

Brief Operating Instructions

Oxymax COS22D, Oxymax COS22

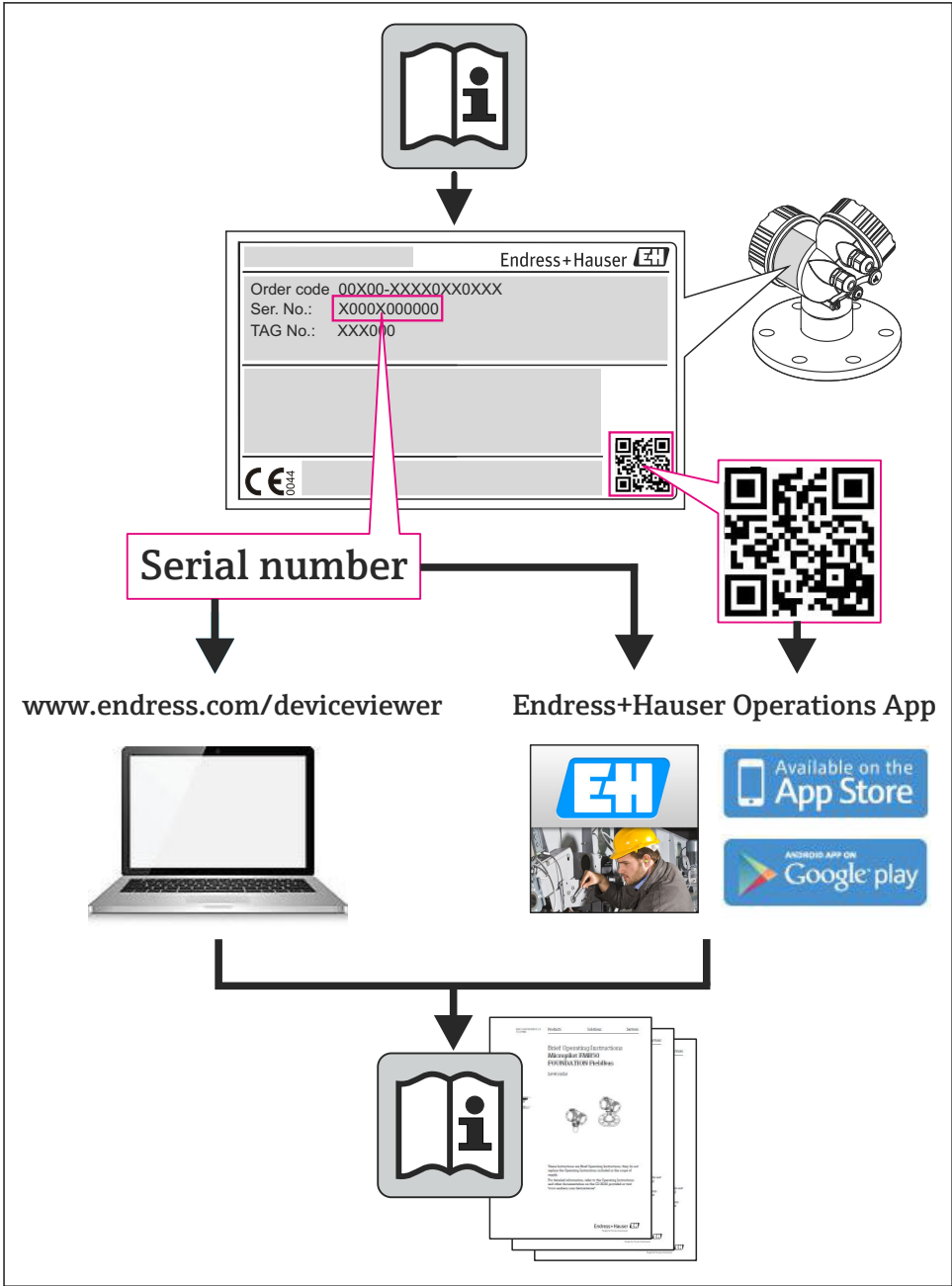
Sensor for the measurement of dissolved oxygen



These instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information on the device can be found in the Operating Instructions and in the other documentation available at:

- www.endress.com/device-viewer
- Smart phone/tablet: Endress+Hauser Operations App



