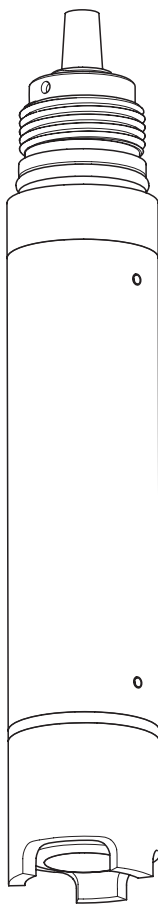


Operating Instructions

OOS61

Dissolved oxygen sensor



Brief overview

Here is how to use these Operating Instructions to commission your sensor quickly and safely:
















→  4 →  5	Safety instructions General safety instructions Explanation of the warning symbols You can find special instructions at the appropriate position in the chapter in question. The positions are indicated with the icons Warning  , Caution  and Note  .
→  7 →  10	Installation Here you can find installation conditions such as sensor dimensions and the angle of installation. Installation examples can be found here.
→  14	Wiring Refer to these pages for sensor wiring.
→  16 →  17 →  17	Sensor design and measuring principle Here you can read about the sensor design. The measuring principle is explained on this page. Here you can find the possible calibration methods.
→  21 →  25	Maintenance Regular maintenance tasks, such as cleaning the sensor, are absolutely essential and prolong the operating time of the sensor. Here you can find an overview of the spare parts which can be delivered as well as an overview of the system.
→  24	Troubleshooting If faults occur during operation, use the checklist to locate the cause.
→  29	Index You can find important terms and keywords on the individual sections here. Use the keyword index to find the information you need quickly and efficiently.

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1 Safety instructions

1.1 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, therefore, not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

Please note the following items:

- Installation, electrical connection, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
The technical personnel must be authorized for the specified activities by the system operator.
- Technical personnel must have read and understood these Operating Instructions and must adhere to them.
- Before commissioning the entire measuring point, check all the connections for correctness. Ensure that hose connections are not damaged.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- Measuring point faults may only be rectified by authorized and specially trained personnel.
- If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.
- Repairs not described in these Operating Instructions may only be carried out at the manufacturer's or by the service organization.

1.3 Operational safety

The sensor has been designed and tested according to the state of the art and left the factory in perfect functioning order.

Relevant regulations and European standards have been met.

As the user, you are responsible for complying with the following safety conditions:

- Installation instructions
- Local prevailing standards and regulations.

1.4 Return

If the device requires repair, please send it *cleaned* to the sales center responsible. Please use the original packaging, if possible.

Please enclose the completed "Declaration of contamination" (copy the second last page of these Operating Instructions) with the packaging and the transportation documents. **No repair without completed "Declaration of contamination"!**

1.5 Notes on safety icons and symbols



Warning!

This symbol alerts you to hazards. They can cause serious damage to the instrument or to persons if ignored.



Caution!

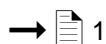
This symbol alerts you to possible faults which could arise from incorrect operation. They could cause damage to the instrument if ignored.



Note!

This symbol indicates important items of information.

1.6 Cross-reference symbols



This symbol stands for a cross-reference to a specific page (e.g. Page 1).



This symbol stands for a cross-reference to a specific graphic (e.g. Fig. 2).

2 Identification

2.1 Product structure

Certificate	
A	Version for non-hazardous area
Cable length incl. extension cable	
0	Cable length: 1.5 m / 4.9 ft
1	Cable length: 7.5 m / 23 ft
2	Cable length: 15 m / 49 ft
8	No cable (for replacement for TOP 68 version)
9	Special version upon request
Sensor head	
F	Thread G1, fixed cable with SXP connector
S	Thread G1, TOP68 connector
Accessories	
0	Without accessories
OOS61-	Complete order code

2.2 Scope of delivery

The following items are included in the delivery:

- Oxygen sensor with transport protection cap for membrane protection
- Operating Instructions, English

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

3 Installation

3.1 Incoming acceptance, transport, storage

- Make sure the packaging is undamaged!
Inform the supplier about 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 delivery contents.
Keep the damaged products until the matter has been settled.
- Check that the scope of delivery is complete and agrees with your order and the 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 sales center responsible.

