Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Oxymax COS21D

Digital sensor for measuring dissolved oxygen
Sensor with long-term stability for frequent sterilization and autoclaving

Application

- Process control in enzyme production
- Control of culture growth
- Biotechnological production
- Food industry
- Chemical industry
- Water treatment
- General process applications

Your benefits

- Sensor version suitable for the pharmaceutical industry:
  - Stainless steel 1.4435 (AISI 316L)
  - Sterilizable and autoclavable
- Application-specific versions:
  - Sensor for standard applications
  - CO_2 compatible trace sensor for the beverage industry
  - Trace sensor in the power plant sector
- Versatile usage:
  - Standard process connection Pg 13.5
  - Installation in standard pH assemblies possible
- Short response time: $t_{98} < 60$ s
- Integrated temperature sensor

Further benefits offered by Memosens technology

- Maximum process safety through contactless inductive signal transmission
- Data safety through digital data transmission
- Easy handling thanks to storage of sensor-specific data in the sensor
- Predictive maintenance possible thanks to registration of sensor load data in the sensor

TI402C/07/EN/03.10
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Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

The oxygen molecules diffused through the membrane are reduced to hydroxide ions (OH-) at the cathode. Silver is oxidized to silver ions (Ag+) at the anode (this forms a silver halogenide layer).
A current flows due to the electron donation at the cathode and the electron acceptance at the anode. Under constant conditions, this flow is proportional to the oxygen content of the medium.
This current is converted in the transmitter and indicated on the display as an oxygen concentration in mg/l, as a saturation index in % SAT or as an oxygen partial pressure in hPa.

Memosens technology

Maximum process safety
The inductive and non-contacting measured value transmission of Memosens guarantees maximum process safety and offers the following benefits:

- All problems caused by moisture are eliminated.
  - The plug-in connection is free from corrosion.
  - Measured value distortion from moisture is not possible.
  - The plug-in system can even be connected under water.
- The transmitter is galvanically decoupled from the medium. The result: No more need to ask about "symmetrically high-impedance" or "unsymmetrical" (for pH/ORP measurement) or an impedance converter.
- EMC safety is guaranteed by screening measures for the digital measured value transmission.
- Application in explosion-hazardous areas is unproblematic; the integrated electronics are intrinsically safe.

Data safety through digital data transfer
The Memosens technology digitalizes the measured values in the sensor and transfers them to the transmitter contactlessly and free from interference potential. The result:

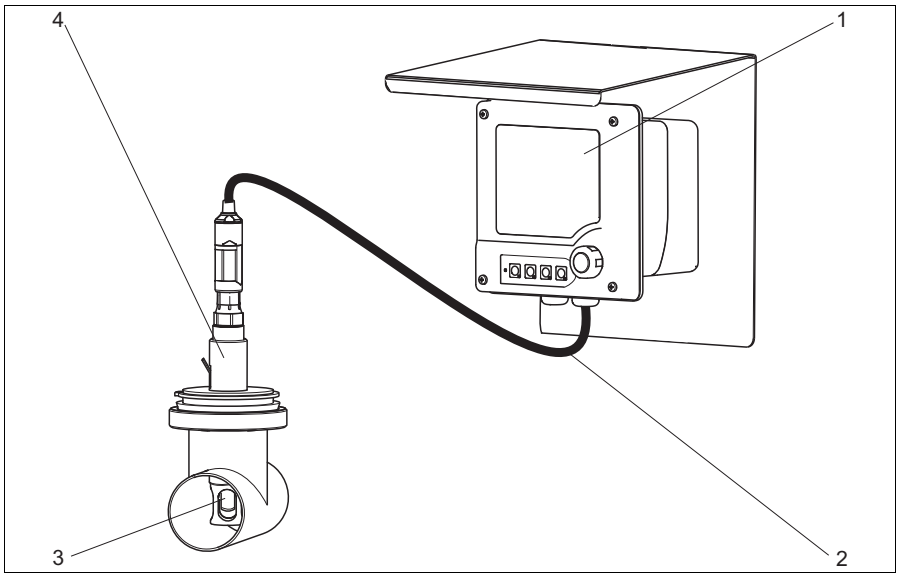
- An automatic error message is generated if the sensor fails or the connection between sensor and transmitter is interrupted.
- The availability of the measuring point is dramatically increased by immediate error detection.

