

Sensors for Dissolved Oxygen

OOS 31

Potentiostatic amperometric three-electrode sensor for Dissolved Oxygen Measurement



Applications

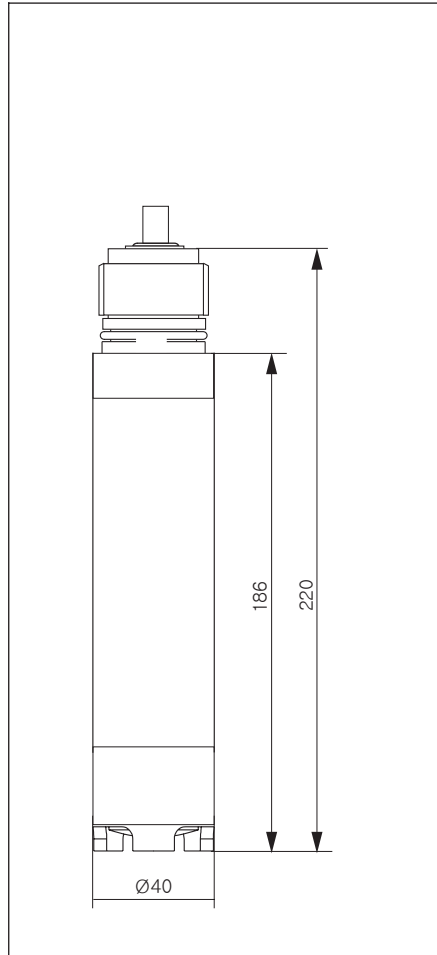
Continuous measurement of the concentration of dissolved oxygen in water plays an important role in many areas of water engineering:

- Sewage treatment plants:
O₂ measurement and regulation in the activated sludge basin to achieve high efficiency of the biological cleaning process
- Water supervision:
O₂ measurement in rivers, lakes and seas as an indicator of water quality
- Water treatment:
O₂ measurement e.g. in drinking water to verify the state (oxygen enrichment / corrosion prevention etc.)
- Fish farming:
O₂ measurement and regulation to maintain optimum survival and growth conditions

Features and benefits

- Broad compatibility with customary measuring transmitters on the market through automatic switch-over between digital and analogue mode
- Calibration to any measuring transmitter or location and subsequent installation at measuring point (in digital mode with OOM 223/253) as calibration data is stored in the sensor
- Minimum calibration effort due to simple air calibration.
No zero calibration required.
- Due to disconnectable cable connection on sensor side (TOP 68 plug-in connector) easy to maintain.
- High adaptability due to simple upgrade from standard to high-speed response by simply replacing membrane cap
- High reliability against incorrect measurements through sensor self-monitor
- High long-term stability through potentiostatic-amperometric three-electrode system

Dimensions and functional principle



Dimensions of OOS 31

Oxygen occurs in the medium in the form of physically dissolved gas and conveyed to the membrane by the required flow. Due to the materials used and the production process, this means that only dissolved gases permeate through the membrane, and not the substances which occur in the liquid phase. Similarly, dissolved salts and ionic substances are retained. This is why the conductivity of the medium has no impact on the measuring signal when the sensor membrane is covered, as opposed to the open measuring principle.

The oxygen molecules diffused through the membrane are reduced to hydroxide ions (OH^-) on the gold cathode. On the counterelectrode, silver is oxidised to silver ions (Ag^+ , formation of a silver bromide layer, AgBr). The associated release of electrons from the gold cathode and the acceptance of electrons at the counterelectrode result in a current flow which, under constant conditions, is proportional to the external concentration of oxygen in the medium. The current flow is converted in the measuring device and displayed on the LCD as the content of dissolved oxygen in mg/l, the oxygen saturation index in % SAT or the partial oxygen pressure in hPa.

Sensor monitoring

As a protection against incorrect measurements, the membrane cap is permanently monitored for tightness. As soon as an operation-related leak occurs, an alarm is generated immediately. This means the membrane cap or the fill electrolyte can be replaced before an undesirable system state occurs.

A special sensor check system in the OOM 223/253 transmitter detects other error states:

- implausibly high or low measured values
- disturbed controller caused by defective measured values
- Sensor passivation, i.e. no or very slow change in the measuring signal despite an external change in the oxygen content in the medium.

Special technical features

- Optional fixed cable on sensor or TOP 68 plug-in connector
- Automatic adaptation of sensor transmitter data communication: analogue or digital depending on the transmitter used
- High EMC protection through digital communication with the OOM 223/253
- Calibration data saved in the sensor in digital mode

- Upgradable any time from normal to high-speed response and vice versa
- No zero calibration required
- Extremely stable »elephant skin« membrane
- Easy to maintain: both the membrane cap and the electrolyte are preterminated

Measuring system

The functional measuring system comprises:

- an oxygen sensor OOS 31 and transmitter OOM 223 / 253-WX/WS
- Immersion assembly or Flow assembly COA 250 or Floating assembly OOA 110

- Associated installation accessories.

We recommend the following under extreme operating conditions:

- Automatic spray cleaning system Chemoclean.

