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

Technical Information

Oxymax H 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
- 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

TI402C/07/en/02.06
71020586

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.

Data safety through digital data transfer
The Memosens technology digitalizes the measured value in the sensor and transfers it to the transmitter via a contactless connection. The result:

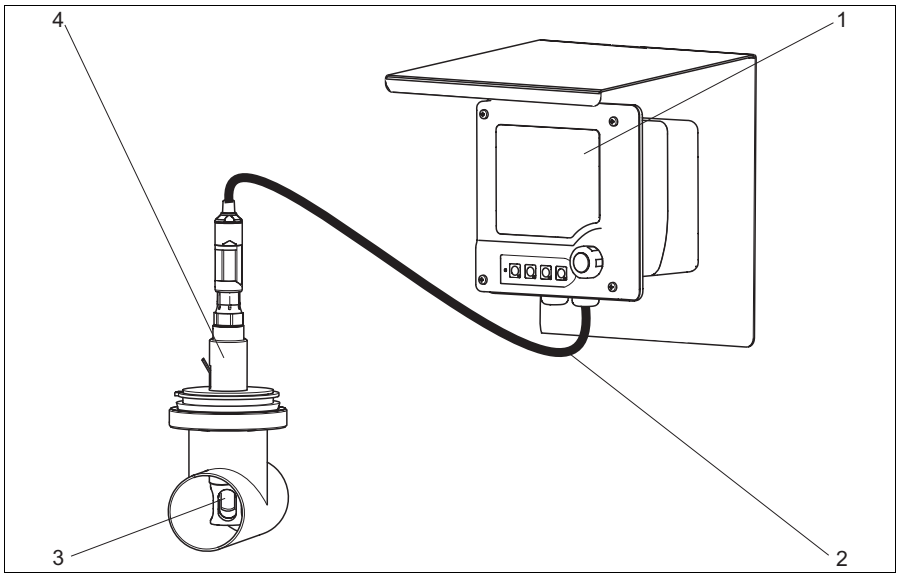
- An automatic error message is generated if the sensor fails or the connection between sensor and transmitter is interrupted.
- The availability of the measuring point is dramatically increased by immediate error detection.
- The digital signals are suitable for application in hazardous areas; the integrated electronics are intrinsically safe.

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 and adjustment away from the measuring point. The result:

- Sensors can be calibrated unter 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 H COS21D
- A transmitter, e.g. Liquiline M 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 M CM42
2 Measuring cable CYK10
3 Digital oxygen sensor Oxymax H COS21D
4 Fixed installation assembly CPA442

Input

Measured variable

dissolved oxygen [mg/l / % SAT / hPa]

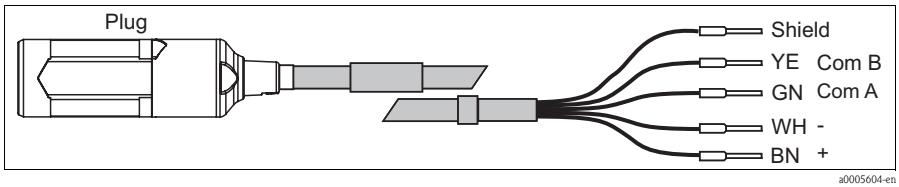
Measuring range

	Measuring range	Recommended operational range
COS21D-A	0.05 to 20 mg/l 0 to 200 %SAT 0 to 400 hPa	0.05 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 at 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 end of measuring range

Long-term drift

Zero-point drift: < 0.1 % per week at 30 °C (86 °F) and under constant conditions
Measuring range drift: < 0.1 % per week at 30 °C (86 °F) and under constant conditions

Influence of medium pressure

Pressure compensation not necessary

Polarization time

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

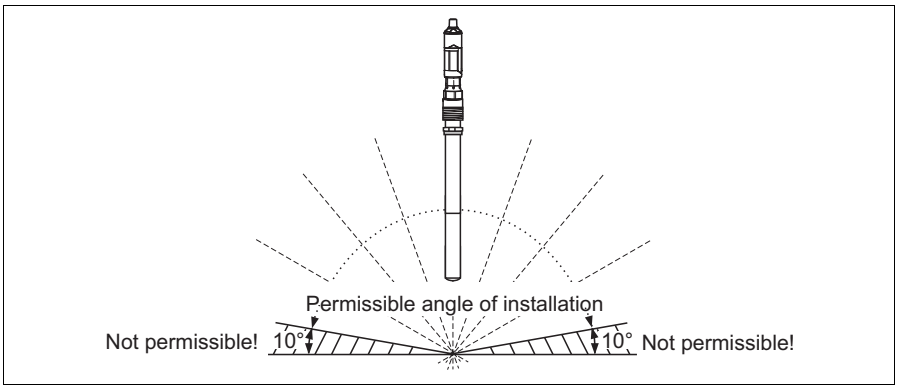
Oxygen intrinsic consumption

- 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 746-1 at nominal operating conditions

Installation

Angle of installation



Permitted angle of installation

Environment

Ambient temperature range

–10 to +60 °C (10 to 140 °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 (filled with water from the mains).

