



Level



Pressure



Flow



Temperature



Analytics



Registration

Systems  
Components

Services



Solutions

## Technical Information

# Oxymax COS61/ COS61D

Dissolved oxygen measurement

Optical sensor acc. to the fluorescence quenching principle, with or without Memosens protocol



### Application

The continuous measurement of the dissolved oxygen concentration is very important in many areas of water management:

- Sewage treatment plants: Oxygen measurement and regulation in the activated sludge basin for a highly efficient biological cleaning process
- Water monitoring: Oxygen measurement in rivers, lakes or seas as an indicator of the water quality
- Water treatment: Oxygen measurement for status monitoring of drinking water for example (oxygen enrichment, corrosion protection etc.)
- Fish farming: Oxygen measurement and regulation for optimum living and growth conditions

### Your benefits

- Optical technology:
  - Minimum maintenance
  - Maximum availability
- Sensor with digital signal processing:
  - Calibration data saved in sensor
  - High degree of EMC protection thanks to digital communication with the transmitter
- Extended maintenance intervals and a high degree of long-term stability
- Intelligent self-monitoring guarantees reliable measured values
- No flow needed - measurement possible in still water
- COS61D - the Liquiline sensor
  - Plug&Play: Safe communication based on Memosens protocol
  - Optionally with M12 plug for fast connection to the transmitter
- COS61 - the Liquisys sensor
  - Compatible with tried-and-tested COS31 with COM2x3W: Easy measuring point changeover to optical technology
  - Compatible with COS41 with COM2x3D with conversion kit

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## Function and system design

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### Measuring principle

- Sensor design:
  - Oxygen-sensitive molecules (markers) are integrated in an optically active layer (fluorescence layer).
  - The surface of the fluorescence layer is in contact with the medium.
  - The sensor optics are directed at the underside of the fluorescence layer.
- There is an equilibrium between the oxygen partial pressure in the medium and that in the fluorescence layer:
  - If the sensor is immersed in the medium, the equilibrium is established very quickly.
- Measuring process:
  - The sensor optics send green light pulses to the fluorescence layer.
  - The markers "answer" (fluoresce) with red light pulses.
  - The duration and intensity of the response signals is directly dependent on the oxygen contents and the partial pressure.
  - If the medium is free from oxygen, the response signals are long and very intense.
  - Oxygen molecules quench the marker molecules. As a result, the response signals are shorter and less intense.
- Measurement result:
  - The sensor returns a signal that is in proportion to the oxygen concentration in the medium.
  - The medium temperature and air pressure are already taken into account calculated in the sensor.
  - In addition to the standard values of concentration, saturation index and partial pressure, the sensor also returns a raw measured value in  $\mu\text{s}$ . The value corresponds to the decay time of the fluorescence and is approx. 20  $\mu\text{s}$  in air, and approx. 60  $\mu\text{s}$  in media free from oxygen.

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### Sensor monitoring

The optical signals are continuously monitored and analyzed for plausibility.

If inconsistencies occur, an error message is output via the transmitter.

Ageing of the sensor cap is detected. The transmitter first displays a warning for predictive maintenance and later generates an error message.

In addition, the following fault conditions are detected in conjunction with the sensor check system of the transmitter:

- Implausibly high or low measured values
- Disturbed regulation due to incorrect measured values

