left**” (back)	Displays possible warnings (see “Warnings”, page 70) and malfunctions (see “Malfunctions”, page 71)

Display	Action	Note
		
	► Select “Sensor values” with “**Arrow down**” ► Press “**Enter**”	Displays sensor measured values for error diagnosis
		Use these data when completing the Diagnosis form.
		

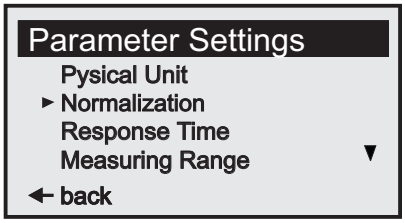
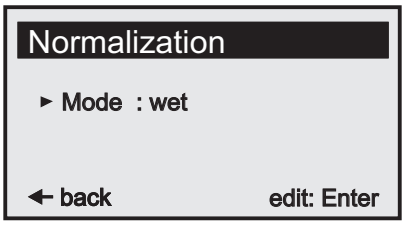
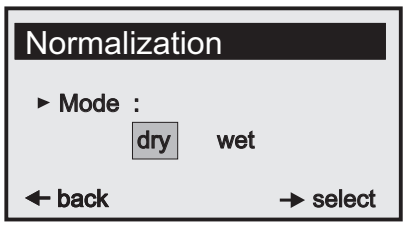
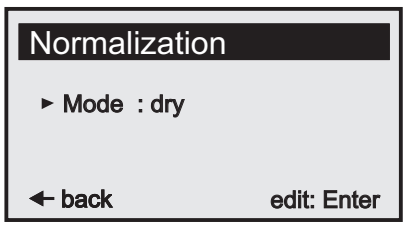
7.2 Configuring

7.2.1 Settings

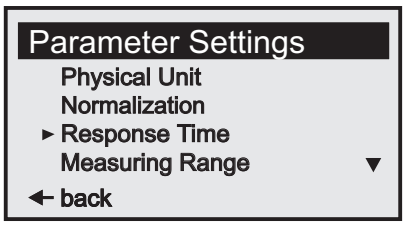
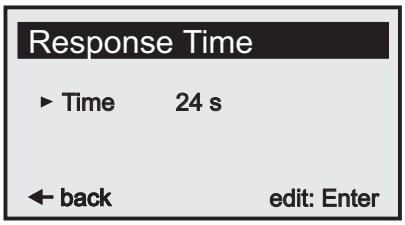
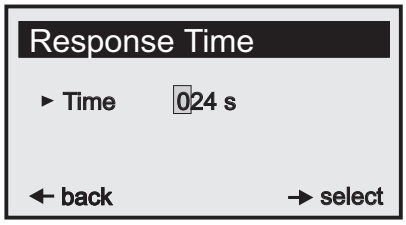
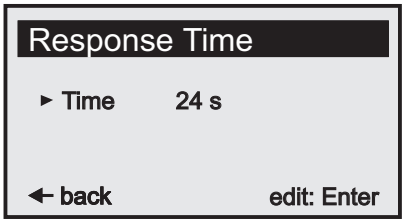
7.2.1.1 *Physical unit*

Display	Action	Note
	► Select “**Physical Unit**” ► Confirm with “**Enter**”	All parameters that can be edited are accessible in this menu
	► Enter password and press “**Enter**”	The password is 1234 The password remains active for 30 minutes
	► Press “**Enter**”	Displays the physical unit
	► Select with “**Arrow right**” ► Confirm with “**Enter**”	Select the physical unit
	► Press “**Arrow left**” (back)	Display returns to selection screen

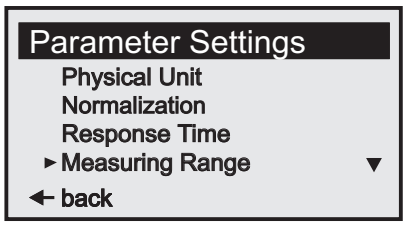
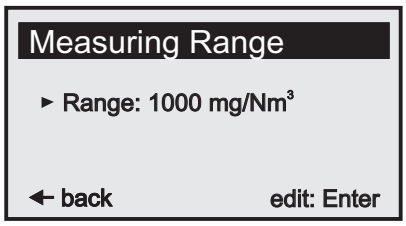
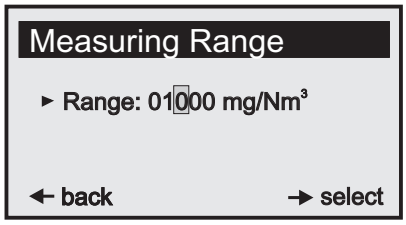
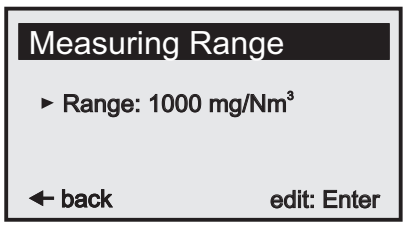
7.2.1.2 *Scaling*

Display	Action	Note
	▶ Select “Normalization” ▶ Press “**Enter**”	Measured value scaling
	▶ Press “**Enter**”	Basic factory setting
	▶ Select with “**Arrow right**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new mode.
	▶ Press “**Arrow left**” (back)	Display returns to selection screen

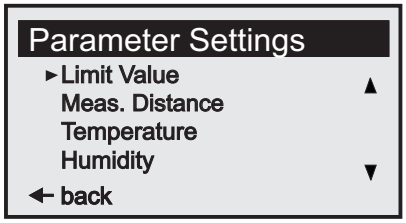
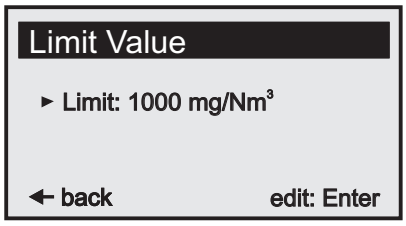
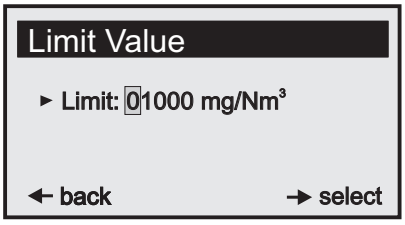
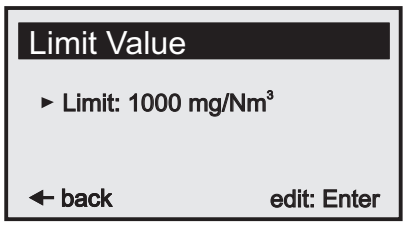
7.2.1.3 *Response time*

Display	Action	Note
	▶ Select “**Response Time**” ▶ Press “**Enter**”	Response time
	▶ Press “**Enter**”	Default factory setting: 24 s Min: 5 s Max: 360 s Note: The actual total response time is 30 s due to the Median Filter default value of 11 which adds 6 s to the response time.
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow up**” or “**Arrow down**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value.
	▶ Press “**Arrow left**” (back)	Display returns to selection screen

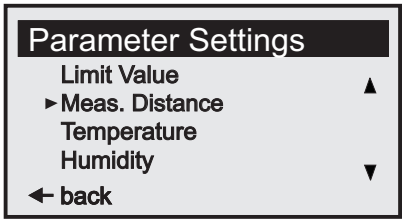
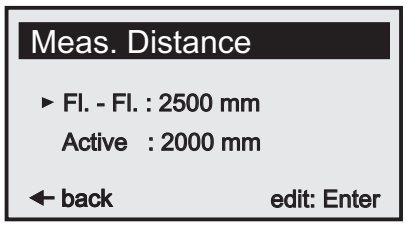
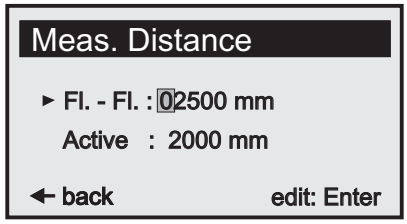
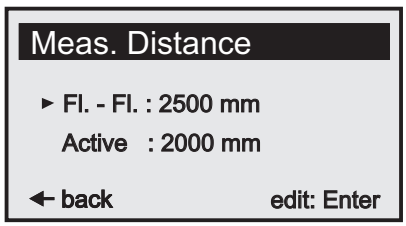
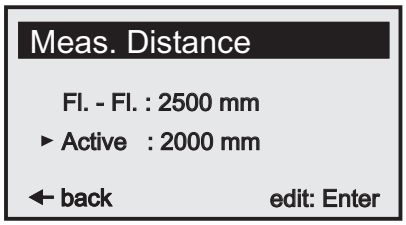
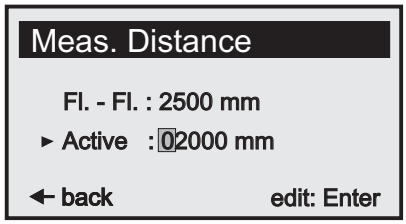
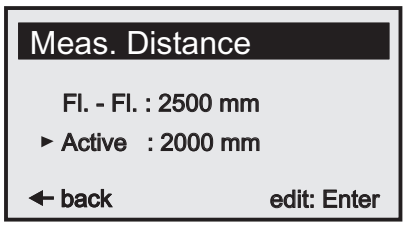
7.2.1.4 *Measuring range*

Display	Action	Note
	▶ Select “**Measuring Range**” ▶ Press “**Enter**”	Measuring range
	▶ Press “**Enter**”	Basic factory setting: 1000mg/Nm3 Min: 100 Max: 60 000
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow up**” or “**Arrow down**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value.
	▶ Press “**Arrow left**” (back)	Display returns to selection screen