Process

Process temperature

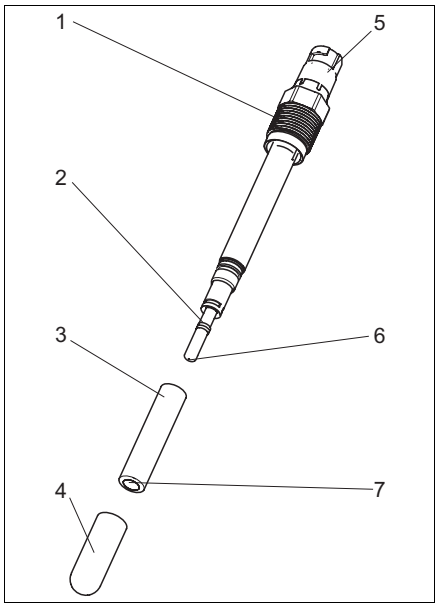
- COS21D-A and COS21D-C:
  -5 to 130 °C (23 to 270 °F)
- COS21D-B:
  -5 to 100 °C (23 to 212 °F)

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)

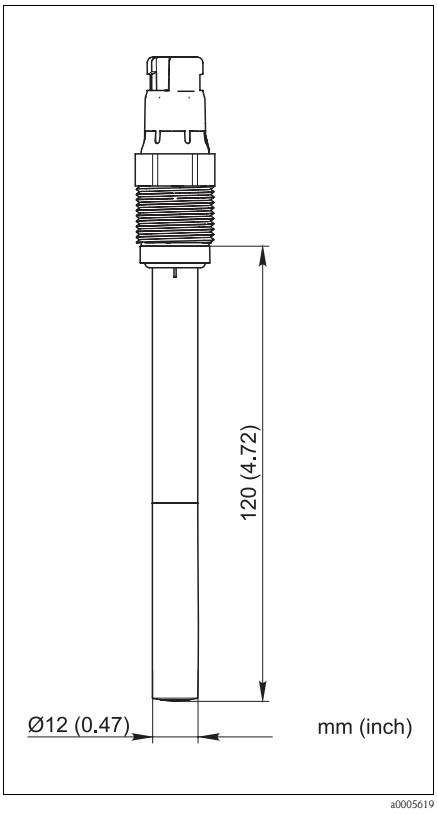
Mechanical construction

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)
Membrane:	Silicone rubber
Electrode combination:	Silver / Platinum
Sealing ring:	Viton®, EPDM (depending on membrane kit)

Process connection

Thread Pg 13.5

Electrolyte

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

Ordering information

Product structure

	Application, operational range					
	A	Standard 0.05 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			
			Approvals			
			1	None		
			2	ATEX/FM (ATEX II 1G EEX ia IIC T3/T4/T6, COS21D-A* only)		
				Certificates		
				1	None	
				2	EN10204 3.1	
					Options	
					1	None
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, 50 ml (1.7 fl.oz.)
- Pipette for filling with electrolyte
- Operating Instructions, English

Certificates and approvals

Ex approval

Version COS21D-A*2
ATEX II 1G EEX ia IIC T3/T4/T6

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 responsible service.

Assemblies (selection)

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

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

Cleanfit H CPA475
- Retractable assembly for installation in tanks and pipework under sterile conditions
- Technical Information TI240/C/07/en

Unifit H CPA442
- Installation assembly for food, biotechnology and pharmaceuticals, with EHEDG and 3A certificate
- Technical Information TI306/C/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:
  – order no. 51505874
- Membrane kit Standard, COS21/COS21D, EN10204:
  – order no. 51516339
- Membrane kit CIP, COS21/COS21D:
  – order no. 51518699
- Membrane kit CIP, COS21/COS21D, EN10204:
  – order no. 71023225
- Membrane kit FDA, COS21/COS21D:
  – order no. 71003199
- Membrane kit FDA, COS21/COS21D, EN10204:
  – order no. 71023226

Scope of delivery (all kits):
- 3 Membrane caps
- 1 bottle with electrolyte COS21D-A
- 1 O-ring (process seal)
- 1 O-ring (sensor)

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
- 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 EEx ia IIC T6/T4

		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

CYK10-				complete order code

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

- CYK81 measuring cable
  to lengthen the cable of e.g. Memosens, 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
  to lengthen the cable for Memosens or CUS31/CUS41, IP 65, with 2 x PG 13.5
  order no. 51500832

Transmitter

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

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