3.2 Installation conditions

3.2.1 Dimensions

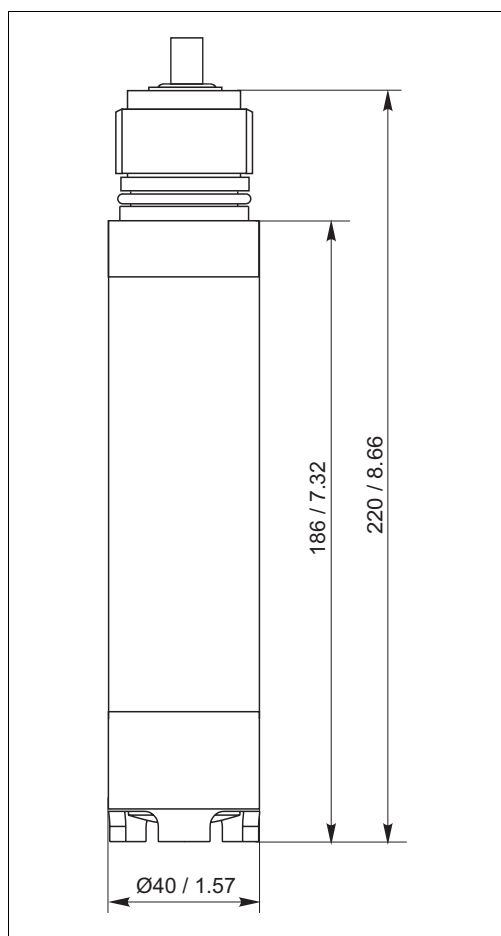


Fig. 1: Fixed cable version

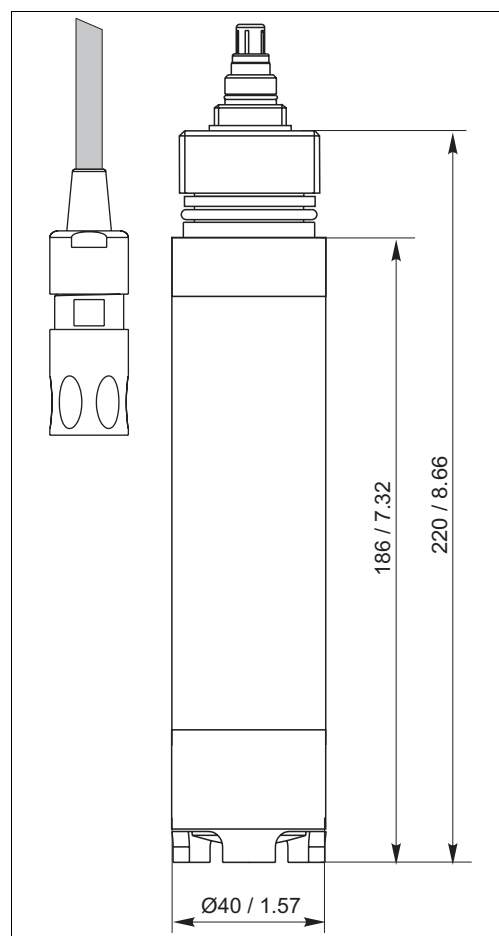
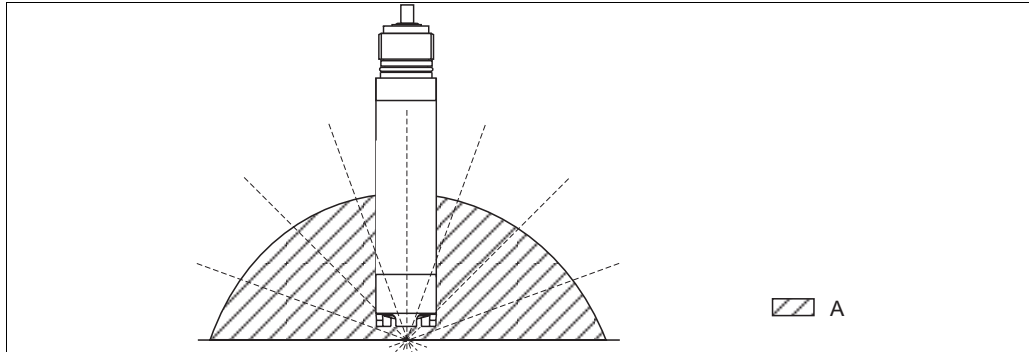


Fig. 2: TOP 68 plug-in head version

3.2.2 Orientation

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.



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Fig. 3: Angle of installation

A Recommended angle of installation: 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.

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.
- For immersed operation in an activated sludge basin, select an installation location which produces a typical oxygen concentration.

3.3 Installation instructions

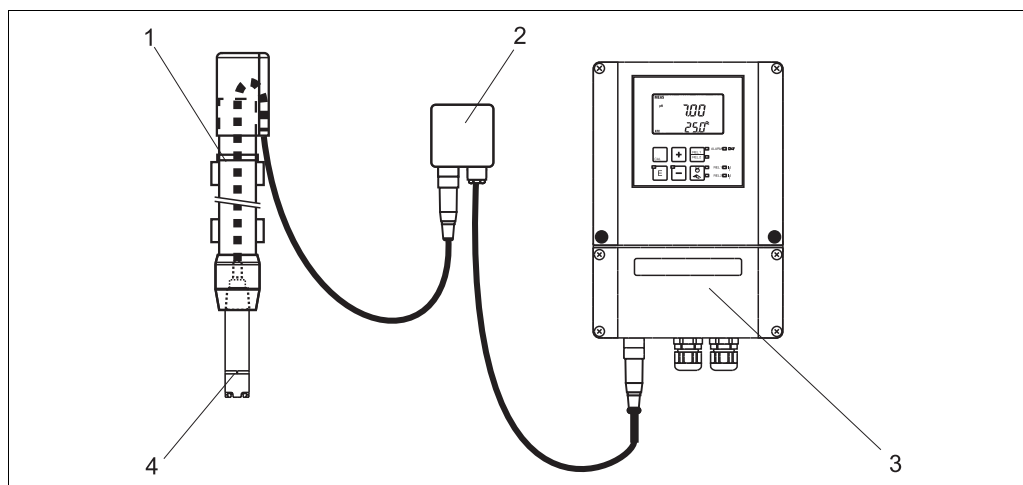
3.3.1 Measuring system

A complete measuring system comprises at least:

- Oxygen sensor
- Transmitter, e.g. OOM223/253
- Special measuring cable if extension necessary
- Assembly, e.g. flow assembly OOA250, immersion assembly OYA611 or retractable assembly OOA451

Optional:

- Universal suspended assembly holder OYH101 for immersed operation
- Junction box VS (with cable extension)
- Automatic spray cleaning system Chemoclean



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Fig. 4: Measuring system (example)

- 1 Immersion assembly OYA611
- 2 Junction box VS (optional)
- 3 Transmitter OOM253
- 4 Oxygen sensor OOS61

3.3.2 Installing a measuring point



Note!