**Measuring system**

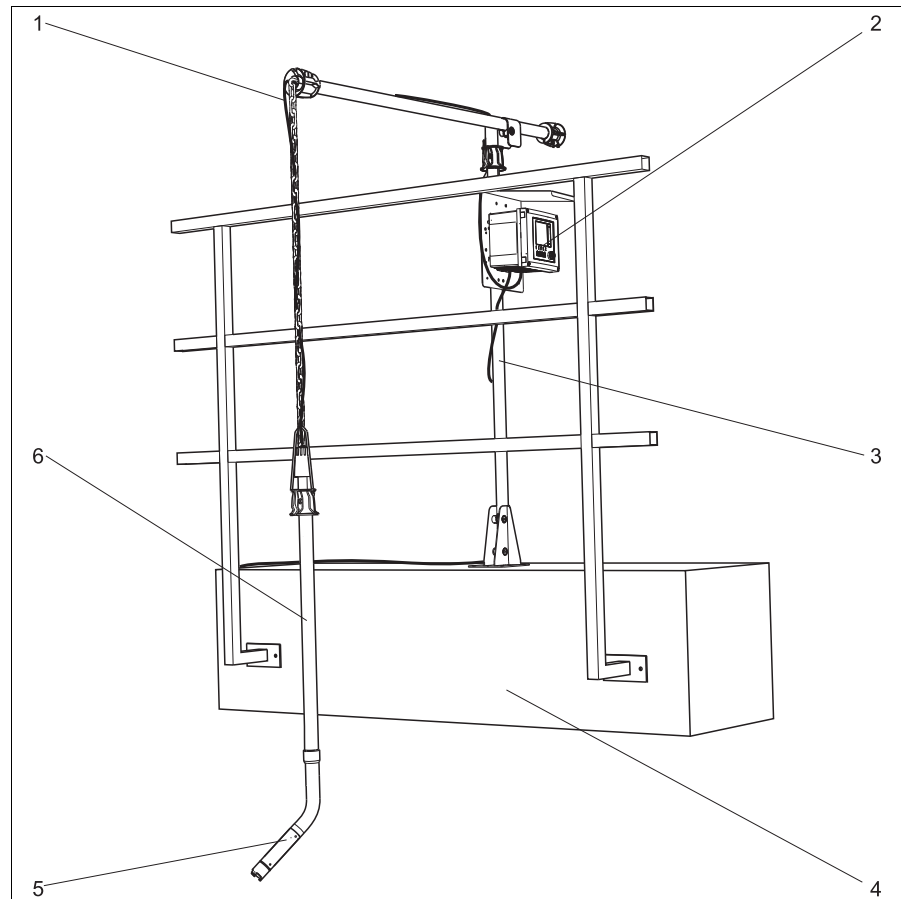
**COS61D**

A complete measuring system comprises:

- Oxygen sensor Oxymax COS61D
- Multi-channel transmitter Liquiline CM44x
- Sensor cable, optionally with M12 plug
- Assembly, e.g. COA250 flow assembly, CYA112 immersion assembly or COA451 retractable assembly

Optional:

- CYH112 assembly holder for immersion operation
- RM junction box (for cable extension)
- Cleaning system



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*Measuring system (example)*

- |   |                             |   |                             |
|---|-----------------------------|---|-----------------------------|
| 1 | Sensor cable                | 4 | Basin rim with rail         |
| 2 | Transmitter Liquiline CM44x | 5 | Oxygen sensor Oxymax COS61D |
| 3 | Flexdip CYH112              | 6 | Flexdip CYA112              |

