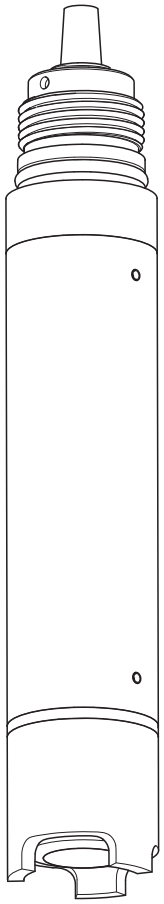
Level Pressure Flow Temperature Analytics Registration Systems Components Services Solutions

Operating Instructions

Oxymax COS61

Dissolved oxygen sensor



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Endress+Hauser
People for Process Automation

Documentation information

Warnings

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Cause (/consequences)** Consequences if safety message is not heeded ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **will** result in a fatal or serious injury.
⚠ WARNING **Cause (/consequences)** Consequences if safety message is not heeded ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **can** result in a fatal or serious injury.
⚠ CAUTION **Cause (/consequences)** Consequences if safety message is not heeded ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE **Cause/situation** Consequences if safety message is not heeded ► Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

Symbols used

→ 1 This symbol indicates a cross reference to a defined page (e.g. p. 1).

→ 2 This symbol indicates a cross reference to a defined figure (e.g. fig. 2).

Additional information, tips

Permitted or recommended

Forbidden or not recommended

Table of contents

1 Basic safety instructions

1.1 Requirements for personnel

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

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

1.2 Designated use

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

Typical applications are:
- Measuring, monitoring and regulating the oxygen content in activated sludge basins.
- Monitoring the oxygen content in the sewage treatment plant outlet.
- Monitoring, measuring and regulating the oxygen content in public waters and fish farming water.
- Monitoring of oxygen enrichment in drinking water.

Any other use than the one described here compromises the safety of persons and the entire measuring system and is not permitted.
The manufacturer is not liable for damage caused by improper or non-designated use.

1.3 Occupational safety

As the user, you are responsible for complying with the following safety conditions:
- Installation instructions
- Local standards and regulations

Electromagnetic compatibility
With regard to electromagnetic compatibility, this device has been tested in accordance with the applicable European standards for industrial applications.
The electromagnetic compatibility indicated only applies to a device that has been connected in accordance with the instructions in these Operating Instructions.

1.4 Operational safety

- ► Before commissioning the entire measuring point, make sure all the connections are correct. Ensure that electrical cables and hose connections are not damaged.
- ► Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Mark the damaged product as defective.
- ► If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

⚠ CAUTION
The cleaning system is not switched off during calibration or maintenance activities
Risk of injury due to medium or cleaning agent
- ► If a cleaning system is connected, switch it off before removing a sensor from the medium.
- ► If you are not switching off the cleaning system because you wish to test the cleaning function, wear protective clothing, goggles and gloves or take other appropriate measures.

1.5 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. Relevant regulations and European standards have been observed.

2 Identification

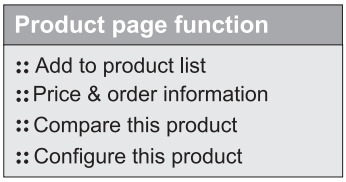
2.1 Product page and configurator

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

2.2 Order code

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.
   Use the radio buttons to configure the order code from the nameplate of your device.
4. Afterwards, you can export the order code as a PDF or Excel file.
   To do so, click the appropriate button at the top of the page.

2.3 Scope of delivery

The following items are included in the delivery:
- Oxygen sensor with transport protection cap for membrane protection
- Operating Instructions (on CD only)
- Brief Operating Instructions (paper version)

If you have any questions, please contact your supplier or your local sales center.

3 Installation

3.1 Incoming acceptance, transport, storage

- ► Make sure the packaging is undamaged!
- ► Inform the supplier about any damage to the packaging.
  Keep the damaged packaging until the matter has been settled.
- ► Make sure the contents are undamaged!
- ► Inform the supplier about damage to the contents. Keep the damaged products until the matter has been settled.
- ► Check that the order is complete and agrees with your shipping documents.
- ► The packaging material used to store or to transport the product must provide shock protection and humidity protection. The original packaging offers the best protection. Also, keep to the approved ambient conditions (see "Technical data").
- ► If you have any questions, please contact your supplier or your local sales center.

