OPERATING INSTRUCTIONS

ZIRKOR200

Gas Analyzer

SICK

Sensor Intelligence.

Described product

ZIRKOR200

Manufacturer

SICK AG
Erwin-Sick-Str. 1
D-79183 Waldkirch
Germany

Legal information

This work is protected by copyright. All rights derived from the copyright shall be reserved for SICK AG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Any modification, abridgment or translation of this document is prohibited without the express written permission of SICK AG.

The trademarks stated in this document are the property of their respective owner.

© SICK AG. All rights reserved.

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Function of this document

These Operating Instructions describe:

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

1.2 Scope of application

These Operating Instructions apply exclusively for the measuring device described in the product identification.

They are not applicable to other SICK measuring devices.

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

1.3 Target groups

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

1.4 Symbols and document conventions

1.4.1 Warning symbols

Table 1: Warning symbols

Symbol	Significance
	Hazard (general)

Symbol	Significance
	Hazard by voltage
	Hazard by high temperature

1.4.2 Warning levels and signal words

DANGER

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

WARNING

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

CAUTION

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

Notice

Hazard which could result in property damage.

Note

Hints

1.4.3 Information symbols

Table 2: Information symbols

Symbol	Significance
	Important technical information for this product

1.4.4 Data integrity

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

SICK AG always assumes that the customer is responsible for the integrity and confidentiality of data and rights involved in connection with using the products.

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

2 For your safety

2.1 Principal safety information

- Read and observe these Operating Instructions.
- Observe all safety instructions.
- If anything is not clear: Please contact SICK Customer Service.

Retention of documents

These Operating Instructions

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

Correct project planning

- Basis of this Manual is the delivery of the measuring device according to the preceding project planning (e.g., based on the SICK application questionnaire) and the relevant delivery state of the measuring device (see delivered System Documentation).
  - ➢ If you are not sure whether the measuring device corresponds to the state defined during project planning or to the delivered system documentation: Please contact SICK Customer Service.

Correct use

- Only use the measuring device as described in “Intended use”. The manufacturer assumes no responsibility for any other use.
- Perform the specified maintenance work.
- Do not perform any work or repairs on the measuring device not described in this Manual.
- Do not remove, add or change any components in or on the device unless such changes are officially allowed and specified by the manufacturer.
- Use only original spare parts and wear and tear parts from SICK.

In case of non-compliance:

- The manufacturer's warranty becomes void.
- The device could become dangerous.
- The approval for use in potentially explosive atmospheres is no longer valid.

Special local conditions

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

2.2 Electrical safety

Hazard through electrical shock

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

- Before starting work on the measuring device, ensure the voltage supply can be switched off using a power isolating switch or circuit breaker in accordance with the valid standard.
- 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.

- Switch off the voltage supply before carrying out any work on the measuring device.
- After completion of the work or for test purposes or calibration, the voltage supply may only be activated again by authorized personnel complying with the safety regulations.

Endangerment of electrical safety through power cable with incorrect rating

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

- Always observe the exact specification in the Operating Instructions when installing a power cable (see *11.1.1 Technical data - control unit*).
- The user must ensure that the power cable is designed in accordance with the applicable standards.

2.3 Warning information on device

The following safety symbols are on the device:

Table 3: Warning symbols

Symbol	Significance
	Hazard by voltage
	Hazard by high temperature

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

➢ Read the relevant Section in these Operating Instructions.

➢ Observe all the safety information in the relevant Section.

2.4 Intended use

The ZIRKOR200 is an analysis system for continuous measurement of the oxygen (O_2) concentration in flue gases of combustion plants or comparable inert gas mixtures.

The oxygen measuring system must remain in operation when the process is interrupted or the system is temporarily switched off (e.g. at night or on weekends).

Frequent cooling and heating of the analyzer unit leads to a thermal load of the hot components (heater, thermocouple and O_2 sensor) and shortens their service life. SICK shall not be liable for any resulting damage.

2.5 Improper use

Do not use the system to determine the oxygen content of inflammable gases or in the environment of inflammable gases! The 800 °C measuring cell is an explosion hazard!

2.6 Requirements for personnel qualification

Table 4: Qualification requirements

Tasks	User groups	Qualification
Mounting	• Qualified personnel	• General knowledge in measurement technology, specialist device knowledge (possibly customer training at SICK)
Electrical installation	• Qualified personnel	• Authorized electrician (authorized skilled electrician or person with similar training) • General knowledge in measurement technology, specialist device knowledge (possibly customer training at SICK)
Initial commissioning Recommissioning	• Authorized operator	• General knowledge in measurement technology, specialist device knowledge (possibly customer training at SICK)
Decommissioning Operation Troubleshooting	• Operator / system integrator • Authorized operator	• General knowledge in measurement technology, specialist device knowledge (possibly customer training at SICK) • Authorized electrician (authorized skilled electrician or person with similar training) • Service training
Maintenance	• Operator / system integrator • Authorized operator	• General knowledge in measurement technology, specialist device knowledge (possibly customer training at SICK) • Service training

3 Product description

3.1 Product identification

Overview

Product name	ZIRKOR200
Manufacturer	SICK AG Erwin-Sick-Str. 1 · D-79183 Waldkirch · Germany
Type plate	The type plates are located at the positions shown below.

Type plate

The type plate contains information about the year of manufacture, serial number and system key, among other things.
The system key describes the system configuration and is itemized in the device passport.
The device passport is supplied with the system.

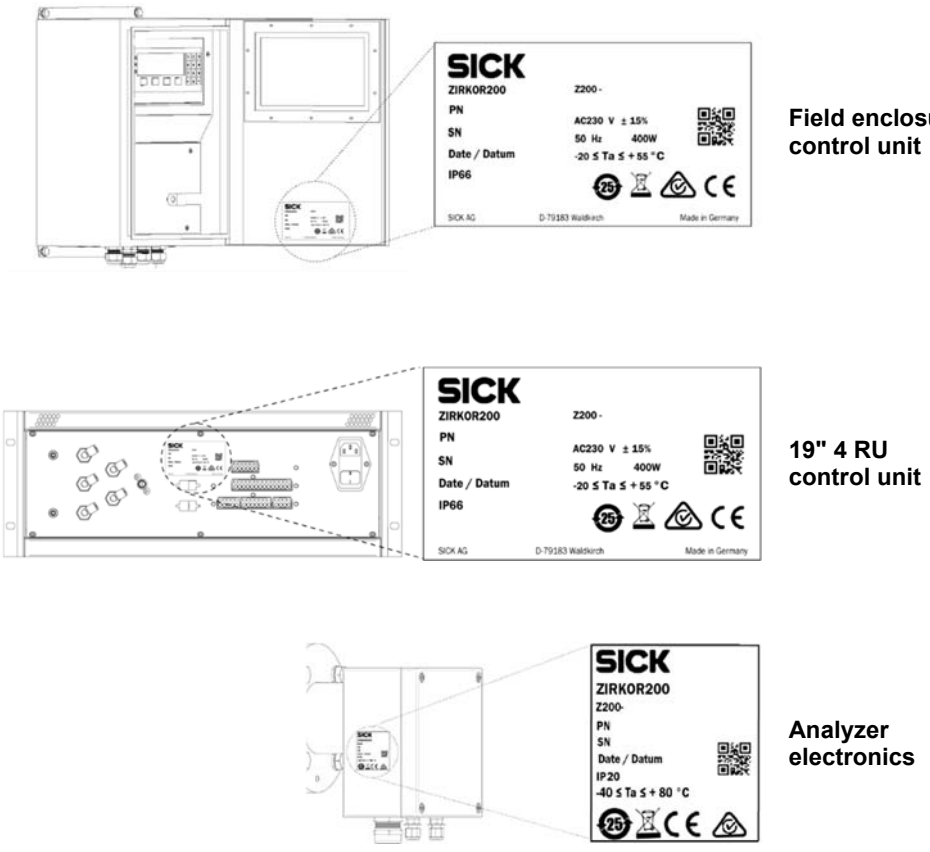


Fig 1: Position of the type plates on the control unit and analyzer electronics

3.2 Gas supply terminology

Definition of utility gases:

Instrument air:	Clean compressed air
Reference air:	Instrument air that is directed to the inside of the measuring cell. Mandatory for measuring operation.
Test air:	Instrument air or synthetic air for adjusting the start value of the measuring range
Test gas:	Gas to adjust the measuring range full scale value

3.3 Layout and function

3.3.1 System overview

Overview

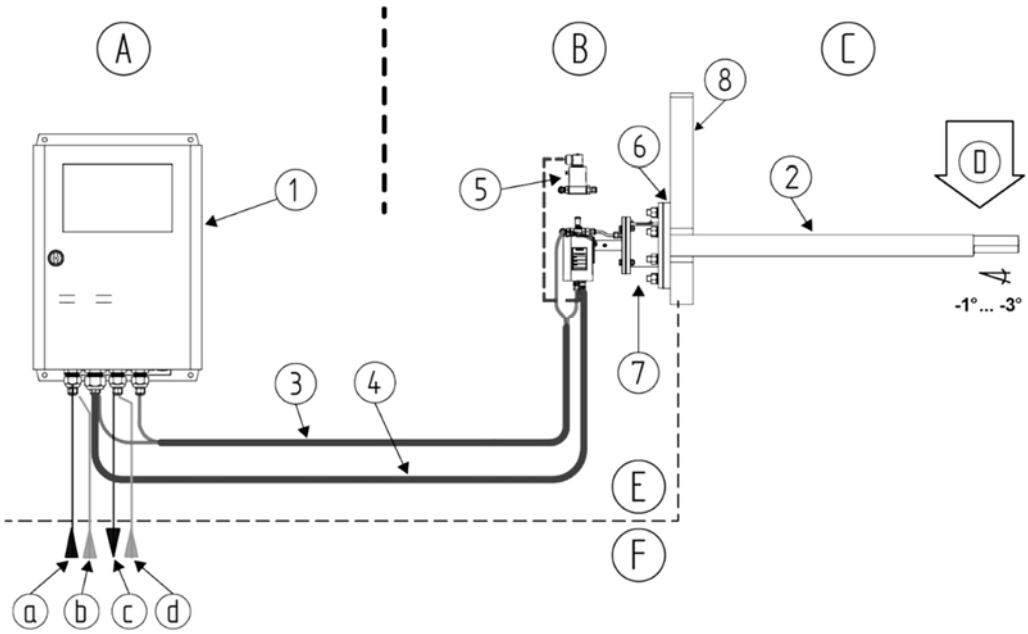


Fig 2: ZIRKOR200 with protection tube for flue gas temperatures up to 600 °C

1 Control unit / IP66

2 Analyzer unit / IP65
Consisting of analyzer electronics and measuring probe

3 Pneumatic line

4 Connection cable

5 Solenoid valve (optional)

6 Counterflange (optional)

7 Insulation: Customer

8 Duct wall

A Safe range - max. ambient temperatures:
-20 °C to +55 °C (-4 °F to +131 °F)

B Safe range - max. ambient temperatures:
-40 °C to +80 °C (-40 °F to +176 °F)

C Flue gas duct / combustion chamber

D Flue gas direction - max. flue gas temperatures: 600 °C

E Manufacturer

F Customer

a Voltage supply

b Test gas inlet

c Output signals (analog and digital)

d Instrument air inlet

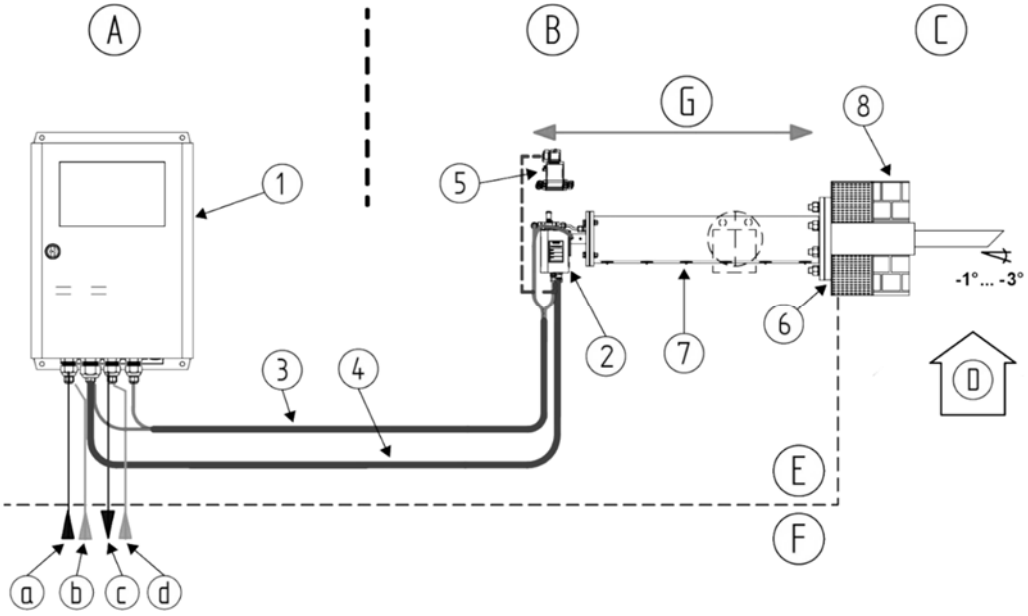


Fig 3: ZIRKOR200 with cooling protection tube for flue gas temperatures up to 1,600 °C

1 Control unit / IP66

2 Analyzer unit / IP65
Consisting of analyzer electronics and measuring probe

3 Pneumatic line

4 Connection cable

5 Solenoid valve (optional)

6 Counterflange (optional)

7 Insulation: Customer

8 Duct wall

A Safe range - max. ambient temperatures:
-20 °C to +55 °C (-4 °F to +131 °F)

B Safe range - max. ambient temperatures:
-40 °C to +80 °C (-40 °F to +176 °F)

C Flue gas duct / combustion chamber

D Flue gas direction - max. flue gas temperatures: 1,600 °C

E Manufacturer

F Customer

G Space requirements: 2.0 m for straight construction, 0.8 m for 90° angle construction

a Voltage supply

b Test gas inlet

c Output signals (analog and digital)

d Instrument air inlet

Function

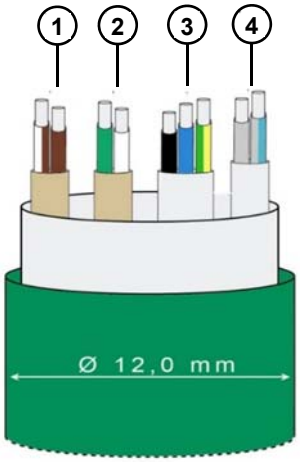
The ZIRKOR200 oxygen measuring system consists of an analyzer unit, which is installed on the duct with the gas to be analyzed, and a control unit for voltage and gas supply as well as for signal processing.

An oxygen sensor regulated to 800 °C which functions according to the zirconium oxide principle is fitted on the analyzer unit tip. An mV signal is measured between the reference gas side of the sensor (inside, instrument air 20.95% O_2) and the measuring gas side, which depends logarithmically on the relation of the oxygen partial pressures of both sides. The mV signal is converted to the oxygen partial pressure in the sample gas using the Nernst equation, which determines the O_2 concentration in the sample gas. The gas-tight separation of the reference and sample gas sides is therefore particularly important, as otherwise incorrect measurements will occur.

If there are also combustible components such as CO or H_2 in the sample gas, these can react with oxygen on the sensor surface and possibly reduce the measured value.

3.3.2 Connection cable

Overview



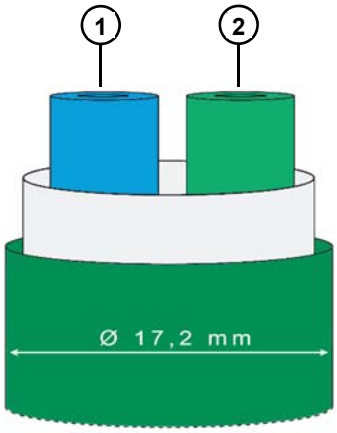
1	O_2 measuring cell	2 x 0.75 mm^2	White-brown / brown	With shielding
2	Thermocouple	2 x 0.75 mm^2	Green / white	With shielding
3	Measuring probe heater	3 x 1.5 mm^2	Black / blue / green-yellow	
4	Solenoid valve	2 x 0.75 mm^2	Grey / grey-blue	

Function

The connection cable connects the analyzer electronics of the analyzer unit with the control unit. The connection cable is required for voltage supply and signal transmission

3.3.3 Pneumatic line

Overview



1	Reference air	Blue	6 mm
2	Test air and test gas	Green	6 mm

Function

The pneumatic line connects the analyzer electronics of the analyzer unit with the control unit. The pneumatic line permanently supplies the analyzer unit with the reference gas required for measuring operation. In the event of a calibration, the analyzer unit is supplied with the required test air or gas via the pneumatic line.

3.3.4 Instrument air conditioning

Overview

If the supplied instrument air does not meet the required quality, an instrument air conditioner can be connected upstream from the control unit.

Important information

NOTICE

Malfunction of the measuring device due to unsuitable instrument air. Operation with air not satisfying the specifications voids the warranty and does not ensure proper functioning of the measuring device.

- ➢ Only feed conditioned instrument air to the measuring device.
- ➢ The instrument air quality must meet the specification.

Function

The instrument air conditioning serves to condition the compressed air provided by the operator.

Related topics

- Instrument Air Conditioning Operating Instructions
- Instrument air quality: See “Gas supply”

3.4 Interfaces

As standard, analog and digital signals are used for device communication with customer peripherals.

3.4.1 Advanced interfaces

Depending on the scope of the order, communication can take place via MODBUS RS-232 or RS-485, HART or FIELDBUS.

4 Transport and storage

4.1 Transport

Overview

The ZIRKOR200 analysis system consists of several components which, depending on the configuration, can weigh over 20 kg. Care must be taken to ensure that they are carried correctly to prevent injury.

Important information

WARNING

When transporting the measuring device, there is a risk of crushing and impact due to the high weight.

- ➢ The measuring device may only be transported by competent persons.

Notice

The measuring device may only be transported and installed by qualified persons who, based on their training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

4.2 Storage

ZIRKOR200 analysis systems and spare parts must be stored in a dry place with sufficient ventilation at temperatures from -40 °C to +80 °C (-40 °F to 176 °F). Paint fumes, silicone sprays etc. must be avoided in the storage environment.

5 Mounting and electrical installation

5.1 Safety

Qualification

Mounting may only be carried out by trained specialists. The electric installation may only be carried out by a trained electrician.

5.1.1 Equipment protection

The customer must ensure short-circuit protection according to the valid standards using fuses or automatic circuit breakers with short-circuit protection and overload protection.

5.1.2 Disconnecting device

Install a power isolating switch or circuit breaker according to the valid standard for disconnecting the voltage supply.

Install an additional disconnecting device if a UPS is used.

Make sure the power isolating switches are easily accessible.

5.2 Scope of delivery

Please see the delivery documents for the scope of delivery.