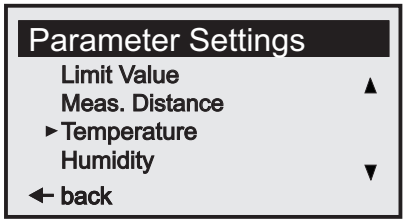
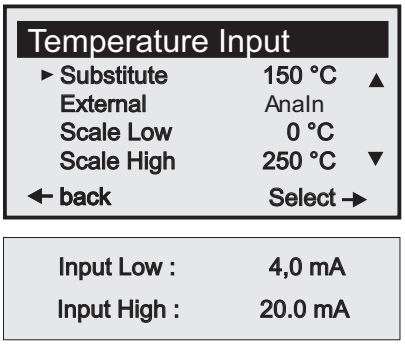
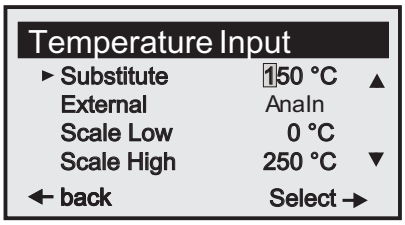
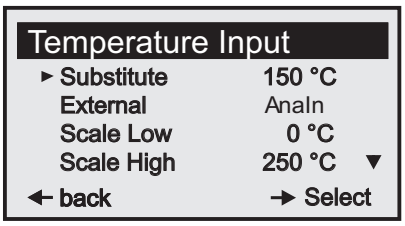
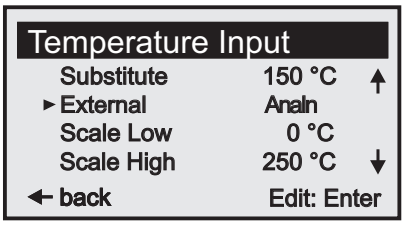
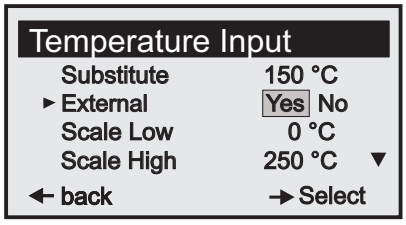
7.2.1.5 *Limit value*

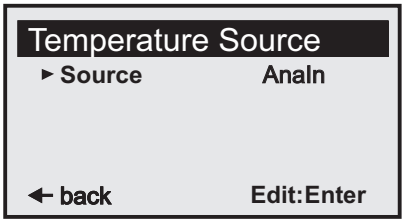
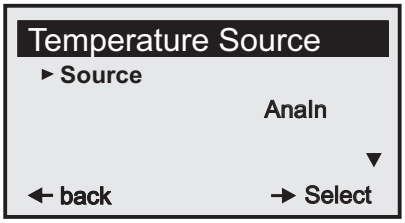
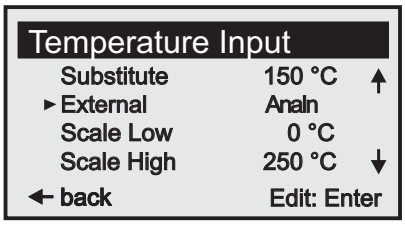
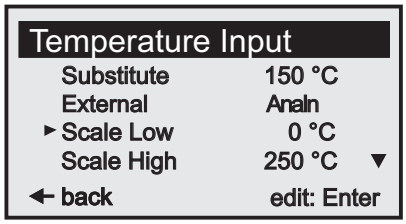
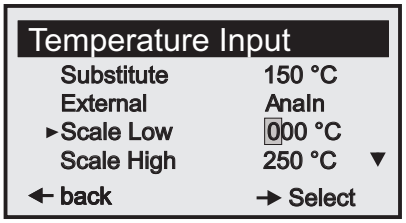
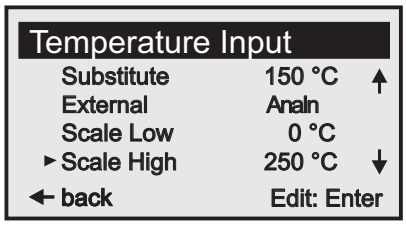
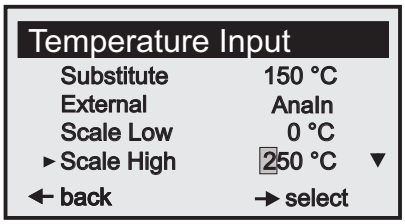
Display	Action	Note
	► Select “**Limit Value**” ► Press “**Enter**”	Limit value
	► Press “**Enter**”	Basic factory setting: 1000 mg/Nm3 **Caution**: Is the value within the selected measuring range?
	► Select with “**Arrow right**” ► Enter new value with “**Arrow up**” or “**Arrow down**” ► Press “**Enter**”	Confirm with “**Enter**” to save new value.
	► Press “**Arrow left**” (back)	Display returns to selection screen

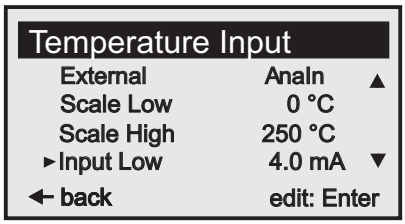
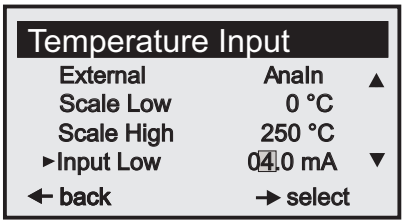
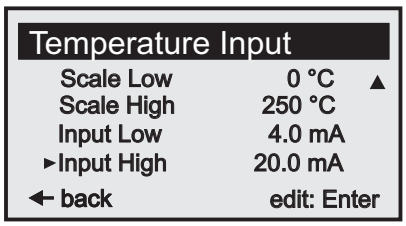
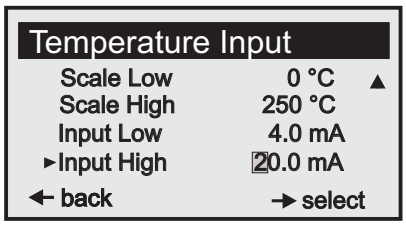
7.2.1.6 *Measuring path flange - flange and active measuring path*

Display	Action	Note
	► Select “**Meas. Distance**” ► Press “**Enter**”	Measuring path Setting the measuring path alters the device parameters and therefore this value must be set before the zero adjust.
	► Select “**Fl.-Fl.**” and confirm with “**Enter**”	Basic factory setting for measuring path Fl.-Fl. : 2500 mm Min: 500 mm Max: 8 000 mm
	► Select “**Arrow right**” ► Enter new value with “**Arrow up**” or “**Arrow down**” ► Press “**Enter**”	Enter value for measuring path flange-flange Confirm with “**Enter**” to save new value
		
	► Select “**Active** with “**Arrow down**” ► Press “**Enter**”	Enter the active measuring path Entering the **active measuring path** must **be very precise (+- 1%)**!
	► Select with “**Arrow right**” ► Enter new value with “**Arrow up**” or “**Arrow down**” ► Press “**Enter**”	Basic factory setting for the active measuring path: 2000 mm Confirm with “**Enter**” to save new value
	► Press “**Arrow left**” (back)	Display returns to selection screen

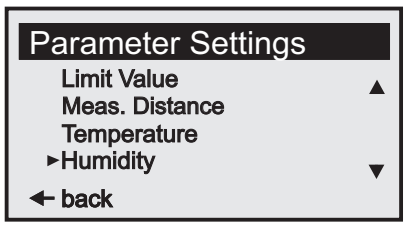
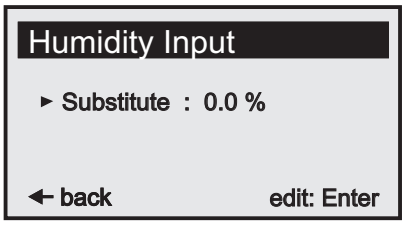
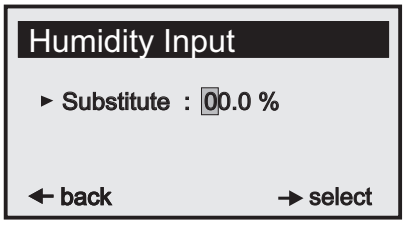
7.2.1.7 *Temperature*

Display	Action	Note
	► Select “**Temperature**” ► Press “**Enter**”	Exhaust gas temperature
	► Select using “**Arrow down**” or “**Arrow up**” ► Press “**Enter**”	Enter the default temperature Further input options are explained in the following screens
	► Select with “Arrow right” ► Enter new value with “**Arrow down**” or “**Arrow up**” ► Press “**Enter**”	Basic factory setting for default temperature value: 150 °C
		
	► Select using “**Arrow down**” or “**Arrow up**” ► Press “**Enter**”	Using an external temperature sensor
	► Select with “**Arrow right**” ► Press “**Enter**”	Confirm with “**Enter**” to save the selection

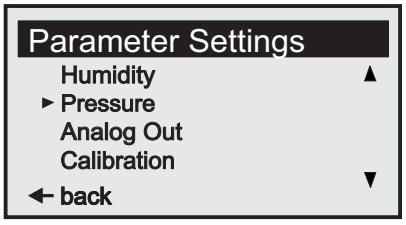
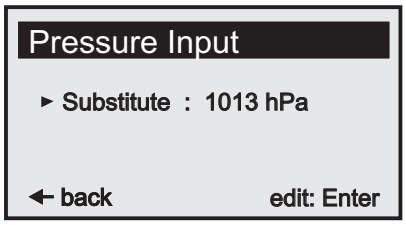
Display	Action	Note
		
		
		
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Basic factory setting: 0 °C
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Basic factory setting: 250 °C Max: 500 °C
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	