3.2 Installation conditions

3.2.1 Dimensions

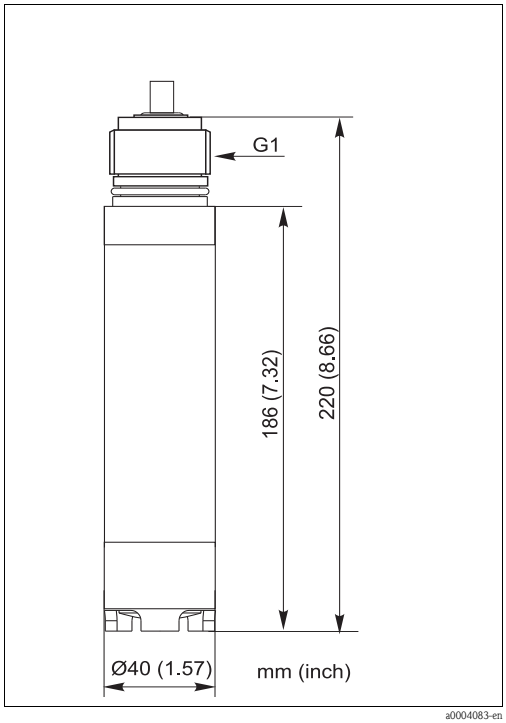


Fig. 1: Fixed cable version

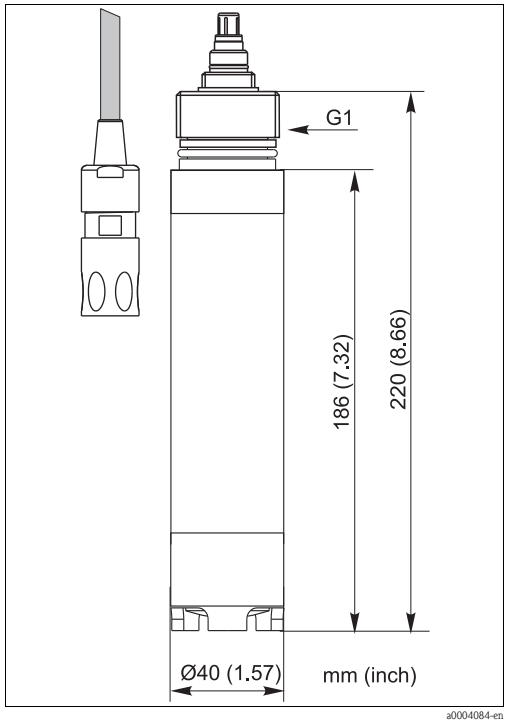


Fig. 2: TOP68 version

3.2.2 Angle of installation

The sensor can be installed up to the horizontal in an assembly, support or a suitable process connection.
Other angles and overhead installation are not recommended. Reason: possible sediment formation and resulting falsification of measured value.

The optimum installation angle is 45° (e.g. with assembly CYA112).

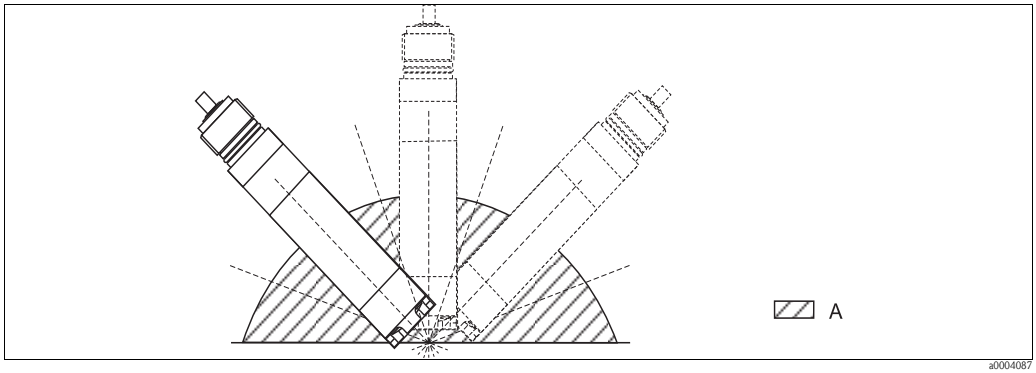


Fig. 3: Angle of installation

A Permissible installation positions: 0 ... 180 °, optimum angle 45 °

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

3.2.3 Mounting location

- Select the installation location so that there is easy access for later calibration.
- Make sure that upright posts and assemblies are secured safely and vibration-free.
- Select an installation location which produces a typical oxygen concentration.

3.3 Installation instructions

3.3.1 Measuring system

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

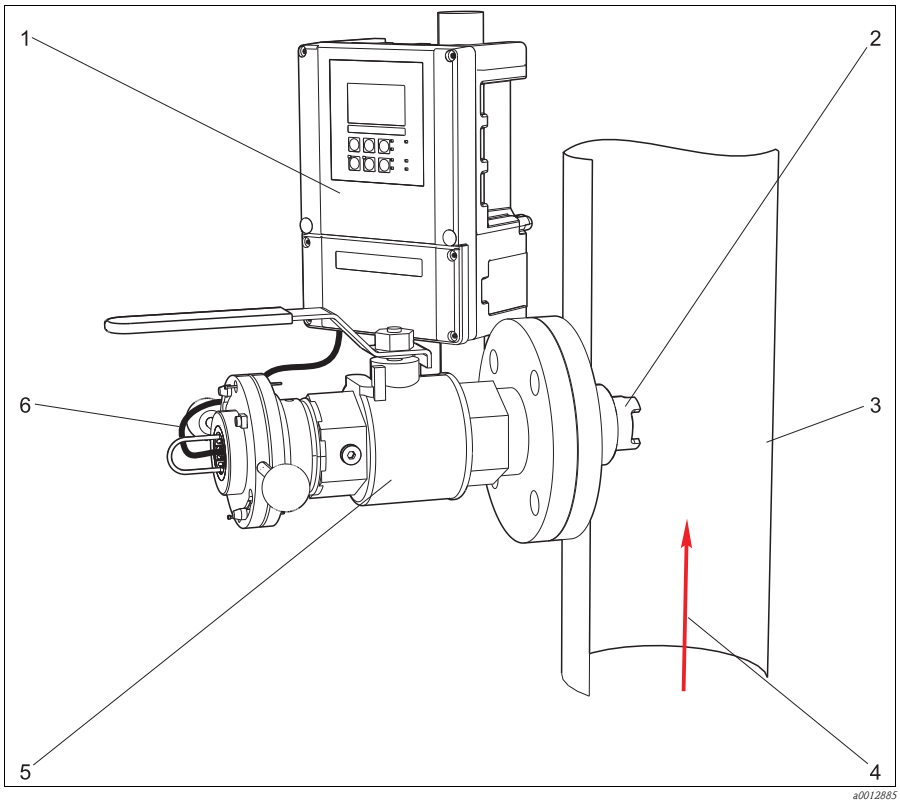


Fig. 4: Measuring system (example)

1	*Liquisys COM253 transmitter*	*4*	*Medium flow direction*
2	*COS61 oxygen sensor*	*5*	*Retractable assembly Cleanfit COA451*
3	*Pipework (ascending pipe)*	*6*	*Sensor cable*

3.3.2 Installing a measuring point

For immersed operation, install the individual modules away from the basin on a solid base. Only carry out the final installation at the intended installation location.

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

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

NOTICE

No assembly used, sensor not correctly installed, grounding regulations not observed

Risk of damaging the sensor cable, no protection to electromagnetic interferencies

- ► Screw the sensor into the assembly so that the cable is not twisted.
- ► Avoid exerting excessive tensile force on the cable (e.g. from jerky pulling).
- ► When using metallic assemblies and installation equipment, comply with national grounding regulations.
- ► Observe the sensor installation instructions of the Operating Instructions of the assembly used.