5.3 Overview of mechanical and electrical installation

Important information

NOTICE

Observe the installation sequence.

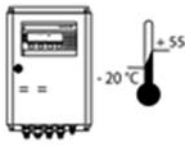
If the installation sequence is incorrect, there is a risk of contamination of the gas sampling unit. This can cause exhaust gas to enter the unheated analyzer and condense out.

- ➢ First connect the instrument air and voltage supply.
- ➢ Only then install the gas sampling unit in the flue gas duct.

Installation sequence

1. Fit the control unit.
2. Lay the pneumatic line and connection cable.
3. Connect the pneumatic line and connection cable to the control unit.
4. Connect the instrument air.
5. Connect the voltage supply.
6. Connect the pneumatic line and connection cable to the analyzer electronics of the analyzer unit.
7. Install the analyzer unit.

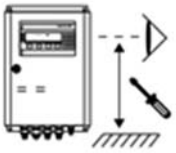
5.4 Installing the control unit



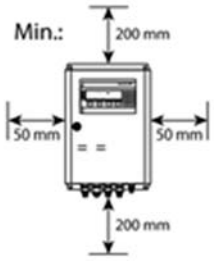
Observe ambient temperatures.

Observe enclosure rating.

Avoid vibrations greater than 2 g.



Install at eye level.



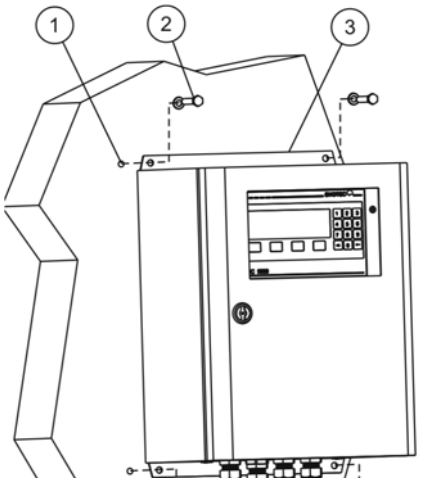
Observe minimum distances.

Heavy device, ensure correct lifting and carrying.

Important information

Notice

The materials used for fastening and the floor must be able to withstand loads of 90 kg.



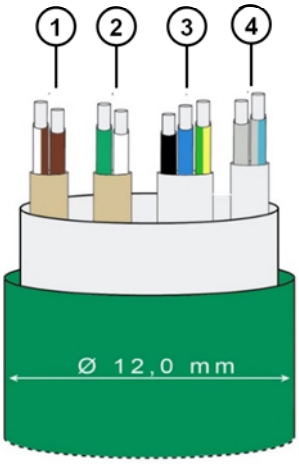
1 Drill holes according to the mounting method for safe installation.

2 Use screws suitable for the floor and fastening method.

3 Control unit

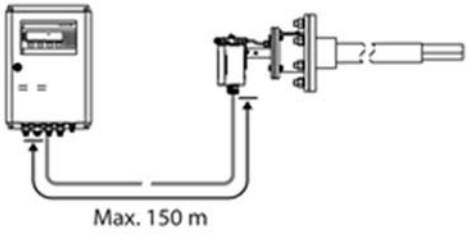
5.5 Installing the connection cable

Overview

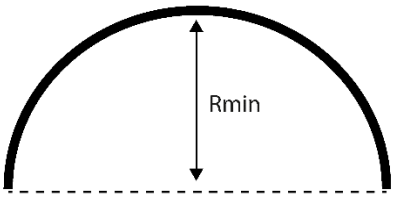


1	O_2 measuring cell	White-brown / brown
2	Thermocouple	Green / white
3	Measuring probe heater	Black / blue / green-yellow
4	Solenoid valve	Grey / grey-blue

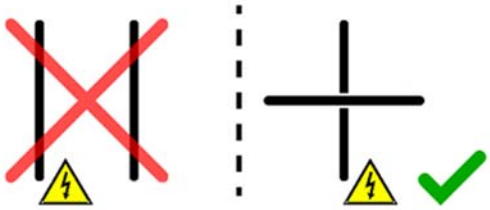
Installation information



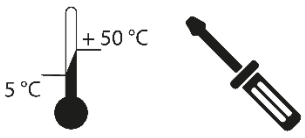
Observe maximum possible cable length:



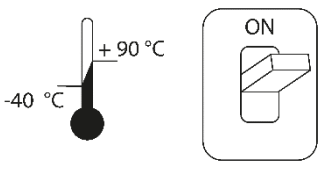
Observe bending radius:
Connection cable Rmin = 96 mm



Lay connection cable only crosswise to cables carrying the load current.



Observe ambient temperature limits:
During installation: -5 °C to +50 °C



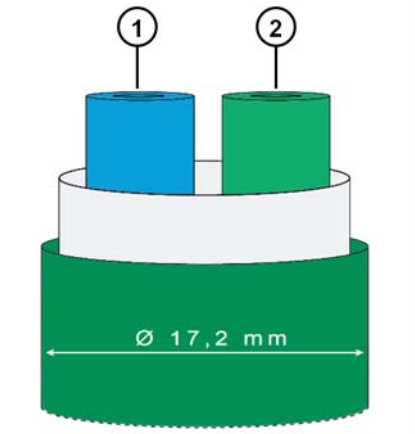
Observe ambient temperature limits:
During operation: -40 °C to +90 °C

Procedure

1. Lay one end of the connection cable to the control unit.
2. Lay the other end of the connection cable to the analyzer unit.
3. Insulate the individual cables within the connection cable. Ensure the length of the individual cables is suitable for the connection.

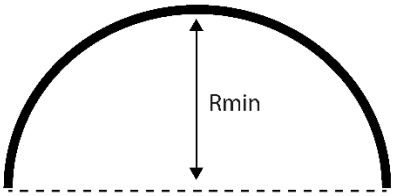
5.6 Installing the pneumatic line

Overview

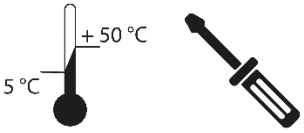


1	Reference air	Blue
2	Test air and test gas	Green

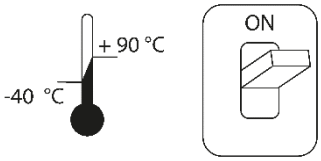
Installation information



Observe bending radius:
Pneumatic line Rmin = 138 mm



Observe ambient temperature limits:
During installation: -5 °C to +50 °C



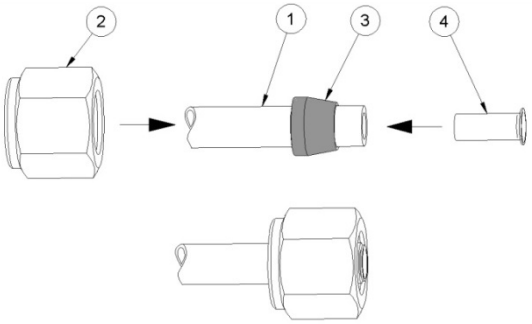
Observe ambient temperature limits:
During operation: -40 °C to +90 °C

Procedure

1. Lay one end of the pneumatic line to the control unit.
2. Lay the other end of the pneumatic line to the analyzer unit.
3. Strip the individual hoses within the pneumatic line. Ensure that the length of the individual hoses is suitable for the connection.
4. Attach the pneumatic screw fittings included in the delivery.

5.6.1 Attaching pneumatic screw fittings

Overview



1	Hose of the pneumatic line
2	Cap nut
3	Ferrule
4	Support sleeve

Procedure

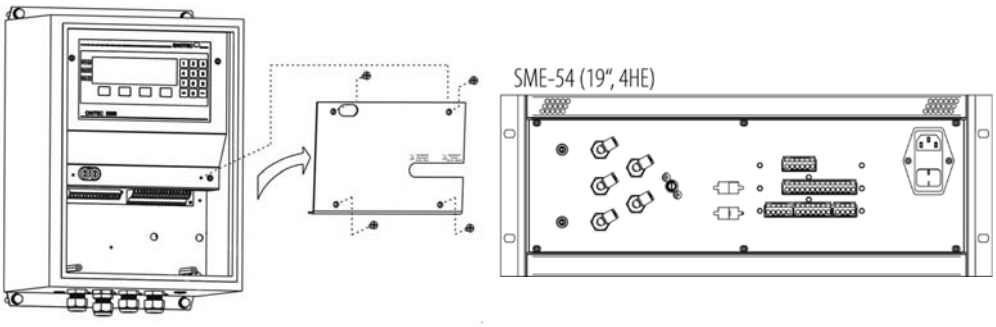
1. Guide the coupling nut over the hose.
2. Guide the ferrule over the hose.
3. Insert the support sleeve into the hose opening.

5.7 Electrical connections of control unit

5.7.1 Accessing the terminals

Important information

WARNING
Disconnect the power voltage from the system before removing the terminal cover. First connect the power voltage supply to the system again after attaching the terminal cover. Live parts may not be accessible after installation.



Field enclosure **Rear 19" 4 RU control units**

5.7.2 Ferrite sleeves

Important information

Notice
CE conformity is void when these ferrite sleeves are not installed.

Procedure

In order to avoid that line-bound interference influences the control unit, the supplied ferrite sleeves must be mounted as follows

Ferrite sleeve	Cable	Cores
1 (customer cable)	Voltage supply	L, N, PE
2 (customer cable)	Current output O_2	17A and 17B
3	Connection cable	Brown, brown-white, green1, white1, green2, white2
5	Connection cable	Blue, black, green-yellow

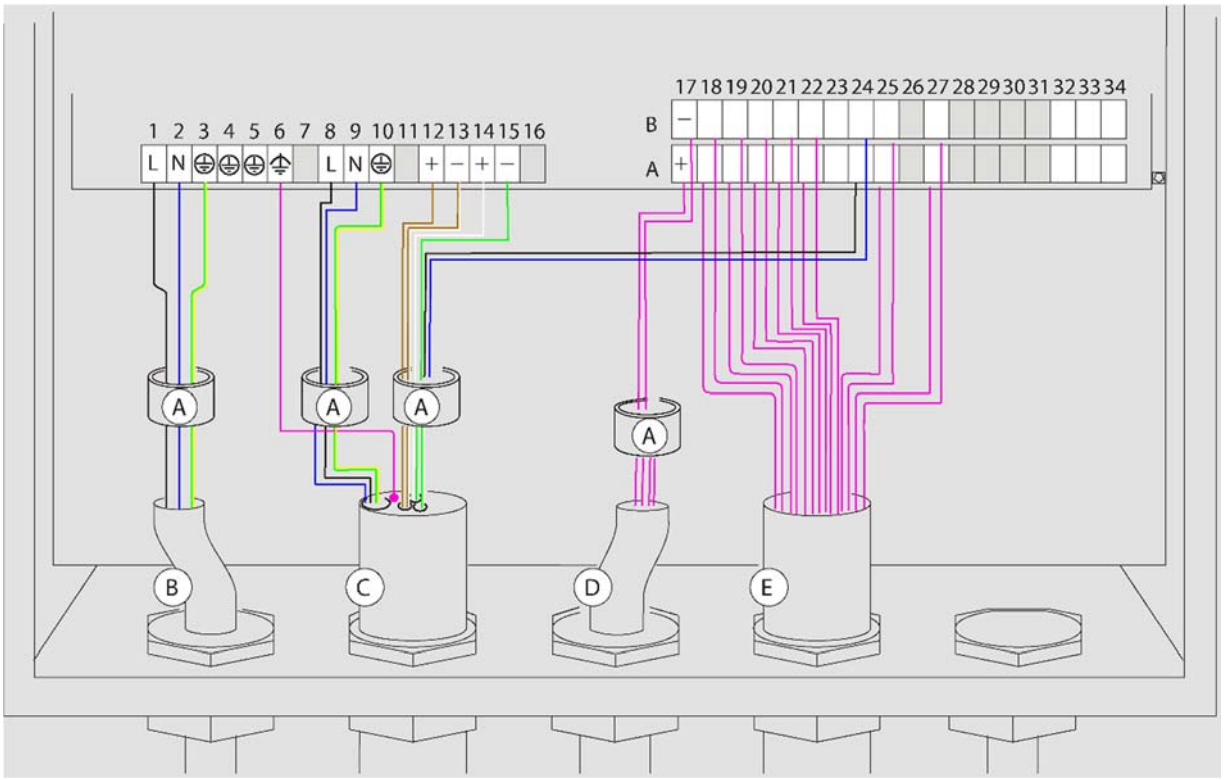
5.7.3 Connections in the control unit

Note

The connection terminals of the control unit are suitable for conductor cross-sections from 0.08 mm² (AWG 28) to 2.5 mm² (AWG 12).

Insulation stripping of electrical connections:	Field enclosure	6 mm
	19“ 4 RU	8 – 9 mm

Reduce the suitable cross-sections by one size unit when using ferrules.



A Ferrite sleeves (included)
B Power voltage cable (not included)
C Connection cable (included)
D Analog output cable (not included)
E Status signal cable (not included)

Voltage supply (115/230 V AC, 50/60 Hz)

X4	1	L	Black	Phase
	2	N	Blue	Neutral
	3	PE	Green/ yellow	Protective conductor

Connection cable

X4	6	FE		Functional grounding
	8	L	Black	Heater
	9	N	Blue	Heater
	10	PE	Green/ yellow	Protective conductor
	12	+	Brown	O_2 sensor signal
	13	-	Brown/white	O_2 sensor signal
	14	+	Green	Thermocouple
	15	-	White	Thermocouple
X5	24A	+	Grey	Solenoid valve
	24B	-	Grey/blue	Solenoid valve

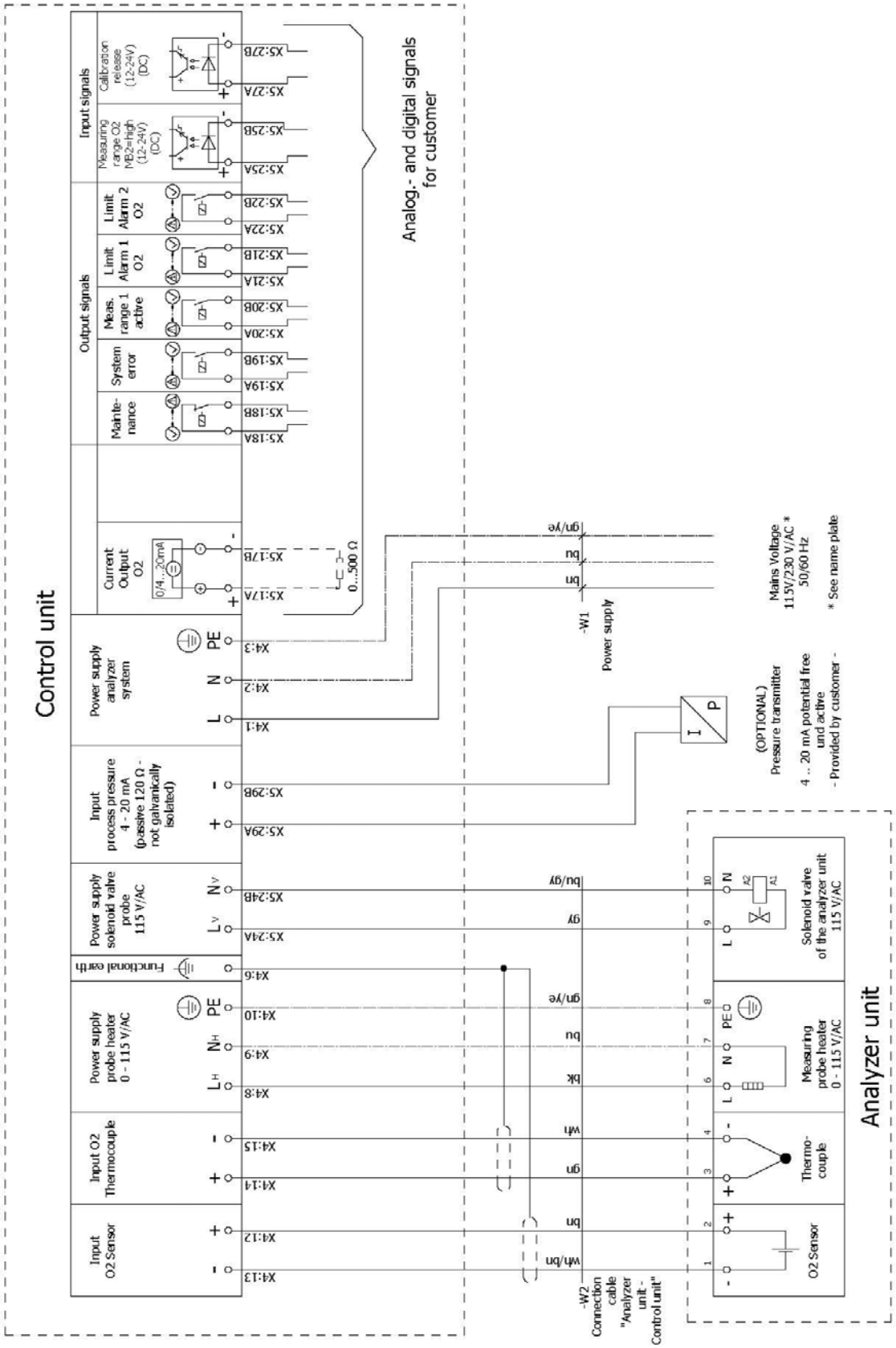
Analog signal cable

X5	17A	+		O_2 output
	17B	-		O_2 output

Status signal cable

X5	18A	+	Maintenance
	18B	-	Maintenance
	19A	+	System error
	19B	-	System error
	20A	+	O_2 measuring range
	20B	-	O_2 measuring range
	21A	+	O_2 limit alarm 1
	21B	-	O_2 limit alarm 1
	22A	+	O_2 limit alarm 2
	22B	-	O_2 limit alarm 2
	25A	+	Measuring range
	25B	-	Measuring range
	27A	+	Calibration release
	27B	-	Calibration release

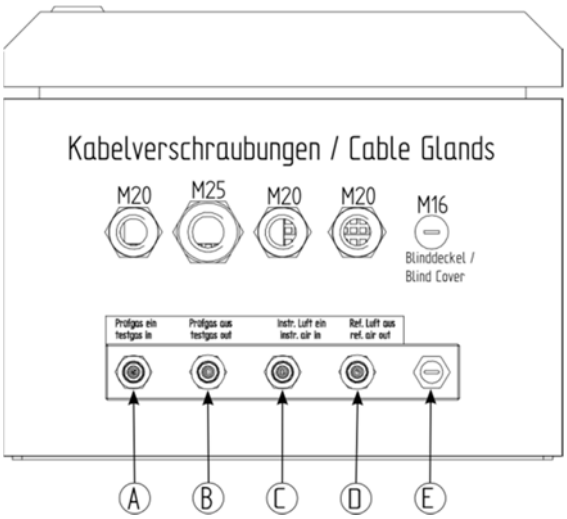
5.7.4 ZIRKOR200 wiring diagram



5.8 Pneumatic connections of control unit

5.8.1 Field enclosure

Overview

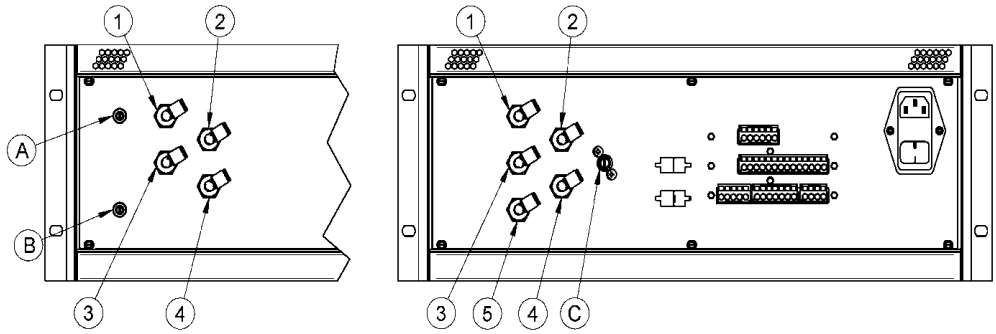


No.	Hose	Pump version	Instrument air version
A	1/4“	Test gas inlet	Test gas inlet
B	1/4“	Test gas outlet	Test gas outlet
C	1/4“	Reference air inlet	Instrument air inlet
D	1/4“	Reference air outlet	Reference air outlet
E	1/4“	Test air inlet	

Procedure

Connect the pneumatic connections according to the assignment above.