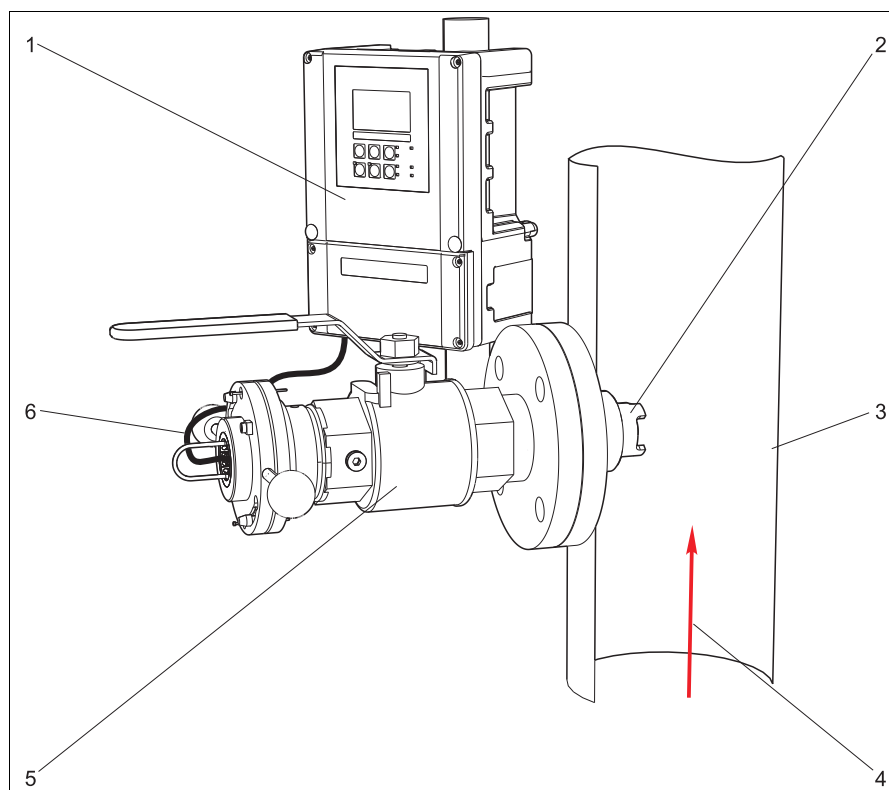
**COS61**

A complete measuring system comprises:

- Oxygen sensor Oxymax COS61
- Transmitter, e.g. Liquisys COM2x3-W
- Special measuring cable
- Assembly, e.g. COA250 flow assembly, CYA112 immersion assembly or COA451 retractable assembly

Optional:

- CYH112 assembly holder for immersion operation
- VS junction box (for cable extension)
- Cleaning system



*Measuring system (example)*

- 1 *Liquisys COM253 transmitter*  
 2 *COS61 oxygen sensor*  
 3 *Pipework (ascending pipe)*

- 4 *Medium flow direction*  
 5 *Retractable assembly Cleanfit COA451*  
 6 *Sensor cable*

**Input****Measured variable**

Dissolved oxygen [mg/l, % SAT, hPa]  
 Temperature [° C, ° F]

**Measuring range**

With Liquisys COM 2x3-W or Liquiline CM44x:  
 0 to 20 mg/l (0 to 20 ppm)  
 0 to 200 % SAT  
 0 to 400 hPa

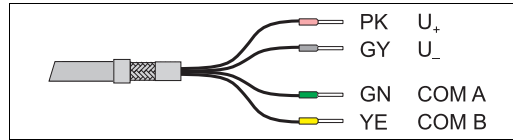
## Power supply

### Electrical connection

#### COS61D

Connection methods

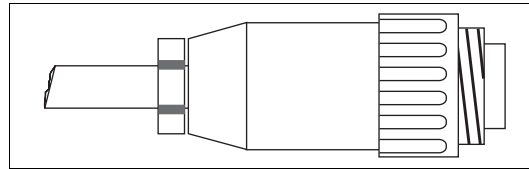
- Sensor cable directly connected to the terminal connector of the basic module
- Optional: Sensor cable plug connected to the M12 sensor socket on the underside of the device. With this type of connection, the device is already wired at the factory.



Sensor cable with terminated cable cores

#### COS61 connected to field device

Connect the sensor directly to the transmitter by using the special measuring cable with SXP plug.



SXP plug

#### COS61 connected to panel mounting device

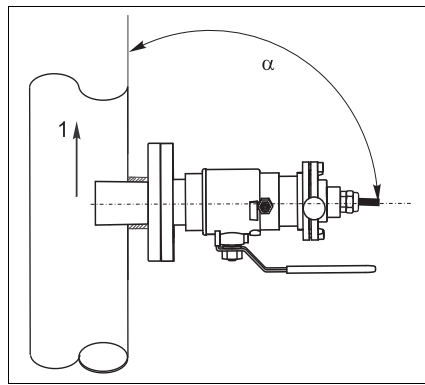
- Remove the SXP connector (transmitter side!) from the cable.
- Refer to the following table for the cable assignment and the assigned terminals for Liquisys COM223-WX/WS.
- Please note that the cable assignment varies depending on the sensor version (fixed cable or TOP68 connection).

Terminal COM223	Sensor with fixed cable (OMK)		Sensor with TOP68 connection (CYK71)	
	Core	Assignment	Core	Assignment
87	YE	+U <sub>B</sub>	YE	+U <sub>B</sub>
0	GY	0 V	WH	0 V
96	PK	Com. (digital)	GN	Communication (digital)
97	BU	Com. (digital)	BN	Communication (digital)
88	BN	-U <sub>B</sub>	Koax innen	-U <sub>B</sub>

## Installation conditions

### Installation instructions

#### Retractable assembly COA451



Installation with retractable assembly

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Arrow 1 shows the flow direction.