3.4 Installation examples

3.4.1 Immersion operation

Upright post and chain assembly

For large basins, where sufficient installation distance is required from the basin edge (aeration basin, especially), it is advisable to use the upright post and chain assembly. The free swinging of the immersed assembly practically rules out vibrations from the upright post.
A good self-cleaning of the fluorescence cap is reached due to the swinging of the assembly. According to this effect, the sensor life time can be extended.

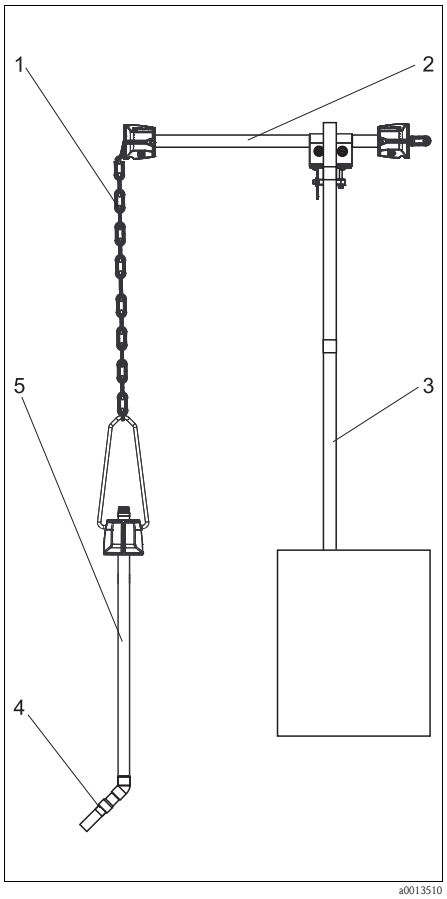


Fig. 5: Chain holder, rail mounted

1 Chain
2 Flexdip CYH112 holder
3 Rail
4 Oxymax sensor
5 Flexdip CYA112 wastewater assembly

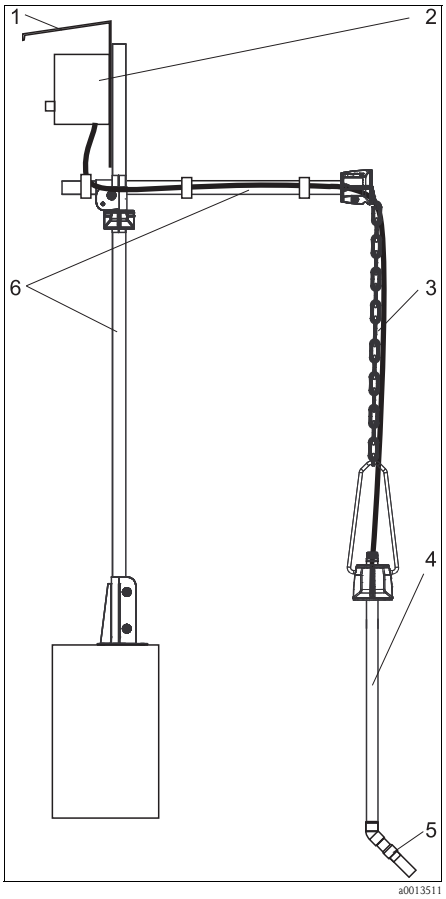


Fig. 6: Chain holder, mounted to a post

1 Weather protection cover
2 @ntroller / transmitter
3 Chain
4 Flexdip CYA112 wastewater assembly
5 Oxymax sensor
6 Flexdip CYH112 holder

Upright post and fixed immersion assembly

The preferable type of installation for strong or turbulent flow (> 0.5 m/s) in the basin or open channels is to secure the device to an upright post and a securely mounted immersion tube. If the flow is very strong, a second transverse pipe can be installed with its own pipe support.

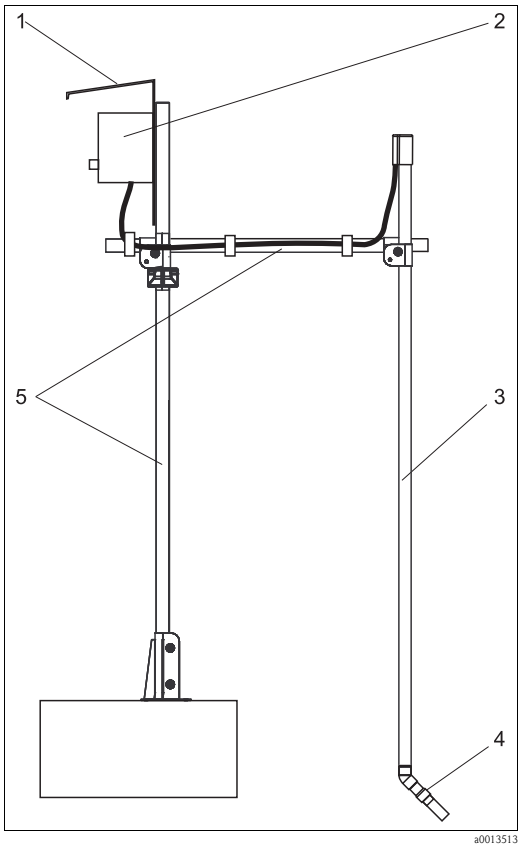


Fig. 7: Assembly holder with immersion tube

1 Weather protection cover CYY101
2 Controller / transmitter
3 Immersion assembly Flexdip CYA112
4 Oxymax sensor
5 Assembly holder Flexdip CYH112

Basin rim mounting with immersion assembly

For fixing to the sides of the basin or channel, we recommend the pendulum holder of the immersion tube. Optionally, you can also use the assembly with a float.