5.8.2 19“ 4 RU



Instrument air version

A Reference air throttle

B Test air throttle

Pump version

C Test air throttle

No.	Hose	Instrument air version	Pump version
1	1/4“	Test gas inlet	Test gas inlet
2	1/4“	Test gas outlet	Test gas outlet
3	1/4“	Instrument air inlet	Reference air inlet
4	1/4“	Reference air outlet	Reference air outlet
5	1/4“		Test air inlet

Procedure

Connect the pneumatic connections according to the assignment above.

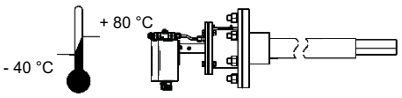
5.9 Installing the analyzer unit

Important information

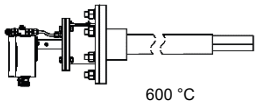
Caution

Hot and harmful gases may escape when working on the flue gas duct.
Only experienced technicians who are able to assess the quality of their work and recognize potential hazards are allowed to work on the flue gas duct.
When working on the flue gas duct, the system must be switched off or suitable protective measures must be taken for work during operation.

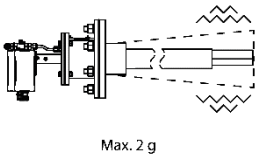
Installation information



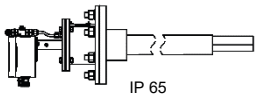
Observe ambient temperatures from -40 °C to +80 °C.



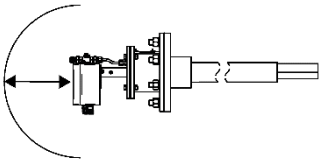
Observe max. process temperature of 600 °C.



Avoid vibrations greater than 2 g.



Observe enclosure rating.

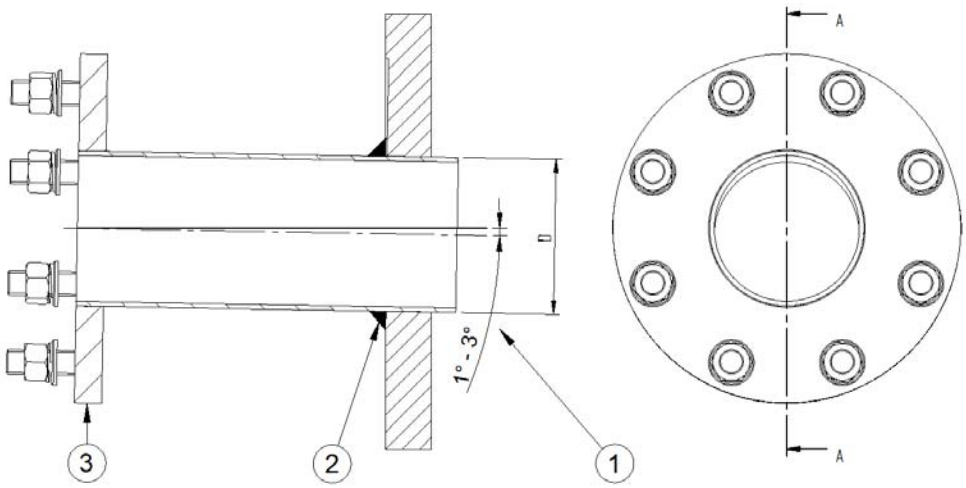


Ensure access to the analyzer unit and analyzer electronics.

Heavy device, ensure correct lifting and carrying.

5.9.1 Fitting the counterflange

Overview



1 Inclination angle of the counterflange

2 Weld the counterflange gas-tight.

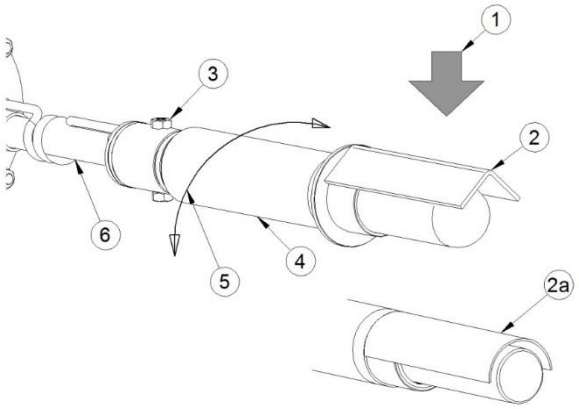
3 Counterflange (provided by customer)

Procedure

1. Before breaking through the flue gas duct wall, make sure there is enough space inside and outside the duct for installation, that there are no fixtures in the vicinity and no other obstacles in the way.
2. For horizontal installations, attach the counterflange **3** at an angle **1** from -1° to -3°. This allows condensed flue gas elements to flow back into the duct.

5.9.2 Adjusting the V-shield

Overview



1 Flue gas flow direction

2 V-shield (ZIRKOR200)

2a V-shield (alternative)

3 Screws for securing the filter head

4 Filter head

5 Filter head rotation direction

6 Analyzer unit

Procedure

3. Before fitting the analyzer unit, determine the flue gas flow direction and turn the V-shield of the filter head in the direction of the flue gas flow.
4. Loosen counter nut and then Allen screw **3** on filter head **4**.
5. Turn filter head **4** so that V shield **2 / 2a** points in the direction of flue gas flow **1** when installing the analyzer unit.
6. Then retighten the Allen screw and counter nut **3**.
7. The filter head is freely rotatable through 360° **5**.

5.9.3 Installing the protection tube and the analyzer unit

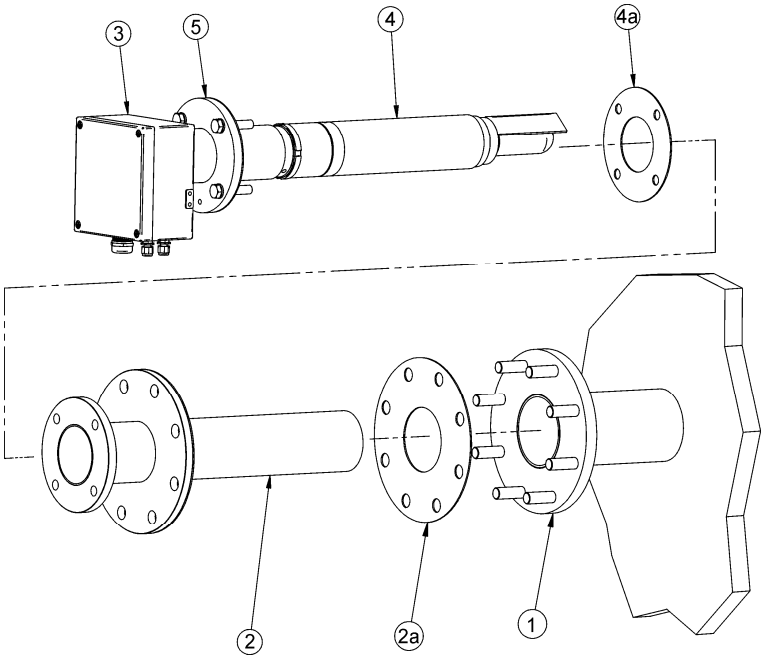
Important information

Notice
Only use new and undamaged flange gaskets to install the analyzer unit.

Notice
Analyzer units with a length of more than 2 m must be supported every 2 m within the flue gas duct.

Notice
Never leave the analyzer unit unheated for long periods of time while the process is running.

Overview



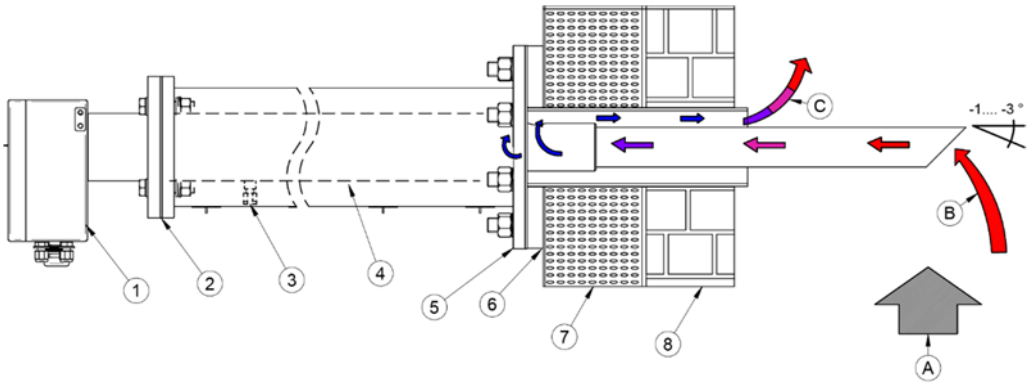
1	Counterflange	**4**	Measuring probe
2	Protection tube	**4a**	Flat gasket of measuring probe flange
2a	Measuring probe seal	**5**	Measuring probe flange
3	Analyzer electronics		

Procedure

1. Slide measuring probe seal **2a** and then protection tube **2** onto counterflange **1**.
2. Tighten the counterflange nuts firmly to ensure the flange connection is tight.
3. Slide flat gasket of measuring probe flange **4a** and then measuring probe **4** onto protection tube flange **2**.
4. Tighten the counterflange nuts provided firmly to ensure the flange connection is tight.
5. Insulate the counterflange to prevent the temperature from falling below the dew point.

5.9.4 Installing the cooling protection tube

Overview



1	Analyzer electronics	**A**	Flue gas
2	Flat gasket of measuring probe flange	**B**	Gas inlet
3	Suction connection	**C**	Gas outlet - do not block
4	Cooling protection tube - insulate to prevent condensation		
5	Cooling protection tube flange		
6	Counterflange gas-tight and welded on at correct angle		
7	Sheet steel		
8	Duct wall		

Procedure

- ➢ Install the cooling protection tube in the same way as the protection tube and follow the instructions in Section 5.9.3 *Installing the protection tube and the analyzer unit*.
- ➢ An optional injector can be connected to the suction connection to increase the analyzer unit's response time.
- ➢ The part of the cooling protection tube protruding from the duct wall must be insulated or, if necessary, heated in order to prevent the flue gas temperature from falling below the dew point inside the analyzer unit.

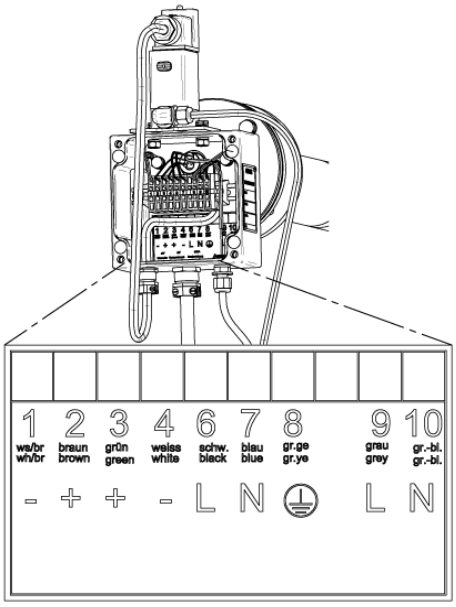
5.10 Electrical connections on the analyzer electronics

Important information

Notice

The connection cable is to be treated as measuring cable.
Under no circumstances should the shielding of the connection cable be connected to the analyzer unit side!

Overview



1	-	White/brown	mV O_2 sensor
2	+	Brown	mV O_2 sensor
3	+	Green	mV thermocouple 1
4	-	White	mV thermocouple 1
6	L	Black	115 V AC measuring probe heater
7	N	Blue	115 V AC measuring probe heater
8	PE	Green/yellow	PE protective grounding
9	L	Grey	115 V AC solenoid valve
10	N	Grey/blue	115 V AC solenoid valve

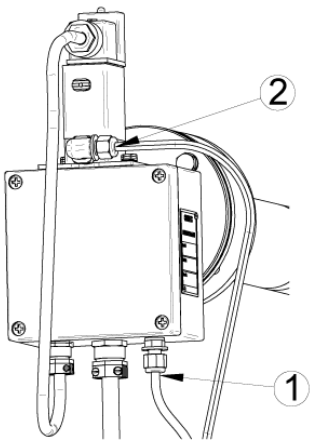
Connections:	0.08 ... 2.5 mm²
Insulation stripping:	8 – 9 mm

Procedure

Connect the electrical connections according to the assignment above.

5.11 Pneumatic connections on the analyzer electronics

Overview



1 Blue line (reference air)

2 Green line (test gas)

Procedure

Connect the pneumatic connections according to the assignment above.

6 Commissioning

6.1 Checklist before initial commissioning of the system

- Does the system number of the analyzer unit match the system number of the control unit? Assign when not correct
- Does the power voltage correspond to the data on the type plate? (See Section *3.1 Product identification*.) If not, contact SICK.
- Are the electrical connections made correctly? (See Sections *5.7.4 ZIRKOR200 wiring diagram* and *5.10 Electrical connections on the analyzer electronics.*)
- Is the allocation of the pneumatic connections correct and are the connections gas-tight? (See Sections *0 Pneumatic connections of control unit* and *5.11 Pneumatic connections on the analyzer electronics.*)
- Make sure there are no leaks on the analyzer unit - is the counterflange welded gas-tight to the flue gas duct, are the flange bolts sufficiently tightened? Were flange gaskets used? (See *Section 5.9 Installing the analyzer unit.*)
- Do the conditions on site correspond to the specifications in the Data Sheets provided?

6.2 Initial commissioning

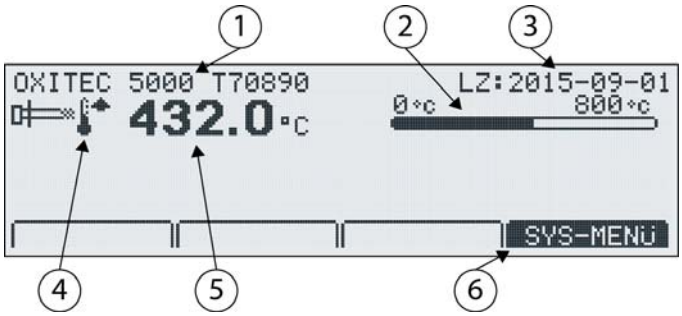
Switch on the supply voltage. After switching the device on, the startup screen which also contains the software version is displayed briefly. Afterwards, you will be prompted to select the **language**, set the **system date** and **system time**, assign a **TAG number** and select a **SICK REMOTE code** (only if SICK REMOTE is activated at the factory).

The analyzer unit heating phase begins and then measuring mode starts.

A 2-point calibration should be carried out 24 hours after commissioning.

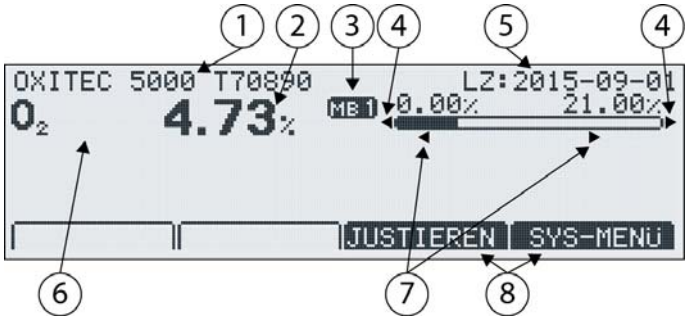
Fig 4: Initial commissioning. The software version is displayed in the lower right corner.

6.3 Display - heating process



1	TAG No.	**4**	Rising temperature
2	Temperature, analog display		(or) shows waiting time
3	Last access, with date		(or) heating fault
5	Current temperature	**6**	Soft key: System menu

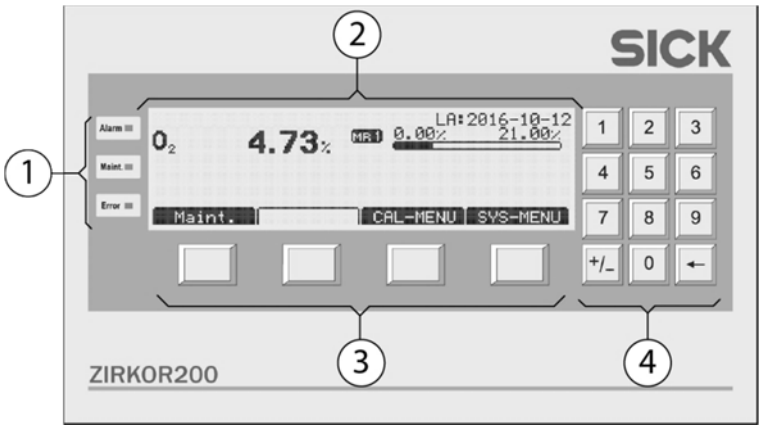
6.4 Display - measuring mode



1	TAG No.	**5**	Last access
2	Measured values	**6**	Measuring components
3	Measuring range specification	**7**	Indicator - min. alarm / max. alarm*
4	Flashing arrow - shows whether measuring range is underflown or overflown	**8**	Soft key name

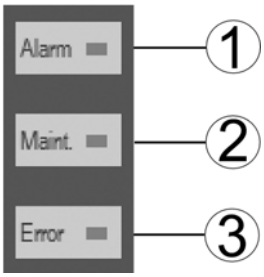
* Only when O_2 limit alarms are switched on and the defined limit values are within the measuring range.

6.5 Operating elements and display



1	Three LED indicators for active status messages	**3**	Four function keys with changing assignment (soft keys)
2	Graphics-capable, backlit display	**4**	Numeric keypad for numerical input

6.6 Status LEDs



Alarm, orange - lights when an alarm is present, (e.g. limit alarm).