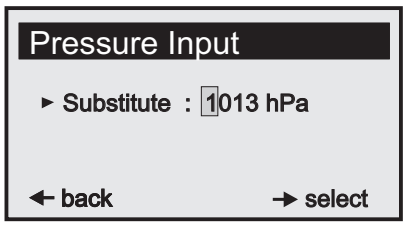
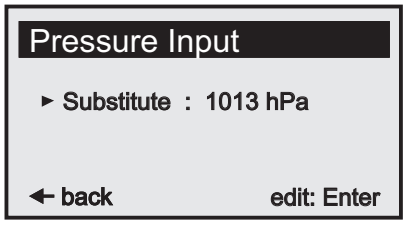
Display	Action	Note
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Signal for measuring range start Basic factory setting: 4.0 mA
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Signal for measuring range end Basic factory setting: 20.0 mA
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value

7.2.1.8 *Moisture*

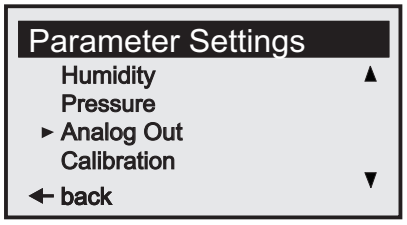
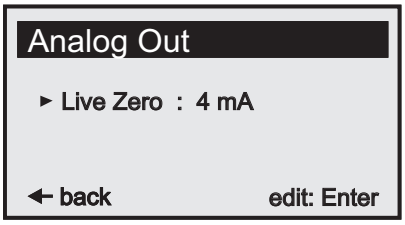
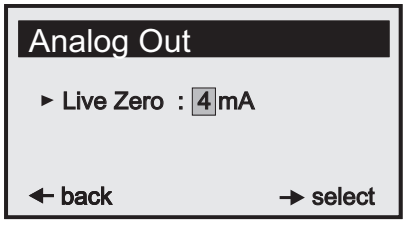
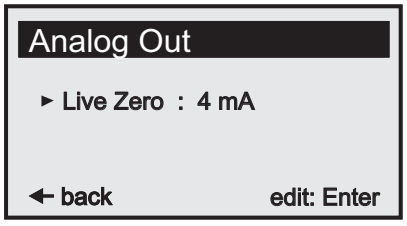
Display	Action	Note
	▶ Select “**Humidity**” Moisture ▶ Press “**Enter**”	Exhaust gas moisture
	▶ Press “**Enter**”	Basic factory setting: 0.0% This is the dry correction value Max.: 99.9%
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value

7.2.1.9 *Pressure*

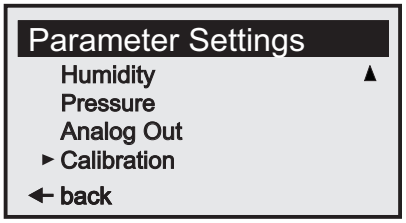
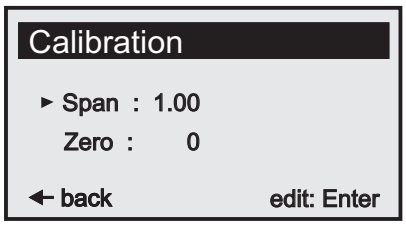
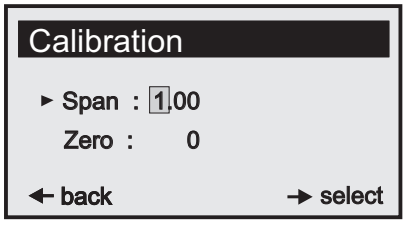
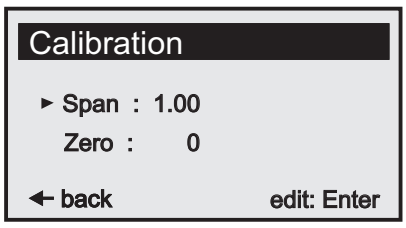
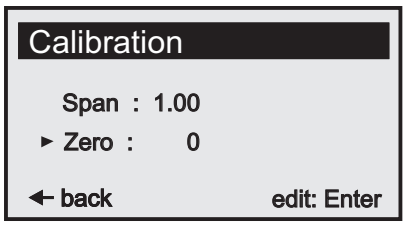
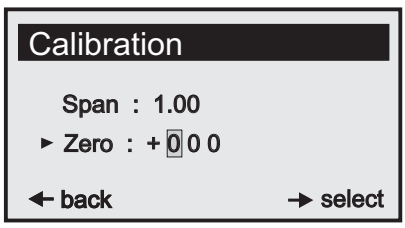
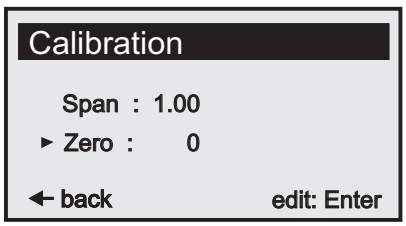
Display	Action	Note
	▶ Select “**Pressure**” ▶ Press “**Enter**”	Exhaust gas pressure
	▶ Press “**Enter**”	Basic factory setting: 1013 hPa Min.: 800 Max.: 1200

Display	Action	Note
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value The pressure correction is made in ppm or Norm in the display using this value
		

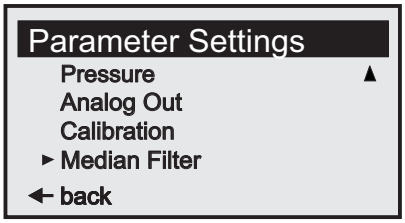
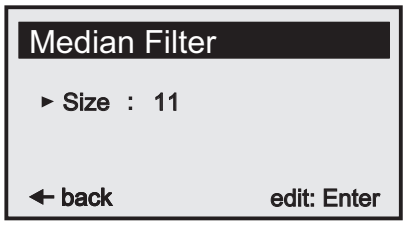
7.2.1.10 *Analog output*

Display	Action	Note
	▶ Select “**Analog Out**” ▶ Press “**Enter**”	Analog output/Live Zero
	▶ Press “**Enter**”	Basic factory setting: 4 mA
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value Possible values: 0 to 4 mA
		

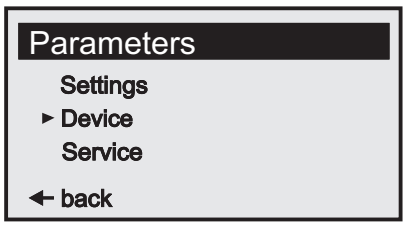
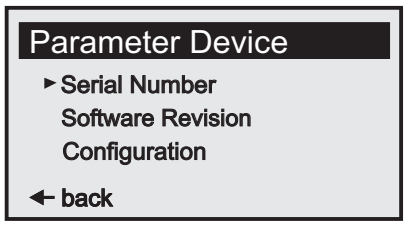
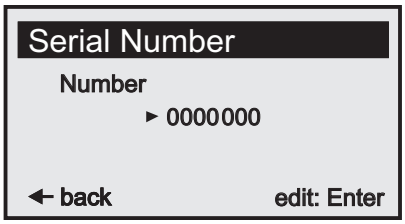
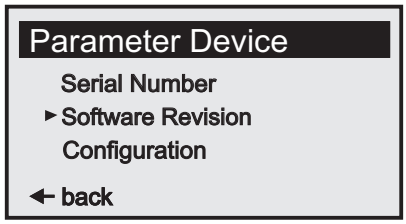
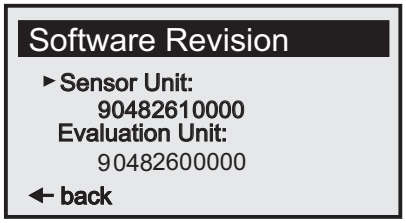
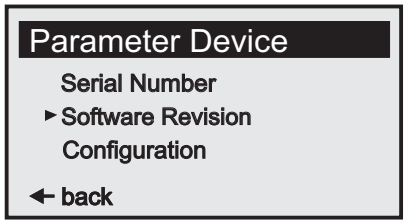
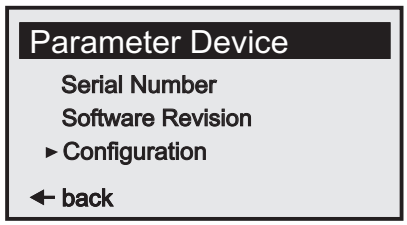
7.2.1.11 *Calibration*

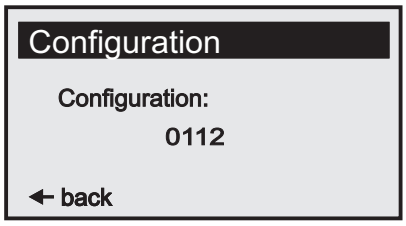
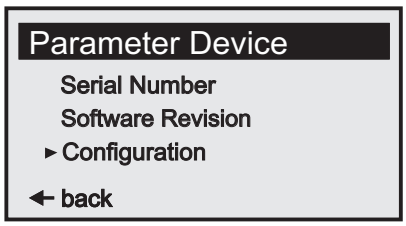
Display	Action	Note
	▶ Select “**Calibration**” ▶ Press “**Enter**”	On-site calibration
	▶ Press “**Enter**”	SPAN / Characteristic Curve Basic factory setting: 1.00 Change possible, e.g., after successful Span test
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value Possible setting range for Span: 0.50 ... 1.99
		
	▶ Press “**Enter**”	Basic factory setting: 0 Offset correction possible, e.g., after a reference measurement
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Confirm with “**Enter**” to save new value
	▶ Press “**Arrow left**” (back)	Display returns to selection screen