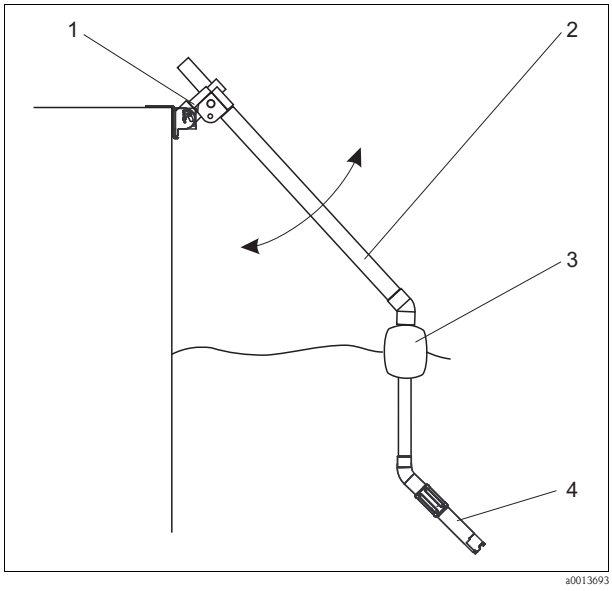
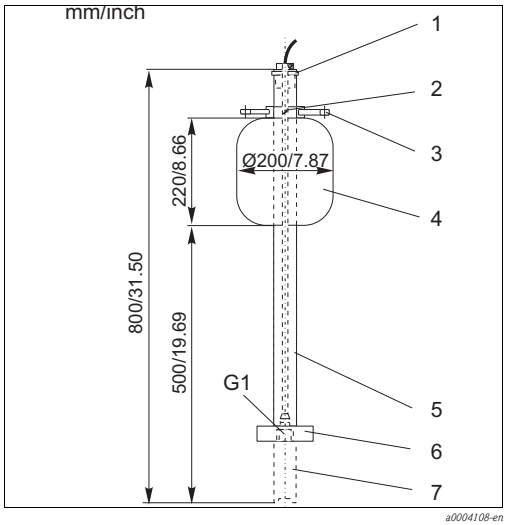


Fig. 8: Basin rim mounting

1 Pendulum holder CYH112
2 Assembly Flexdip CYA112
3 Float of assembly CYA112
4 Oxymax sensor

Floating body

To aid installation in strongly fluctuating water levels, e.g. in rivers or lakes, there is a floating body COA 110-50 available (→ 9).



1 Cable route with strain relief and rain protection
2 Mounting ring for ropes and chains with locking screw
3 Lugs Ø15, 3 x 120 ° for anchoring
4 Saltwater-resistant plastic float
5 Pipe 40x1, stainless steel 1.4571 (AISI 316Ti)
6 Shock absorber and weight
7 Oxygen sensor

Fig. 9: Floating body

3.4.2 Flow assembly

The COA250 flow assembly with automatic self-venting is suitable for use in pipelines or hose connections. The inlet is at the bottom of the assembly, the outlet at the top (connection thread G¾). It can be installed in a pipe by using two 90° pipe brackets to allow inflow to the assembly (→ 11, Pos. 6).

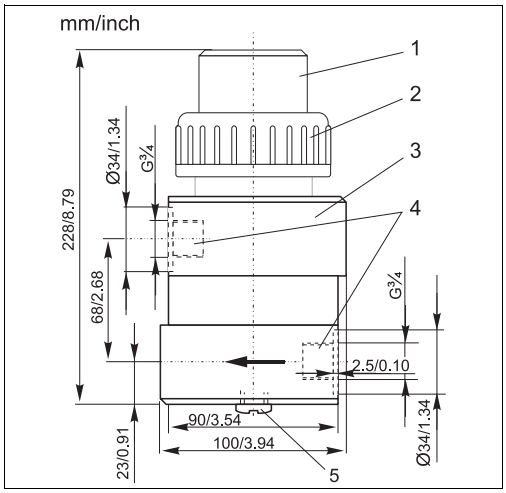


Fig. 10: Flow assembly COA250

1 Screw-in part for sensor
2 Screw ring
3 Meter body
4 Connection thread G¾
5 Dummy plug (connection for spray head CUR3)

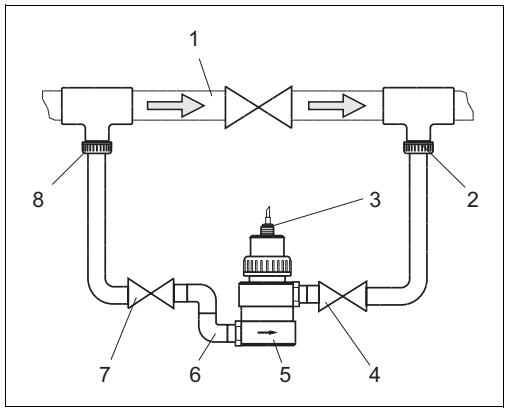


Fig. 11: Bypass installation with manually actuated valves or solenoid valves

1 Main line
2 Medium return
3 Oxygen sensor
4, 7 Manually actuated or solenoid valves
5 Flow assembly COA250
6 90 ° pipe bracket
8 Medium removal

3.4.3 Retractable assembly

The assembly is designed for installation on tanks and pipes. Suitable nozzles must be available for this.

Install the assembly at places with constant flow. The minimum pipe diameter is DN 80 (3").

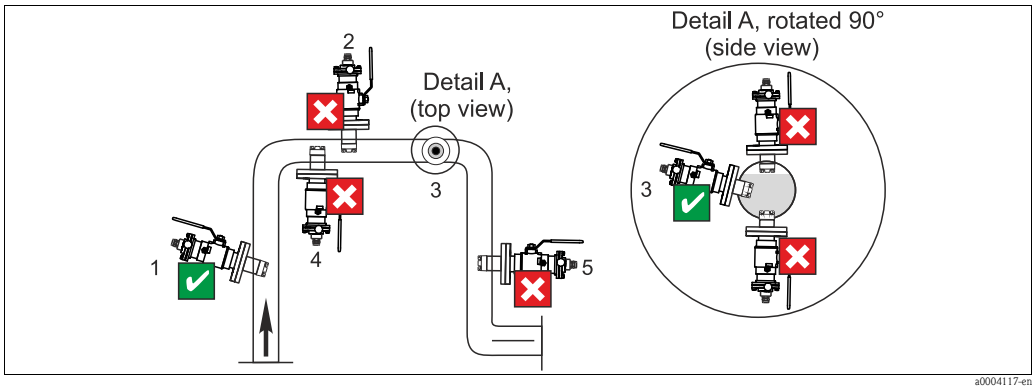


Fig. 12: Permissible and impermissible sensor installation positions

1 Ascending pipe, best position
2 Horizontal pipe, sensor top down, impermissible due to air cushion or foam bubble forming
3 Horizontal pipe, installation with permissible emitting angles (acc. to sensor version)
4 Overhead installation, impermissible due to missing electrolyte contact of the sensor electrodes
5 Down pipe, impermissible

NOTICE

Sensor not immersed into the medium, suspended particles settled on the sensor membrane or sensor optics, sensor installed overhead

Measuring errors can occur

► Do not install the assembly at places, where air cushions or foam bubbles can be formed or where suspended particles can settle on the sensor membrane or optics (→  12).