A0023555

EG/EU-Konformitätserklärung
EC/EU-Declaration of Conformity
Déclaration CE/UE de Conformité

Endress+Hauser 
People for Process Automation




Company Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24, 70839 Gerlingen, Germany
erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt
declares as manufacturer under sole responsibility, that the product
déclare sous sa seule responsabilité en qualité de fabricant que le produit

Product Memosens Sensoren / Memosens sensors / Memosens capteurs
COS21D-*12*1
COS22D-BA****3
COS51D-G*8*0
zusammen mit Messkabel / together with measuring cable / ensemble avec cable de mesure
CYK10-a**b a = G, E; b = 1, 2
CYK20-BAab a = B1, B2; b = C1, C2

Regulations den folgenden Europäischen Richtlinien entspricht:
conforms to following European Directives:
est conforme aux prescription des Directives Européennes suivantes :
EMC 2014/30/EU
ATEX 2014/34/EU

Standards angewandte harmonisierte Normen oder normative Dokumente:
applied harmonized standards or normative documents:
normes harmonisées ou documents normatifs appliqués :
EN 61326-1 (2013) EN 60079-0 (2012) + A11 (2013)
EN 61326-2-3 (2013) EN 60079-11 (2012)
EN 60079-26 (2007) + Corrigendum 1

Certification EG-Baumusterprüfbescheinigungs-Nr. BVS 04 ATEX E 121 X
EC-Type Examination Certificate No.
Numéro de l'attestation d'examen CE de type
Ausgestellt von/issued by/délivré par DEKRA EXAM GmbH (0158)
Qualitätssicherung/Quality assurance/Système d'assurance DEKRA EXAM GmbH (0158)
qualité
Gerlingen, 20.04.2016
Endress+Hauser Conducta GmbH+Co. KG


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Technology






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Technology Certifications and Approvals

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
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1 About this document

1.1 Warnings

Structure of information	Meaning
 Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.
 Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.
 Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
 Cause/situation If necessary, Consequences of non-compliance (if applicable) ► Action/note	This symbol alerts you to situations which may result in damage to property.

1.2 Symbols

Symbol	Meaning
	Additional information, tips
	Permitted or recommended
	Not permitted or not recommended
	Reference to device documentation
	Reference to page
	Reference to graphic
	Result of a step

2 Basic safety instructions

2.1 Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.



Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Designated use

The sensor is designed for the continuous measurement of dissolved oxygen in water.

The specific suitability depends on the sensor version:

- COS22-****1******* (standard, measuring range 0.01 to 60 mg/l)
COS22D-****1******* (standard, measuring range 0.01 to 60 mg/l)
 - Measuring, monitoring and regulating the oxygen content in fermenters
 - Monitoring the oxygen content in biotechnology facilities
- COS22-****3******* (trace measurement, measuring range 0.001 to 10 mg/l, preferred operational range 0.001 to 2 mg/l), also suitable for high CO₂ partial pressure
COS22D-****3/4******* (trace measurement, measuring range 0.001 to 10 mg/l, preferred operational range 0.001 to 2 mg/l), also suitable for high CO₂ partial pressure
 - Monitoring inertization equipment in the food industry
 - Monitoring the residual oxygen content in carbonated fluids of the beverage industry
 - Trace measurement in industrial applications such as inertizations
 - Monitoring the residual oxygen content in boiler feedwater
 - Monitoring, measuring and regulating the oxygen content in chemical processes

NOTICE

Molecular hydrogen

Hydrogen causes sensitivity in other substances and leads to false low readings or, at the worst, total failure of the sensor.

- ▶ Only use the COS22-****1/3******* sensor or COS22D-****1/3******* in media free of hydrogen.
- ▶ Use the sensor COS22D-****4******* in media containing hydrogen.

For non-contact digital data transmission, the sensor COS22D must be connected to the digital input of the Liquiline transmitter using the CYK10 measuring cable.

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Occupational safety

As the user, you are responsible for complying with the following safety conditions:

- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

Electromagnetic compatibility

- The product has been tested for electromagnetic compatibility in accordance with the applicable international standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.
3. Do not operate damaged products, and protect them against unintentional operation.
4. Label damaged products as defective.

During operation:

- ▶ If faults cannot be rectified:
products must be taken out of service and protected against unintentional operation.