7.2.1.12 *Median Filter*

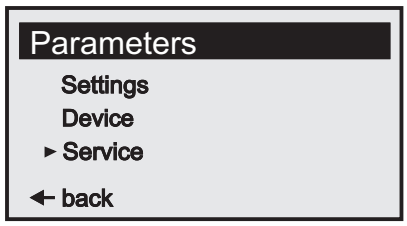
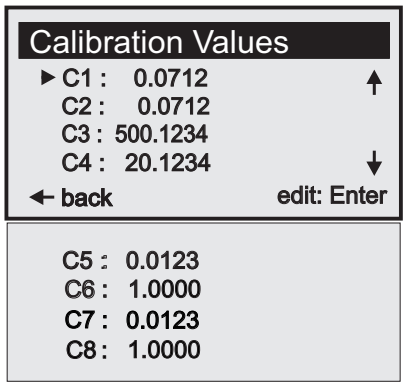
Anzeige	Aktion	Hinweis
	▶ Select „**Median Filter**“ ▶ Press „**Enter**“	The Median Filter reduces signal noise caused by high dust or rapidly changing processes. Median Filter value: „1“ = no filter „17“ = highest filter level „11“ = default value
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	The Median Filter adds 1 to 9 seconds to the response time based on the calculation: $\frac{(\text{Median Filter} + 1)}{2}$ Example: – desired response time: 20 s – If Median Filter = 15: (15 +1)/2 = 8 s delay time – Enter new value „Response Time“: 12 s (see “Response time”, page 43)

7.2.2 Device data

Display	Action	Note
	▶ Select “**Device**” ▶ Press “**Enter**”	Key device data
	▶ Press “**Enter**”	
	▶ Press “**Arrow left**” (back)	Displays the device serial number
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Displays the software version
	▶ Press “**Arrow left**” (back)	
		
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Device configuration

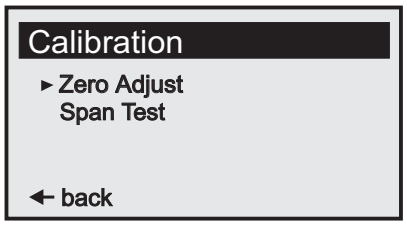
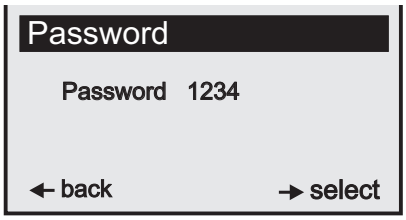
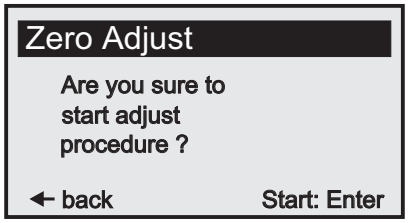
Display	Action	Note
	▶ Press “**Arrow left**” (back)	Displays the device configuration delivered 0112 = Standard No input possible
	▶ Press “**Arrow left**” (back)	

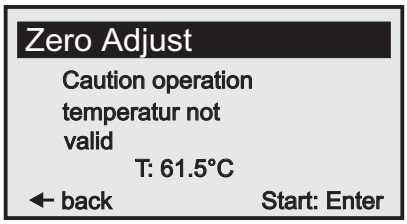
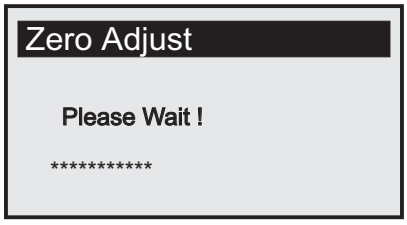
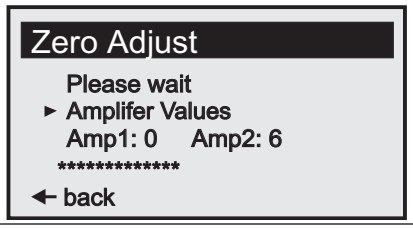
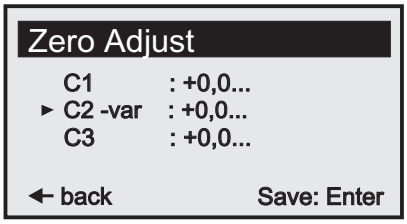
7.2.3 Service

Display	Action	Note
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Sensor calibration parameters **Caution:** Changes lead to measured value deviations
	▶ Press “**Enter**”	These values may only be changed in special cases e.g., after exchanging the receiver!

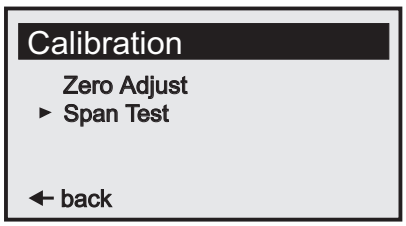
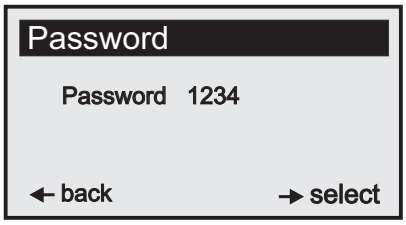
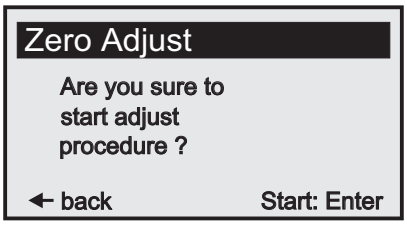
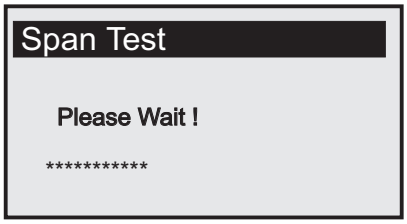
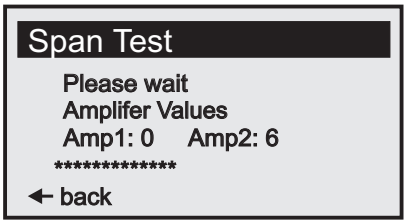
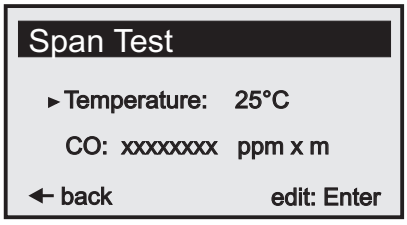
7.3 Calibration

7.3.1 Zero adjust

Display	Action	Note
	▶ Press “**CAL**” ▶ Select “**Zero Adjust**” with “**Enter**”	
	▶ Enter password “**1234**”	Prompt only appears when a warning is pending (e.g., device temperature)
	▶ Confirm with “**Enter**” ▶ Cancel with “**Arrow left**” (back)	

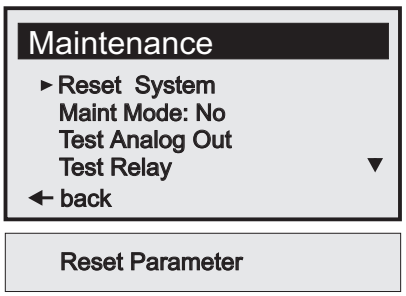
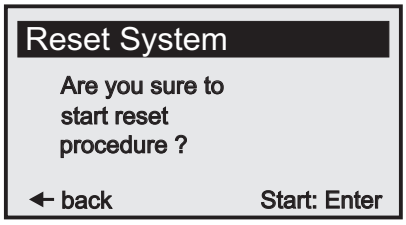
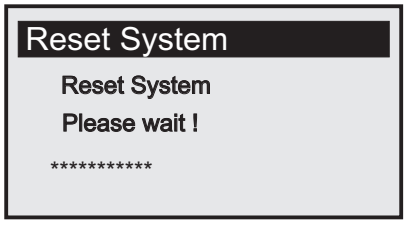
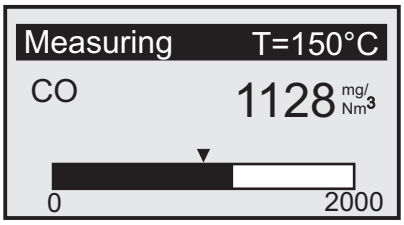
Display	Action	Note
		Wait until device temperature is reached Message only appears when the temperature has not yet stabilized
	▶ Confirm with “**Enter**” (for T=60 °C +- 0.5 °C) ▶ Cancel with “**Arrow left**” (back)	No inputs can be made during the calibration procedure
		No inputs can be made during the calibration procedure
	▶ Confirm with “**Enter**”	Data are saved

7.3.2 SPAN Test

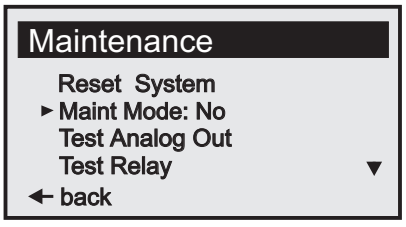
Display	Action	Note
	▶ Press “**CAL**” ▶ Select “**Span Test**” and confirm with “**Enter**”	
	▶ Enter password “**1234**”	Prompt only appears when a warning is pending (e.g., device temperature)
	▶ Confirm with “**Enter**”	Starts the zero point adjustment for the Span test
		Zero adjust is running No input possible on the device
		Zero adjust is running No input possible on the device
	▶ Edit ambient temperature ▶ Insert test cell in the holder	Set the temperature to the current ambient temperature Compare the measured value displayed with the value on the test cell Deviations can be corrected with the SPAN value when necessary (see “Calibration”, page 52). The Span factor to be set is calculated from the setpoint value (label on test cell) divided by the displayed measured value. Use “**Back**” to terminate span adjustment.