Easy handling
Sensors with Memosens technology have integrated electronics that allow for saving calibration data and further information such as total hours of operation and operating hours under extreme measuring conditions. When the sensor is mounted, the calibration data are automatically transferred to the transmitter and used to calculate the current measured value. Storing the calibration data in the sensor allows for calibration away from the measuring point. The result:

- Sensors can be calibrated under optimum external conditions in the measuring lab. Wind and weather do neither affect the calibration quality nor the operator.
- The measuring point availability is dramatically increased by the quick and easy replacement of precalibrated sensors.
- The transmitter does not need to be installed close to the measuring point but can be placed in the control room.
- Maintenance intervals can be defined based on all stored sensor load and calibration data and predictive maintenance is possible.
- The sensor history can be documented on external data carriers and evaluation programs at any time. Thus, the current application of the sensors can be made to depend on their previous history.

Measuring system

A complete measuring system comprises:
- The digital oxygen sensor Oxymax COS21D
- A transmitter, e.g. Liquiline CM42
- An appropriate measuring cable, e.g. CYK10
- Optional: an assembly, e.g. fixed installation assembly CPA442, flow assembly CPA240 or retractable assembly CPA475



Example of a measuring system

1 Liquiline CM42
2 Measuring cable CYK10
3 Digital oxygen sensor Oxymax COS21D
4 Fixed installation assembly CPA442

Input

Measured variable

Dissolved oxygen [mg/l, µg/l, ppm, ppb, % SAT or hPa]
Temperature [° C, °F)

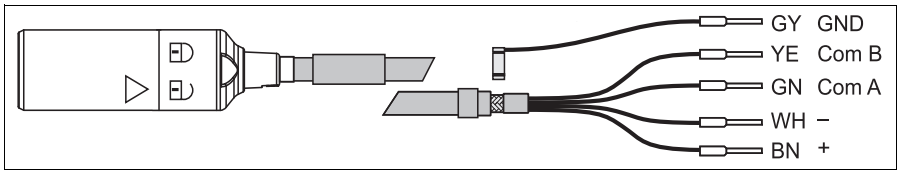
Measuring range

	Measuring range	**Recommended operational range**
COS21D-A	0.01 to 20 mg/l 0 to 200 %SAT 0 to 400 hPa	0.01 to 20 mg/l 0 to 200 %SAT 0 to 400 hPa
COS21D-B	0.001 to 20 mg/l 0 to 200 %SAT 0 to 400 hPa	0.001 to 2 mg/l 0 to 20 %SAT 0 to 40 hPa
COS21D-C		

Wiring

Electrical connection

The sensor is electrically connected to the transmitter by means of the special measuring cable CYK10.



Special measuring cable CYK10

Performance characteristics

Response time

From air to nitrogen at 25 °C (77 °F)
- t_{90} : < 30 s
- t_{98} : < 60 s

Reference operating conditions

Reference temperature: 25 °C (77 °F)
Reference pressure: 1013 hPa (15 psi)

Signal current at air[1)]

- COS21D-A:
  60 nA (40 to 80 nA)
- COS21D-B and COS 21D-C:
  300 nA (180 to 500 nA)

Zero current

< 0.1 % of the current in air

Measured value resolution

- COS21D-A:
  10 µg/l (10 ppb)
- COS21D-B and COS21D-C:
  1 µg/l (1 ppb)

Maximum measured error

±1 % of measured value[2)]

Repeatability

±1 % of measured value

Long-term drift

Zero-point drift: < 0.1 % per week at 30 °C (86 °F)
Measuring range drift: < 0.1 % per week at 30 °C (86 °F) [1)]