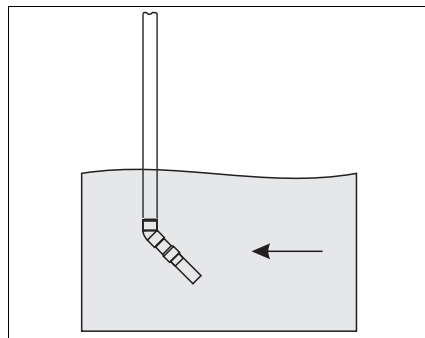
The installation angle  $\alpha$  must not exceed  $90^\circ$ .

The recommended installation angle is  $75^\circ$ .

The optical windows of the sensor have to be aligned parallel to the flow direction ( $\alpha = 90^\circ$ ) or face the flow direction ( $\alpha < 90^\circ$ ).

For manual insertion/retraction of the assembly the medium pressure may not exceed 2 bar (29 psi).

#### Wastewater assembly CYA112



Installation with wastewater assembly

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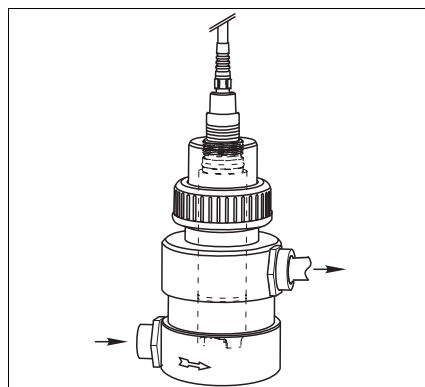
The arrow shows the flow direction.

The installation angle is  $45^\circ$  (recommended) or  $90^\circ$ .

If you use the sensor in open basins, install the sensor in a way no bubbles can build up around the optical windows.

If you use the sensor in strong aerated basins install the sensor in an installation angle of  $90^\circ$  to minimize the influence of bubbles.

#### Flow assembly COA250



Flow assembly

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The arrow on the assembly shows the flow direction.

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## Environment

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**Ambient temperature range** -20 to +60 °C (0 to 140 °F)

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**Storage temperature** -20 to +70 °C (0 to 160 °F)  
at 95% relative humidity, non condensing

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**Ingress protection**

**COS61D**

- Fixed cable with terminated cable cores:
  - IP 68 (test conditions: 10 m (33 ft) water column at 20 °C (68 °F) in 7 days)
- Fixed cable with M12 plug:
  - IP 68 (test conditions: 1 m (3.3 ft) water column, 3N KCl at 50 °C (122 °F) in 30 days)

**COS61**

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

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## Process

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**Process temperature** -5 to 60 °C (20 to 140 °F)

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**Process pressure** max. 10 bar (145 psi) abs.

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## Performance characteristics

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**Response time  $t_{90}$**   $t_{90}$ : 60 s

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**Maximum measured error<sup>1)</sup>**

**COS61D**  
0.01 mg/l or  $\pm 1$  % of measured value (< 12 mg/l)  
 $\pm 2$  % of measured value (from 12 to 20 mg/l)

**COS61**  
0.02 mg/l or  $\pm 1$  % of measured value (< 12 mg/l)  
 $\pm 2$  % of measured value (from 12 to 20 mg/l)

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**Repeatability**  $\pm 0.5$  % of measuring range end

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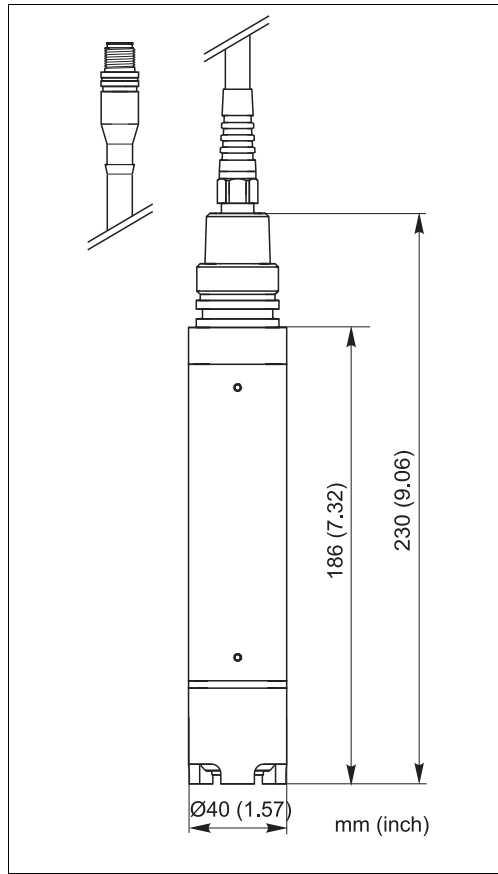
**Life time of the sensor cap** >2 years (under reference operating conditions, protect against direct sun light)