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 a suspension assembly (if used) into the process.



Caution!

- For immersed operation, the sensor must be installed in an immersion assembly (e.g. OYA611). **Do not install the sensor suspended from the cable.**
- 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).
- Select the installation location so that there is easy access for later calibration.





Warning!

When using metallic assemblies and installation equipment, comply with national grounding regulations.

3.4 Installation examples

3.4.1 Immersion operation

Universal assembly holder and chain assembly

For large basins, where sufficient installation distance is required from the basin edge (activated sludge basin, especially), it is advisable to use the upright post and chain assembly (→  5, →  6). The free swinging of the immersed assembly practically rules out vibrations from the upright post.

A good self-cleaning of the fluorescence caps is reached due to the swinging of the assembly. According to this effect, the sensor life time can be extended.

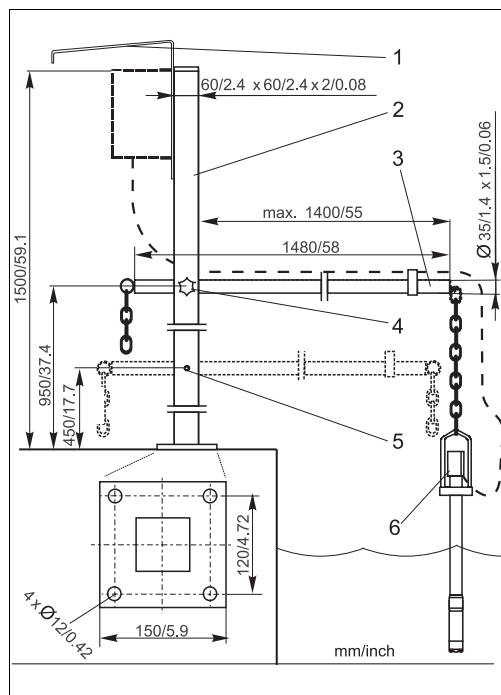


Fig. 5: Universal assembly holder OYH101 with immersible pendulum assembly OYA611

- 1 Weather protection cover
- 2 Upright post, square pipe SS 1.4301 (AISI 304)
- 3 Transverse pipe SS 1.4301 (AISI 304)
- 4 Star handle
- 5 Second fixing possibility for transverse pipe
- 6 Immersion assembly OYA611