Maint, orange – lights when a system function is called up that may influence the O_2 measured value.

Error, red - lights when a system error occurs.

6.7 Soft key symbols

	Moves a selection up one position.
	Moves a selection down one position.
	Exit selection.
	Cancel function or entry.
	Select or confirm a function / value.

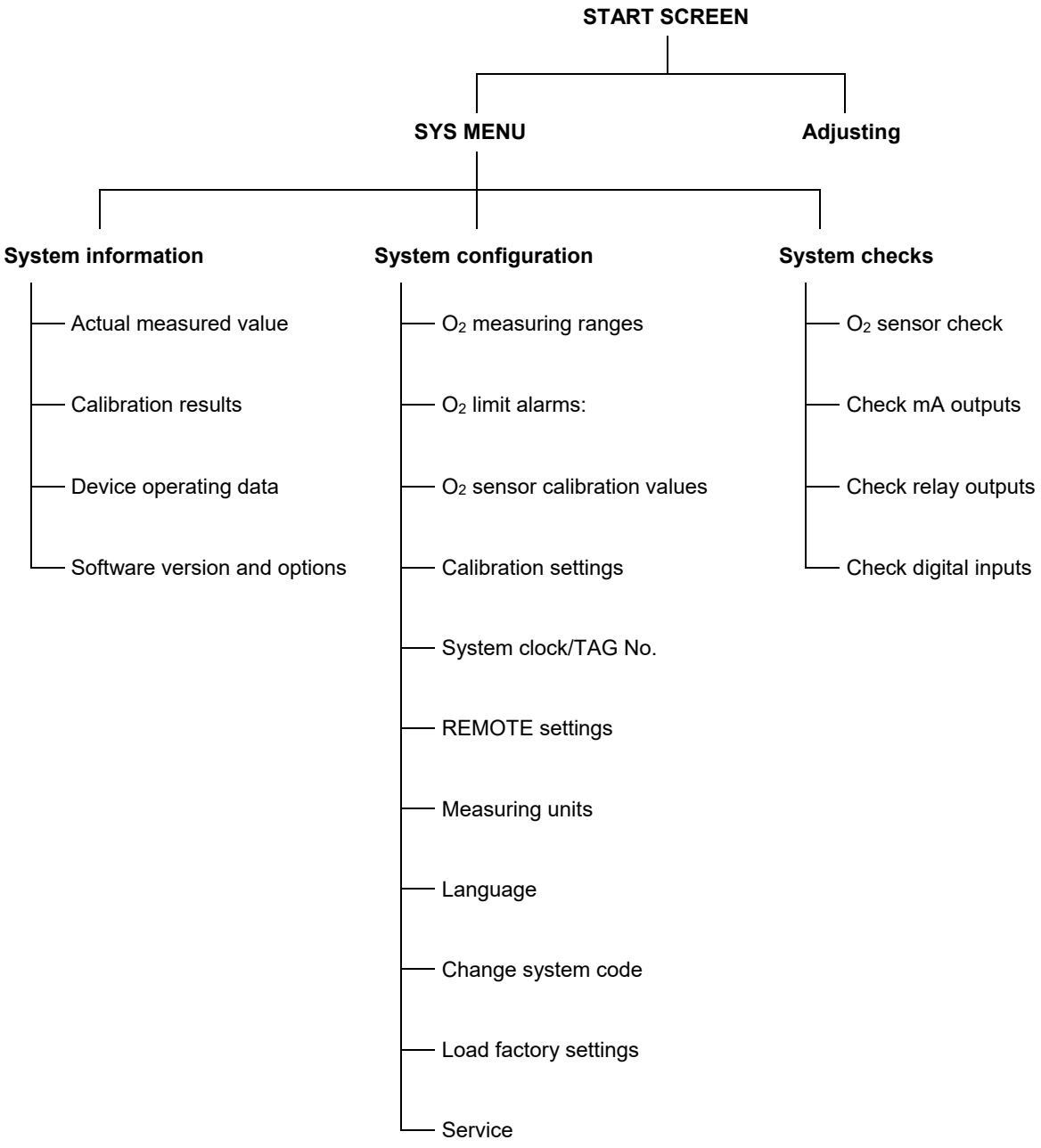
6.8 System code

The system code is 0000 on delivery. In this state, system changes are possible without code entry. The system code protects the configuration data of the system against unauthorized users. Functions that can influence the measurements are also secured in this way.

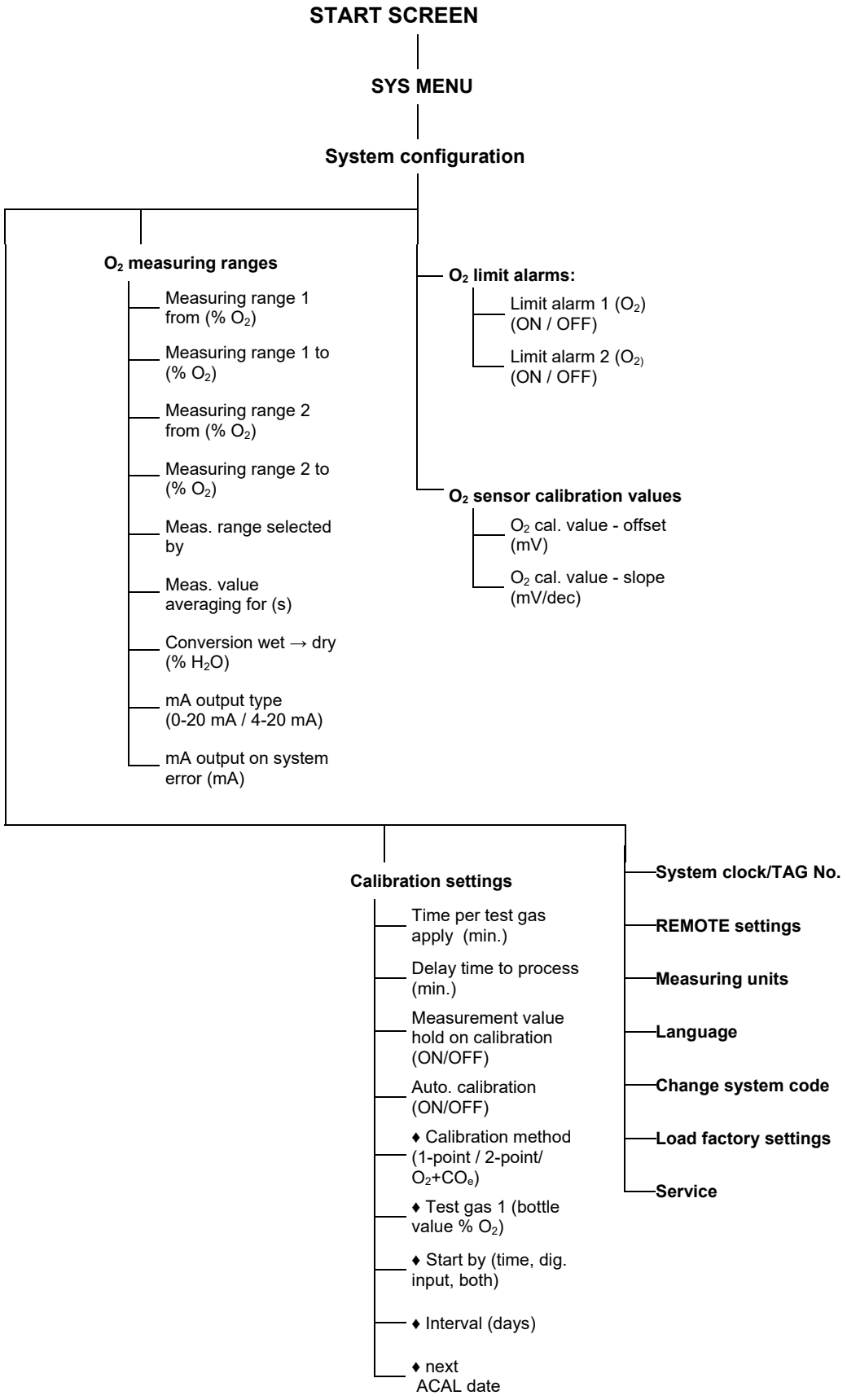
If the system code is changed, it must be kept in a safe place!

7 Menu overview and explanations

7.1 Menu overview

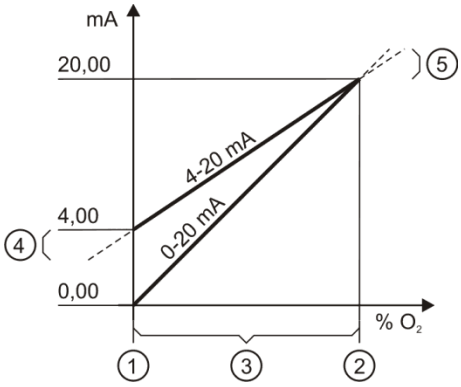


7.2 Menu overview - SYS MENU



7.3 Menu explanations

7.3.1 O_2 measuring ranges



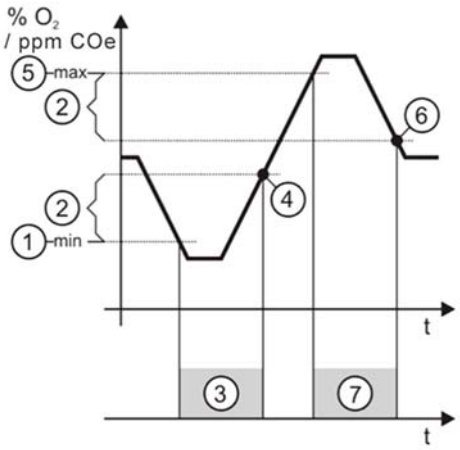
The O_2 measuring range (**3**) specifies the linear scaling of the O_2 measured value as analog output value (mA). The “O_2 measuring range from” (**1**) defines the O_2 value at which the analog output signal should be 4.00 mA (4-20 mA) or 0.00 mA (0-20 mA). The “O_2 measuring range to” (**2**) defines the O_2 value at which the analog output signal should be 20.00 mA.

Only 4-20 mA: A measuring range underflow (**4**) exists when the O_2 measured value falls below the value defined in “O_2 measuring range from”. The analog output signal is limited to a minimum of 3.60 mA for the O_2 measured value output.

A measuring range overflow (**5**) exists when the O_2 measured value rises above the value specified in “O_2 measuring range to”.

The analog output signal is limited to a maximum of 20.40 mA for the O_2 measured value output. Measuring range underflows and overflows are shown on the display (measuring mode).

7.3.2 O_2 limit alarms



The entry “at” defines the value from which the limit alarm is to be signaled.

With limit alarm function “min” **1**, limit alarm **3** is triggered when the measured value falls below the defined limit value “min”.

If a hysteresis not equal to 0 is set **2**, the limit alarm is reset when the measured value rises above the limit value plus hysteresis value **4**.

With limit alarm function “max” **5**, limit alarm **7** is triggered when the measured value rises above the defined limit value “max”. If a hysteresis unequal to 0 is set **2**, the limit alarm is reset when the measured value drops below the limit value minus hysteresis value **6**. If the hysteresis is set to 0%, the limit alarm must be reset manually on the device.

7.3.3 O_2 sensor calibration values

The O_2 sensor calibration values can be changed by a 1- or 2-point calibration. Manual entry is only necessary after replacing the analyzer unit.

7.3.4 Measured value averaging for

This entry defines the time span for continuous averaging (rolling average). During a calibration as well as a sensor check, averaging for the measurement display is switched off, the signal at the analog output is still averaged.

7.3.5 mA output on system error

Sets the mA output value in the range 0 to 3.55 or 20.41 to 20.80 mA in the event of a system error. The mA output value in case of a system error cannot be within the mA measuring range.

7.3.6 Time per test gas apply

Defines the time per test gas feed (test air feed) during a sensor calibration. If the sensor stability is not reached within the preset maximum time, the calibration is aborted with the error message:

"**O_2 sensor calibration failed - O_2 sensor signal instable".** Extend the time when this error message appears.

The maximum time set at the factory is 10 minutes. If necessary, the time can be set between 5 and 30 minutes.

7.3.7 Delay time to process (O_2)

The entry determines, on the one hand, the delay time of the measured value memory (when switched on) after the test gas feed (test air feed) has been completed, and, on the other hand, the time for which the O_2 trend display should still be shown on the display after the test gas feed (test air feed) has been completed during sensor calibration.

7.3.8 Auto. calibration

The automatic calibration enables a cyclic, time-controlled or remote-controlled calibration of the sensors via the digital input provided for this purpose. The automatic calibration can be globally switched on or off. It only starts from the main measured value display.

When an ACAL 2-point is set, a test gas cylinder must be permanently connected and turned on.

Make sure the test air and test gas flow volumes required for calibration are set correctly.

For systems with flow monitoring: The flow volumes can be checked and possibly adjusted via System checks -> Sensor check.

Without flow monitoring: Check the flow volumes using an external flow meter and, if necessary, set to 150 - 180 l/h using an external throttle valve.

The settings for automatic calibration are only visible when automatic calibration is switched on globally. The calibration method determines whether the automatic calibration should be carried out as a 1-point calibration with test air only or as a 2-point calibration with two test gases (test air / test gas). Test air (ambient air) is preset with a fixed O_2 concentration of 20.95%; this value is therefore neither displayed nor can it be changed. The automatic calibration starts via:

Time: Time-controlled start with fixed intervals. The interval time (in days) as well as the time of the next execution (next ACAL) can be defined here. The entry for the next execution also allows a date/time before the system time, but this is then automatically corrected to the system time + interval.

Time + digital input: Same as "Time", additionally a control voltage of 12-24 V DC must be applied to the digital input "Calibration release" to start automatic calibration.

Digital input: Automatic calibration is started as soon as a control voltage of 12-24 V DC is applied to the digital input "Calibration release". If the control voltage on the digital input is maintained after calibration, a new automatic calibration is started immediately.

7.3.9 REMOTE

Note

A maximum of 16 users (smartphones / tablets) can be connected to the SICK REMOTE module of a SICK analyzer.

The connection fails when additional users try to connect.

In this case, SICK REMOTE must be switched off and on again via the front panel, all mobile devices that have already been connected to the device once must be registered to it again.

SICK REMOTE is disabled by default, so the password and range are not shown. After activation (only possible from system level), the 8-digit password which is prompted during the remote connection setup must be assigned.

The password is used:

- For authentication and pairing with a smartphone/tablet/notebook/PC.
- For authentication/login after each connection establishment. Without authentication/login, neither device data can be read out nor the device configuration changed.

The **range** limits the transmission power of the REMOTE module.

Maximum = approx.100 m,
Medium = approx. 10 m,
Short = approx. 1 m.

The actual possible range can vary greatly due to local conditions and the reception performance of the smartphone used.

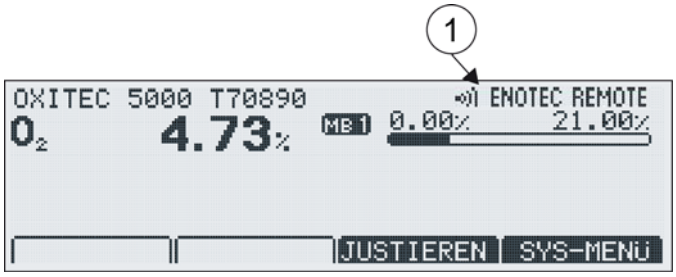


Fig 5: REMOTE connection active

If a REMOTE connection to the analyzer is active, the connection is shown in the upper right corner of the display (**1**).

7.3.10 Measuring units

The measuring units for temperature (°C / °F), pressure (psi / mbar) and concentration (ppm / mg/m^3) can be set.

7.3.11 Language

Sets the language for all display texts. The languages German, English, Spanish, Polish and French are available.

7.3.12 Change system code

The system code protects the analysis system against unauthorized access. Measurement-relevant settings can also be protected

The system code is 0000 on delivery. Note the new system code and keep the information in a place accessible only to those authorized to make changes to the system. If the system code is lost, it can only be restored by a trained service technician. A 6-digit system code is available as an option

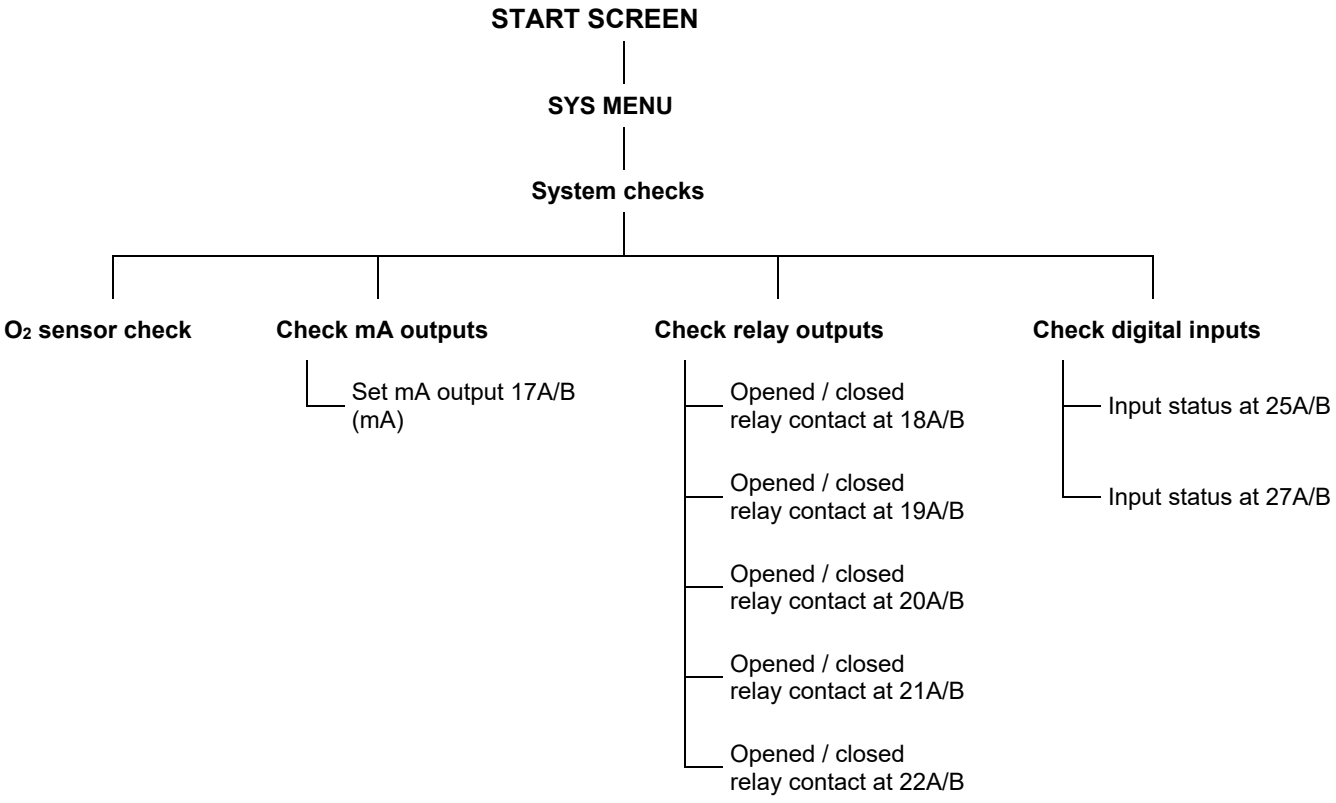
7.3.13 Load factory settings

Restores the delivery status of the system. All values changed in the meantime as well as the O_2 sensor calibration values and calibration results are lost. Write down all O_2 sensor calibration values beforehand and enter them again afterwards. A new calibration must be carried out when this is not done.