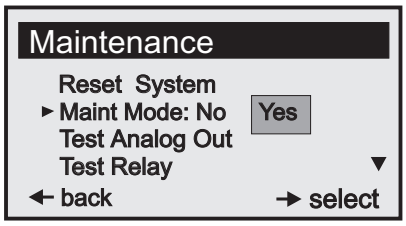
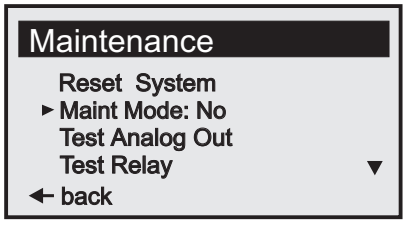
7.4 Maintenance

7.4.1 Reset System

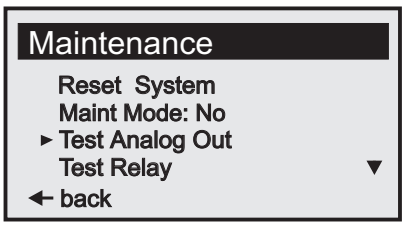
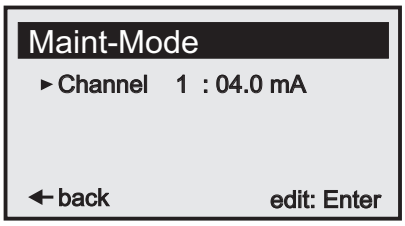
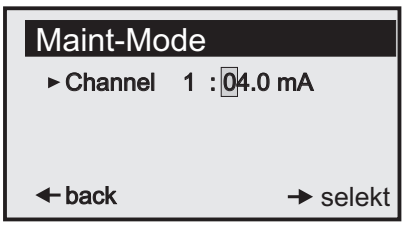
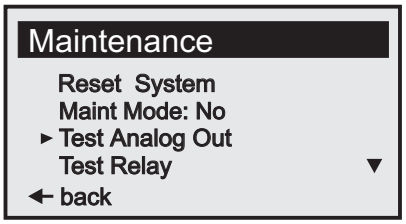
Display	Action	Note
	► Select using “**Arrow down**” or “**Arrow up**” ► Press “**Enter**”	Restarts the device
	► Press “**Enter**”	
		No input possible on the device
		Device is restarted

7.4.2 Maintenance mode

Display	Action	Note
	► Select using “**Arrow down**” or “**Arrow up**” ► Press “**Enter**”	

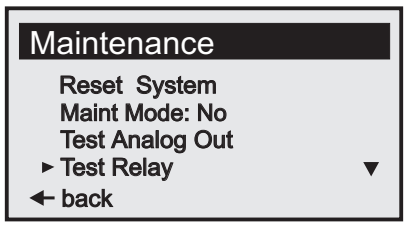
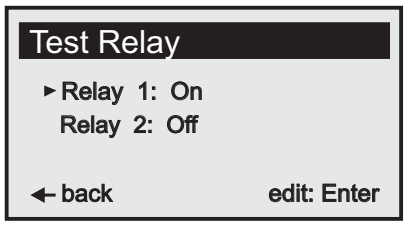
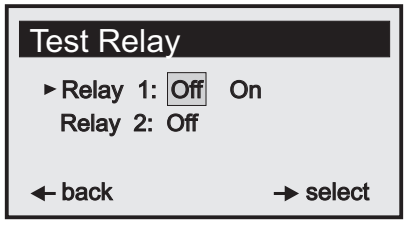
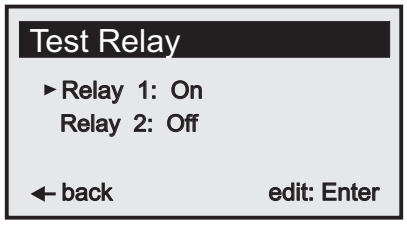
Display	Action	Note
	▶ Select with “**Arrow right**” ▶ Press “**Enter**”	Switches display to Maintenance mode when “**Yes**” is selected Output relay drops out Analog output retains last value
		

7.4.3 Test analog output

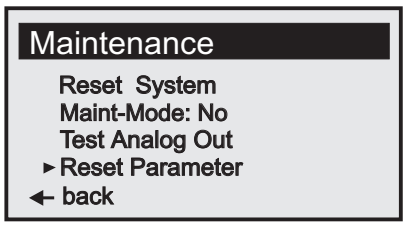
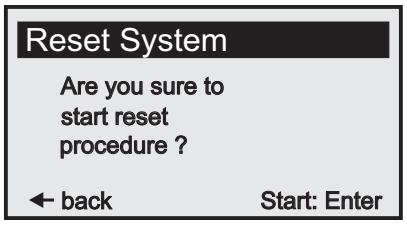
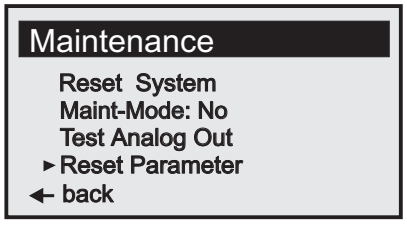
Display	Action	Note
	▶ Press “**Enter**”	
	▶ Press “**Enter**”	The set value must be output on the analog output
	▶ Select with “**Arrow right**” ▶ Enter new value with “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	
		

NOTE:
Analog-In can be tested using the displayed sample gas temperature.

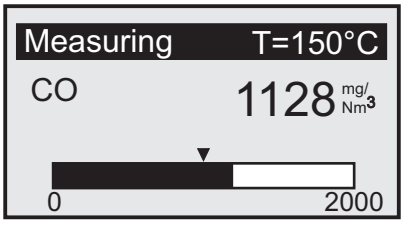
7.4.4 Test relay

Display	Action	Note
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	Tests relay 1 and relay 2
	▶ Select using “**Arrow down**” or “**Arrow up**” ▶ Press “**Enter**”	
	▶ Select with “**Arrow right**” ▶ Press “**Enter**”	
		

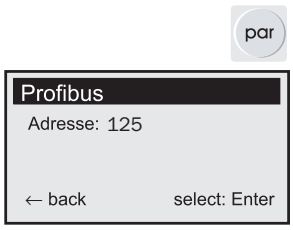
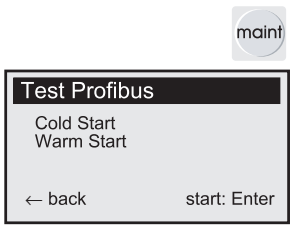
7.4.5 Resetting parameters

Display	Action	Note
	► Press “**Enter**”	
	► Press “**Enter**”	**Caution:** All values are reset to default. Calibration data will be lost!
		No input possible on the device

7.5 Measuring mode

Display	Action	Note
		Press “**Meas**” for immediate return to measuring mode

7.6 Connecting the PROFIBUS during commissioning (if installed)

	▶ Activate Parameter mode (**par**). ▶ Call up menu Profibus and select address ▶ Use the arrow keys to enter the corresponding 7 bit address and acknowledge.
	▶ Activate Maintenance mode (**maint**) and call up the Profibus menu. ▶ Perform menu item Cold Start This initializes the PROFIBUS software with the new addresses. The device master file (GSD) can now be configured via the PROFIBUS Master for operation of the GM901.

8 Shutting Down

8.1 Disassembling the sender and receiver

It is recommended to disassemble the GM901 during long periods of plant shutdowns. It is essential to disassemble the GM901 when the optional purge air unit is also put out of operation.

WARNING: Hot, toxic gases escaping!
Toxic gases can escape from the duct when the sender and receiver are removed from the flange!
- Take appropriate protective measures

Procedure

- Disconnect the device from the power supply
- Disconnect the cable plugs on the sender and receiver. Protect the cable plugs against moisture and dirt when not used for a longer period of time
- Take the sender and receiver off the purge air fixtures (loosen quick-release fasteners).
- Close off the purge air fixtures with an optional dummy flange

The optical adjustment of the purge air fixtures remains intact.

8.2 Deinstallation

Observe safety information according to VDE and national guidelines:

- During deinstallation, make sure no live lines are accessible unsecured
- Always insulate open cable ends with suitable auxiliary means to protect against dirt and moisture

Secure switches that should not be switched on again for safety reasons with signs and safeguards to prevent unintentional switching

9 Technical Data

9.1 Technical data overview

Measuring range	100 ppm to 60,000 ppm [1]
Measuring path	0.5 m ... 8.0 m (GM901-05)
Gas temperature	Standard: 250 °C; With extended calibration: 430 °C
Linearity	± 5% of measuring range end value
Resolution	Approx. 10 ppm
Response time	5 ... 360 s
Ambient temperature	–20 °C ... +55 °C
Ingress protection rating	IP 65
Supply voltage	115 V / 230 V
Power frequency	50/60 Hz
Max. power input	75 VA

[1] Dependent on the active measuring path.