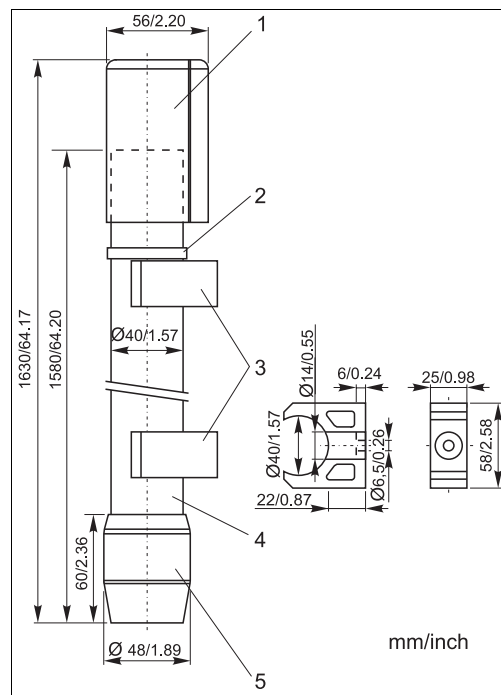

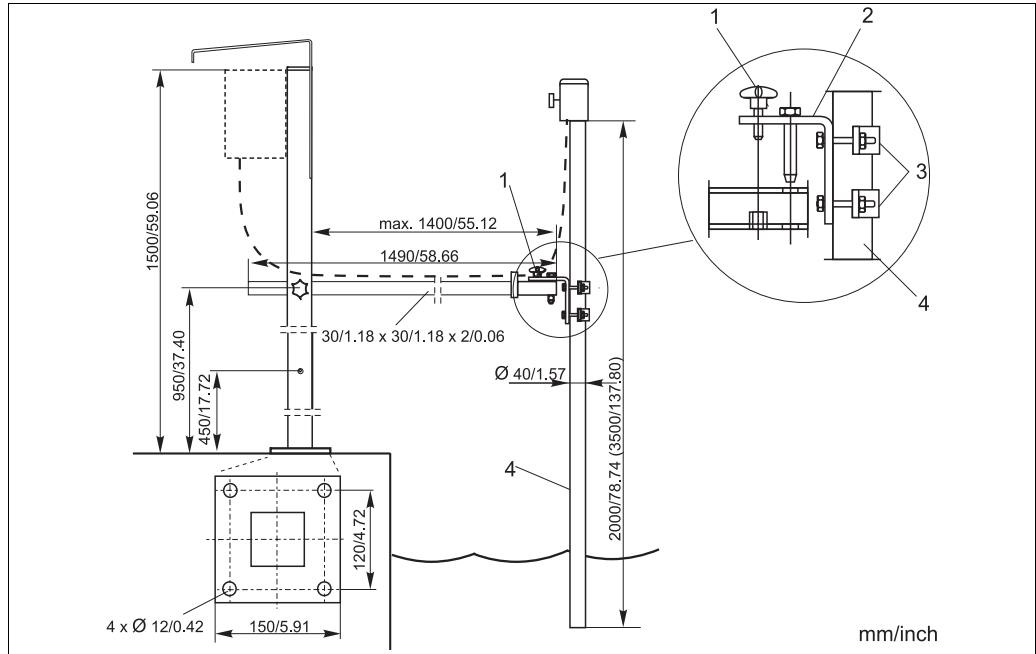


Fig. 6: Immersible pendulum assembly OYA611

- 1 Protection cap
- 2 Worm drive hose clip
- 3 Pipe clips (detailed drawing in right half)
- 4 PVC pipe
- 5 Threaded coupling

Universal assembly holder 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 (→  7). If the flow is very strong, a second transverse pipe can be installed with its own pipe support.





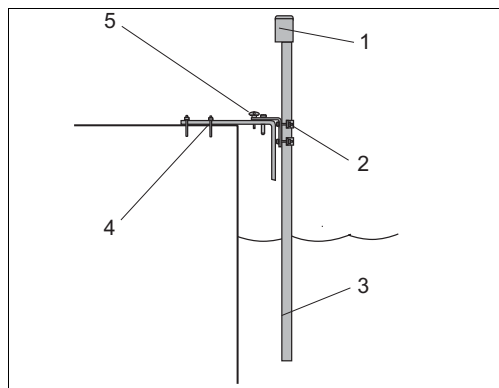
a0004105-en

Fig. 7: Universal assembly holder OYH101 with immersion tube OYY105

- 1 Star handle
- 2 Pipe support
- 3 Fixing bracket
- 4 Immersion assembly (= immersion tube)

Basin rim mounting with immersion tube

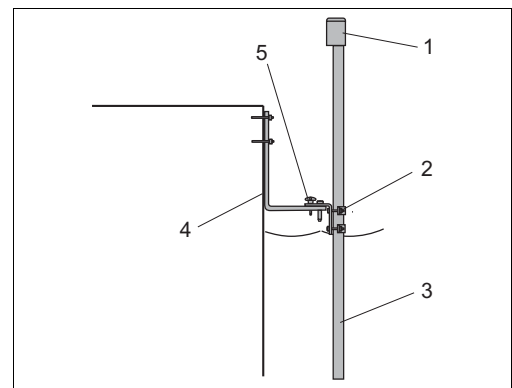
For fixing to the sides of the basin or channel, we recommend immersion assembly basin rim mounting (→  8, →  9).



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Fig. 8: Horizontal basin rim mounting

- 1 Protection cover for cable entry
- 2 Pipe support
- 3 Immersion assembly SS 1.4301 (AISI 304)




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Fig. 9: Vertical basin rim mounting

- 4 Basin rim mounting
- 5 Star handle

If there is strong turbulence or flow, a second basin rim mounting must be used for the immersion assembly.

Floating body

To aid installation in strongly fluctuating water levels, e.g. in rivers or lakes, the floating body OOA110-50 is available (→  10).

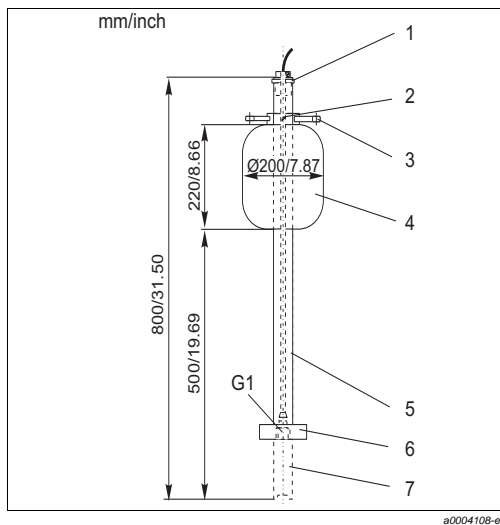




Fig. 10: Floating body

- 1 Cable route with strain relief and rain protection
- 2 Mounting ring for ropes and chains with locking screw
- 3 Lugs $\varnothing 15$, 3 x 120 ° for anchoring
- 4 Saltwater-resistant plastic float
- 5 Pipe 40x1, stainless steel SS 1.4571 (AISI 316Ti)
- 6 Shock absorber and weight
- 7 Oxygen sensor

3.4.2 Flow operation

The OOA250-A flow assembly (→  11) 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 G $\frac{3}{4}$). It can be installed in a pipe by using two 90° pipe brackets to allow inflow to the assembly (→  12, item 6).