3.5 Post-installation check

► Sensor and cable undamaged?
► Cap undamaged?
► Compliance with permissible sensor installation position?
► Is the sensor installed in an assembly and is not suspended from the cable?
► Avoid moisture by rain by putting the protective cap on the assembly?

4 Wiring

⚠ WARNING
Device is energized
Improper connection can cause injury or death.
► The electrical connection must only be carried out by a certified electrician.
► Technical personnel must have read and understood the instructions in this manual and must adhere to them.
► **Prior to beginning** any wiring work, make sure voltage is not applied to any of the cables.

4.1 Direct connection to the transmitter

4.1.1 Field installation

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

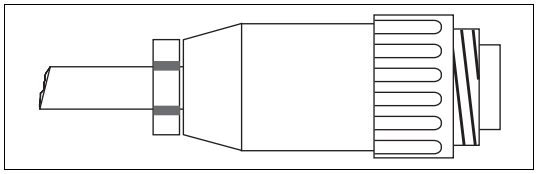


Fig. 13: SXP plug

4.1.2 Panel mounting

- 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	$+U_B$	YE	$+U_B$
0	GY	0 V	WH	0 V
96	PK	Com. (digital)	GN	Communication (digital)
97	BU	Com. (digital)	BN	Communication (digital)
88	BN	$-U_B$	Koax innen	$-U_B$

4.2 Connection via junction box

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.

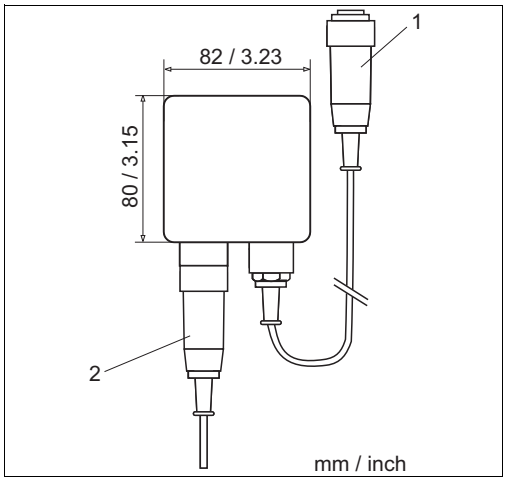


Fig. 14: Junction box VS to a field device

1 SXP plug to field device
2 SXP plug from sensor

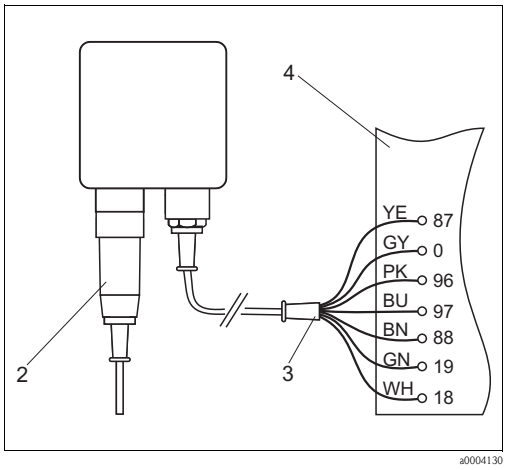


Fig. 15: Junction box VS to a panel mounted device

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

4.3 Post-connection check

Instrument status and specifications	**Remarks**
Are the sensor, assembly, junction box or cable damaged?	Visual inspection
Electrical connection	**Remarks**
Does the supply voltage of the transmitter match the specifications on the nameplate?	
Are the installed cables strain-relieved and not twisted ?	
Is the cable type route completely isolated ?	Power cable/weak current cable
Are the power supply and signal cable correctly connected to the transmitter ?	Use the connection diagram of the transmitter.
Long enough length of cable core stripped and correct in terminal?	Check seating (pull slightly)
Are all the screws terminals properly tightened ?	Tighten
Are all the cable entries installed, tightened and sealed ?	For cable entries lateral: cable loops downwards for water to be able to drip off.
Are all the cable entries installed downwards or lateral ?	