9.2 Technical data of the sender and receiver of the GM901-5

Dimensions (L x W x H)	462 mm x 164 mm x 164 mm Length incl. purge air fixture
Weight	3 kg incl. purge air fixture
Lamp service life	Approx. 20 000 operating hours

9.3 Control unit

Analog input:	0 ... 20 mA; Input resistance 100 Ω
Analog output (electrically isolated)	0 ... 20 mA; Max. load 500 Ω
Relay 1, contact opens for device malfunction/warning	Potential-free, NO contact Maximum switching currency: 1 A Maximum switching voltage: 125 V DC/ 150 V AC Maximum switching capacity: 30 W DC/60 W AC
Relay 2, contact closes for limit value overrun	Potential-free, NC contact Maximum switching currency: 1 A Maximum switching voltage: 125 V DC/ 150 V AC Maximum switching capacity: 30 W DC/ 60 W AC
Status input for maintenance	Max. contact load 5 V /2 mA
Interfaces	RS 232 for Service PROFIBUS-DP-V1 (when installed) CAN Bus (optional)
Dimensions (L x W x H)	200 mm x 90 mm x 300 mm
Weight	4.3 kg

9.4 Specifications for optional voltage supply unit

Voltage supply inlet	
Nominal supply voltage	115 V /230 V AC, selectable with bridge
Power frequency	50/60 Hz
Voltage range	• 190 ... 260 V AC at 50 Hz • 95 ... 130 V AC at 60 Hz
Max. power input	50 VA
Protection class	IP65
Connection data for output voltage	
Nominal output voltage	24 V ± 0.5 V
Short-circuit proof	Yes
Overcurrent protection	Yes
Over-temperature protection	Yes

Table 2: Technical data of the optional voltage supply unit

9.5 Specifications on electric isolation

Connections SCU I/O	
Relay contact ↔ PE	860 V AC
Relay contact ↔ Relay contact	860 V AC
Relay contact ↔ Activation	1376 V AC
Electric isolation VISIC620	
Relay contact ↔ PE 230 V AC	230 V AC
Relay contact ↔ Relay contact 230 V AC	230 V AC
Relay contact ↔ Activation 368 V AC	368 V AC

Table 3: Characteristic data for electric isolation

9.6 Conformities

The technical version of the control unit complies with the following EU directives and EN standards:

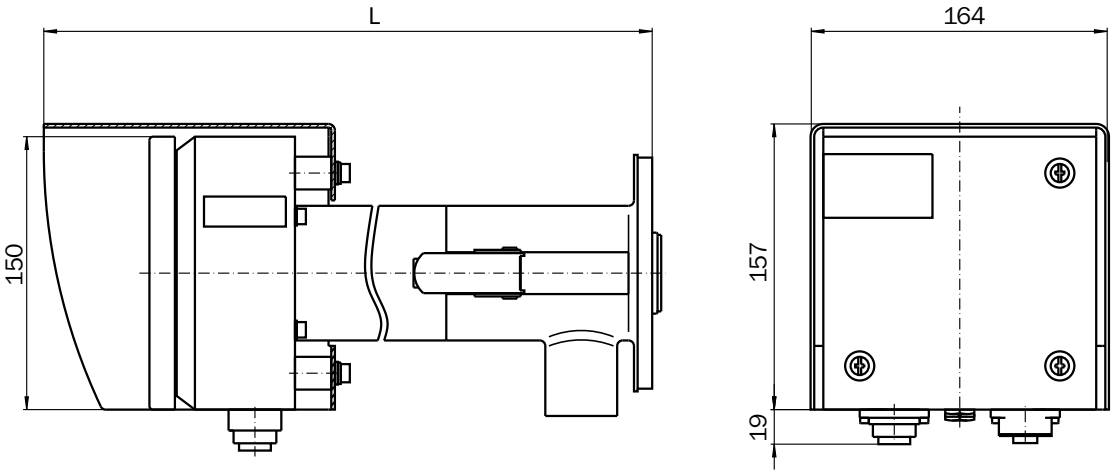
- EC Directive LVD 2006/95/EC
- EC Directive EMC 2004/108/EC

Applied EN standards:

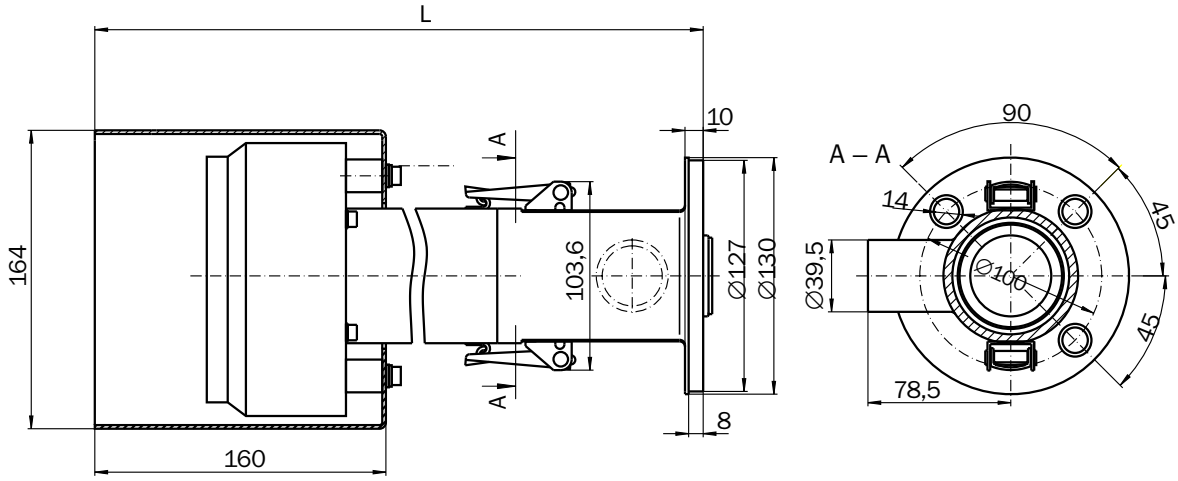
- EN 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326, Electrical equipment for measurement, control and laboratory use - EMC requirements

9.7 Dimensions - sender/receiver GM901-05

Fig. 30: Dimensions - sender/receiver

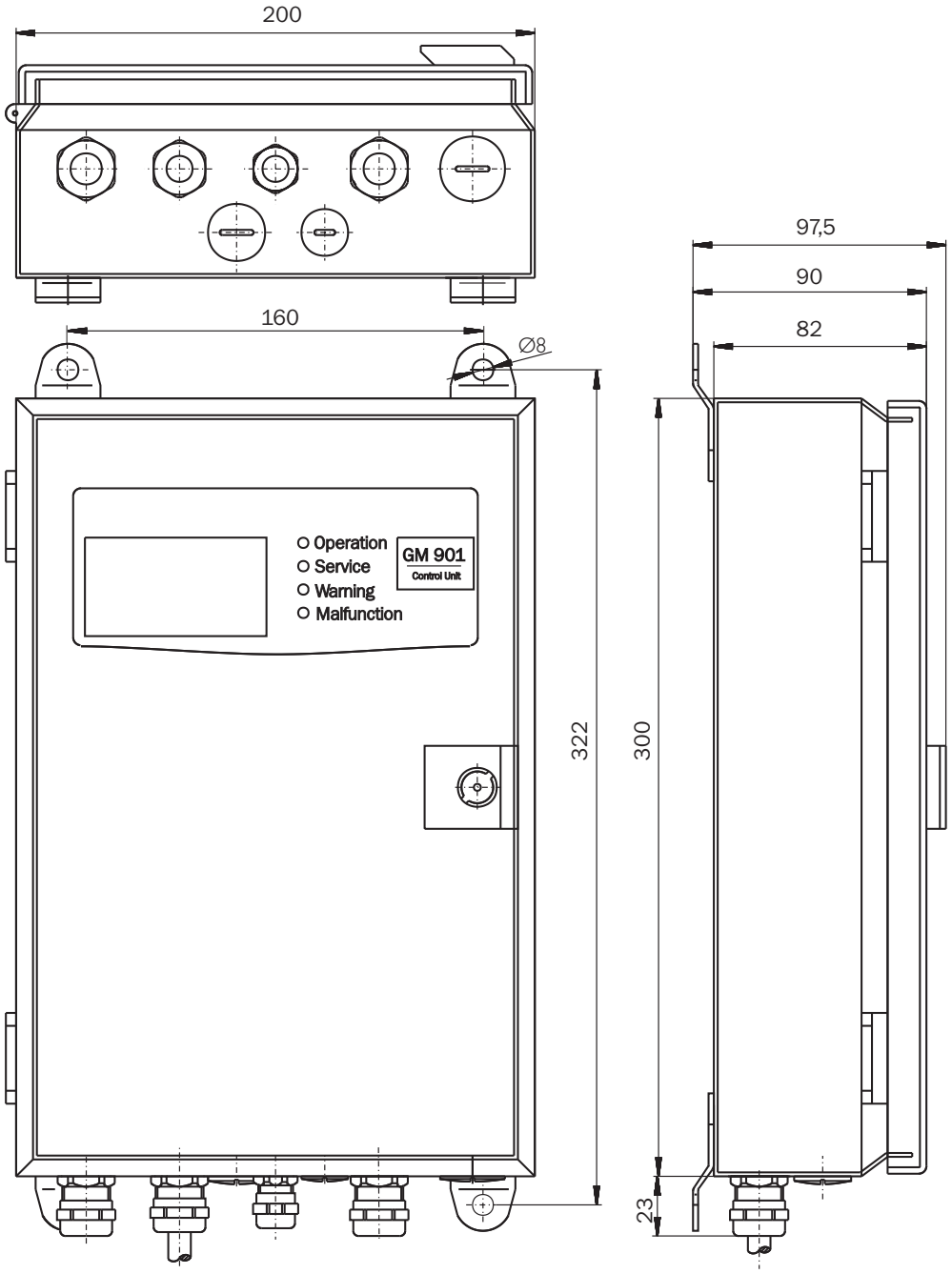


Sender: L = 298
Receiver: L = 462



9.8 Dimensioned drawing - control unit

Fig. 31:Dimensioned drawing - control unit



10 Warnings and Malfunctions

10.1 Warnings

Message	Possible cause	Action
Analog input temperature out of range	• Input signal (0 ... 20 mA) of the temperature measurement is outside the configured limits, the system continues running with the default temperature value	▶ Check temperature sensor ▶ Check cable connection ▶ Check configuration (see “Temperature”, page 47)
Temperature low, no humidity correction	• Measured gas temperature is so low that it is assumed the plant has been switched off. This means no cross-sensitivity correction is performed for exhaust gas humidity	▶ Check temperature sensor ▶ Check configuration (see “Temperature”, page 47). The switching point is at 70 °C or half the value of the default temperature depending on which value is lower ▶ No action required when the plant is switched off
Sensor low signal	• Dust content too high • Fog formation • Optical surfaces of device contaminated • Device not adjusted correctly • Lamp defective	▶ Check device alignment ▶ Clean optical surfaces ▶ Check for free light path through the duct ▶ Check lamp ▶ Still warning message after carrying out the actions ▶ New zero adjust
Warming up	• The required operating temperature is not already reached shortly after the device is switched on, the measured values displayed can be outside the tolerance	▶ Wait approx. 30 minutes.
Out of range	• The measured value has exceeded the specified measurement range by more than 5%	▶ Change the measurement range to a higher value (see “Measuring range”, page 44)