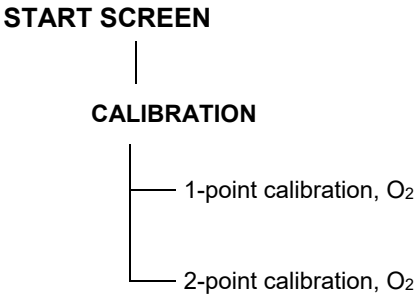
7.3.14 Service

The service functions may only be called up by trained service technicians. They are protected by their own service code, which is independent of the system code.

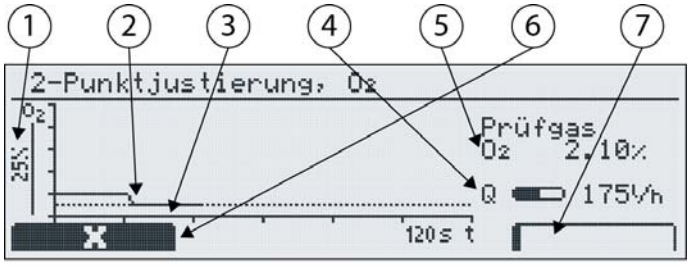
7.4 Menu overview - System checks



7.5 Menu overview - Calibration



7.5.1 Calibration - Display overview



1 Max. measuring range is displayed (switches between O_2 and CO_e)

2 O_2 measurement curve

3 Time scale of the respective test gas feed in seconds. The time specification refers to the end of the time scale.

4 Current flow rate

5 Current O_2 and CO_e measured value

6 Cancel calibration

7 Progress bar

7.5.2 1-point calibration (manual)

The calibration value **Offset** is determined during 1-point calibration of the sensor. For this purpose, only test air (test gas 1) is fed to the sensor. For systems without integrated pneumatics, the test air feed (test gas 1 feed) must be performed manually, i.e. by the user, and the test gas flows must be checked and, if necessary, readjusted.

Sequence

1. System code entry
2. Maintenance signal is set
3. Prompt for test air feed *(only appears for systems without flow monitoring)*
4. Calibration with test air
5. Prompt to terminate test air feed *(only appears for systems without flow monitoring)*
6. Display of the process return when the difference between the previously measured O_2 concentration in the process and the O_2 concentration with test air is more than 3.00%
7. Entry O_2 concentration test gas 1 *(not applicable for test air)*
8. Display of calibration results *(max. 1 minute)*
9. Maintenance signal reset *(delayed after last test gas monitoring by the "Delay time to process" when "Measurement value hold on calibration" is switched on)*
10. Return to main measured value display

7.5.3 2-point calibration (manual)

During 2-point calibration of the sensor, calibration values Offset (constant) and Slope (steepness) are determined. For this purpose, two test gases are fed to the sensor. For systems without integrated pneumatics, test air/test gas feed must be performed manually, i.e. by the user, and the test gas flows must be checked and, if necessary, readjusted.

Sequence

1. System code entry
2. Maintenance signal is set.
3. Prompt for test gas feed *(only appears for systems without flow monitoring)*
4. Calibration with test gas (test gas 1)
5. Prompt for test air feed *(only appears for systems without flow monitoring)*
6. Calibration with test air
7. Prompt to terminate test gas feed *(only systems without internal flow monitoring)*
8. Display of the process return when the difference between the previously measured O_2 concentration in the process and the O_2 concentration with test air is more than 3.00%.
9. Prompt for test gas concentration(s)
10. Display of calibration results *(max. 1 minute)*
11. Maintenance signal reset *(delayed after last test gas monitoring by the “Delay time to process” when “Measurement value hold on calibration” is switched on).*
12. Return to main measured value display

8 Service and maintenance

8.1 Control unit

Important information

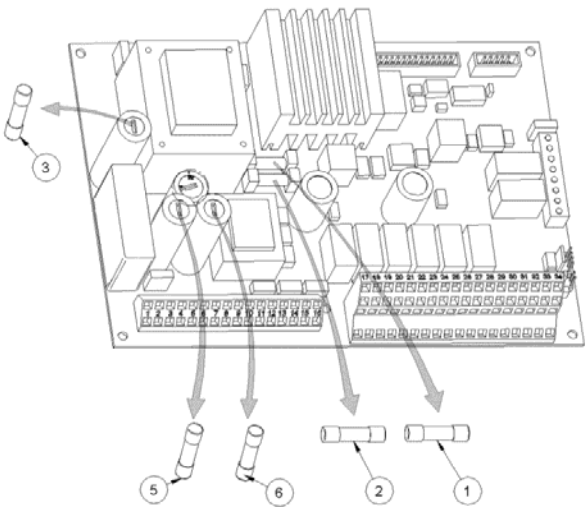
WARNING

Before opening the control unit, the system must be disconnected from the power supply. Wait at least 5 seconds before opening.

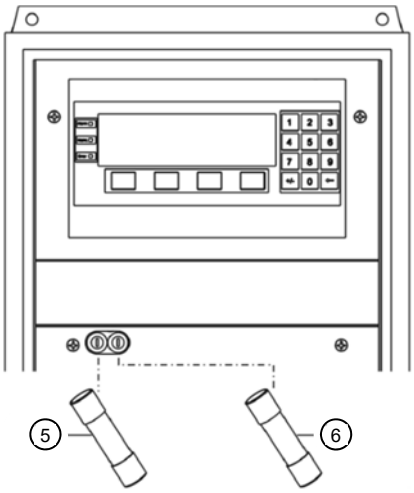
8.1.1 Replace fuses

Overview

Position of all fuses on power board



Main fuses accessible from outside



No.	Fuse	System voltage	Ampere	Rated voltage	Characteristic	Size	Part No.
1	F3	115 / 230 V AC	0.5 A	250 V AC	T / L	5x20 mm	
2	F4	115 / 230 V AC	0.5 A	250 V AC	T / L	5x20 mm	
3	F5	115 / 230 V AC	1.0 A	250 V AC	M / L	5x20 mm	
5	F1	230 V AC	2.0 A	250 V AC	T / H	5x20 mm	2116785 (set)
5	F1	115 V AC	4.0 A	250 V AC	T / H	5x20 mm	2116785 (set)
6	F2	115 / 230 V AC	4.0 A	250 V AC	M / H	5x20 mm	2116785 (set)

8.1.2 Test air and reference air volumes

The systems are always preset at the factory to the correct test air or reference air volumes. The instrument air versions are designed for a primary pressure of 1-10 bar, it might be necessary to adjust the reference air and/or test air volumes for a primary pressure higher than 6 bar.

The air volume should be within the following ranges:

Test air: 150 l/h - 180 l/h

Reference air: 30 l/h - 40 l/h

8.1.3 Setting the flow rate (field enclosure)

In a field enclosure with integrated pneumatics it is possible to set the reference or test air volume on the electronics.

Reference air volume: 30 to 40 l/h

Test air volume: 150 to 180 l/h

A distinction is made here between the pump and instrument air version:

- Only the test air volume can be set for the pump version.
- With an instrument air version, it is possible to set both the reference and test air volume.

In systems with integrated pneumatics, the flow rate can be checked in the “Actual measured values” menu.

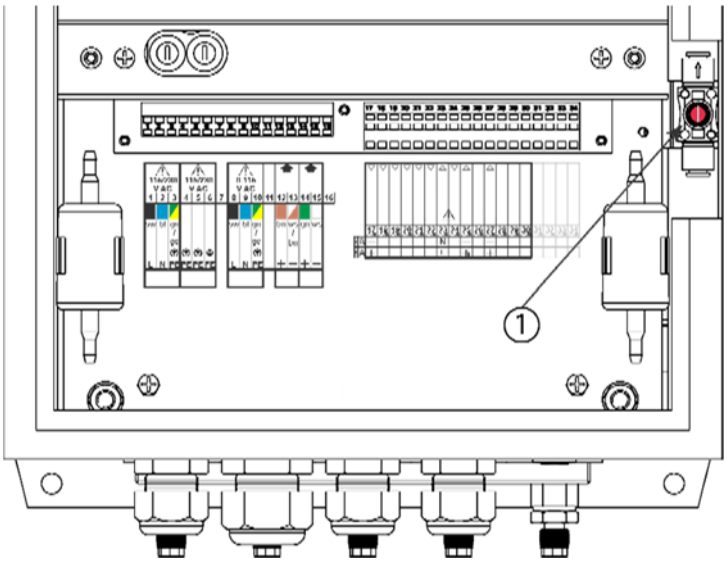


*Fig 6: Controller positions for test air **1** (pump version)*

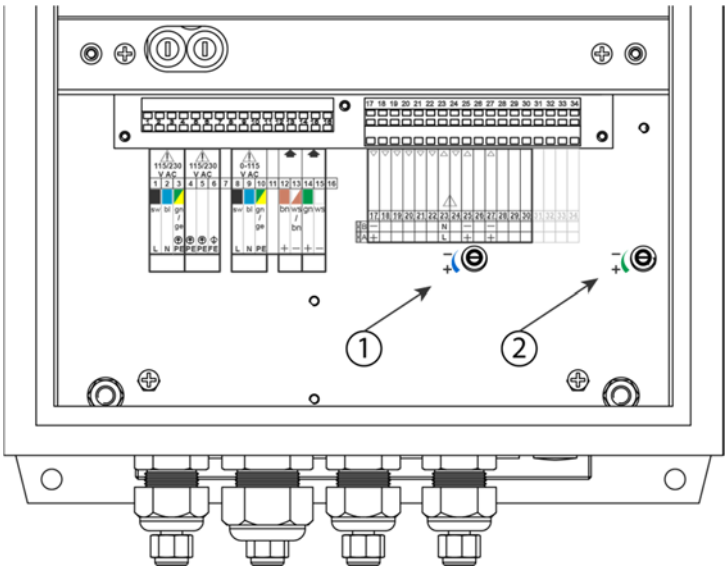


*Fig 7: Controller positions for reference air **1** and test air **2** (instrument air version)*

8.1.4 Setting the flow rate (19“ 4 RU)

In the 19“ 4 RU control unit with integrated pneumatics it is possible to set the reference or test air volume on the rear of the control unit.

Reference air volume: 30 to 40 l/h

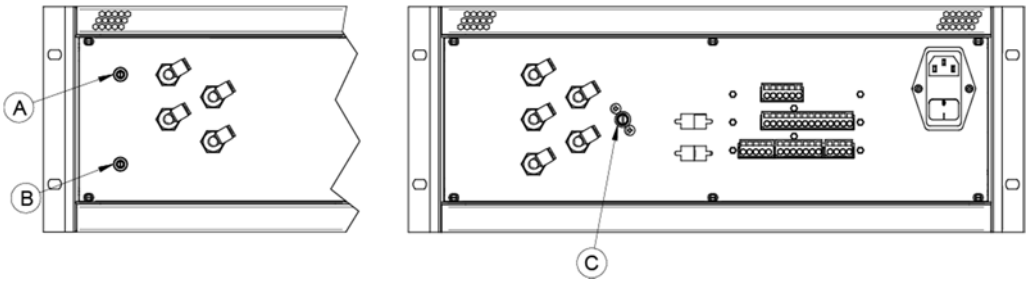
Test air volume:150 to 180 l/h

A distinction is made here between the pump and instrument air version:

Only the test air volume can be set for the pump version.

With an instrument air version, it is possible to set both the reference and test air volume.

In systems with integrated pneumatics, the flow rate can be checked in the “Actual measured values” menu.



Instrument air version

A Reference air throttle

B Test air throttle

Pump version

C Test air throttle

8.2 Analyzer unit

Important information

WARNING

Before opening the analyzer electronics, the system must be disconnected from the power supply. Wait at least 5 seconds before opening.

8.2.1 Removing the analyzer unit

Important information

CAUTION

The analyzer unit and the (cooling) protection tube may only be removed when wearing heat protection gloves.

Procedure

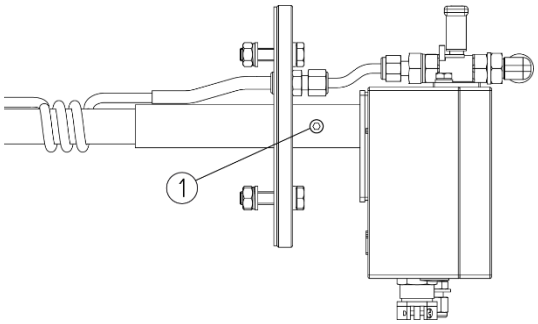
1. Switch off the supply voltage to the control unit.
2. Loosen the protection tube flange nuts.
3. Pull the analyzer unit out of the protection tube.
4. Disconnect the connection cable in the analyzer electronics.
5. Place the analyzer unit in a safe and protected area after removal and wait until the analyzer unit temperature has cooled down to below 35 °C.
6. If necessary, clean the analyzer unit after it has cooled down.
7. The analyzer unit can be installed later in accordance with Section *5.9 Installing the analyzer unit*.
8. Allow the system to heat up to operating temperature and carry out a two-point calibration after 24 hours of operation.

8.2.2 Replacing the inner part of the analyzer unit

Procedure

Disassembly

1. Disconnect the cables of the inner part of the analyzer unit from the terminal strip in the analyzer electronics.
2. Remove the thin transparent reference air hose from the inner part of the analyzer unit in the analyzer electronics.
3. Loosen the two screws ① on the outside of the measuring probe that hold the inner part of the analyzer unit in place.



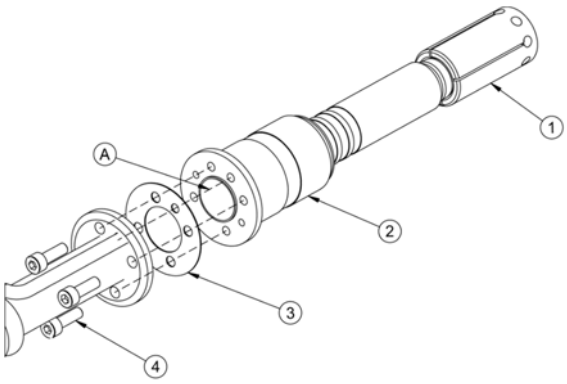
4. Pull the inner part of the analyzer unit straight and carefully out of the measuring probe.

Mounting

1. Insert the new inner part of the analyzer unit straight into the measuring probe.
2. Attach the new inner part of the analyzer unit to the outside of the measuring probe using the two matching screws ①.
3. Connect the thin transparent reference air hose of the inner part of the analyzer unit to the air inlet of the analyzer electronics.
4. Connect the cables of the inner part of the analyzer unit to the terminal strip of the analyzer electronics as described in Section *5.10 Electrical connections on the analyzer electronics*.
5. The analyzer unit can be installed later in accordance with Section *5.9 Installing the analyzer unit.*
6. Allow the system to heat up to operating temperature and carry out a two-point calibration after 24 hours of operation.

8.2.3 Replacing the O_2 measuring cell

Overview



1 Protective cap

2 Measuring cell holder with flange

3 Measuring cell flange gasket

4 Screw, M5 x 12

A Align the drill holes.

Procedure

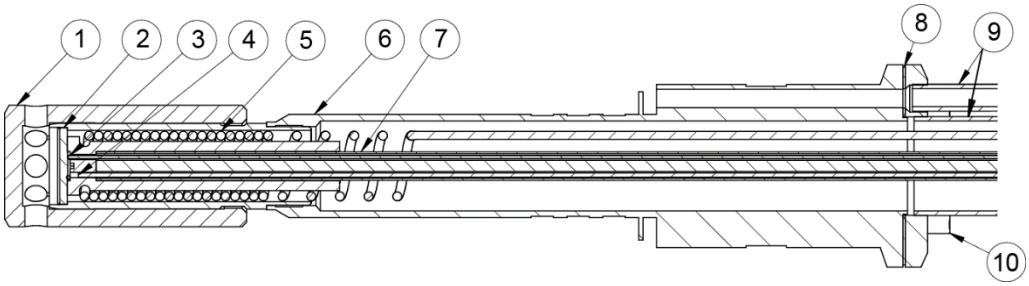
Disassembly

1. Remove the inner part of the analyzer unit.
2. Loosen the four M5 x 12 screws **4.**
3. Remove measuring cell holder with flange **2** and measuring cell flange gasket **3** from the measuring probe.

Mounting

1. Clean the measuring probe flange with sandpaper.
2. Insert measuring cell flange gasket **3** exactly flush with the holes in the measuring probe flange (see step A).
3. Fasten new measuring cell holder with flange **2** using the four M5 x 12 screws **4**.
4. If necessary, attach new protective cap **1**.
5. Insert the inner part of the analyzer unit into the measuring probe tube.
6. Connect the cables of the inner part of the analyzer unit to the terminal strip of the analyzer electronics as described in Section 5.10 *Electrical connections on the analyzer electronics*.
7. The analyzer unit can be installed later in accordance with Section *5.9 Installing the analyzer unit*.
8. Allow the system to heat up to operating temperature and carry out a two-point calibration after 24 hours of operation.

8.2.4 Layout of measuring cell holder



1	Protective cap	**6**	Measuring cell holder
2	Measuring cell	**7**	Ceramic rod
3	Measuring signal wire	**8**	Measuring cell flange gasket
4	Thermocouple	**9**	Measuring probe
5	Heater	**10**	Screws M5

8.2.5 Replacing the filter element

Remove filter element

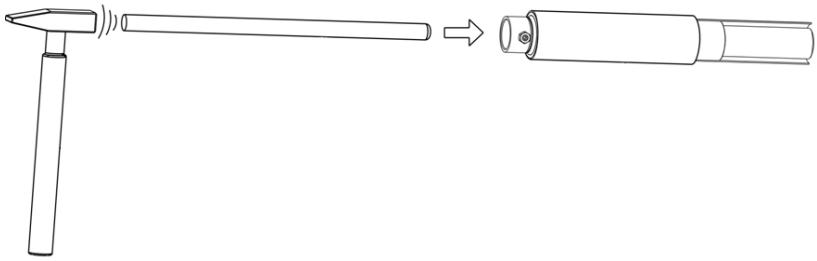


Fig 8: Schematic representation of the removal of the filter head

1. Loosen the two fastening screws on the filter head and pull the filter head off the measuring probe.
2. Clamp the filter head in a vice. Remove the old filter completely. Also clean the grooves in the filter seat.