1) under constant conditions each

Influence of medium pressure

Pressure compensation not necessary

Polarization time

- COS21D-A and COS21D-C:
  < 60 minutes
- COS21D-B:
  < 12 hours

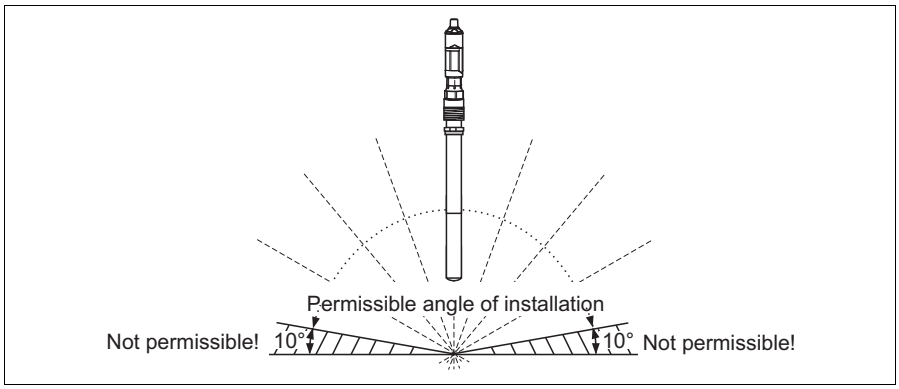
Oxygen intrinsic consumption

- COS21D-A:
  Approx. 20 ng/h in air at 25 °C (77 °F)
- COS21D-B and COS21D-C:
  Approx. 100 ng/h in air at 25 °C (77 °F)

1) For the reference operating conditions indicated
2) In accordance with IEC 60746-1 at nominal operating conditions

Installation

Angle of installation



Permitted angle of installation

Environment

Ambient temperature range

–5 to +135 °C (23 to 175 °F)

Storage temperature

–10 to +60 °C (10 to 140 °F) at 95% relative air humidity, not condensing

Caution! Danger of drying out
Only store the sensor with the electrode protection cap (water filled).

Ingress protection

IP 68 (10 m (33 ft) water column at 25 °C (77 °F) during 45 days, 1 mol/l KCl)

Process

Process temperature

- COS21D-A and COS21D-C:
  -5 to 135 °C (23 to 275 °F)
- COS21D-B:
  -5 to 100 °C (23 to 212 °F)

Process pressure

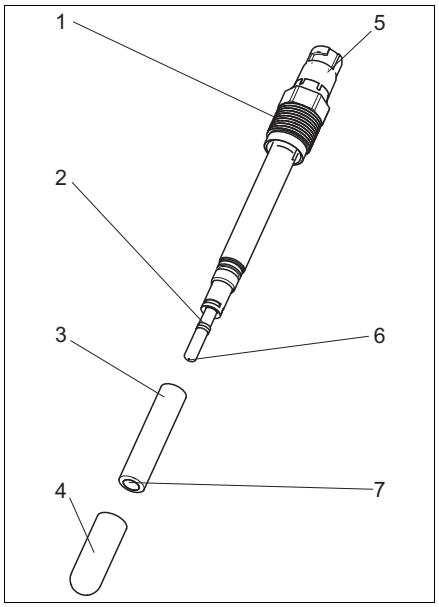
- COS21D-A:
  0 to 4 bar (0 to 58 psi)
- COS21D-B and COS21D-C:
  0 to 12 bar (0 to 174 psi)

Minimum flow rate

- COS21D-A:
  0.02 m/s (0.07 ft/s)
- COS21D-B/C:
  0.10 m/s (0.33 ft/s)

