



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

Oxymax W COS71

Potentiostatic amperometric three-electrode sensor
Long-term stable sensor for trace measurement



Application

Continuous measurement of the dissolved oxygen concentration plays an important role in monitoring boiler feed water:

- Trace quantities
Oxygen may only be present in trace quantities. Excessive concentrations of oxygen can result in corrosion damage in the circuit.
- Thermal resp. chemical degassing
Boiler feed water is thermally and chemically degassed to achieve oxygen-free water. This state must be maintained in service under process conditions.
- Laboratory measurement vs. continuous process monitoring
Spot laboratory measurements to measure oxygen involve a risk of error due to sampling errors. Continuous measurement directly in the process eliminates this risk and provides reliable information about the state of the medium at any time.

Your benefits

- Maximum measurement accuracy:
 - Longterm-stable measurement thanks to potentiostatic amperometric three-electrode system
 - Long maintenance intervals
 - Intelligent sensor self monitoring
- Calibration to any transmitter or location and subsequent installation at measuring point (in digital mode with Liquisys M COM 223/253) as calibration data is stored in the sensor
- Membrane covered sensor, i.e.:
 - high O₂ selectivity
 - Minimum maintenance effort
 - Minimum calibration effort thanks to simple calibration in air

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.

Potentiostatic amperometric three-electrode system

The high-impedance, current-free reference electrode plays an important role. The formation of a silver bromide or silver chloride coating on the anode uses up the bromide or chloride ions dissolved in the electrolyte. In the case of conventional membrane-covered sensors working with the two-electrode system, this causes an increase in signal drift.

This is not the case with the three-electrode system: The change in bromide or chloride concentration is registered by the reference electrode and an internal control circuit holds the working electrode potential constant. The advantages of this principle are significantly increased accuracy of the signal and considerably extended calibration intervals.

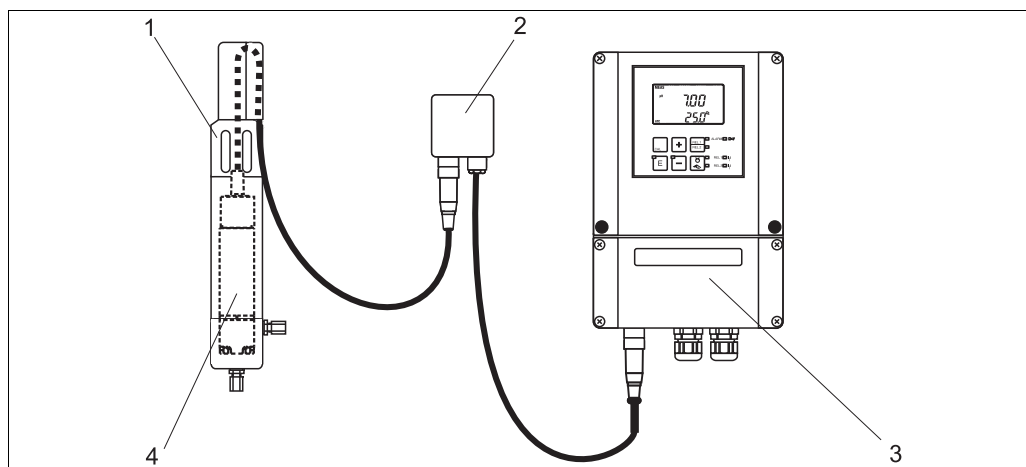
Measuring system

A complete measuring system comprises at least:

- Oxygen sensor
- Transmitter, e.g. Liquisys M COM223/253-WX/WS
- Special measuring cable
- Assembly, e.g. flow assembly COA260 or retractable assembly COA451

Optional:

- Junction box VS (with cable extension)



Measuring system (example)

- 1 Flow assembly
- 2 Junction box VS (optional)
- 3 Transmitter Liquisys M COM253
- 4 Oxygen sensor

Input

Measured variable dissolved oxygen [mg/l, ppm, % SAT or hPa]

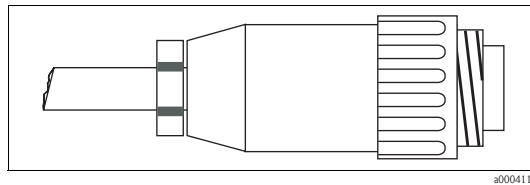
Measuring range with Liquisys M COM223/253-WX/WS:
 0.001 to 20.000 mg/l
 0.0 to 200.0 % SAT
 0 to 400 hPa

Wiring

Electrical connection

Direct connection to the transmitter (field device)

Connect the sensor directly to the transmitter (COM253-WX/WS) by using the special measuring cable with SXP plug.