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1) at 20 °C (68 °F)

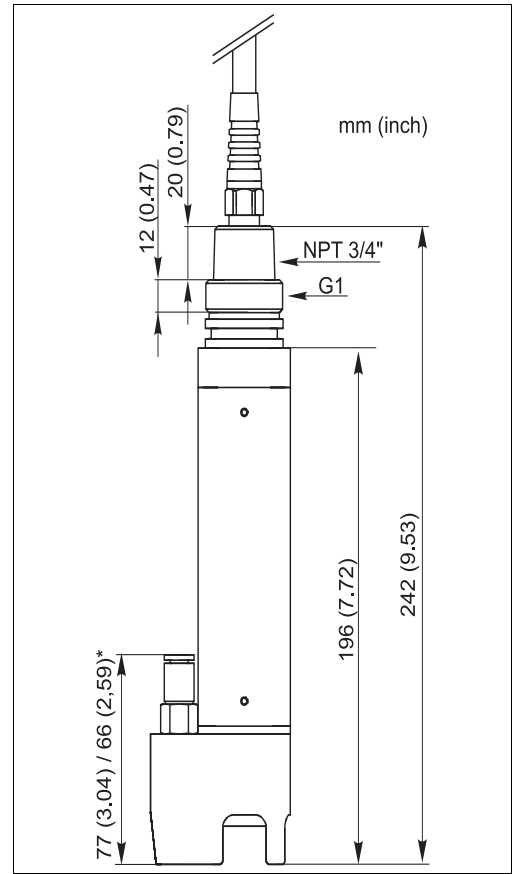
## Mechanical construction

### Design, dimensions COS61D



With optional M12 plug

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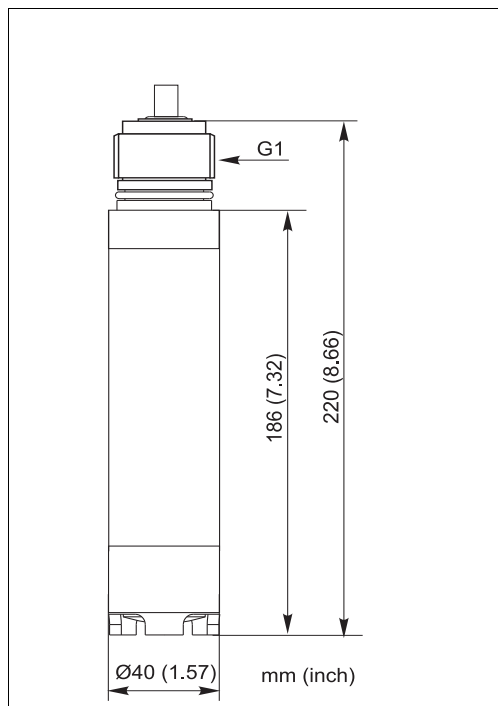


With optional cleaning unit

\* depending on cleaning unit version

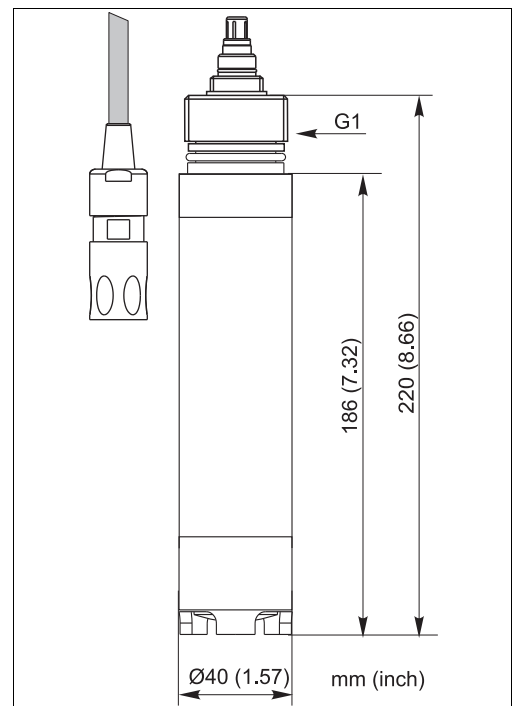
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### Design, dimensions COS61