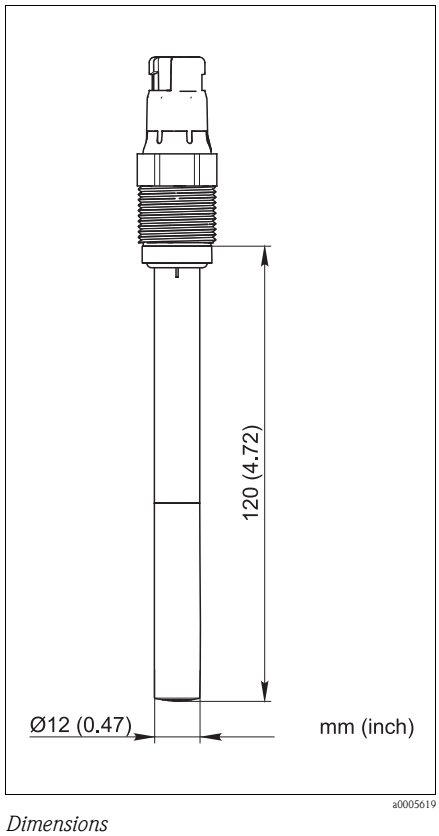
Mechanical construction

Design, dimensions



Design

1 Threaded connection Pg 13.5
2 Anode
3 Membrane cap
4 Protective cap
5 Memosens plug-in head
6 Cathode
7 Membrane



Dimensions

Weight

0.2 kg (0.44 lbs)

Material

Sensor shaft:	Stainless steel 1.4435 (AISI 316L)
Electrode combination:	Silver / Platinum
O-rings:	Viton® (FDA certified, original delivery) EPDM (depending on membrane kit)
Process sealing of ATEX/FM/CSA versions:	Viton® (not FDA conform)
Membrane	
COS21D-****2:	FDA certified material
all other versions:	Silicone rubber

Process connection

Thread Pg 13.5

Surface roughness

$R_a < 0.4$ µm

Electrolyte

- COS21D-A and COS21D-C:
  Alkaline electrolyte
- COS21D-B:
  Phosphoric acid electrolyte

Ordering information

Product structure

	Application, operational range						
	A	Standard 0.01 to 20 mg/l					
	B	Trace, beverages (CO_2 compatible) 0.001 to 2 mg/l					
	C	Trace, power plants 0.001 to 2 mg/l					
		Shaft length					
		1	120 mm (4.72")				
			Approvals				
			1	None			
			2	ATEX II 1G Ex ia IIC T3/T4/T6 (COS21D-A*2*1 and COS21D-C*2*1 only)			
			3	FM/CSA IS/NI CL I DIV 1&2 GP A-D (COS21D-A*3*1 and COS21D-C*3*1 only)			
				Certificates			
				1	None		
				2	EN10204 3.1		
					Options		
					1	None	
					2	FDA membrane cap	
COS21D-							Complete order code

Scope of delivery

The following items are included in the delivery:
- Oxygen sensor with transport protection cap for membrane protection
- Electrolyte, 1 bottle, 25 ml (0.85 fl.oz.)
- Pipette for filling with electrolyte
- Operating Instructions, English

Certificates and approvals

Ex approval

Versions COS21D-A*2*1, COS21D-C*2*1
ATEX II 1G Ex ia IIC T3/T4/T6

Versions COS21D-3*1**
FM/CSA IS/NI CL I DIV 1&2 GP A-D

Material certificates

Manufacturer's declaration of FDA conformity

The manufacturer declares the FDA compliance of the materials used.
You can download the certificates from the product page (www.endress.com).

Product	FDA certificate for
COS21D-**1*2	Membrane, O-rings
COS21D-**1*1	when using membrane kits 71003199, 71023226
Membrane kits 71003199, 71023226	Membrane, O-rings

Inspection certificate

Depending on the version, an inspection certificate 3.1 acc. to EN10204 is supplied (—> product structure).

Accessories

Note!
In the following sections, you find the accessories available at the time of issue of this documentation.
For information on accessories that are not listed here, please contact your local service or sales representation.