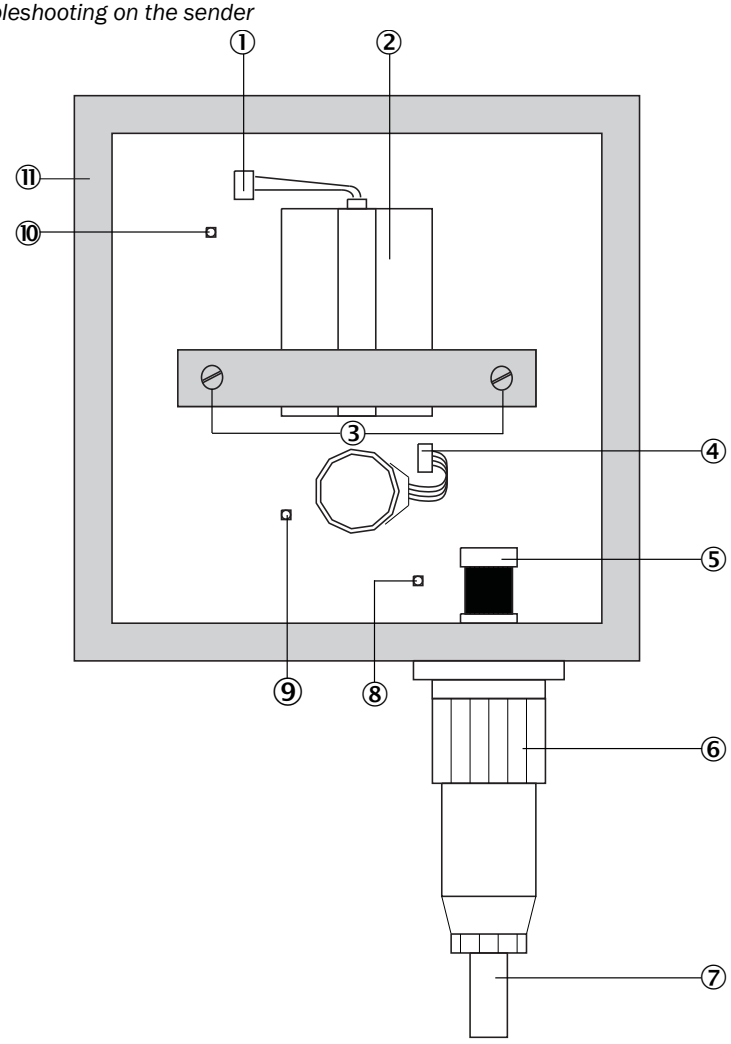
10.2 Malfunctions

Message	Possible cause	Action
EEPROM Parameter	• Invalid parameters • Control unit defective	▶ Reset parameters (see “Resetting parameters”, page 63) ▶ Configure again ▶ New zero adjust
Sensor communication	• Data communication between receiver unit and control unit interrupted	▶ Check cable connection and correct seat of the plug connection ▶ Further measures see “Troubleshooting on the control unit”, page 74
Sensor amplifier has reached maximum value	• Erroneous device adjustment • Optical surfaces contaminated • Light path interrupted	▶ Check device alignment ▶ Clean optical surfaces ▶ Check for free light path
Sensor no signal	• Erroneous device adjustment • Optical surfaces contaminated • Light path interrupted • Receiver unit defective	▶ Check device alignment ▶ Clean optical surfaces ▶ Check for free light path through the duct
Signal too high	• Measuring path Fl.-Fl. shorter than 0.5 m	▶ Correct measuring path flange - flange
IR source fault	• Infrared lamp defective • Power supply defective	▶ Check lamp plug connection (**Caution:** Lamp very hot in operation) ▶ Exchange sender unit when necessary
Chopper fault	• Chopper in sender unit defective	▶ Check chopper plug connection in sender unit (**Caution**: Lamp very hot in operation) ▶ Exchange sender unit when necessary
Device not ready, warming up	• The required operating temperature is not reached shortly after switching on • Device not ready for measuring	▶ Wait approx. 30 minutes
Motor fault	• Motor in the receiver unit defective	▶ Exchange receiver unit

10.3 Further tips on troubleshooting

10.3.1 Troubleshooting on the sender

Fig. 32: Troubleshooting on the sender



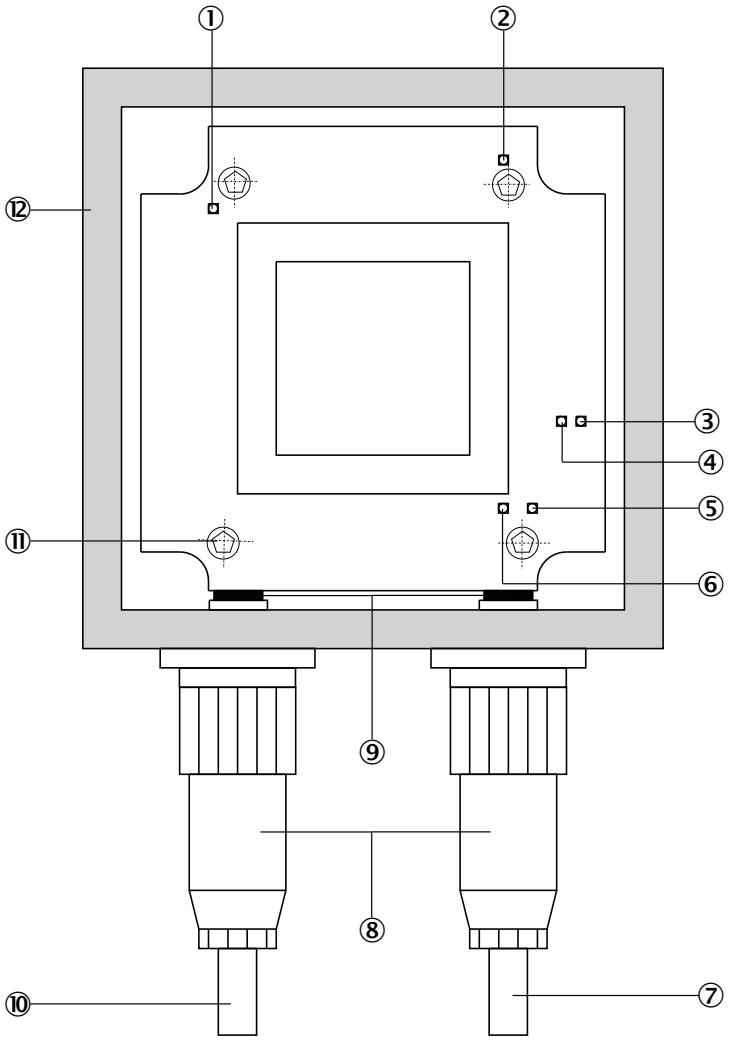
NOTE: Loosening the 2 adjustment screws causes the sender to be adjusted incorrectly!

▶ New adjustment only possible at the factory!

①	IR source: Plug connection
②	IR source⚠ Risk of burns! The infrared lamp becomes extremely hot during operation!
③	Adjustment screws
④	Chopper motor plug
⑤	Internal plug
⑥	External plug
⑦	Receiver cable
⑧	LED: On when voltage connected for motor and logic module
⑨	LED: On when voltage for IR source connected
⑩	LED: On when the lamp is on and the chopper disk rotates
⑪	Adjustment screw: 4 x
⑫	Sender housing