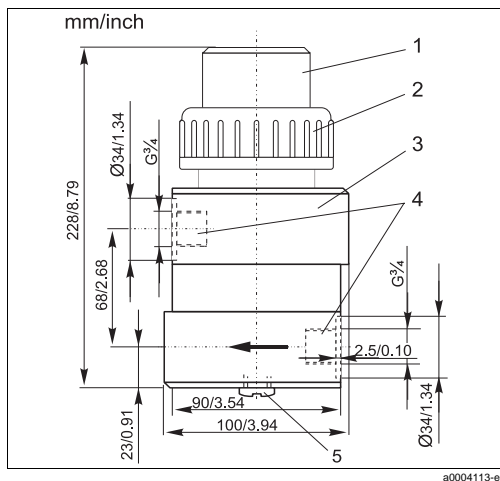


Fig. 11: Flow assembly OOA250-A

- 1 Screw-in part for sensor
- 2 Screw ring
- 3 Meter body
- 4 Connection thread G $\frac{3}{4}$
- 5 Dummy plug (connection for spray head OOR3)

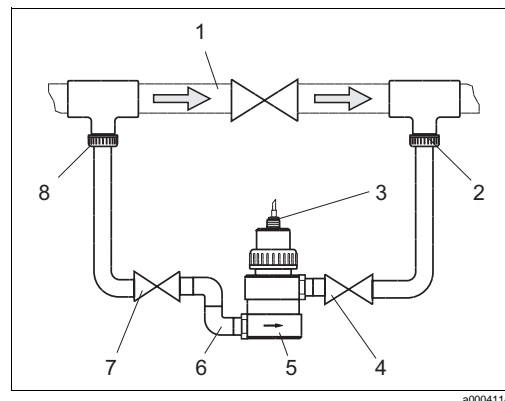


Fig. 12: Bypass installation with manually actuated valves or solenoid valves

- 1 Main line
- 2 Medium return
- 3 Oxygen sensor
- 4, 7 Manually actuated or solenoid valves
- 5 Flow assembly OOA250-A
- 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.

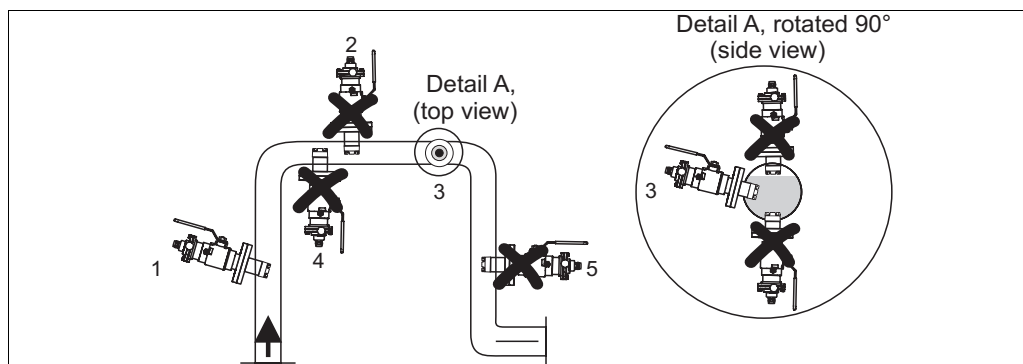


Fig. 13: Permissible and impermissible sensor installation positions

- 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 installation angle (acc. to sensor version)
- 4 Overhead installation, critical due to possible sediment buildup on fluorescence cap
- 5 Down pipe, impermissible



Note!

- 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 optics (→ 13).
- Measuring errors can occur, if:
 - the sensor is not immersed into the medium
 - suspended particles are settled on the sensor membrane
 - the sensor is installed overhead.

3.5 Post-installation check

- Sensor and cable undamaged?
- Fluorescence 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 fitting the protective cap to the immersion assembly?

4 Wiring




Warning!

- The electrical connection must only be carried out by an electrical technician.
- The electrical technician must have read and understood the instructions in this manual and must adhere to them.
- Ensure that there is no voltage at the power cable **before beginning** the connection work.

4.1 Direct connection to the transmitter

4.1.1 Field installation

Connect the sensor directly to the transmitter (OOM253-WX/WS) by means of the special measuring cable with the SXP connector (→  14).

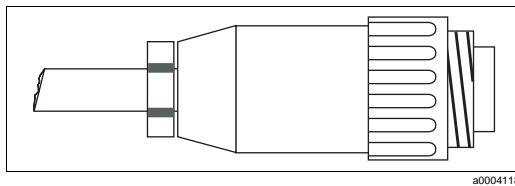




Fig. 14: SXP connector

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 OOM223-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
85	Yellow	+U _B	Yellow	+U _B
0	Gray	0 V	White	0 V
96	Pink	Comm. (digital)	Green	Communication (digital)
97	Blue	Comm. (digital)	Brown	Communication (digital)
88	Brown	-U _B	Coax, inner	-U _B

4.2 Connection via junction box

To extend the sensor connection beyond the length of the fixed cable, the connection has to take place using a junction box VS (→  15, →  16).

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

The extension to the transmitter depends on the transmitter version, i.e. field device or panel-mounted instrument.