SXP plug

Direct connection to the transmitter (panel mounting device)

- Remove the SXP connector (transmitter side!) from the cable.
- Refer to the following table for the cable assignment and the assigned terminals for Liquisys M COM223-WX/WS.
- Please note that the cable assignment changes depending on the sensor version (fixed cable or TOP68 connection).

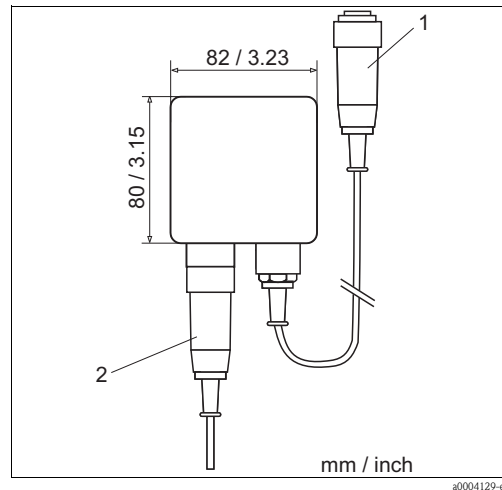
Terminal COM223	Sensor with fixed cable (OMK)		Sensor with TOP68 connection (CYK71)	
	Core	Assignment	Core	Assignment
87	YE	+U _B	YE	+U _B
0	GY	0 V	WH	0 V
96	PK	NTC (analog) or Com. (digital)	GN	Communication (digital)
97	BU	NTC (analog) or Com. (digital)	BN	Communication (digital)
88	BN	-U _B	Koax innen	-U _B
19	GN	Alarm		
18	WH	Sensor signal		

Connection with cable extension

To lengthen the sensor connection beyond the length of the fixed cable, you require a junction box VS.

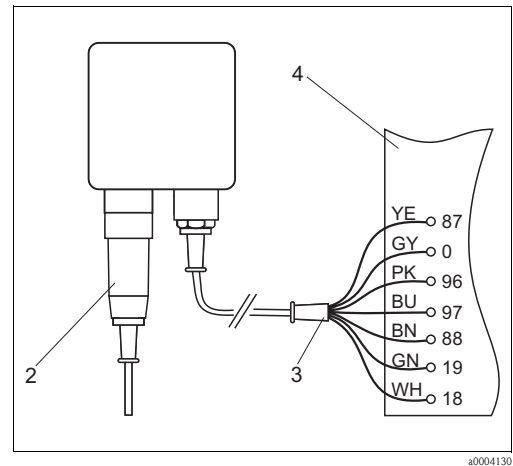
Always connect the sensor cable with the SXP plug to the junction box.

The cable extension to the transmitter then depends from the transmitter version, i.e. field device or panel mounted device.



Junction box VS to a field device

- 1 SXP plug to field device
- 2 SXP plug from sensor



Junction box VS to a panel mounted device

- 2 SXP plug from sensor
- 3 Measuring cable (OMK) to the transmitter
- 4 Connection department of the transmitter

Performance characteristics

Response time	<ul style="list-style-type: none"> ■ T_{90}: 0.5 minutes ■ T_{99}: 1.5 minutes (each at 20 °C (68 °F))
Reference operating conditions	Reference temperature: 25 °C (77 °F) Reference pressure: 1013 hPa (15 psi)
Signal current in air¹⁾	approx. 9000 nA
Zero current	zero current free
Measured value resolution	0.001 mg/l (0.001 ppm)
Maximum measured error	±1 % of measured value ²⁾
Long-term drift	with permanent polarization: < 1 % per month
Influence of medium pressure	Pressure compensation not necessary
Polarization time	< 60 minutes
Oxygen intrinsic consumption	Approx. 900 ng/h in air at 25 °C (77 °F)