NOTICE

Non-designated use

Incorrect measurements, malfunctions and even measuring point failure could result

- ▶ Only use the product in accordance with the product specifications.
- ▶ Pay particular attention to the technical data on the nameplate.

2.5 Product safety

The product is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. The relevant regulations and international standards have been observed.

2.5.1 State of the art

The product is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. The relevant regulations and international standards have been observed.

2.5.2 Electrical equipment in hazardous areas

For all approvals

- To avoid incendive sparking, you must install the titanium hazardous area versions COS22D-BA***D*3, COS22D-GC***D*3, COS22D-8A***D*3, COS22D-TA***D*3 and COS22D-NA***D*3 in such a way that they are protected against impact and friction.
- When transporting, installing and performing maintenance in the hazardous area, you must also avoid sparks resulting from impact and friction on the sensor shaft or membrane body.
- The use of these versions in liquid media with solid particles must be avoided.

ATEX II 1G / IECEx Ex ia IIC T3/T4/T6 Ga

The Memosens inductive sensor cable connection system, consisting of:

- oxygen sensor Oxymax COS22D-BA
- measuring cable CYK10 or measuring cable CYK20

is suitable for use in hazardous areas according to type examination certificate BVS 04 ATEX E 121 X and IECEx BVS 11.0052X. The corresponding EU Declaration of Conformity is part of this document.

- The certified Oxymax COS22D-BA*****3 oxygen sensor, in conjunction with the CYK10-G*** measuring cable, may be connected only to certified, intrinsically safe, digital sensor circuits of the Liquiline M CM42-OE/F/I***** transmitter. The electrical connection must be made according to the wiring diagram.
- Oxygen sensors for use in the Ex area have a special conductive O-ring. The electrical connection of the metallic sensor shaft to the conductive mounting location (such as a metallic assembly) is via the O-ring.
- You must connect the assembly or the mounting location to ground using suitable measures according to the Ex standards.
- The sensors must not be operated under electrostatically critical process conditions. Avoid strong steam or dust currents that act directly on the connection system.
- Hazardous area versions of digital sensors with Memosens technology are indicated by a red-orange ring in the plug-in head.
- The maximum permitted cable length between the sensor and transmitter is 100 m (330 ft).

NEPSI Ex ia IIC T3/T4/T6 Ga

The Memosens inductive sensor cable connection system, consisting of:

- oxygen sensor Oxymax COS22D-NA*****3 and
- measuring cable CYK10-G***

is approved for use in explosive atmospheres in accordance with the National supervision and inspection center for Explosion protection and Safety of Instrumentation (NEPSI) in China.

The certified oxygen sensor Oxymax COS22D-NA*****3 may only be connected to the following certified, intrinsically safe, digital sensor circuits in conjunction with the measuring

cable CYK10-G***, or a Memosens cable with an identical structure both in terms of hardware and function:

- Liquiline CM42-OJ*****
- Alternatively to an approved, intrinsically safe Memosens sensor output that supplies the following values at the very maximum:

Parameter set 1	Parameter set 2
$U_0 = 5.1 \text{ V}$ $I_0 = 130 \text{ mA}$ $P_0 = 166 \text{ mW}$ (linear output characteristic) $C_i = 15 \text{ }\mu\text{F}$ $L_i = 95 \text{ }\mu\text{H}$	$U_0 = 5.04 \text{ V}$ $I_0 = 80 \text{ mA}$ $P_0 = 112 \text{ mW}$ (trapezoidal output characteristic) $C_i = 14.1 \text{ }\mu\text{F}$ $L_i = 237.2 \text{ }\mu\text{H}$

- The electrical connection must be made according to the wiring diagram.
- Oxygen sensors for use in the Ex area have a special conductive O-ring. The electrical connection of the metallic sensor shaft to the conductive mounting location (such as a metallic assembly) takes place via the O-ring.
- You must connect the assembly or the installation location to ground according to the Ex guidelines.
- If the CYK10-G*** cable is installed with its terminal head in Ex zone 0, the cable must be protected against electrostatic charge.
- The user may not change the configuration. Only in this way will the explosion protection of the unit remain intact. Every change puts safety at risk.
- The sensors must not be operated under electrostatically critical process conditions. Avoid strong steam or dust currents that act directly on the connection system. The metal sensor shaft must be installed at the mounting location in such a way that it is electrostatically conductive ($< 1 \text{ M}\Omega$).
- To mount, use and maintain the product, you must follow the information in the Operating Instructions and the following standards:
 - GB50257 -1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"
 - GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
 - GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres- Part 15: Electrical installations in hazardous area (other than mines)"
 - GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres- Part 16: Inspection and maintenance of electrical installation (other than mines)"
- Hazardous area versions of digital sensors with Memosens technology are indicated by a red-orange ring in the plug-in head.
- The maximum permitted cable length between the sensor and transmitter is 100 m (330 ft).