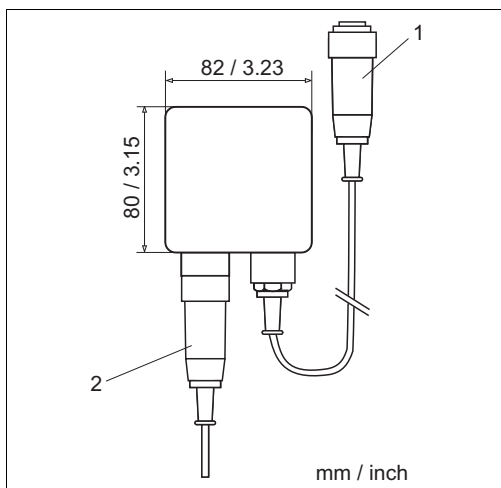


Fig. 15: Junction box VS to the field device

- 1 SXP connector to the field device
- 2 SXP connector from the sensor

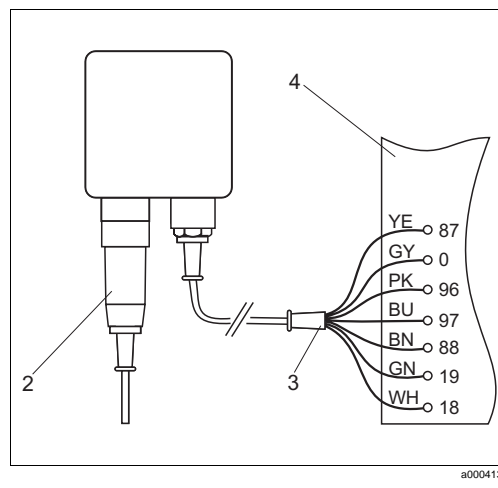


Fig. 16: Junction box VS to the panel-mounted instrument

- 2 SXP connector from the sensor
- 3 Special measuring cable to the transmitter (OMK)
- 4 Transmitter connection compartment

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?	110/230 V AC 24 V AC/DC
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 COM 2x3.
Are all the screws terminals properly tightened?	
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

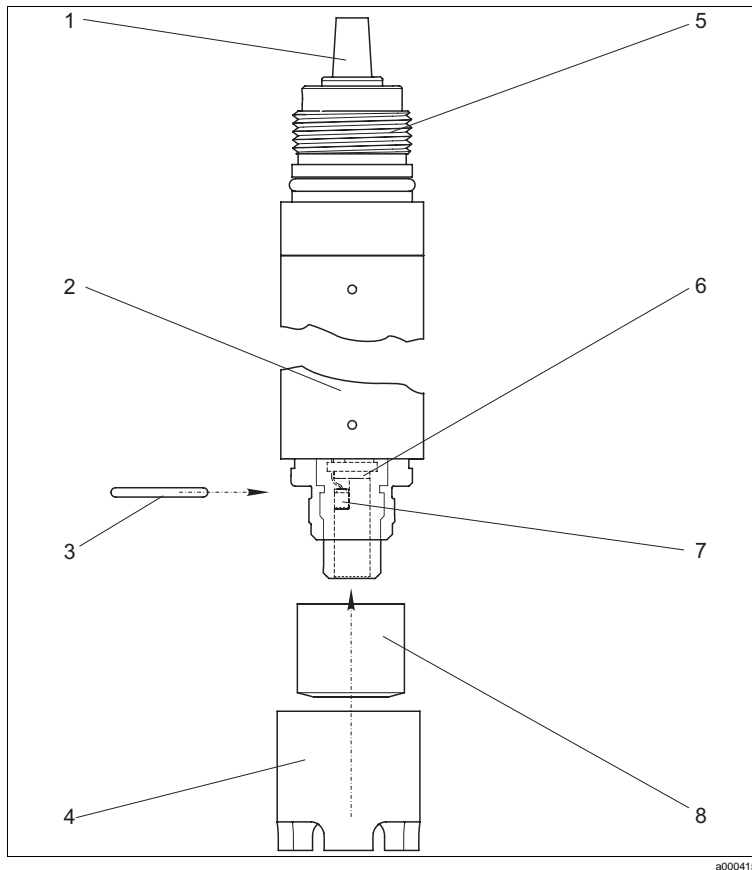


Fig. 17: Sensor design

- 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 guard



Note!

- Alternatively to the protection guard, you can use a spray head OOR 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 fluid temperature and air pressure are already calculated in the sensor.

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.



Note!

Ideally, use the calibration vessel (see Accessories) for calibration.

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 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 20 % SAT result in the calibration of the measured value to the reference value while maintaining the measured value at air

If necessary, calibrate OOS61 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

1. If you want to calibrate the sensor in the meantime due to a special application and/or a special type of installation, you can determine the intervals with the following method:
2. Check the sensor one month after its being put into operation by taking it out of the fluid, drying it and then measuring the oxygen saturation index at air after 10 minutes. Decide using the results:
 - a. If the measured value is not at 100 ± 2 %SAT, you have to calibrate the sensor.
 - b. Otherwise, double the length of 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.



Note!

Be sure to calibrate the sensor at least once a year.

5.3.3 Calibration in air

1. Remove the sensor from the medium.
2. Clean the outside of the sensor with a damp cloth. Then dry the sensor membrane e.g. by using a tissue.
3. Then wait while the sensor adjusts to the temperature of the ambient air. This takes about 20 minutes. Check that the sensor is not in direct sunlight during this time.
4. If the measured value display on the transmitter is stable, carry out the calibration in accordance with the Operating Instructions of the transmitter.
5. Place the sensor in the medium again.



Note!

Make sure you comply with the instructions for calibration in the Operating Instructions of the transmitter.