Assemblies (selection)

Flowfit CPA240
- pH/redox flow assembly for processes with a high level of requirements
- Technical Information TI179C/07/en

Cleanfit CPA450
- Manual retractable assembly for installing 120 mm sensors in tanks and pipework
- Technical Information TI183C/07/en

Cleanfit CPA475
- Retractable assembly for installation in tanks and pipework under sterile conditions
- Technical Information TI240C/07/en

Unifit CPA442
- Installation assembly for food, biotechnology and pharmaceuticals, with EHEDG and 3A certificate
- Technical Information TI306C/07/en

Zero solution

- 3 units to produce 3 x 1 liter oxygen-free solution
- order no. 50001041

Electrolyte solutions and membrane cap kits

Electrolyte solutions
- For COS21D-A:
  – order no. 51505873
- For COS21D-B:
  – order no. 51518701
- For COS21D-C:
  – order no. 51518703

Membrane kits
- Membrane kit Standard, COS21/COS21D:
  – O-rings
  – membrane: silicon rubber
  – order no. 51505874
- Membrane kit Standard, COS21/COS21D, EN10204:
  – O-rings
  – membrane: silicon rubber
  – order no. 51516339
- Membrane kit CIP, COS21/COS21D:
  – O-rings: Viton®
  – membrane: silicon rubber
  – order no. 51518699
- Membrane kit CIP, COS21/COS21D, EN10204:
  – O-rings: Viton®
  – membrane: silicon rubber
  – order no. 71023225
- Membrane kit FDA, COS21/COS21D:
  – O-rings
  – membrane: FDA certified material
  – order no. 71003199
- Membrane kit FDA, COS21/COS21D, EN10204:
  – O-rings
  – membrane: FDA certified material
  – order no. 71023226

Scope of delivery (all kits):
- 3 Membrane caps
- 1 O-ring (process seal, Viton®, none-Ex)
- 1 O-ring (sensor, EPDM)

Note!
The electrolytes in the membrane caps are specific to the sensor versions and must **not** be mixed together!

Process seal for Ex applications
- 3 pieces
- Viton® (not FDA conform)
- order no. 71023212

Measuring cable

CYK10 Memosens data cable
- For digital sensors with Memosens technology
- Ordering according to product structure, see below

	Certificates	
	A	Standard, non-Ex
	G	ATEX II 1G Ex ia IIC T6/T4/T3, FM/CSA IS/NI Cl I DIV 1&2 GP A-D
	L	LABS free, non-Ex
	O	FM IS/NI Cl I DIV 1&2 GP A-D
	S	CSA IS/NI Cl I DIV 1&2 GP A-D
	T	TIIS
	V	ATEX/NEPSI II 3G Ex nL IIC

		Cable length	
		03	Cable length: 3 m (9.8 ft)
		05	Cable length: 5 m (16 ft)
		10	Cable length: 10 m (33 ft)
		15	Cable length: 15 m (49 ft)
		20	Cable length: 20 m (66 ft)
		25	Cable length: 25 m (82 ft)
		88	... m length
		89	... ft length

			Ready-made	
			1	Wire terminals
			2	M12 plug

CYK10-				complete order code

Note!
Ex versions of CYK10 are indicated by an orange-red coupling end.

CYK81 measuring cable
- Non-terminated measuring cable for extension of sensor cables of e.g. Memosens sensors, CUS31/CUS41
- 2 wires, twisted pair with shield and PVC-sheath (2 x 2 x 0.5 mm^2 + shield)
- Sold by the meter, order no.: 51502543

Junction box

Junction box RM
- For cable extension (e.g. for Memosens sensors)
- 5 terminals
- Cable entries: 2 x Pg 13.5
- Material: PC
- Ingress protection: IP 65
- Order no.: 51500832

Transmitter

Liquiline CM42
- Modular two-wire transmitter for Ex and non-Ex areas
- Hart®, PROFIBUS or FOUNDATION Fieldbus available
- Ordering acc. to product structure, Technical Information TI381C/07/en

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