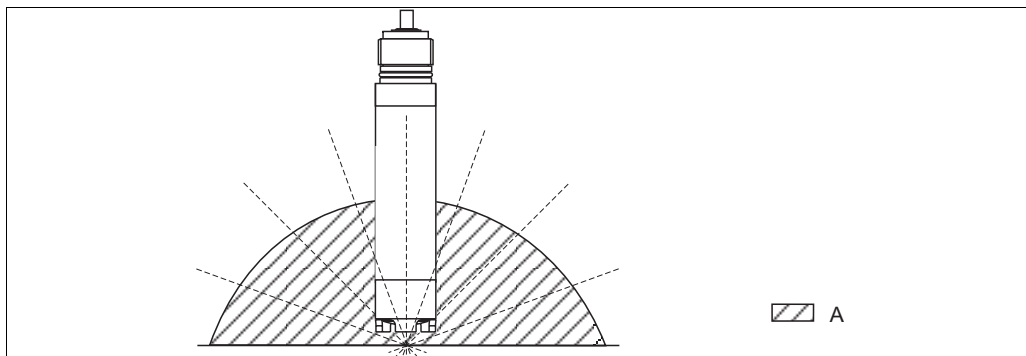
1) For the reference operating conditions indicated

2) In accordance with IEC 746-1 at nominal operating conditions

Installation

Angle of installation

The sensor can be installed up to the horizontal in an assembly, support or a suitable process connection. Other angles are not permissible. Do **not** install the sensor overhead.



Angle of installation

A Permissible installation positions: 0 ... 180 °



Note!

Make sure you comply with the instructions for installing sensors. You will find them in the Operating Instructions for the assembly used.

Environment

Ambient temperature range

–5 to 50 °C (20 to 120 °F)

Storage temperature

filled with electrolyte: –5 to 50 °C (20 to 120 °F)
without electrolyte: –20 to 60 °C (0 to 140 °F)

Ingress protection

- Fixed cable versions:
IP 68 (10 m (33 ft) water column at 25 °C (77 °F) in 30 days)
- Top 68 plug-in head versions:
IP 68 (1 m (3.3 ft) water column at 50 °C (122 °F) in 7 days)

Process

Process temperature

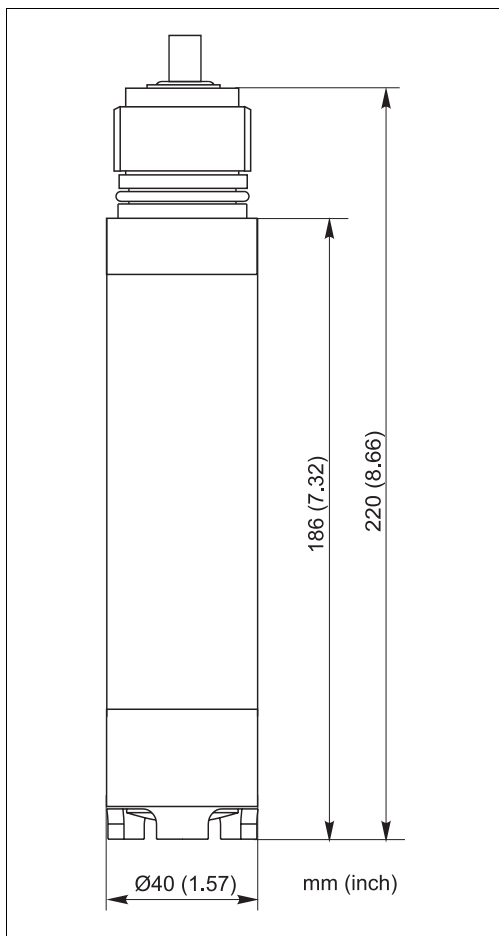
–5 to 50 °C (20 to 120 °F)

Process pressure

max. 10 bar (145 psi) permissible overpressure
Underpressure operation is not permissible.