5.3.4 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 sensor temperature (ambient air)
 - the altitude above sea level
 - the current air pressure (**=rel. air pressure to sea level**) at the time of calibration. (If undeterminable, use 1013 hPa for an approximate calculation.)
2. Define:
 - the saturation value **S** acc. to the first table
 - the factor **K** acc. to the second table

° C	S [mg/l]
0	14.64
1	14.23
2	13.83
3	13.45
4	13.09
5	12.75
6	12.42
7	12.11
8	11.81
9	11.53
10	11.25

° C	S [mg/l]
11	10.99
12	10.75
13	10.51
14	10.28
15	10.06
16	9.85
17	9.64
18	9.45
19	9.26
20	9.08

° C	S [mg/l]
21	8.90
22	8.73
23	8.57
24	8.41
25	8.25
26	8.11
27	7.96
28	7.82
29	7.69
30	7.55

° C	S [mg/l]
31	7.42
32	7.30
33	7.18
34	7.06
35	6.94
36	6.83
37	6.72
38	6.61
39	6.51
40	6.41

Altitude [m]	K
0	1.000
50	0.994
100	0.988
150	0.982
200	0.977
250	0.971
300	0.966
350	0.960
400	0.954
450	0.949
500	0.943

Altitude [m]	K
550	0.938
600	0.932
650	0.927
700	0.922
750	0.916
800	0.911
850	0.905
900	0.900
950	0.895
1000	0.890

Altitude [m]	K
1050	0.885
1100	0.879
1150	0.874
1200	0.869
1250	0.864
1300	0.859
1350	0.854
1400	0.849
1450	0.844
1500	0.839

Altitude [m]	K
1550	0.834
1600	0.830
1650	0.825
1700	0.820
1750	0.815
1800	0.810
1850	0.805
1900	0.801
1950	0.796
2000	0.792

3. Determine:
 - L = current air pressure in bar (1013 hPa=1.013 bar, if unknown)
4. Calculate the calibration value C:

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

Example

- Air calibration at 18 °C, altitude 500 m above sea level, current air pressure 1009 hPa=1.009 bar
- S = 9.45 mg/l, K = 0.943, L = 1.009

Calibration value C = 9.17 mg/l.

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 water connection at the assembly rinse connection.



Warning!

Danger of medium leaking off

Before applying compressed air to an assembly with cleaning facility, make sure the connections are correctly fitted. Otherwise, the assembly may not be insert into the process.

6.2 Calibration

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

7 Maintenance

Maintenance work must be 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
- Check the measuring function:
 1. Remove the sensor from the medium.
 2. Clean and dry the membrane.
 3. After about 10 minutes, measure the oxygen saturation index in air (without recalibration).
 4. The measured value should be at 100 ± 4 % SAT
(Display O₂ saturation with OOM 2x3: press plus key four times).
- If necessary, replace a defective membrane or one which cannot be cleaned any more.
- Recalibration
(if desired or required)

7.1 Cleaning the sensor

The measurement can be corrupted by sensor fouling or malfunction, e.g.:

- Buildup on the fluorescence cap
--> causes 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.

Clean 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 the membrane with water and a soft sponge.



Caution!

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

7.1.1 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.

Caution!

The optical surface may not be scratched or damaged in any way!

7.2 Regenerating

7.2.1 Replacing the sealing ring

Replacing the sealing ring is only necessary when it is visibly damaged. For replacement, use only original sealing rings.

7.2.2 Changing the fluorescence cap

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.



Note!

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

8.1 Connection accessories

- Junction box VS
with socket and 7-pole connector,
for cable extension from the sensor (COS71, COS61, COS31, COS3 with SXP connector)
to the transmitter, IP 65 degree of protection;
Order No. 50001054
- Measuring cable OMK
for extension between junction box VS and transmitter, unterminated, yard good;
Order No. 50004124

8.2 Installation accessories

- Immersion assembly OOA110
for sensor immersion in the basin, PVC pipe resp. PUR floating body with SS 1.4571
(AISI 316Ti) immersion tube
- Flow assembly OOA250
for sensor installation in pipe lines, PVC
- Retractable assembly OOA451
Manual stainless steel retractable assembly with ball valve shutoff for oxygen sensors;
- Universal suspended assembly holder OYH101
for pH, redox, oxygen, conductivity assemblies and oxygen and turbidity sensors;
- Pendulum assembly OYA611
for sensor immersion in basins, open channels and tanks, PVC;
- Basin rim mounting OYY106
for sensor immersion in basins, SS 1.4301 (AISI 304);
- Immersion assembly OYY105
for sensor immersion in basins, SS 1.4404 (AISI 316L) pipe, SS 1.4571 (AISI 316Ti) fitting;

8.3 Measuring, monitoring and cleaning

- OOM223/253
Transmitter with integrated sensor function monitoring, measured value monitoring, free
configuration of alarm contact, field or panel mounting, HART® or PROFIBUS possible;

9 Troubleshooting

9.1 Troubleshooting 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.
	Medium flow available?	Create flow.
	Buildup on the fluorescence cap?	Clean sensor
	With a TOP 68 connection: Humidity or dirt in plug?	Clean connection (cleaning alcohol) and dry it.
Displayed value too high	Temperature display clearly too low?	Check sensor, if necessary send sensor in for repair.
Displayed value too low	With a TOP 68 connection: Humidity or dirt in plug?	Clean connection (cleaning alcohol) and dry it.
	Sensor calibrated?	Recalibrate
	Medium flow available?	Create flow.
	Displayed temperature clearly too high?	Check sensor, if necessary send sensor in for repair.
	Buildup on the fluorescence cap?	Clean sensor
	Fluorescence cap worn out?	Replace
Strong deviations in displayed value	Fluorescence cap damaged?	Fluorescent cap replacement
	EMC interference on the measuring system?	Remove outer shielding of sensor and extension cable at terminal S. Cut measuring and signaling lines from h.v. power lines.



Note!

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



Caution!

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

Check	Action	Setpoint
Voltage inspection	With the sensor connected, test the operating voltage on the OOM 2x3 transmitter	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. 102 % SAT (4 times key)
Zero point inspection	Immerse the sensor in zero solution ¹ .	Display near to 0 mg/l (0% Sat)
	Open the measuring chamber and dry the electrodes.	