Technical data

General data

Manufacturer	ISI Europa
Product designation	OOS 31

Mechanical data

Measuring principle	Potentiostatic–amperometric three–electrode sensor
Materials	Sensor body: stainless steel 1.4571 (SS 316Ti); Membrane cap.: POM
Membrane thickness	approx. 50 µm (OOS 31–xxx1), approx. 25 µm (OOS 31–xxx2)
Threaded connection	G 1
Electrical connection	–Screened 7–conductor special measuring cable (fixed cable) or –Double–screen coaxial cable with 4 pilot wires (on TOP 68 plug–in connector) SXP plug–in or snap–in terminal on transmitter
Cable lengths	1, 5 m / 7 m / 15 m / Special version on request
Max. total cable extension	100 m
Weight without packaging (for cable length)	0.7 kg (7 m) or 1.1 kg (15 m)

Measuring range

Lower range limit	typ. 0.05 mg/l (OOS 31–xxx1) typ. 0.02 mg/l (OOS 31–xxx2)
Upper range limit	60 mg/l

Operating data

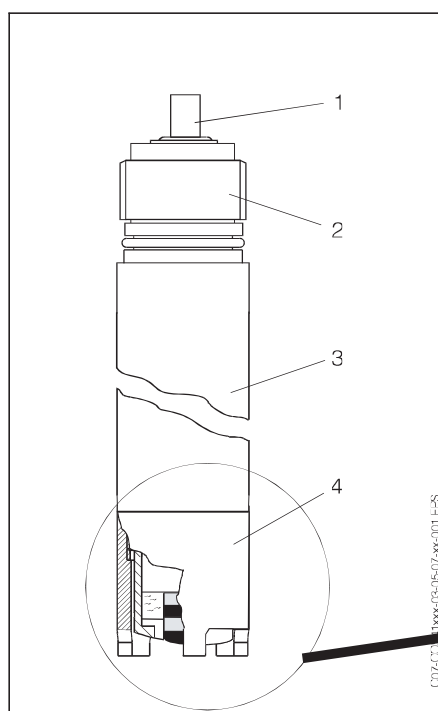
Response time	t_{90} : 3 min (OOS 31–xxx1) t_{90} : 0.5min (OOS 31–xxx2) each at 20 °C, 1013 hPa
Polarisation time	< 60 min
Min. flow velocity	typ. 0.5 cm/s for 95% measured variable display. (OOS 31–xxx1) typ. 2.5 cm/s for 95% measured variable display. (OOS 31–xxx2)
Sensor monitor	Membrane rupture detector – in conjunction with OOM 223/253–WS: Cable breakage or short–circuit, Incorrect measurement and sensor passivation
Drift	under continuous polarisation: < 1%/month
Zero current	zero–current–free

Process conditions

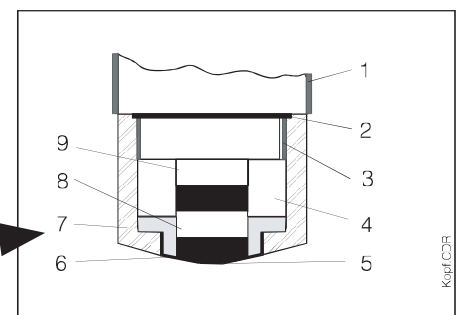
Max. permissible overpressure	10 bar
Degree of protection	IP 68
Nominal operating temperature	–5 ... 50 °C
Storage temperature	filled: –5 ... 50 °C, unfilled: –20 ... 60 °C
Temperature compensation	with NTC temperature sensor, 0 ... 50 °C

Design

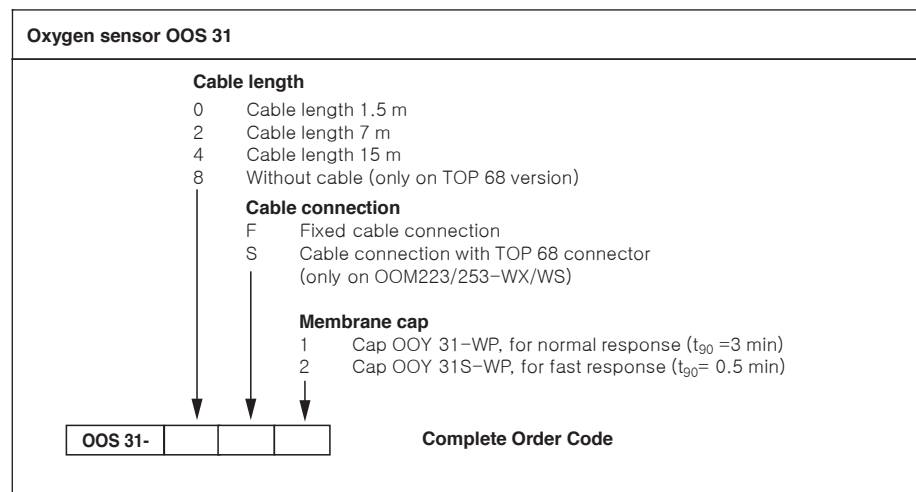
- OOS 31:
- 1 Sensor cable
 - 2 Thread G 1
 - 3 Sensor body
 - 4 Protection guard



- Sensor head:
- 1 Thread for protection guard
 - 2 Sealing ring
 - 3 Thread for membrane cap
 - 4 Electrolyte
 - 5 Gold cathode
 - 6 Membrane
 - 7 Membrane cap
 - 8 Counterelectrode
 - 9 Reference electrode



Product overview



Accessories

- OOY 31-WP**
 2 preterminated spare replacement cartridges with pretensioned membrane (normal response)
- OOY 31S-WP**
 2 preterminated spare replacement cartridges with pretensioned membrane (fast response)
- OOY 3-F**
 Fill electrolyte for OOS 31, 10 plastic ampoules, transparent
- OOY 31-PF**
 polishing film (for gold cathode) 6 pcs,
- OOY 31-OR**
 Sealing ring, 3 pcs
- Accessory set OOO 31-Z**
 each 1x OOO 3-F, OOO 31-WP, OOO 31-OR and OOO 31-PF
- Accessory set OOO 31S-Z**
 each 1x OOO 3-F, OOO 31S-WP, OOO 31-OR and OOO 31-PF