5 Device description

5.1 Sensor design

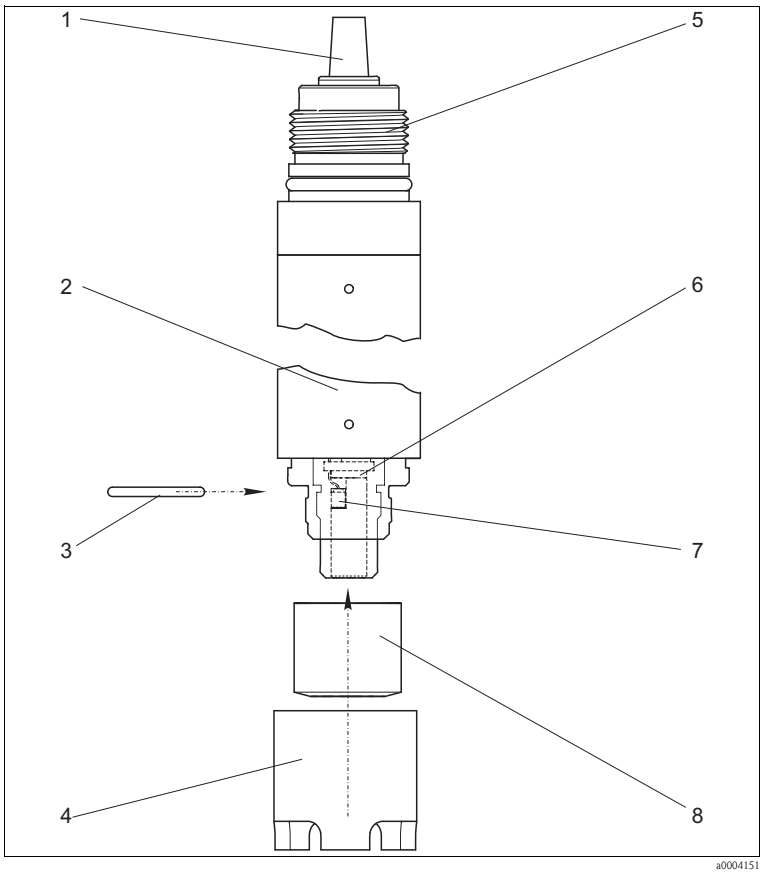


Fig. 16: Sensor design

1 Sensor cable
2 Sensor shaft
3 O-ring
4 Protection guard
5 Threaded connection
6 Detector
7 Emitter diode
8 Fluorescence cap

The sensor consists of the following function units:
- Sensor shaft
- Sensor head with optics (emitter and detector)
- Fluorescence cap
- Protection basket
- Alternatively to the protection basket, you can use a spray head COR 3 (optional, see "Accessories") for use in immersed operation with cleaning function.

5.2 Measuring principle

5.2.1 Oxygen measurement based on the principle of fluorescence quenching

- 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 µs. The value corresponds to the decay time of the fluorescence and is approx. 20 µs in air, and approx. 60 µs in media free from oxygen.

5.2.2 Fluorescence cap

The oxygen dissolved in the medium is diffused into the fluorescence cap.
Suitable flow is not necessarily mandatory but it does improve the speed at which the measuring system responds and ensures a more representative measured value compared to a measurement in static medium.
The cap is only permeable for dissolved gases. Other substances dissolved in the liquid phase e.g. ionic substances, will not penetrate through the membrane. Therefore, medium conductivity has no impact on the measuring signal.

5.3 Calibration

Calibration is a means of adapting the transmitter to the characteristic values of the sensor.

Normally, sensor calibration is seldom necessary. It is necessary after:
- Changing the fluorescence cap

Within the framework of system monitoring and supervision, for example, the calibration can also be cyclically monitored (at typical time intervals, depending on operating experience) or renewed.

Ideally, use the calibration vessel (see Accessories) for calibration. For this purpose, unscrew the basket protector from the sensor and guide the sensor into the calibration vessel as far as it will go (resting on the vessel rim).

5.3.1 Types of calibration

Types of calibration:
- Air (preferably saturated water vapor, e.g. near the water surface)
  - Measured values between 70 and 130 %SAT result in the calibration of the measured value at air
  - Measured values smaller than 15 %SAT result in the calibration of the zero point
- Air-saturated water
  - Like air calibration
- Reference measured value (entry at transmitter, sensor remains in the medium).
  - Measured values between 50 and 150 %SAT result in the calibration of the measured value to the reference value while maintaining the zero point
  - Measured values smaller than 10 %SAT result in the calibration of the measured value to the reference value while maintaining the measured value at air

If necessary, calibrate COS61 practically:
- In the **air** (water-vapor saturated) type of calibration in order to calibrate the **measured value at air.**
- In the **air-saturated water** type of calibration, but while using **oxygen-free** water, (see "Sensor check" section), to calibrate the **zero point**.

5.3.2 Calibration intervals

You can determine the intervals with the following method:

1. Check the sensor one month after its being put into operation:
   - Remove the sensor from the medium.
   - Clean the outside of the sensor with a damp cloth.
   - Measure the oxygen saturation index at air after 20 minutes.
2. Decide using the results:
   a. If the measured value is not at 100 ±2 %SAT, you have to calibrate the sensor.
   b. Otherwise, lengthen the time to the next inspection.
3. Proceed as per Point 1 after two, four and/or eight months. In this way, you can determine the optimum calibration interval for your sensor.

5.3.3 Calculation example for the calibration value

As a check, you can calculate the expected calibration value (transmitter display) as shown in the following example (salinity is 0).

1. Determine:
   - The ambient temperature for the sensor (air temperature for "air" calibration method,water temperature for "air-saturated water" calibration type)
   - the altitude above sea level
   - the current air pressure **L** (=rel. air pressure to sea level) at the time of calibration. (If undeterminable, use 1013 hPa (407 inH_2O) for an approximate calculation.)
2. Define:
   - the saturation value **S** acc. to the first table
   - the factor **K** acc. to the second table

°C / °F	S [mg/l=ppm]
0 / 32	14.64
1 / 34	14.23
2 / 36	13.83
3 / 37	13.45
4 / 39	13.09
5 / 41	12.75
6 / 43	12.42
7 / 45	12.11
8 / 46	11.81
9 / 48	11.53
10 / 50	11.25

°C / °F	S [mg/l=ppm]
11 / 52	10.99
12 / 54	10.75
13 / 55	10.51
14 / 57	10.28
15 / 59	10.06
16 / 61	9.85
17 / 63	9.64
18 / 64	9.45
19 / 66	9.26
20 / 68	9.08

°C / °F	S [mg/l=ppm]
21 / 70	8.90
22 / 72	8.73
23 / 73	8.57
24 / 75	8.41
25 / 77	8.25
26 / 79	8.11
27 / 81	7.96
28 / 82	7.82
29 / 84	7.69
30 / 86	7.55

°C / °F	S [mg/l=ppm]
31 / 88	7.42
32 / 90	7.30
33 / 91	7.18
34 / 93	7.06
35 / 95	6.94
36 / 97	6.83
37 / 99	6.72
38 / 100	6.61
39 / 102	6.51
40 / 104	6.41

Altitude [m / ft]	K
0	1.000
50 / 160	0.994
100 / 330	0.988
150 / 490	0.982
200 / 660	0.977
250 / 820	0.971
300 / 980	0.966
350 / 1150	0.960
400 / 1320	0.954
450 / 1480	0.949
500 / 1650	0.943