FM/CSA IS/NI Cl.1 Div.1 GP: A-D

- Pay attention to the documentation and control drawings for the transmitter.

Temperature classes ATEX, IECEx, FM/CSA and NEPSI

	Temperature class		
	T3	T4	T6
Ambient temperature T _a	−5 to +135 °C	−5 to +120 °C	−5 to +70 °C
Reference temperature T _{ref}	+25 °C		

TIIS Ex ib IIC T4

The certified oxygen sensor Oxymax COS22D-TA*****3 may only be connected to the certified, intrinsically safe, digital sensor circuit of the transmitter Liquiline M CM42-OT***** in conjunction with the measuring cable CYK10-U**1.

Temperature classes TIIS

	T4
Ambient temperature T _a	−5 to +60 °C
Reference temperature T _{ref}	+25 °C

3 Certificates and approvals

A list of all the approvals is provided below. The approvals that are valid for this product depend on the device version ordered.

3.1 CE mark

3.1.1 Declaration of Conformity

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EU directives. The manufacturer confirms successful testing of the product by affixing to it the CE mark.

3.2 Ex approvals

Version COS22D-BA

ATEX II 1G / IECEx Ex ia IIC T3/T4/T6 Ga

Version COS22D-8A

FM/CSA IS/NI Cl.1 Div.1 GP: A-D

Version COS22D-NA

NEPSI Ex ia IIC T3/T4/T6 Ga

Version COS22D-GC

The product has been certified in accordance with Directive TR CU 012/2011 which applies in the European Economic Area (EEA). The EAC conformity mark has been affixed to the product.

- EAC 0Ex ia IIC T6/T4/T3 Ga X
- Zone 0
- Certificate number: TC RU C-DE.AA87.B.00088

3.3 Certification body

DEKRA EXAM GmbH

Bochum

3.4 Material certificates

3.4.1 Manufacturer declaration of FDA compatibility

All parts (seals) in contact with the medium comply with the relevant regulations of the U.S. Food and Drug Administration (FDA).

Certified in the FDA Declaration of Conformity and Pharma CoC (→ Product Configurator on the product page)

Product	FDA certificate for
COS22-****22 COS22D-****22	Membrane, O-rings, process seal
COS22Z-*2*2	Membrane, O-rings, process seal
COS22-****23 COS22D-****23	Membrane, O-rings
COS22Z-*2*3	Membrane, O-rings



Hazardous area versions

For operation in FDA processes, another FDA-approved seal must be installed before the process seal (for example CPA442). Doing so will sufficiently separate the process from the Ex connection.

3.4.2 Material test certificate

A test certificate 3.1 in accordance with EN 10204 is supplied depending on the version (→ Product Configurator on the product page).

This certificate certifies the traceability of the materials used including the pipe material.

3.5 EHEDG

Compliance with EHEDG's criteria for hygienic design

- Technical University of Munich, Research Center for Brewing and Food Quality, Freising-Weihenstephan
- Certificate type: Type EL Class I

The use of an EHEDG-certified assembly is a prerequisite for the easy-to-clean installation of a 12-mm sensor in accordance with EHEDG requirements. Furthermore, the instructions regarding the hygienic installation and operation of the assembly in the relevant Operating Instructions must be adhered to.

3.6 Regulation (EC) No. 1935/2004

Meets the requirements of Regulation (EC) No. 1935/2004

The sensor therefore meets the requirements for materials that come into contact with food.