Glue in new filter element

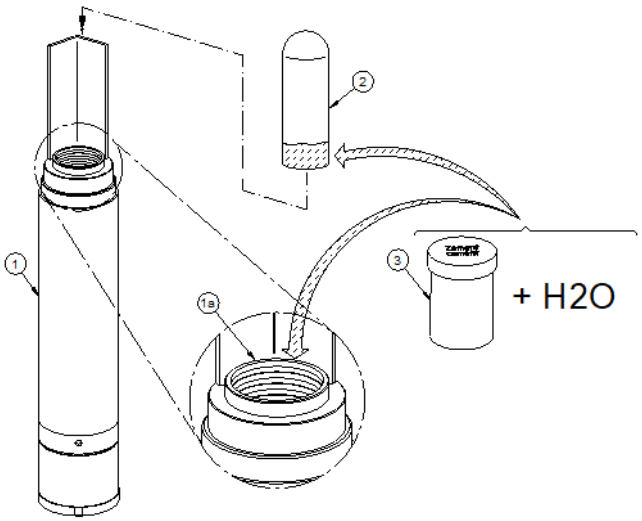


Fig 9: Schematic representation of gluing in the filter head

1. Insert the new filter with the supplied adhesive as follows:
2. Mix adhesive **3** according to the instructions and coat both the grooves in seat **1a** and the outside of the filter in the area of the seat. Press filter **2** into the seat by turning.
3. Smooth the ceramic adhesive between the filter and the seat and remove any adhesive residue.
4. The adhesive is fully cured within 24 hours at room temperature. All filter types from the SICK product range (ceramic, basalt and sintered metal filters) can be bonded with the adhesive supplied by SICK.

8.3 Relay outputs, functions and assignment

All status relay contacts are designed for 24 V and 1 A AC, 1 A DC (exception: Solenoid valve of the analyzer unit).

Relay	Contact	Function	Terminal
System error*	NC contact	Signals operation-critical errors	X5 (19A/B)
Maintenance (“Maint.”)	NO contact	System code has been entered, System in maintenance mode.	X5 (18A/B)
Measuring range	NO contact	Closed: Measuring range 1 active Open: Measuring range 2 active	X5 (20A/B)
Solenoid valve of the analyzer unit**	NO contact	Control of the analyzer unit solenoid valve	X5 (24A/B)
Limit value 1	NC contact	Signals an O_2 limit value violation of the 1st limit value	X5 (21A/B)
Limit value 2	NC contact	Signals an O_2 limit value violation of the 2nd limit value	X5 (22A/B)

* The system error relay is also active during the heating phase.

** The relay contact of the analyzer unit solenoid valve is designed for 230 V and 1 A ≅. The insulation voltage to neighboring circuits is designed for a maximum of 1,600 V AC!

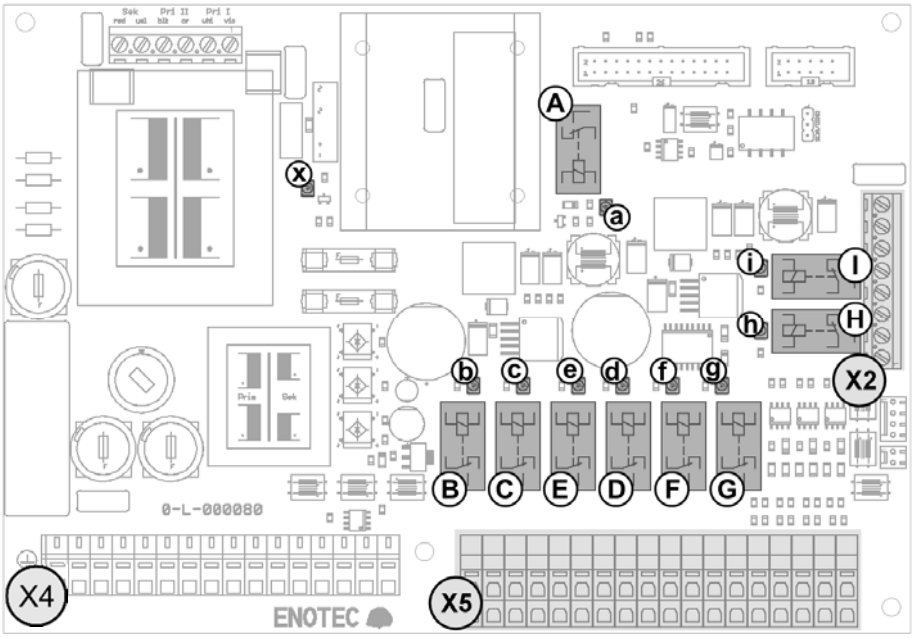


Fig 10: Relay board with relays and LEDs marked

Relay marking	LED marking	Function
A	a	Measuring probe heating relay
B	b	Maintenance
C	c	System error
D	d	Limit value O_2 1
E	e	Measuring range
F	f	Limit value O_2 2
G	g	Solenoid valve of the analyzer unit
H	h	Solenoid valve test gas 1
I	I	Solenoid valve test gas 2
	x	Measuring probe heater control

8.4 Digital inputs

The digital inputs are designed for a DC voltage of 12 to 30 V for logical “high”. Logical “low” corresponds to a voltage less than 1 V.

Digital input	Function
Calibration release	External release to start calibration at ACAL
Measuring range switchover	Activate the 2nd O_2 measuring range

8.5 Stability criteria during calibration

During calibration, the cell voltage is checked for stability. This check works according to the following criteria:

The last measured value is stored temporarily. If the next value is out of tolerance, the internal timer is reset and the new value is stored temporarily. This means that if the timer has not been reset, the value is stable. Therefore, the last measured value after the timer (2 minutes) is used to calculate the constants or slope.

8.6 mA output response time

The response time of the mA output to a change in the O_2 cell input voltage is less than 200 ms.

8.7 Expansion modules

The control unit is also available optionally with different interfaces (RS-232, RS-485, HART, Fieldbus). If you have ordered one of these options, a separate Manual/Specification for this interface is included with the delivery.

8.8 Maintenance interval

In general, the maintenance work to be carried out and the necessary maintenance interval depend on the flue and/or process gas conditions in which the analyzer unit is installed. Therefore, the appropriate maintenance interval can vary from a few months up to several years. The analyzer unit should be checked for corrosion and abrasion at least once a year. Depending on the flue gas conditions, this interval must be reduced or can be increased.

The main influencing factors are the presence of corrosive components such as SO_2 or HCl, a continuous reducing atmosphere (reduced oxygen concentration, increased concentration of combustible gases) and the nature of the solid components in the sample gas. These may have the following effects: Chemical or mechanical damage to the analyzer unit, clogging of the filter element or accelerated aging of the sensor. This can lead to both a falsification of the measured values and an increase in the response time, which can subsequently lead to an incorrect process operation.

For this reason, a sensor check is recommended with test gas and test air every six months. A 2-point calibration should be carried out after a serious deviation between the values obtained and those presently anticipated. A visual inspection of the analyzer unit, which includes cleaning the filter element if necessary, should be conducted at least once a year.

Deviating from these recommendations, the operator must define a suitable maintenance interval for his process and measuring location which is appropriate to the safety relevance of the measurement and the process conditions.

9 Status messages

9.1 Error messages

Note

Error messages not listed: The error cannot be rectified by the customer. Contact one of the SICK service points.

Hardware error 1-7	**Relay contact:**	System error, open	**Occurrence:**	At any time
	O_2 output:	2.00 mA, if not set otherwise	**Error reset:**	- Switching the system off and on again
	Description:	- Fault in one of the control unit components - The measuring probe heater is switched off.	**Cause:**	
Open circuit thermocouple	**Relay contact:**	System error, open	**Occurrence:**	At any time
	O_2 output:	2.00 mA, if not set otherwise	**Error reset:**	- By the user after elimination of the error
	Description:	- Interruption in the circuit of the thermocouple - The measuring probe heater is switched off.	**Cause:**	- Contact problems of the thermocouple cable at the terminal points of the control unit or the analyzer unit - Connection cable damaged - Thermocouple defective
Analyzer unit set point temp. not reached	**Relay contact:**	System error, open	**Occurrence:**	- The measuring probe heater is switched off
	O_2 output:	2.00 mA, if not set otherwise	**Error reset:**	- By the user
	Description:	- The measuring probe heater is switched off.	**Cause:**	- Fuse F2 defective - Contact problems of the measuring probe heater cable at the terminal points of the control unit or the analyzer unit - Connection cable damaged - Thermocouple short circuit - Reference air volume greater than 60 l/h - Power voltage too low - Flow volume too high and/or temperature in the process too low - Control unit error

Analyzer unit temperature too low	**Relay contact:**	System error, open	**Occurrence:**	During measuring operation
	O_2 output:	2.00 mA, if not set otherwise	**Error reset:**	- By the user; process restart
	Description:	- O_2 sensor temperature 20 °C below the set temperature - The measuring probe heater is switched off.	**Cause:**	- Fuse F2 defective - Contact problems of the measuring probe heater cable at the terminal points of the control unit or the analyzer unit - Connection cable damaged - Thermocouple short circuit - Reference air volume greater than 60 l/h - Power voltage too low - Flow volume too high and/or temperature in the process too low - Control unit error
Analyzer unit temperature too high	**Relay contact:**	System error, open	**Occurrence:**	During measuring operation
	O_2 output:	2.00 mA, if not set otherwise	**Error reset:**	- By the user; process restart
	Description:	- O_2 sensor temperature 20 °C (68 °F) above the set temperature - The measuring probe heater is switched off.	**Cause:**	- Process temperature too high - Measuring probe heating cable incorrectly connected to the evaluation electronics - Electronics error
Open circuit O_2 sensor	**Relay contact:**	System error, open	**Occurrence:**	At any time
	O_2 output:	2.00 mA, if not set otherwise	**Error reset:**	- By the user; process restart
	Description:	- Short circuit in the O_2 sensor	**Cause:**	- Contact problems of O_2 sensor heating cable on the terminal points of the control unit and/or analyzer unit - Connection cable defective - Contact problem between the inner part of the analyzer unit and the O_2 sensor
O_2 sensor calibration failed	**Relay contact:**	System error, open	**Occurrence:**	During O_2 sensor calibration
	O_2 output:		**Error reset:**	- By the user after elimination of the error
	Description:		**Cause:**	

Test gas flow rate too low	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Through successful calibration
	Description: - Insufficient test gas flow	**Cause:** - Test gas cylinder empty - Test gas flow volume set incorrectly - Instrument air supply to the system not available
Test gas flow rate too high	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Through successful calibration
	Description: - Test gas flow rate too high	**Cause:** - Test gas pressure too high - Test gas flow volume set incorrectly - Test air flow volume set incorrectly
O_2 sensor offset too low	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Through successful calibration
	Description:	**Cause:** - Reference air supply insufficient - Process pressure too high - Wrong test gas - O_2 sensor defective
O_2 sensor offset too high	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Through successful calibration
	Description:	**Cause:** - Wrong test gas - Test gas flow rate too low - O_2 sensor defective
O_2 sensor slope too low	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Through successful calibration
	Description:	**Cause:** - Wrong test gas - Test gas flow rate too low - Filter head damaged - Filter head missing - O_2 sensor defective

O_2 sensor slope too high	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Through successful calibration
	Description:	**Cause:** - Wrong test gas - Test gas flow rate too low - Filter head damaged - Filter head missing - O_2 sensor defective
O_2 sensor signal instable	**Relay contact:** System error, open	**Occurrence:** During O_2 sensor calibration
	O_2 output:	**Error reset:** - By the user - Successful calibration
	Description:	**Cause:** - Test gas flow rate too low - Filter head damaged - Process pressure fluctuations too high
Error REMOTE module	**Relay contact:** System error, open	**Occurrence:**
	O_2 output:	**Error reset:**
	Description:	**Cause:** - REMOTE module is defective.

9.2 Alarm messages

Note
Alarm messages not listed: Contact one of the SICK service points.

Reference air flow too low	**Relay contact:**	**Error reset:**
	Description:	**Cause:** - Reference air flow rate incorrectly set - Instrument air supply to the system insufficient - Reference air pump defective
Reference air flow too high	**Relay contact:**	**Error reset:**
	Description:	**Cause:** - Reference air flow rate incorrectly set
Electronic temp. too low	**Relay contact:**	**Error reset:**
	Description:	**Cause:** - The ambient temperature of the control unit is lower than the specified lower limit. - The measured value tolerances specified for the system are no longer guaranteed.

Electronic temp. too high	**Relay contact:**	**Error reset:**
	Description:	**Cause:** - The ambient temperature of the control unit is higher than the specified upper limit. - The measured value tolerances specified for the system are no longer guaranteed.
Clock battery low	**Relay contact:**	**Error reset:** - Not by the user - The battery may only be replaced by SICK in a safe zone.
	Description: - The alarm has no effect as long as the system is supplied with power voltage. - The time/date set can be incorrect after switching the system off and on again. Any timer-controlled automatic calibration that may have been set can then no longer be carried out correctly.	**Cause:**
Limit alarm 1	**Relay contact:** O_2 limit alarm 1, open	**Error reset:**
	Description:	**Cause:** - The O_2 measured value underflows/overflows the specified O_2 alarm limit.
Limit alarm 2	**Relay contact:** O_2 limit alarm 2, open	**Error reset:**
	Description:	**Cause:** - The O_2 measured value underflows/overflows the specified O_2 alarm limit.

9.3 Maintenance messages

Measured value(s) held	**Relay contact:** O_2 limit alarm 1, open	**Description:** - When the measured value memory is switched on, the O_2 measured value determined before a calibration is held at the mA output for the duration of the Status message.

10 Troubleshooting

Unsteady, strongly fluctuating O_2 measured value	**Cause 1**	- Loose contact due to wire breakage of the measuring signal wire - Loose contact in the analyzer unit	**Measure 1:**	- Remove loose contact.
	Cause 2	- Broken filter element - Incorrectly installed V-shield - Analyzer unit was installed without filter head.	**Measure 2:**	- Visual inspection by removing the analyzer unit.
O_2 display remains at end of measuring range or is higher than expected.	**Cause 1**	- Leakage on the measuring cell or on the measuring cell flange gasket	**Measure 1:**	- Check all flanges and screw fittings for leaks. Replace the measuring cell or renew the measuring cell flange gasket. If there is a leak in the area of the O_2 measuring cell, it must be replaced.
	Cause 2	- Measuring probe flange leaking	**Measure 2:**	- Tighten the flange screws to the required torque.
O_2 display at 0%, although the operating mode indicates a higher O_2 value	**Cause 1**	- Measuring probe heater defective (resistance must be approx. 37.5...-47.5 Ohm; disconnect on the analyzer unit and check) Attention: Control unit must be disconnected from the power supply and potential-free.	**Measure 1:**	- Query the measuring cell temperature (setpoint 800 °C or 840 °C depending on the setting). A cell temperature lower than 800 °C or 840 °C can cause a display of 0%.
	Cause 2	- Thermocouple defective (check resistance, approx. 2-80 Ohm)	**Measure 2:**	- Replace the inner part of the analyzer unit.
	Cause 3	- Fuse of heating voltage defective	**Measure 3:**	- Replace fuse.
	Cause 4	- Line short circuit Control unit input defective Wire break	**Measure 4:**	- Check wiring. - Measure the connection cable.
	Cause 5	- Transformer (230/115 V) defective	**Measure 5:**	- Check voltages.
	Cause 6	- mV-tap in the analyzer unit (measuring signal wire) is not available or interrupted.	**Measure 6:**	- Check analyzer unit inner part for good contact.
	Cause 7	- Combustible components in flue gas	**Measure 7:**	- Check that the analyzer unit reacts to test gas. - When the probe reacts to the test gas, there may be a high percentage of combustible gases in the flue gas. In this case, reducing conditions prevail on the O_2 measuring cell, which reduce the O_2 content on the cell surface. Attention Danger of explosion!.
	Cause 8	- Measuring cell defective	**Measure 8:**	- Replace measuring cell.

No measured value for O_2; empty bar graph	**Cause 1**	- O_2 value in an area not covered by the control unit, e.g. due to a low O_2 concentration in conjunction with a high CO_e concentration	**Measure 1:**	- Carry out a system test.
Indications on the display are OK, mA output is not correct	**Cause 1**	- Control unit is defective. - mA value not available	**Measure 1:**	- Check measuring range. Check whether the current value is outside the measuring range. - Measure the mA output on the terminal strip.