Check	Action	Setpoint
Temperature sensor check	Disconnect the sensor and measure the resistance: – between TOP68 pins 3 and 4 – between SXP pins 3 and 4 (with fixed cable version)	depending on temperature: 5 °C: 74.4 kΩ 10 °C: 58.7 kΩ 15 °C: 46.7 kΩ 20 °C: 37.3 kΩ 25 °C: 30.0 kΩ 30 °C: 24.3 kΩ

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.



Note!

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

9.3 Spare parts

	Position	Spare parts kit	order no.
<p>Fig. 18: a0004166</p>	1	Sensor	see product structure
	2	Sealing ring – 2 pieces	51518597
	3	Sensor cap (fluorescence cap)	51518598
	4	Protection guard	on request
	without fig.	Zero solution – 3 units to produce 3 x 1 liter oxygen free solution	50001041

9.4 Return

If the device requires repair, please send it *cleaned* to the sales center responsible. Please use the original packaging, if possible.

Please enclose the completed "Declaration of contamination" (copy the second last page of these Operating Instructions) with the packaging and the transportation documents. **No repair without completed "Declaration of contamination"!**

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

10.1.1 Measured value

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

10.1.2 Measuring range

with OOM 223/253:

0 ... 20 mg/l

0 ... 200 % SAT

0 ... 400 hPa

10.2 Environment

10.2.1 Storage temperature

-20 ... +70 °C at 95% relative air humidity, not condensing

10.2.2 Ambient temperature range

-5 ... 50 °C

10.2.3 Degree of protection

IP 68

10.3 Process

10.3.1 Process pressure

Max. permitted overpressure: 10 bar

10.3.2 Process temperature

-20 ... +60 °C

10.4 Performance characteristics

10.4.1 Response time

t_{90} : 60 s

10.4.2 Maximum measured error

±2 % of end of measuring range

10.4.3 Repeatability

±0.5 % of end of measuring range

10.4.4 Operating life of sensor cap

1 year (protect against direct sunshine)

10.5 Mechanical construction

10.5.1 Weights

For cable length 7 m (23 ft): 0.7 kg (1.5 lbs)

For cable length 15 m (49 ft): 1.1 kg (2.4 lbs)

With TOP68 connection: 0.3 kg (0.66 lbs)

10.5.2 Materials

Sensor shaft: Stainless steel 1.4571 (AISI 316Ti)

Cap with fluorescence layer: POM

Fluorescence layer: Silicone

10.5.3 Process connection

G1

10.5.4 Sensor cable

Shielded 7-core fixed cable or double-shielded coaxial cable with 4 pilot wires (for TOP68 connection)

10.5.5 Cable connection to transmitter

- SXP connector (field device)
- Terminal connection (panel-mounted instrument)

10.5.6 Maximum cable length

Max. 100 m / 328 ft (including cable extension)

10.5.7 Temperature compensation

Internal

10.5.8 Interface

RS 485

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Declaration of Hazardous Material and De-Contamination

Erklärung zur Kontamination und Reinigung

RA No.

Please reference the Return Authorization Number (RA#), obtained from your supplier, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.

Bitte geben Sie die von Ihrem Lieferanten mitgeteilte Rücklieferungsnummer (RA#) auf allen Lieferpapieren an und vermerken Sie diese auch außen auf der Verpackung. Nichtbeachten dieser Anweisung führt zur Ablehnung ihrer Lieferung.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.

Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination und Reinigung", bevor Ihr Auftrag bearbeitet werden kann. Bringen Sie diese unbedingt außen an der Verpackung an.

Type of instrument / sensor

Geräte-/Sensortyp _____

Serial number

Seriennummer _____

Used as SIL device in a Safety Instrumented System / Einsatz als SIL Gerät in Schutzeinrichtungen

Process data / Prozessdaten

Temperature / Temperatur _____ [°C]

Pressure / Druck _____ [Pa]

Conductivity / Leitfähigkeit _____ [S]

Viscosity / Viskosität _____ [mm²/s]

Medium and warnings

Warnhinweise zum Medium



	Medium /concentration Medium /Konzentration	Identification CAS No.	flammable entzündlich	toxic giftig	corrosive ätzend	harmful/ irritant gesundheitsschädlich/ reizend	other * sonstiges*	harmless unbedenklich
Process medium Medium im Prozess								
Medium for process cleaning Medium zur Prozessreinigung								
Returned part cleaned with Medium zur Endreinigung								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive

* explosiv; brandfördernd; umweltgefährlich; biogefährlich; radioaktiv

Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.
Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Description of failure / Fehlerbeschreibung _____

Company data / Angaben zum Absender

Company / Firma _____	Phone number of contact person / Telefon-Nr. Ansprechpartner: _____
Address / Adresse _____	Fax / E-Mail _____
Your order No. / Ihre Auftragsnr. _____	

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge. We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."

"Wir bestätigen, die vorliegende Erklärung nach unserem besten Wissen wahrheitsgetreu und vollständig ausgefüllt zu haben. Wir bestätigen weiter, dass die zurückgesandten Teile sorgfältig gereinigt wurden und nach unserem besten Wissen frei von Rückständen in gefährlichen Mengen."

(place, date / Ort, Datum)

Name, dept./Abt. (please print / bitte Druckschrift)

Signature / Unterschrift