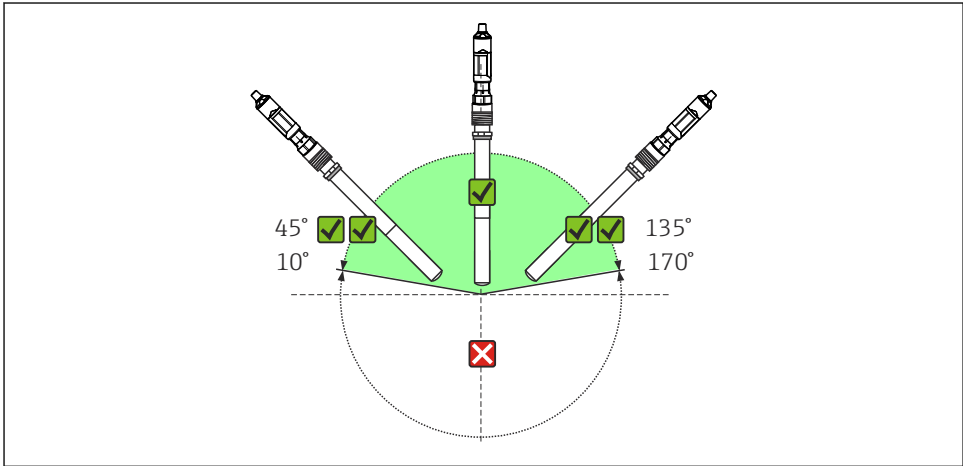
3.7 CRN approval

As the assembly can be operated at a nominal pressure greater than 15 psi (approx. 1 bar), it has been registered according to CSA B51 ("Boiler, pressure vessel, and pressure piping code"; category F) with a CRN (Canadian Registration Number) in all Canadian provinces.

4 Installation

4.1 Installation conditions

4.1.1 Orientation



1 Permitted orientations

The sensor must be installed at an angle of inclination of 10 to 170 ° in an assembly, holder or appropriate process connection. Recommended angle: 45° to prevent the attachment of air bubbles.

Inclination angles other than those mentioned are not permitted. In order to avoid buildup and condensation on the spot, do **not** install the sensor upside down.



Follow the instructions for installing sensors in the Operating Instructions for the assembly used.

4.1.2 Mounting location

1. Choose a mounting location that is easy to access.
2. Ensure that upright posts and assemblies are fully secured and vibration-free.
3. Choose a mounting location with an oxygen concentration that is typical for the application.

4.2 Mounting the sensor

Must be installed in a suitable assembly (depending on the application).

WARNING

Electrical voltage

In the event of a fault, non-grounded metallic assemblies may be live and as such are not safe to touch!

- ▶ When using metallic assemblies and installation equipment, national grounding provisions must be observed.

For complete installation of a measuring point, proceed as follows:

1. Install the retractable assembly or a flow assembly (if used) into the process.
2. Connect the water supply to the rinse connections (if you are using an assembly with a cleaning function).
3. Install and connect the oxygen sensor.

NOTICE

Installation error

Cable breakage, loss of sensor due to cable separation, unscrewing of membrane cap!

- ▶ Do not install the sensor freely suspended from the cable!
- ▶ Screw the sensor into the assembly, ensuring that the cable is not twisted.
- ▶ Hold on to the sensor body during installation or removal. Turn **only at the hexagonal nut** of the armored coupling. Otherwise the membrane cap might be unscrewed and will then remain in the assembly or process.
- ▶ Avoid exerting excessive tensile force on the cable (e.g. through jerky pulling movements).
- ▶ Choose a mounting location that is easy to access for later calibrations.
- ▶ Follow the instructions for installing sensors in the Operating Instructions for the assembly used.

4.3 Post-installation check

1. Are the sensor and cable undamaged?
2. Is the orientation correct?
3. Is the sensor installed in an assembly and is not suspended from the cable?
4. Avoid the penetration of moisture by fitting the protection cap on the immersion assembly.