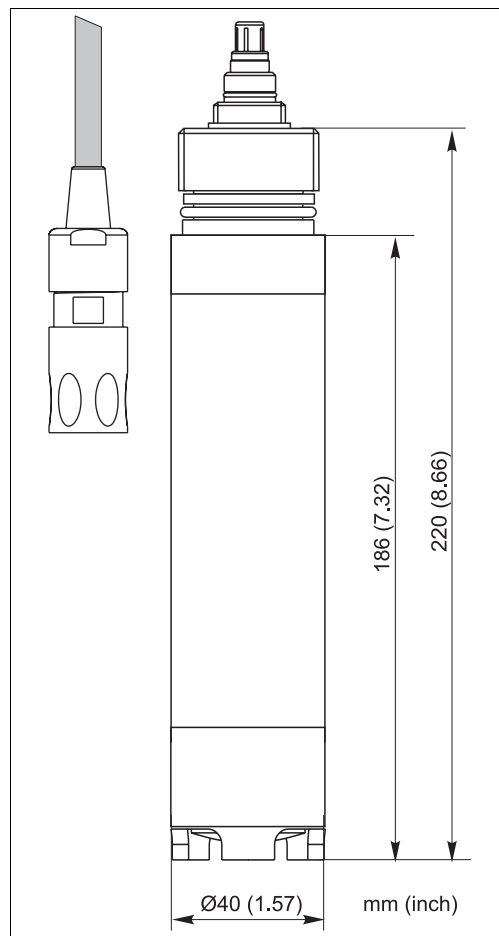
Mechanical construction

Design, dimensions



Fixed cable version

a0004083-en



TOP68 version

a0004084-en

Weight	with cable length 7 m (23 ft): 0.7 kg (1.5 lbs.)
	with cable length 15 m (49 ft): 1.1 kg (2.4 lbs.)
	with TOP68 plug-in connection: 0.3 kg (0.66 lbs.)

Material	Sensor shaft:	stainless steel 1.4571, AISI 316Ti
	Membrane cap:	POM
	Cathode:	Silver
	Anode/Reference electrode:	Silver / Silver bromide

Process connection	G1
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Maximum cable length	max. 100 m (328 ft) (including cable extension)
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Membrane thickness	approx. 25 µm
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Electrolyte	Alkaline electrolyte
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Ordering information

Product structure

Certificate	
A	Ex free version
Cable length	
0	Cable length: 1.5 m (4.9 ft)
2	Cable length: 7 m (23 ft)
4	Cable length: 15 m (49 ft)
8	Without Cable (TOP 68 version only)
9	Special design to customer specifications
Cable connection	
F	Fixed cable connection
S	Cable connection using TOP 68 plug (with COM223/253-WX/WS only)
COS71-	Complete order code

Scope of delivery

The following items are included in the delivery:

- Oxygen sensor with transport protection cap for membrane protection
- Accessories set with the following contents:
 - 2 replacement cartridges (replacement membrane caps)
 - 10 plastic ampoules containing electrolyte
 - 1 sealing kit with 3 O-rings
 - 6 abrasive sheets
- Operating Instructions (on CD only)
- Brief Operating Instructions (paper version)

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)

Retractable assembly Cleanfit COA451

- manually driven retractable assembly, stainless steel, with ball valve, for oxygen sensors;
- ordering acc. to product structure (Technical Information TI368C/07/en)

Flow assembly COA260

- for plate or wall mounting, for oxygen trace measurements
- ordering acc. to product structure (Technical Information TI310C/07/en)

Zero solution

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

Measuring cable

COK31 special measuring cable

- for sensors COS31, COS61 and COS71 with TOP68 plug-in head
- Order numbers:
 - Cable length 1.5 m (4.9 ft): 51506820
 - Cable length 7 m (23 ft): 51506821
 - Cable length 15 m (49 ft): 51506822

Measuring cable OMK

- for use as extension cable between junction box VS and transmitter, not terminated
- sold by the metre - order no. 50004124

Junction box

VS junction box

- With plug-in socket and 7-pole plug
- For cable extension from sensor (COS71, COS61, COS31, COS3 with SXP connector) to transmitter, IP 65;
- Order no. 50001054

Transmitter

Liquisys M COM 223/253

- Transmitter for oxygen measurement
- field or panel-mounted housing
- Hart® or Profibus available
- Ordering acc. to product structure, see Technical Information (TI 199C/07/en)

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