Fixed cable version

a0004083-en

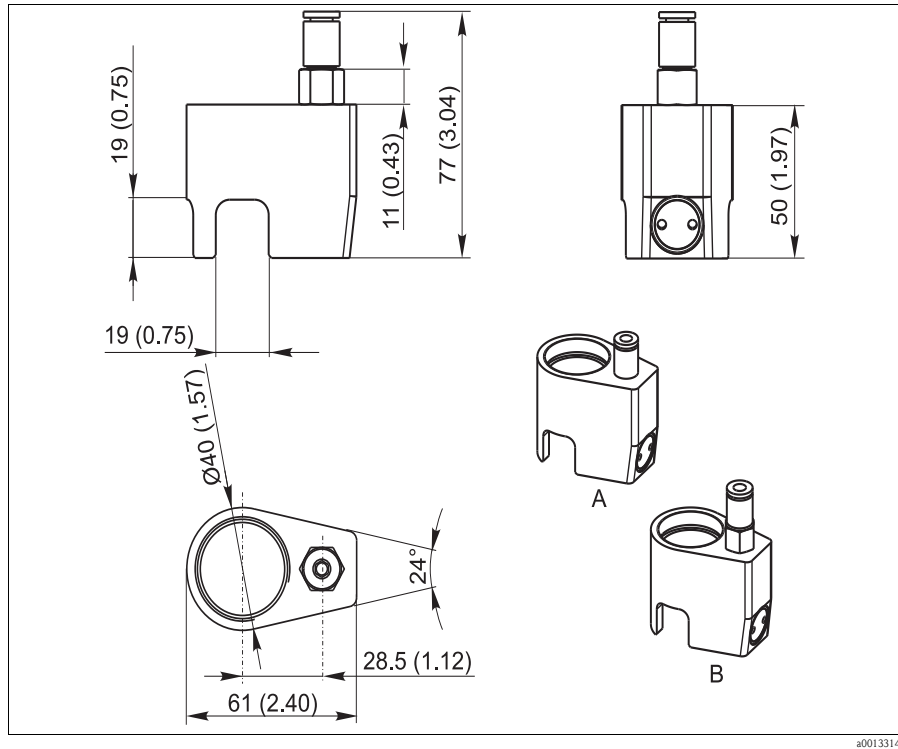


TOP68 version

a0004084-en



**Optional cleaning unit**



Optional cleaning unit

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<b>Weight</b>	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.)
<b>Materials</b>	Sensor shaft: stainless steel 1.4571 (AISI 316Ti) Cap with fluorescence layer: POM Fluorescence layer: Silicone
<b>Process connection</b>	<b>COS61D</b> G1, NPT 3/4" <b>COS61</b> G1
<b>Sensor cable</b>	<b>COS61D</b> shielded 4-core fixed cable <b>COS61</b> shielded 7-core fixed cable or double-shielded coaxial cable with 4 pilot wires (with TOP68 plug connection)
<b>Cable entry at transmitter</b>	<b>COS61D</b> <ul style="list-style-type: none"> <li>■ Terminal connection</li> <li>■ optional: M12 plug</li> </ul> <b>COS61</b> <ul style="list-style-type: none"> <li>■ SXP plug (field device)</li> <li>■ Terminal connection (panel mounted device)</li> </ul>
<b>Cable specification</b>	max. 100 m (330 ft, (including cable extension))
<b>Temperature compensation</b>	internal
<b>Interface</b>	<b>COS61D</b> Memosens protocol <b>COS61</b> RS 485

## Certificates and approvals

### EMC compatibility

#### COS61D

Interference emission and interference immunity complies with EN 61326: 2005, Namur NE 21:2007

#### COS61

Interference emission and interference immunity complies with EN 61326: 1997 / A1: 1998

## Ordering information

### Product page

You can create a complete and valid order code by using the configurator on the internet product page.