11 Technical data

11.1 Control unit

11.1.1 Technical data - control unit

Enclosure:	Powder-coated sheet steel; RAL2004 (GRP version optional) (19" rack, optional)
IP code:	Field enclosure: IP66 GRP enclosure: IP66 19" rack: IP20
Display:	LC Dot Matrix 240 x 64 - LED backlit
Keypad:	Membrane keypad with pressure point
Signal LED:	Orange: Alarm, orange: Maintenance, red: Error
O_2 measuring ranges	Two freely selectable measuring ranges from 0% - 2% O_2 to 0% - 25% O_2, other measuring ranges on request
Accuracy:	<0.5% of the measured value or 0.02 Vol% O_2 (higher value valid)
Manual or ACAL (automatic calibration):	1 or 2 point (automatic calibration)
Power voltage:	230 V AC ±10% 50 Hz to 60 Hz, overvoltage category II 115 V AC ±10% 50 Hz to 60 Hz, overvoltage category II
Power input:	400 VA (heating up phase) 200 VA (typ., measuring mode)
Recommended back-up fuse:	10 A
Output signal O_2:	Active, 0/4 to 20 mA, max. load 500 Ω galvanically isolated
Relay contacts:	24 V AC/DC, 1 A
Relay contact of analyzer unit solenoid valve:	115 V AC, 1 A, maximum insulation voltage 1,600 V AC
Dimensions:	300 x 440 x 240 mm (W x H x D) (standard control unit) 483 x 177 x 400 mm (W x H x D) (19" rack)
Weight:	Approx. 19 kg Approx. 12 kg (19” rack)
Temperature range, storage: *	-40 °C to +80 °C
Temperature range, operation *	-20 °C to +55 °C (-4 °F to 131 °F); others on request
Max. altitude:	Up to 2,000 m
Relative humidity:	0 – 93%
Impact resistance:	IK08 (viewing window reduced impact resistance IK07)
SICK Remote max. send power:	100 mW (20 dBm)
SICK Remote send frequency:	2.4 GHz

11.1.2 Dimensions of the control units

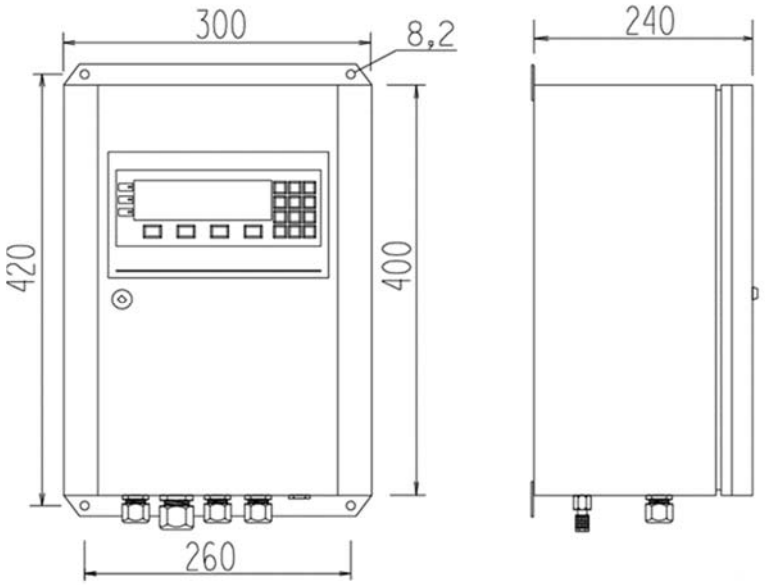


Fig 11: Field enclosure dimensions in mm

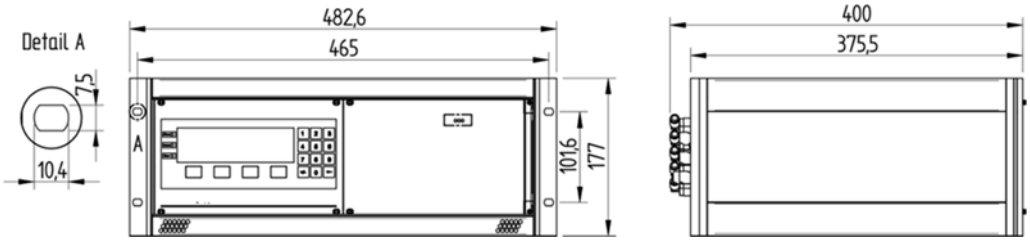


Fig 12: 19" 4 RU rack dimensions (mm)

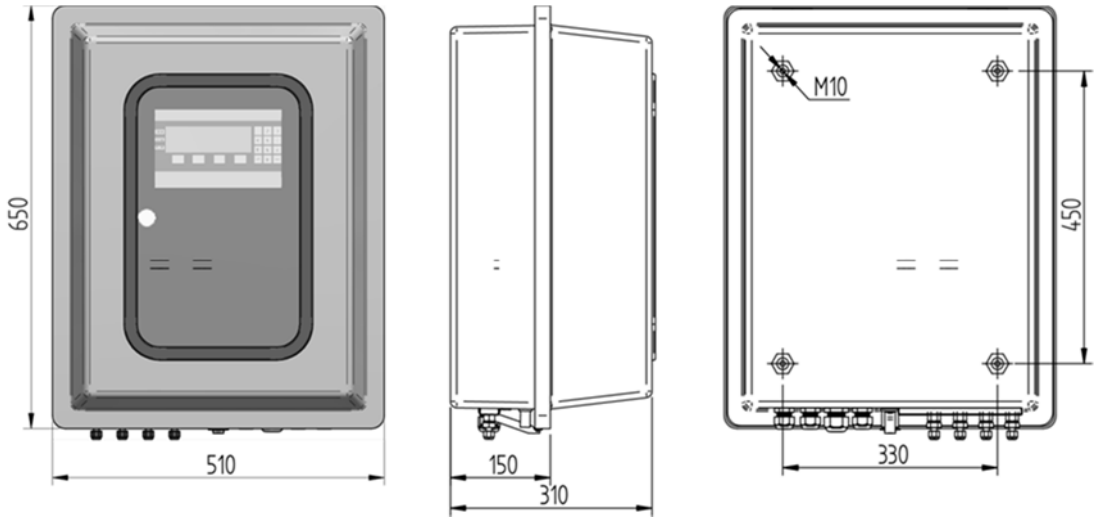
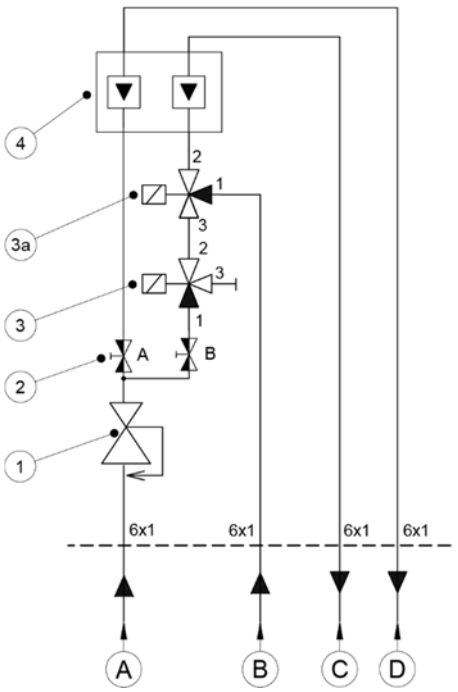


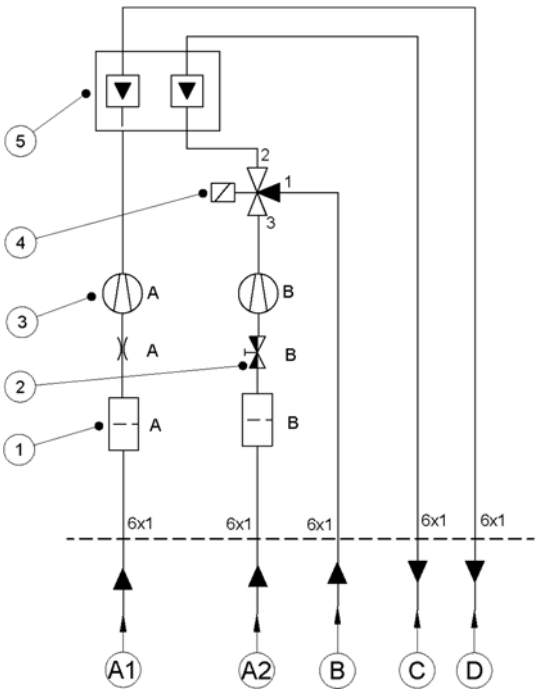
Fig 13: GRP protective box (option) – dimensions in mm

11.1.3 Gas plans of the field enclosures

Instrument air version



Pump version

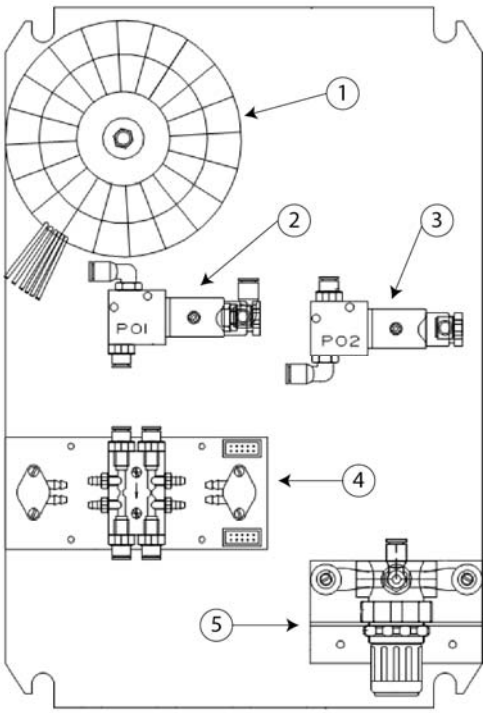


1	Pressure regulating valve
2	Throttle check valve
3	3/2-way solenoid valve
3a	3/2-way solenoid valve
4	Flow meter
A	Instrument air inlet 4 – 10 bar
B	Test gas inlet, max. 3 bar
C	Test gas outlet
D	Reference air outlet

1	Filter
2	Throttle valve
3	Reference / test air pump
4	3/2-way solenoid valve
5	Flow meter
A1	Reference air inlet
A2	Test air inlet
B	Test gas inlet
C	Test gas outlet
D	Reference air outlet

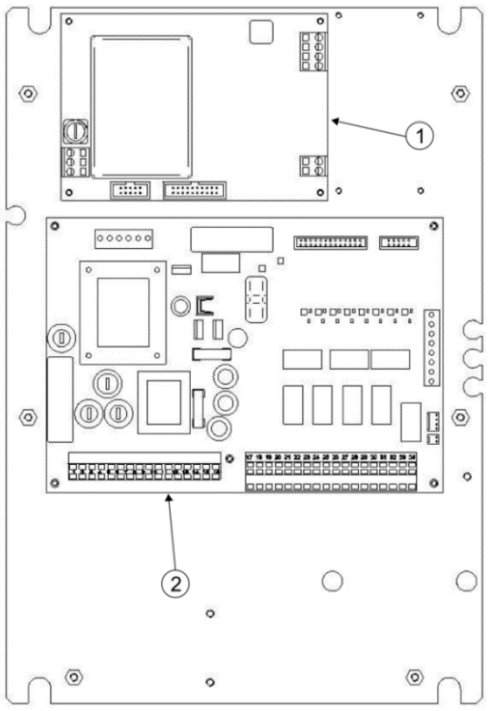
11.1.4 Installation plates for field enclosure

Field enclosure instrument air version installation plate 1



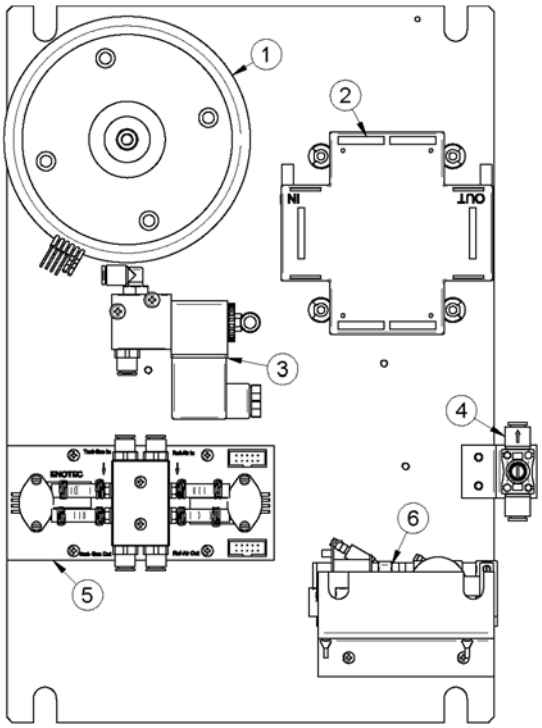
No.	Part No.	Description
1	2089317	Toroidal transformer 2x115 V; secondary 115 V / 330 VA
2	2089324	Test gas solenoid valve P01 with pneumatic version with screw fitting.
3	2089325	Test gas solenoid valve P02 with pneumatic version with screw fitting.
4	2089327	Internal flow meter for test and reference gas
5	2089336	Pressure regulating valve

Field enclosure instrument air version installation plate 2



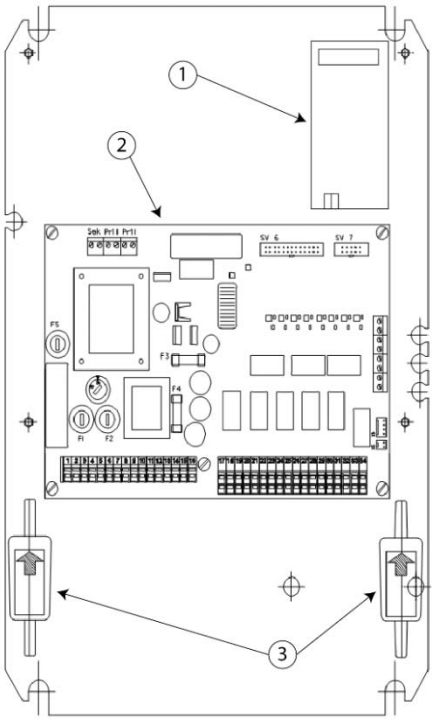
No.	Part No.	Description
1	2089318	Optional current output 4-20 mA
2	2089328	Power board

Field enclosure pump version
Installation plate 1



No.	Part No.	Description
1	2089317	Toroidal transformer 2x115 V; secondary 115 V / 330 VA
2	2089330	Test air pump 720 l/h
3	2089324	Test gas solenoid valve P01 with pneumatic version with screw fitting.
4		Throttle screw fitting
5	2089327	Internal flow meter for test and reference gas
6	2089329	Reference air pump 30 l/h

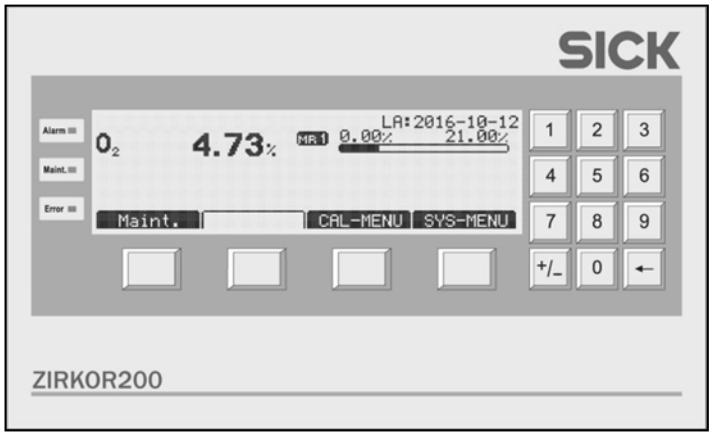
Field enclosure pump version
Installation plate 2



No.	Part No.	Description
1	2089318	Optional current output 4-20 mA
2	2116780	Power board
3	2089328	Fine filter for reference and test air version pump version

11.1.5 Display board

Display and microprocessor unit



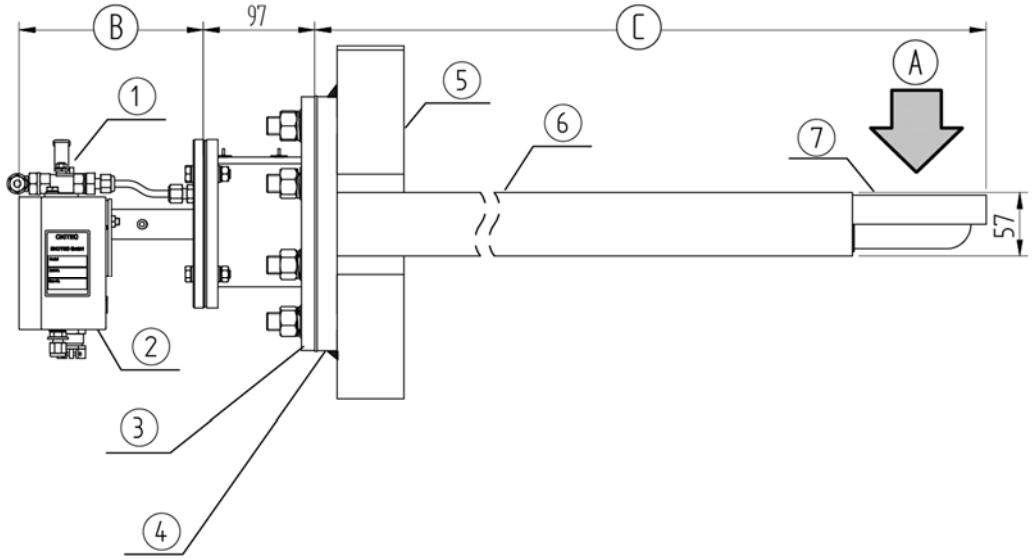
Part No.	Description
2089320	Display board with software for systems without pneumatics
2089321	Display board with software for systems with pneumatics

11.2 Analyzer unit

11.2.1 Technical data - analyzer unit

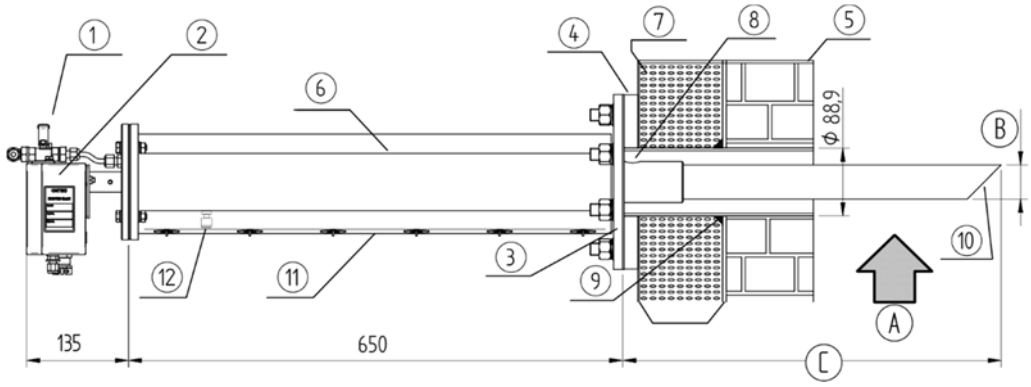
Process gas temperature:	ZIRKOR200: Up to 600 °C (1,112 °F) All analyzer units up to 1,600 °C with cooling protection tube
Immersion depth:	ZIRKOR200, length 1: 520 mm ZIRKOR200, length 2: 950 mm ZIRKOR200, length 3: 1,835 mm ZIRKOR200, length 4: 2,768 mm ZIRKOR200, length 5: 3,682 mm
Immersion depth of cooling protection tube:	500 mm / 1000 mm Others on request
Measuring principle:	Zirconium dioxide
Operating temperature O_2 sensor:	800 °C
O_2-sensor raw signals:	Air 20.95% O_2: 0 mV ± 1 mV Test gas: 2.10 O_2: 50 mV ± 1 mV
O_2-sensor reference air:	Instrument air 40 l/h Setting on the control unit
Process gas pressure:	±50 mbar (±0.725 PSIG) atmospheric pressure
Flow velocity:	0 to 10 m/s, others on request
Ambient temperature:	-40 °C to +80 °C
Reaction time (O_2):	< 1 s (on test gas)
T90 (O_2):	< 5 s (on test gas)
Material of the analyzer unit:	Stainless steel (SS316)
Enclosure rating:	IP65
Voltage supply:	Via control unit
Max. altitude:	Up to 2,000 m