5 Electrical connection

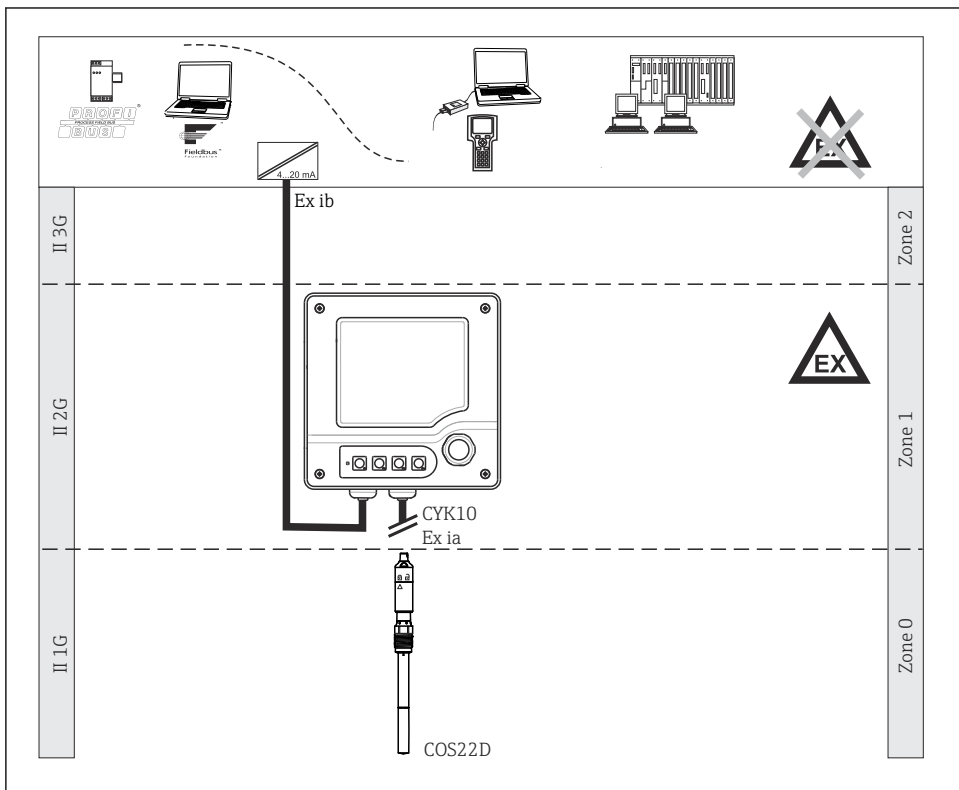
WARNING

Device is live!

Incorrect connection may result in injury or death!

- ▶ The electrical connection may be performed only by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions contained therein.
- ▶ **Prior** to commencing connection work, ensure that no voltage is present on any cable.

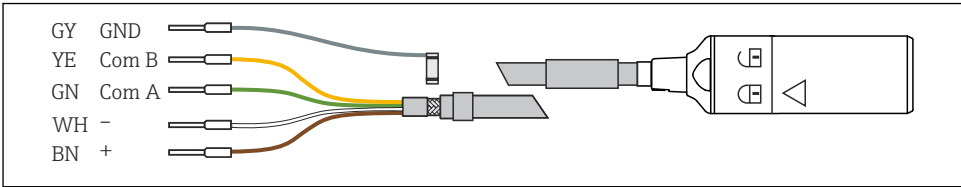
5.1 Quick wiring guide (COS22D-BA/NA only)



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5.2 Connecting the sensor (COS22D)

The electrical connection of the sensor to the transmitter is established using measuring cable CYK10.

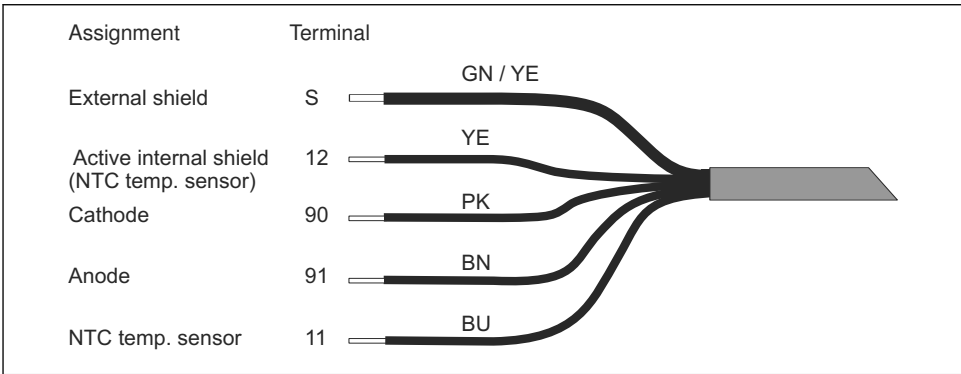


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3 Measuring cable CYK10

5.3 Connecting the sensor (COS22)

A multi-core COK21 measuring cable is used for the electrical connection of the sensor to the transmitter.