Altitude [m / ft]	K
550 / 1800	0.938
600 / 1980	0.932
650 / 2130	0.927
700 / 2300	0.922
750 / 2460	0.916
800 / 2620	0.911
850 / 2790	0.905
900 / 2950	0.900
950 / 3120	0.895
1000 / 3300	0.890

Altitude [m / ft]	K
1050 / 3450	0.885
1100 / 3610	0.879
1150 / 3770	0.874
1200 / 3940	0.869
1250 / 4100	0.864
1300 / 4270	0.859
1350 / 4430	0.854
1400 / 4600	0.849
1450 / 4760	0.844
1500 / 4920	0.839

Altitude [m / ft]	K
1550 / 5090	0.834
1600 / 5250	0.830
1650 / 5410	0.825
1700 / 5580	0.820
1750 / 5740	0.815
1800 / 5910	0.810
1850 / 6070	0.805
1900 / 6230	0.801
1950 / 6400	0.796
2000 / 6560	0.792

3. Calculate the factor **L**:

$$L = \frac{\text{relative air pressure during calibration}}{\text{1013 hPa}}$$

4. Calculate the calibration value **C**:

$$C = S \cdot K \cdot L$$

Example

- Air calibration at 18°C (64 °F), altitude 500 m (1650 ft) above sea level, air pressure 1009 hPa (405 inH_2O)
- S = 9.45 mg/l, K = 0.943, L = 0.996

Calibration value C = 8.88 mg/l.

You do not need factor K from the table if your device returns the absolute air pressure L_{abs} (location-dependent air pressure) as the measured value.
Thus, the formula for calculation is: $C = S \cdot L_{abs}$.

6 Commissioning

6.1 Function check

Before first commissioning, check if:
- the sensor is correctly installed
- the electrical connection is correct.

If using an assembly with automatic cleaning, check the correct connection of the cleaning agent (e.g. water or air).

⚠ WARNING
Escaping process medium
Risk of injury from high pressure, high temperatures or chemical hazards
► Before applying compressed air to an assembly with cleaning facility, make sure the connections are correctly fitted.
► Do not install the assembly in the process if you cannot make the correct connection reliably.

6.2 Calibration

The sensor is calibrated at the factory. A new calibration is only needed in special situations.

6.3 Automatic cleaning

Compressed air is most suitable for cyclic cleaning. The cleaning unit is either ready supplied or can be retrofitted, and is attached to the sensor head. It operates at a capacity of 20-60 l/min. Optimum results are achieved with 2 bar (29 psi) and 60 l/min.

The following settings are recommended for the cleaning unit:

Type of soiling	Cleaning interval	Cleaning duration
Media containing grease and oils	15 min	20 s
Biofilm	60 min	20 s

7 Maintenance

Maintenance work must carried out at regular intervals. To ensure that it is carried out, we recommend you enter the maintenance dates into an operations logbook or in an operations calendar in advance.

The maintenance cycle primarily depends on:
- the system
- the installation conditions and
- the medium in which measurement is taking place.

The following activities must be carried out:
- Cleaning the sensor
- If necessary, replacing wear and tear materials:
  – sealing ring
  – electrolyte
  – fluorescence cap
- Check the measuring function:
  – Remove the sensor from the medium.
  – Clean and dry the membrane.
  – After about 10 minutes, measure the oxygen saturation index in air (without recalibration).
  – The measured value should be near to 100% SAT
    (display of O_2 saturation with COM 2x3: press plus key four times).
- Recalibration.
  (if desired or required)

7.1 Cleaning

The measurement can be corrupted by sensor fouling or malfunction, e.g.:
- Buildup on the fluorescence cap
  —> cause longer response times and a reduced slope under certain circumstances.

To ensure reliable measurement, the sensor must be cleaned at regular intervals. The frequency and intensity of the cleaning operation depend on the measuring medium.

7.1.1 External cleaning

Clean the outside of the sensor:
- before every calibration
- at regular intervals during operation as necessary
- before returning it for repairs.

Depending on the type of soiling, proceed as follows:

Type of soiling	**Cleaning**
Salt deposits	Immerse the sensor in drinking water or in 1-5% hydrochloric acid for a few minutes. Afterwards, rinse it with copious amounts of water.
Dirt particles on the sensor body **(not cap!)**	Clean the sensor body mechanically with water and a suitable brush.
Dirt particles on the fluorescence cap	Clean with water and a soft sponge.

► After cleaning, rinse the sensor with copious amounts of clean water.

7.1.2 Cleaning the optics

The optics only need to be cleaned if medium has penetrated through a defective fluorescence cap.

To clean it, proceed as follows:

1. Unscrew the protection guard and fluorescence cap from the sensor head.
2. Carefully clean the optical surface with a soft cloth until the buildup is fully removed.
3. Clean the optics with drinking or distilled water.
4. Clean the optics and screw on a new fluorescence cap.

NOTICE
Damages, scratches on the optical surface
Faulty measured values
► Ensure that the optical surface is not scratched or damaged in any way.

7.2 Replacing wear and tear materials

7.2.1 Replacing the sealing ring

The sealing ring must be replaced if visibly damaged. For replacement, use only original sealing rings.

7.2.2 Replacing the fluorescence cap

The typical operating life of a fluorescence cap is more than 2 years. The sensor checks whether the cap is aging and issues a warning via the transmitter if the rate of aging reaches a specific value. The sensor is still able to measure at this stage. However, it is advisable to change the cap as quickly as possible.

Removing the old fluorescence cap

1. Remove the sensor from the medium.
2. Unscrew the protection guard.
3. Clean the outside of the sensor.
4. Unscrew the fluorescence cap.
5. Clean and dry the optical surface if necessary.

Installing the new fluorescence cap

6. Make sure that there are no dirt particles on the sealing surface.
7. Carefully screw the fluorescence cap onto the sensor head **until the stop.**
8. Screw the protection guard back on.

After replacing the fluorescence cap, the sensor must be recalibrated. Then insert the sensor into the medium and check that no alarm is displayed on the transmitter.

8 Accessories

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 center.