11.2.2 Dimension drawing analyzer unit, lengths 1 - 2



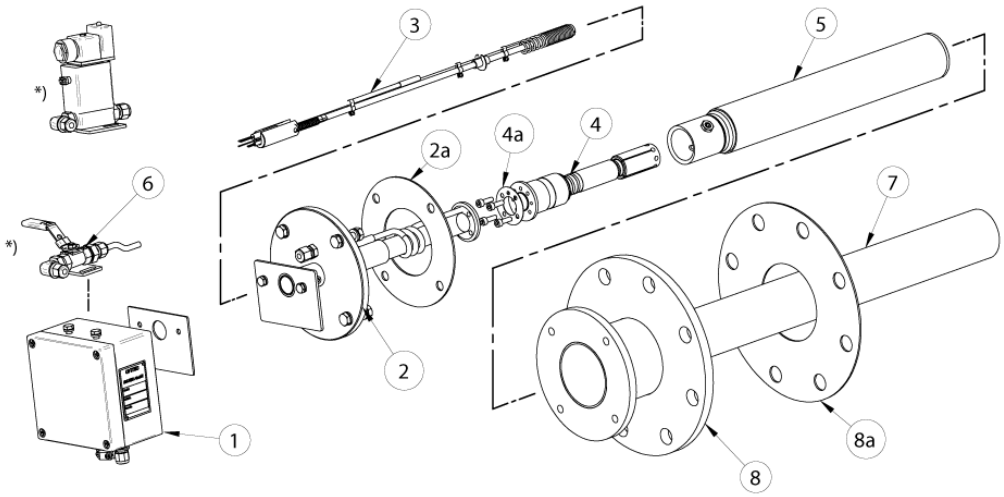
1	Test gas cock / solenoid valve (option)	**A**	Flue gas temperature	Max. 600 °C
2	Analyzer electronics	**B**	External dimensions of analyzer electronics	Length 1: 385 mm Length 2: 475 mm
3	Protection tube flange	**C**	Immersion depth of measuring probe	Length 1: 520 mm Length 2: 950 mm
4	Counterflange (welded gas-tight)		Weight	Length 1: 11 kg Length 2: 13 kg
5	Duct wall			
6	Measuring probe protection tube			
7	V-shield			

11.2.3 Dimension drawing analyzer unit, length 1 with cooling protection tube



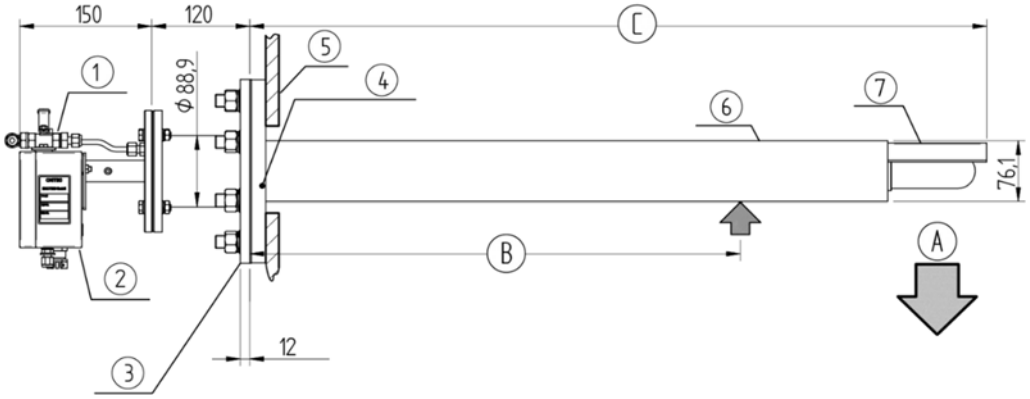
1	Test gas cock / solenoid valve (option)	**A**	Flue gas temperature	PROTEC: 1,400 °C INCOLOY: 1,050 °C
2	Analyzer electronics	**B**	Diameter	PROTEC: 45 mm INCOLOY: 48 mm °
3	Protection tube flange	**C**	Immersion depth of cooling protection tube	PROTEC: Length 1: 500 mm Length 2: 1,000 mm INCOLOY: Length 1: 500 mm Length 2: 1,000 mm
4	Counterflange		Weight	PROTEC: Length 1: 19.1 kg Length 2: 20.2 kg INCOLOY: Length 1: 20.0 kg Length 2: 21.5 kg
5	Duct wall			
6	Cooling protection tube			
7	Insulation			
8	Gas outlet (do not block)			
9	Welded gas-tight			
10	Gas inlet			
11	Insulating sleeve			
12	Suction connection			
13	Sheet steel			

11.2.4 Components of analyzer unit, lengths 1 - 2



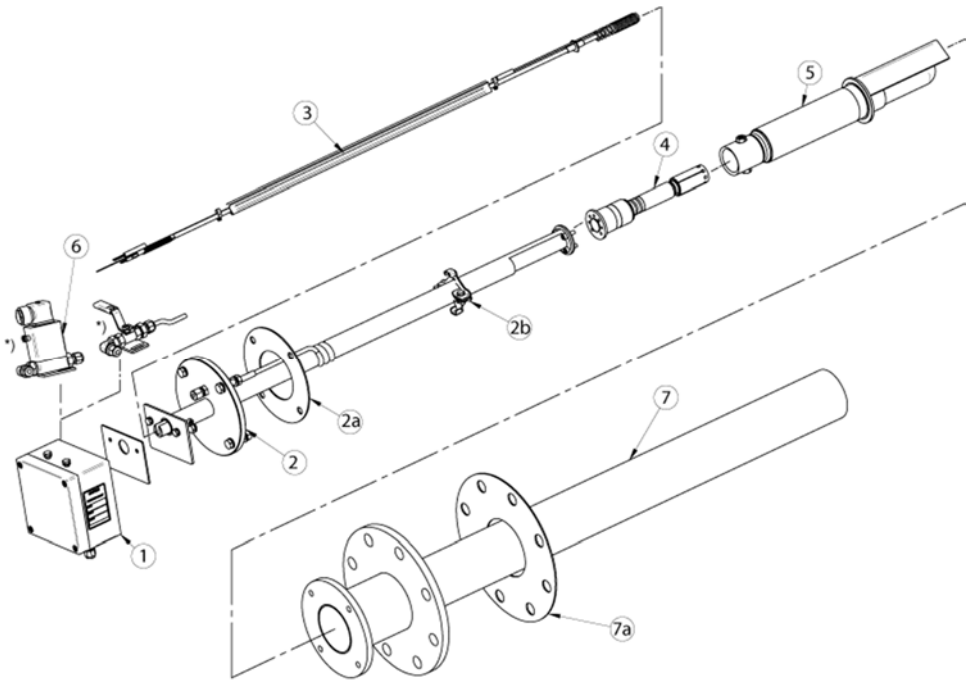
No.	Name	Part No.
1	Analyzer electronics	2089298
2	Measuring probe	Length 1 - 2089308 Length 2 - 2089309
2a	Flange gasket	2089294
3	Analyzer unit inner part	Length 1 - 2089270 Length 2 - 2089271
4	Oxygen measuring cell	2089289
4a	Measuring cell flange gasket	2089295
5	Filter head	Ceramic filter 2089344 Ceramic filter for vertical installation 2089362 Basalt filter 2089363 Basalt filter for vertical installation 2089364 Sintered metal filter 2089365 Sintered metal filter with flame arrester 2089366 Sintered metal filter for vertical installation 2089368
6	*) Test gas cock / *) Solenoid valve	Please contact SICK.
7	Measuring probe protection tube	Please contact SICK.
8	Protection tube flange	Please contact SICK.
8a	Protection tube flange gasket (“A”)	2089296

11.2.5 Dimension drawing analyzer unit, lengths 3 5



1	Test gas cock / solenoid valve (option)	**A**	Flue gas temperature: Max. 600 °C
2	Analyzer electronics	**B**	On-site support required as from length 4
3	Protection tube flange		
4	Counterflange (welded gas-tight)	**C**	Immersion depth of measuring probe: Length 1: 1,835 mm Length 2: 2,768 mm Length 3: 3,682 mm
5	Duct wall		Weight: Length 1: 17.5 kg Length 2: 21.1 kg Length 3: 25.0 kg
6	Measuring probe protection tube		
7	V-shield		

11.2.6 Components of analyzer unit, lengths 3 - 5



No.	Name	Part No.
1	Analyzer electronics	2089298
2	Measuring probe	Length 1 - 2089311 Length 2 - 2089312 Length 3 - 2089313
2a	Flange gasket	2089294
2b	Spacer	0-R-000476
3	Analyzer unit inner part	Length 1 - 2089272 Length 2 - 2089274 Length 3 - 2089273
4	Oxygen measuring cell	2089289
4a	Measuring cell flange gasket	2089295
5	Filter head	Ceramic filter 2089344 Ceramic filter for vertical installation 2089362 Basalt filter 2089363 Basalt filter for vertical installation 2089364 Sintered metal filter 2089365 Sintered metal filter with flame arrester 2089366 Sintered metal filter for vertical installation 2089368
6	*) Test gas cock / *) Solenoid valve	Please contact SICK.
7	Measuring probe protection tube	Please contact SICK.
7a	Protection tube flange gasket	2089296

11.2.7 Dimensions of counterflanges

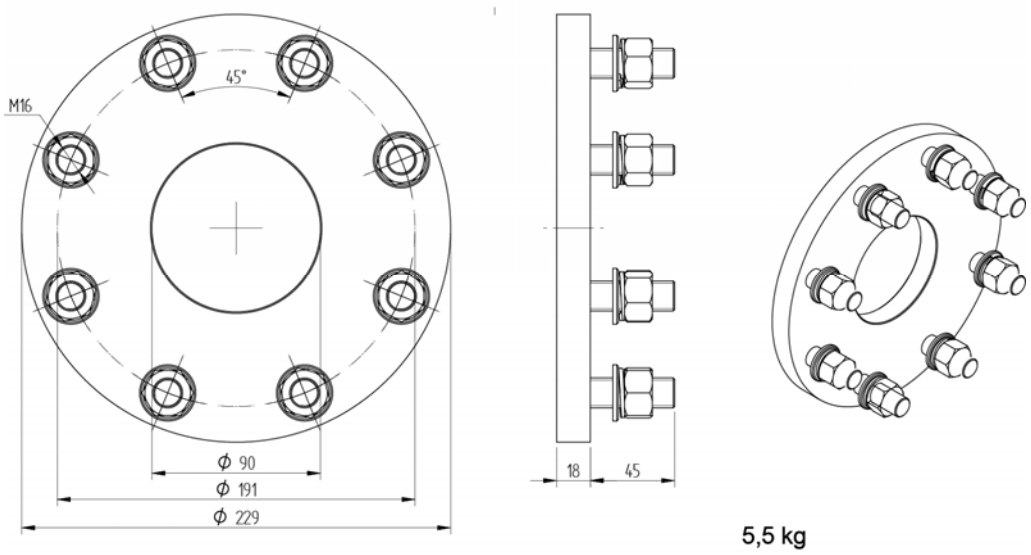


Fig 14: Counterflange dimensions

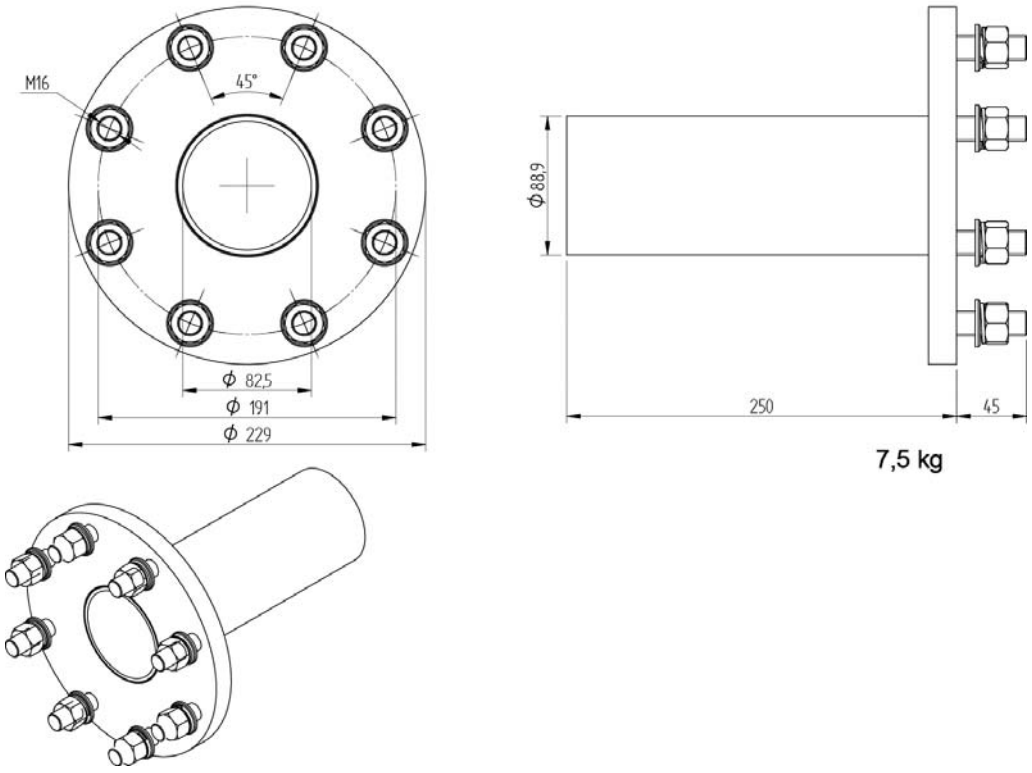
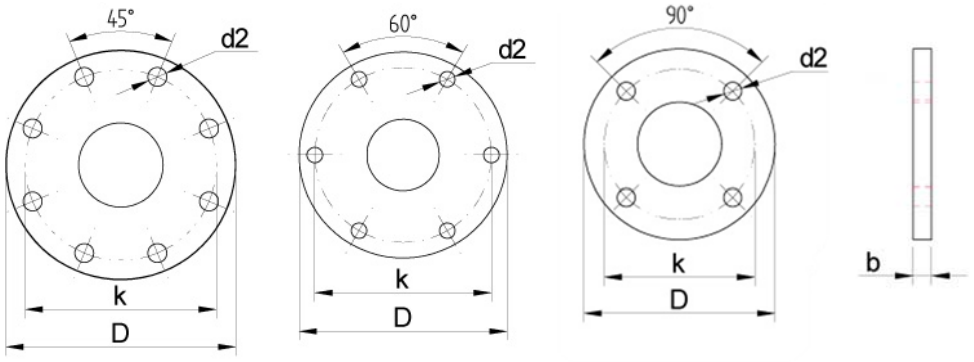


Fig. 15: Dimensions of counterflange with tube (others on request)

11.2.8 Dimension of protection tube flanges

8 bore holes **6 bore holes** **4 bore holes**



Protection tube flange
Mat.: DIN 1.4571 / AISI 316 Ti
Dimensions: See Table
Outer diameter of protection tube: 57/76.1 mm

Subject to technical modifications.

Abmessungen / Dimensions Flanschtyp / Type of flange	D [mm (in)]	B [mm (in)]	K [mm (in)]	d2 [mm (in)]	Bore holes
ANSI 4" 150lbs FF Best.-Nr. /Order code: **A**	228.6 (9.00)	12.5 (0.50)	190.5 (7.50)	19.0 (0.75)	8
ANSI 2" 150lbs FF Best.-Nr. /Order code: **B**	153.0 (6.00)	12.5 (0.50)	121.0 (4.75)	20.0 (0.78)	4
ANSI 3" 150lbs RF Best.-Nr. /Order code: **C**	190.5 (7.50)	23.9 (0.94)	152.4 (6.00)	19.1 (0.75)	4
ANSI 3" 300lbs RF Best.-Nr. /Order code: **D**	209.5 (8.25)	28.6 (1.13)	168.3 (6.63)	22.2 (0.87)	8
ANSI 4" 150lbs RF Best.-Nr. /Order code: **E**	228.6 (9.00)	12.5 (0.5)	190.5 (7.50)	19.1 (0.75)	8
ANSI 4" 300lbs RF Best.-Nr. /Order code: **F**	254.0 (10)	31.7 (1.25)	200.1 (7.88)	22.2 (0.87)	8
DN50/ PN16 Best.-Nr. /Order code: **G**	165.0 (6.47)	18.0 (0.71)	125.0 (4.90)	18.0 (0.71)	4
DN65/ PN6 Best.-Nr. /Order code: **H**	160.0 (6.27)	14.0 (0.55)	130.0 (5.12)	14.0 (0.55)	4
DN65/ PN16 Best.-Nr. /Order code: **I**	185.0 (7.28)	18.0 (0.71)	145.0 (5.71)	18.0 (0.71)	4
DN80/ PN6 Best.-Nr. /Order code: **K**	190.0 (7.48)	18.0 (0.71)	150.0 (5.91)	18.0 (0.71)	4
DN80/ PN16 Best.-Nr. /Order code: **L**	200.0 (7.87)	20.0 (0.79)	160.0 (6.29)	18.0 (0.71)	8
DN100/ PN16 Best.-Nr. /Order code: **M**	220.0 (8.66)	20.0 (0.79)	180.0 (7.09)	18.0 (0.71)	8

11.3 Technical data - instrument air

Note

The analysis system uses the connected instrument air during the entire operating time to supply reference air and to supply test air (test gas 1) during calibration or system test.

Specification:	According to ISO 8573-1 Class 2 *Particle size.:* *1 µm* *Particle density max.:* *1 mg/m³* *Oil content max.:* *0.1 mg/m³* *Pressure dew point max.:* *-40 °C or 10 °C below the lowest ambient temperature* *Constant:* *20.95 Vol % O_2*
Inlet pressure:	2 - 10 bar
Flow rate of test gas:	Max. 180 l/h
Flow rate of reference air:	Max. 40 l/h

11.4 Technical data – test air

Note

The flow volume of the test gases must be adjusted on the test gas cylinders themselves.

Inlet pressure:	Max. 3 bar
Specification of test gas 1 (optional):	21 vol. % O_2 in N_2 (synthetic air - when instrument air is not available)
Specification of test gas 2:	The calibration gas must have the same composition as specified in the Test protocol. The Test protocol is located on the analyzer unit/sensor on delivery. The test gas recommendations for the O_2 and CO_e sensor may differ from each other. In this case, the sensors must be adjusted individually.
Flow rate at 1.1 ± 0.1 bar:	180 l/h

12 Warranty

SICK WARRANTY

SICK guarantees that the products it manufactures and sells are free from manufacturing and material defects at the time of delivery. However, if a defect becomes apparent within the warranty period, SICK shall, at SICK's option, repair or replace the defective part after immediate written notification by the purchaser. The buyer is not entitled to any other legal remedies under this guarantee. We will also be happy to send you our General Terms and Conditions on request.

The warranty period is as follows:

24 months after delivery.
12 months after delivery for spare parts.

SICK assumes no warranty or liability for defects and damage to SICK products that are attributable to the following causes: Wear, corrosion, improper use, unauthorized modifications, inadequate maintenance and non-compliance with the Operating Instructions.

All SICK products and systems that contain a heated sensor must be operated under constant conditions. If the power supply to the heater is switched off and on regularly, this leads to a thermal load on the analyzer unit heater, the thermocouple and the O_2 measuring cell, which reduces their service life. If it is not possible to operate the heated system continuously over a longer period of time, please contact SICK for technical advice.

Note: During installation, the customer must ensure that all necessary supply lines are connected and that the measuring cell heating is regulated. This ensures that the sensor is supplied with alternating current, heating voltage, reference gas and test air and that the functionality of the products supplied does not deteriorate should full commissioning be delayed. Experience has shown that products installed but not put into operation can be damaged by the process or by external influences. SICK accepts no liability for such defects.

If professional tools are not used during the installation and commissioning of SICK products and damage is caused as a result, all warranty claims are void.

8020278/1A1E/V2-0/2023-11/en

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
Sensor Intelligence.