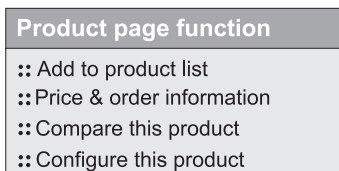
Product page link:

[www.products.endress.com/cos61](http://www.products.endress.com/cos61)

[www.products.endress.com/cos61d](http://www.products.endress.com/cos61d)

### Product configurator

1. You can choose from the following options on the product page located on the right:



2. Click "Configure this product".

3. The configurator opens in a separate window. You can now configure your device and receive the complete order code that applies for the device.

4. Afterwards, export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the page.

### Scope of delivery

The scope of delivery comprises:

- Oxygen sensor with transport protection cap or with mounted cleaning unit
- Operating Instructions, English

## Accessories

### Assemblies (selection)

Wastewater assembly Flexdip CYA112

- Modular assembly system for sensors in open basins, channels and tanks
- Versions in stainless steel or PVC
- Ordering per product structure (→ Online configurator, [www.products.endress.com/cya112](http://www.products.endress.com/cya112))
- Technical Information TI00432C/07/EN

Flow assembly COA250

- for sensor installation in pipe lines, PVC
- ordering acc. to product structure (Technical Information TI111C/07/en)

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)

### Assembly holder

Holder system Flexdip CYH112 for water and wastewater assembly Flexdip CYA112

- Modular holder system for sensors and assemblies in open basins, channels and tanks
- The holder system CYH112 works for nearly any type of fixing - fixing on the floor, wall or directly on a rail.
- Material: stainless steel
- Ordering acc. to product structure (Technical Information TI430C/07/en)

<b>Measuring cable</b>	<p><b>COS61D</b></p> <p>CYK11 Memosens data cable</p> <ul style="list-style-type: none"> <li>■ Extension cable for digital sensors with Memosens protocol</li> <li>■ Ordering as per product structure (→ Online configurator, <a href="http://www.products.endress.com/cyk11">www.products.endress.com/cyk11</a>)</li> </ul> <p><b>COS61</b></p> <p>Measuring cable OMK</p> <ul style="list-style-type: none"> <li>■ for use as extension cable between junction box VS and transmitter, not terminated</li> <li>■ sold by the metre - order no. 50004124</li> </ul>
<b>Junction box (COS61 only)</b>	<p>VS junction box</p> <ul style="list-style-type: none"> <li>■ With plug-in socket and 7-pole plug</li> <li>■ For cable extension from sensor (COS71, COS61, COS31, COS3 with SXP connector) to transmitter, IP 65;</li> <li>■ Order no. 50001054</li> </ul>
<b>Protection guard</b>	<p>Membrane protection guard COY3-SK</p> <ul style="list-style-type: none"> <li>■ for sensor use in fish ponds</li> <li>■ order no. 50081787</li> </ul>
<b>Cleaning</b>	<p>Pressurized air cleaning system for COSXX</p> <ul style="list-style-type: none"> <li>■ Connection: 6/8 mm or 6.35 mm (¼")</li> <li>■ Materials: POM/V4A</li> <li>■ Order numbers             <ul style="list-style-type: none"> <li>– 6/8 mm: 71110801</li> <li>– 6.35 mm (¼"): 71110802</li> </ul> </li> </ul> <p>Compressor</p> <ul style="list-style-type: none"> <li>■ For cleaning system</li> <li>■ 230 V AC order number: 71072583</li> <li>■ 115 V AC order number: 71096199</li> </ul> <p>Chemoclean</p> <ul style="list-style-type: none"> <li>■ Injector CYR10</li> <li>■ Ordering acc. to product structure</li> <li>■ Technical Information TI00046C/07/EN</li> </ul> <p>Chemoclean COR3</p> <ul style="list-style-type: none"> <li>■ Spray head for sensor cleaning in immersion operation</li> <li>■ Material: PVC</li> <li>■ order no.: COR3-0</li> </ul>
<b>Calibration vessel</b>	<p>Calibration vessel</p> <ul style="list-style-type: none"> <li>■ for COS61/61D</li> <li>■ order no. 51518599</li> </ul>

## Instruments International

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