8.1 Connection accessories

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

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

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

8.2 Installation accessories

Immersion assembly COA110
- for sensor immersion in the basin, PVC pipe resp. PUR floating body with SS 1.4571 (AISI 316Ti) immersion tube
- Ordering acc. to product structure (see Technical Information TI035C/07/en)

Flow assembly COA250
- For sensor installation in pipe lines, PVC
- Ordering acc. to product structure (—> Online configurator: www.products.endress.com/coa250)
- Technical Information TI00111C/07/EN

Retractable assembly Cleanfit COA451
- Manually driven retractable assembly, stainless steel, with ball valve, for oxygen sensors;
- Ordering acc. to product structure (—> Online configurator: www.products.endress.com/coa451)
- Technical Information TI00368C/07/EN

Holder system Flexdip CYH112 for water
- 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 (—> Online configurator: www.products.endress.com/cyh112)
- Technical Information TI00430C/07/EN

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)
- Technical Information TI00432C/07/EN

Baffle plate OP
- extra protection for extreme flow conditions
- order no. 50028712

Membrane protection guard COY3-SK
- for sensor use in fish ponds
- order no. 50081787

8.3 Cleaning and calibration

Pressurized air cleaning system for COSXX
- Connection: 6/8 mm or 6.35 mm (¼")
- Materials: POM/V4A
- Order numbers
  - 6/8 mm: 71110801
  - 6.35 mm (¼"): 71110802

Compressor
- For cleaning system
- 230 V AC order number: 71072583
- 115 V AC order number: 71096199

Chemoclean
- Injector CYR10
- Ordering acc. to product structure
- Technical Information TI00046C/07/EN

Chemoclean COR3
- Spray head for sensor cleaning in immersion operation
- Material: PVC
- order no.: COR3-0

Calibration vessel
- for COS61/61D
- order no. 51518599

9 Trouble-shooting

9.1 Trouble-shooting instructions

Problem	Check	Remedial action
No display, no sensor reaction	Mains voltage to the transmitter?	Connect mains voltage.
	Sensor connected correctly?	Set up correct connection.
	Coating on the fluorescence cap?	Clean the sensor.
	Medium flow available?	Create flow.
Displayed value too high	With a TOP 68 connection: humidity or dirt in plug?	Cleaning of the TOP 68 plug-in connection by using cleaning alcohol.
	Temperature display clearly too low?	Check sensor, if necessary send sensor in for repair.
Displayed value too low	Humidity or dirt in plug?	Cleaning by using cleaning alcohol.
	Sensor calibrated?	Recalibrate
	Medium flow available?	Create flow.
	Displayesd temperature clearly too high?	Check sensor, if necessary send sensor in for repair.
	Coating on the fluorescence cap?	Replace
	Fluorescence cap worn out?	Replace
Strong deviations in displayed value	Fluorescence cap damaged?	Replace fluorescence cap.
	EMC interference on the measuring system?	Remove outer screening of sensor and extension cable at terminal S. Cut measuring and signalling lines from h.v. power lines.

Make sure you comply with the instructions for troubleshooting in the Operating Instructions of the transmitter. If necessary, carry out a test of the transmitter.

9.2 Sensor checks

Only authorised and trained personnel may test the sensor!
You will also require a multimeter (voltage, resistance).

Check	Measure	Setpoint
Voltage inspection	With the sensor connected, test the operating voltage on the transmitter: COM2x3-WX/WS	between terminals 87 and 0: +8 V between terminals 88 and 0: –8 V
Slope inspection	Place the sensor in the air, and dry with a paper towel.	After 10 minutes: approx. 100% SAT (4 times plus-key)
Zero point inspection	Immerse the sensor in zero solution[1].	Display near to 0 mg/l (0% Sat)

[1] How to use the zero solution:

1. Fill a large beaker (1.5 - 2 l) with approx. 1 l of water.
2. Pour a cap-full of the zero solution into the water.
3. Immerse the sensor into the water and wait a sufficient period of time (15 min. for oxygen depletion).
   The display drops to around 0 mg/l (0 %SAT).

Depending on the conditions (contact surface water/air), the zero solution is stable for up to 12 hours.

If there are deviations from the reference values, follow the troubleshooting instructions or contact your sales office.

9.3 Spare parts

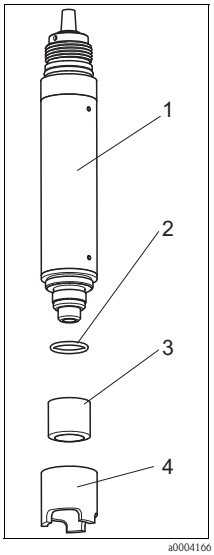


Fig. 17: Spare parts

	Position	Spare parts kit	order no.
	1	Sensor	acc. to product structure
	2	Sealing ring – 2 pieces	51518597
	3	Sensor cap (fluorescence cap)	51518598
	without fig.	Zero solution – 3 units to produce 3 x 1 litre oxygen free solution	50001041

9.4 Return

The device must be returned if repairs or a factory calibration are required, or if the wrong device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the internet site:
www.services.endress.com/return-material

9.5 Disposal

The device contains electronic components and must therefore be disposed of in accordance with regulations on the disposal of electronic waste.
Please observe local regulations.

10 Technical data

10.1 Input

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

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

10.2 Performance characteristics

Response time
t_{90}: 60 s

Maximum measured error
0.02 mg/l or ±1 % of measured value (< 12 mg/l)
±2 % of measured value (from 12 to 20 mg/l)

Repeatability
±0.5 % of measuring range end

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

10.3 Environment

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

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

Ingress protection
- 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)

10.4 Process

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

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

10.5 Mechanical construction

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.)	
Materials	Sensor shaft: Cap with fluorescence layer: Fluorescence layer:	stainless steel 1.4571 (AISI 316Ti) POM Silicone
Process connection	G1	
Sensor cable	shielded 7-core fixed cable or double-shielded coaxial cable with 4 pilot wires (with TOP68 plug connection)	
Maximum cable length	max. 100 m (330 ft, (including cable extension))	
Temperature compensation	internal	
Interface	RS 485	

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