10.3.2 Troubleshooting on receiver

Fig. 33: Troubleshooting on receiver



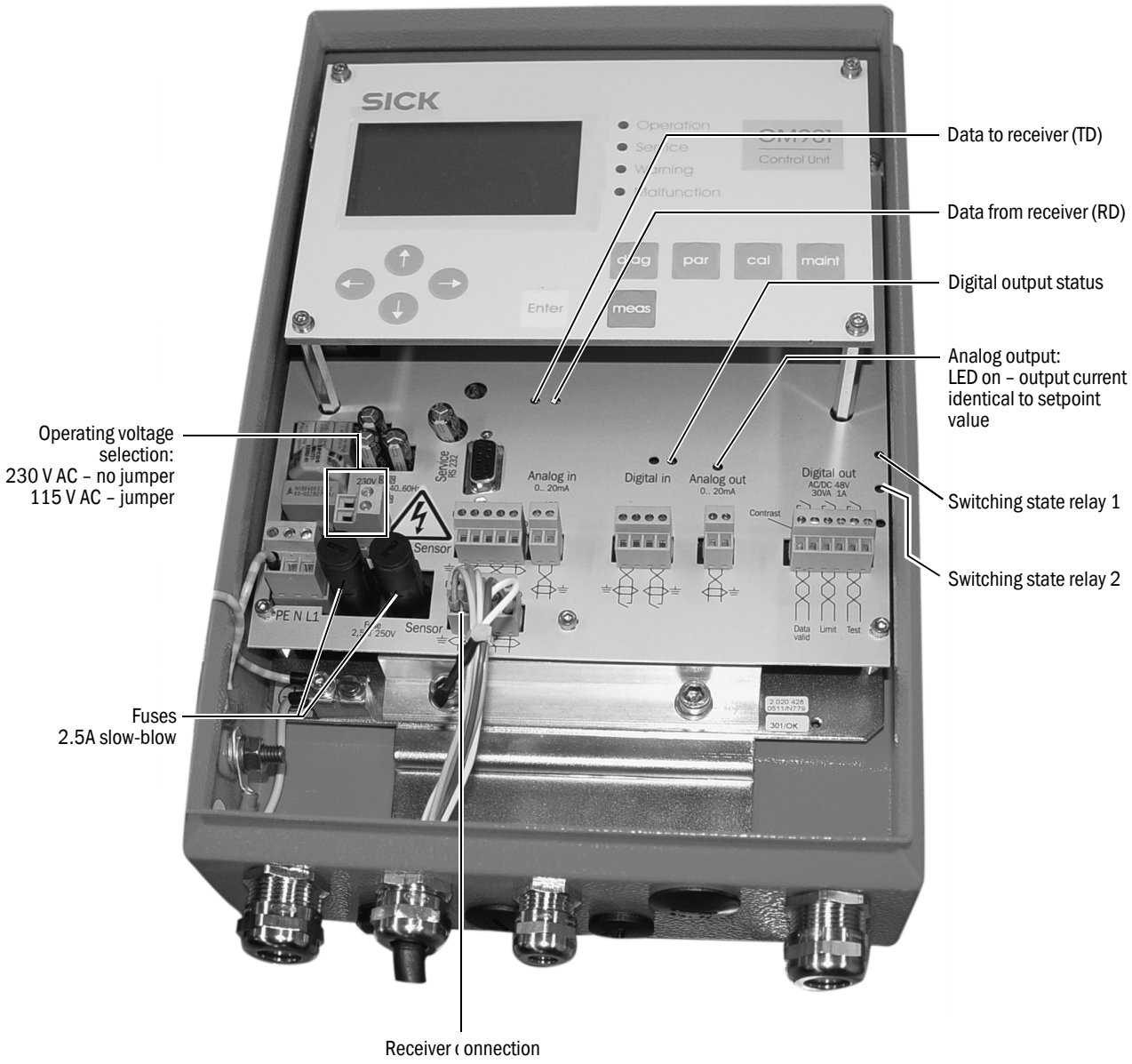
NOTE: Loosening the 4 adjustment screws causes the receiver to be adjusted incorrectly!

▶ New adjustment only possible at the factory!

①	LED: On when operation is uninterrupted
②	LED as status indicator for optics heating – On continuously: Ambient temperature too high – Blinks: Normal operation – Off: Ambient temperature too low
③	LED: Communication to control unit (TD)
④	LED: Communication from control unit (RD)
⑤	LED: Blinks when the cell disk in the receiver rotates and receives chopper signal.
⑥	LED: Blinks when the motor of the cell disk rotates
⑦	Line to sender
⑧	Outer plug-in connector
⑨	Inner plug-in connector
⑩	Line to control unit
⑪	Adjustment screw: 4 x
⑫	Receiver housing

10.3.3 Troubleshooting on the control unit

Fig. 34: Troubleshooting on the control unit - standard



Device shows no reaction:

- ▶ Check power supply
- ▶ Check operating voltage set
- ▶ Check fuse in control unit
- ▶ Check indicator for 24 V -/5 V supply in the control unit, when doing so, remove the plug-in terminal on the cable to the receiver when necessary.
  Check the cables first when these displays are only on when the plug connections are disconnected

If no error is found, connect the system components one after each other.

1 Only the cable from the control unit to the receiver
2 Connect the receiver

3 Lay the cable from the receiver to the sender
4 Connect the sender

If the error occurs again, it has been triggered by the last component connected which must then be exchanged.

Communication between receiver unit and control unit interrupted

Error messages: Sensor communication

The receiver sends data continuously to the control unit, an inquiry is sent automatically when nothing is received there.

Check following connections:

- Connection between control unit and receiver
- Cable connection on the plug-in terminal in the control unit
- Cable to receiver
- External plug connection on receiver
- Internal plug connections in receiver

Sensor values

The sensor values shown in the Table are valid for uninterrupted, steady state operation within specified limits.

To retrieve these data, see “Diagnosis”, page 39, or press **diag**.

Unit	Description	Min. Value	Typ. Value	Max.Value
V1	Signal-Value 1	0.5 V	Dependent on current conditions	5.0 V
V2	Signal-Value 2	0.5 V	Dependent on current conditions	5.0 V
DK	Variability of k-Value	0	Dependent on current conditions	
CC	Cooler Current	0 mA	Dependent on current conditions	1200 mA
TE	Temperature of Electronic Unit	20 °C	Dependent on current conditions	80 °C
TO	Temperature of Optic Unit	50 °C	60 °C	80 °C
TD	Detector Temperature	9 °C	10.7 °C	12 °C
AM	Amplifier Gain	00.00	Dependent on the measuring path	31.31

If the sensor values of the GM901 are outside these value ranges, please contact SICK Customer Service for remote diagnosis.

10.3.4 Remote diagnosis

Complete the Tables with the sensor values momentarily displayed and send as FAX to SICK AG, Customer Service. FAX No. ++49 7641 - 469 - 1149.

11 Spare Parts and Accessories

11.1 Spare parts

Identifier	Qty.	Part No.
Sender GM901-05 without purge air fixture	1	2 032 400
Receiver GM901-05 without purge air fixture, replacement part (only available when defective part returned)	1	2 020 655
Receiver GM901-05	1	2 032 347
Control unit GM901	1	2 043 414
Receiver connection cable	1	2 020 447
Connection cable, length 15 m	1	2 020 439
Electronics card module, control unit	1	2 061 631
Touch-sensitive keypad, control unit GM901	1	6 020 400
Cell wheel with motor (serial numbers ≥ 16508000)	1	2 091 937
Cell wheel with motor (serial numbers < 16508000)	1	2 091 938

Battery for real-time clock in the control unit	Type CR2032

11.2 Options, accessories

Identifier	Qty.	Part No.
Optical adjustment device	1	2 020 436
Assembly bracket for zero path	2	2 020 445
Purge air unit with distributor and 5 m hose	1	1 012 424
Purge air hose D = 40 m	1	5 304 683
Connection unit with power supply 230 V/24 V for sender and receiver	1	2 020 440
5 m extension cable		2 020 437
10 m extension cable		2 020 438
15 m extension cable		2 020 439
Weatherproof cover for purge air unit	1	5 306 108
Weatherproof cover for GM901 control unit	1	4 029 146
Protection device, blind flange with seal	2	2 020 435
Protection device, air filter kit	1	2 020 442
Purge air fixture for zero adjust	2	2 020 021
Filter element	1	5 306 091
Test tool kit for SPAN Test	1	2 019 639
Adapter flange GM910 -> GM901	1	2 019 369

12 General Maintenance

12.1 General

Maintenance tasks are principally application-dependent because the influences are also individual. This is why the maintenance interval is typically determined based on experience.

12.2 Maintenance interval of individual components of GM901 CO systems

GM901 (sender, receiver, control unit)

Interval	Action
Half-yearly	▶ Check optics and optical equipment for cleanness and clean as required
Yearly	▶ Drift check (zero point/adjust and sensitivity check with test cells)

Purge air unit

Interval	Action
Half-yearly	▶ Clean purge air filter and replace when necessary
Yearly	▶ Calibration of measuring system with test gas or filter check in cooperation with SICK.

8008250/13WN/V3-0/2019-07

Australia
Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Austria
Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

Belgium/Luxembourg
Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

Brazil
Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

Canada
Phone +1 905.771.1444
E-Mail cs.canada@sick.com

Czech Republic
Phone +420 234 719 500
E-Mail sick@sick.cz

Chile
Phone +56 (2) 2274 7430
E-Mail chile@sick.com

China
Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark
Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland
Phone +358-9-25 15 800
E-Mail sick@sick.fi

France
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany
Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

Greece
Phone +30 210 6825100
E-Mail office@sick.com.gr

Hong Kong
Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary
Phone +36 1 371 2680
E-Mail ertekesites@sick.hu

India
Phone +91-22-6119 8900
E-Mail info@sick-india.com

Israel
Phone +972 97110 11
E-Mail info@sick-sensors.com

Italy
Phone +39 02 27 43 41
E-Mail info@sick.it

Japan
Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia
Phone +603-8080 7425
E-Mail enquiry.my@sick.com

Mexico
Phone +52 (472) 748 9451
E-Mail mexico@sick.com

Netherlands
Phone +31 (0) 30 229 25 44
E-Mail info@sick.nl

New Zealand
Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway
Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland
Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania
Phone +40 356-17 11 20
E-Mail office@sick.ro

Russia
Phone +7 495 283 09 90
E-Mail info@sick.ru

Singapore
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia
Phone +421 482 901 201
E-Mail mail@sick-sk.sk

Slovenia
Phone +386 591 78849
E-Mail office@sick.si

South Africa
Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

South Korea
Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

Spain
Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden
Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland
Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan
Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

Thailand
Phone +66 2 645 0009
E-Mail marcom.th@sick.com

Turkey
Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates
Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

United Kingdom
Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

USA
Phone +1 800.325.7425
E-Mail info@sick.com

Vietnam
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at **www.sick.com**

SICK AG | Waldkirch | Germany | www.sick.com

SICK
Sensor Intelligence.