A0005583-EN

4 Measuring cable COK21

The polarization voltage must be set at the transmitter as follows:
Standard measuring range: -650 mV
Trace measuring range: -550 mV
The voltage is applied between the working electrode (cathode) and the reference electrode (anode).

5.4 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions and which are necessary for the required, designated use, may be carried out on the device delivered.

- Exercise care when carrying out the work.

Otherwise, the individual types of protection (Ingress Protection (IP), electrical safety, EMC interference immunity) agreed for this product can no longer be guaranteed due, for example to covers being left off or cable (ends) that are loose or insufficiently secured.

5.5 Post-connection check

Device condition and specifications	Action
Are the sensor, assembly, junction box or cables free from damage on the outside?	► Perform a visual inspection.
Electrical connection	Action
Are the mounted cables strain-relieved and not twisted?	<ul style="list-style-type: none"> ► Perform a visual inspection. ► Untwist the cables.
Is a sufficient length of the cable cores stripped, and are the cores positioned in the terminal correctly?	<ul style="list-style-type: none"> ► Perform a visual inspection. ► Pull gently to check they are seated correctly.
Are all the screw terminals properly tightened?	► Tighten the screw terminals.
Are all cable entries mounted, tightened and leak-tight?	► Perform a visual inspection.
Are all cable entries installed downwards or mounted laterally?	In the case of lateral cable entries: <ul style="list-style-type: none"> ► Point cable loops downward so that water can drip off.

6 Commissioning

6.1 Function check

Prior to initial commissioning, ensure that:

- The sensor is correctly installed
- The electrical connection is correct
- There is sufficient electrolyte in the membrane cap
The transmitter is not displaying a warning about electrolyte depletion



Please note the information on the safety data sheet to ensure safe use of the electrolyte.

If using an assembly with automatic cleaning function:

- Check that the cleaning medium (water or air, for example) is connected correctly.

WARNING

Escaping process medium

Risk of injury from high pressure, high temperatures or chemical hazards!

- Before applying pressure to an assembly with cleaning system, ensure that the system has been connected correctly.
- If you cannot reliably establish the correct connection, do not install the assembly in the process.



Following commissioning, the sensor must be serviced at regular intervals, as only then can reliable measurement be guaranteed. Further information on this can be found in the Operating Instructions for the sensor.



- Operating Instructions Oxymax COS22D, BA00447C
- Operating Instructions Oxymax COS22, BA00446C
- Operating Instructions for the transmitter used, such as BA01245C if using the Liquiline CM44x or CM44xR.

6.2 Sensor polarization

NOTICE

Incorrect measurements due to ambient influences!

- Always avoid strong direct sunlight on the sensor.
- Comply with the instructions for commissioning in the Operating Instructions of the transmitter used.

The sensor has been tested at the factory for proper functioning and is shipped in a condition in which it is ready to operate.

To prepare for calibration:

1. Remove the sensor protection cap.

2. Expose the sensor, which is dry on the outside, to the air atmosphere.
 - ↳ The air should be saturated with water vapor. Therefore, install the sensor as close as possible to a water surface. However, the sensor membrane must remain dry during calibration. Therefore, avoid direct contact with the water surface.
3. Connect the sensor to the transmitter.
4. Switch on the transmitter.
 - ↳ When the sensor is connected to the transmitter, the polarization takes place automatically after the transmitter powers up.
5. Wait for polarization time to elapse.

6.3 Sensor calibration

Calibrate the sensor (e.g. air calibration) immediately after the polarization time elapses.

The calibration intervals depend greatly on:

- The application
- The installation position of the sensor

The following method helps you determine the necessary calibration intervals:

1. Inspect the sensor one month after commissioning. To do so, remove the sensor from the medium and dry it off.
2. After 10 minutes, measure the oxygen saturation index in air.
 - ↳ Decide using the results:
 - a) Measured value not 100 ± 2 %SAT? → Calibrate the sensor.
 - b) Measured value = 100 ± 2 %SAT? → Double the length of time to the next inspection.
3. Proceed as indicated in Step 1 after two, four and eight months.
 - ↳ This allows you to determine the optimum calibration interval for your sensor.



In any case, calibrate the sensor at least once a year.



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