

Operating Manual

GWO 5610

Dissolved Oxygen Sensors for GMH 5630, GMH 5650



Specification:

Measuring range:

Oxygen partial pressure: 0 ... 1200 hPa O₂

Temperature: -5,0 ... 50,0 °C

Electrodes: Active membrane type platinum/lead, integrated-NTC-Resistor

Response time: 90% in 10 sec., temperature depending

Recommended minimum flow: 30 cm/s at membrane

Lifetime: 3 years or more, depending on application and maintenance

Operating pressure: max. 3 bar

Shaft diameter: Ø 12,0 ±0,2 mm

Length over all: approx. 170 mm incl. cable gland

Integration length: approx. 100 mm

Weight: approx. 120 g

Connection: approx. 2 m cable, 7-pole bayonet plug.
(Optional longer cables possible)

Working temperature: 0 ... +40°C

Storage temperature: 0 ... +60°C

Standards and directives: The sensors comply with the following Council Directives on the approximation of the laws of the Member States:

2011/65/EU RoHS

Applied harmonized standards:

EN IEC 63000 : 2018

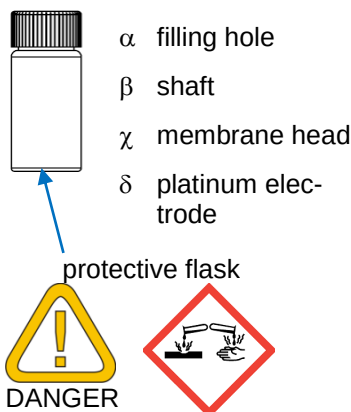
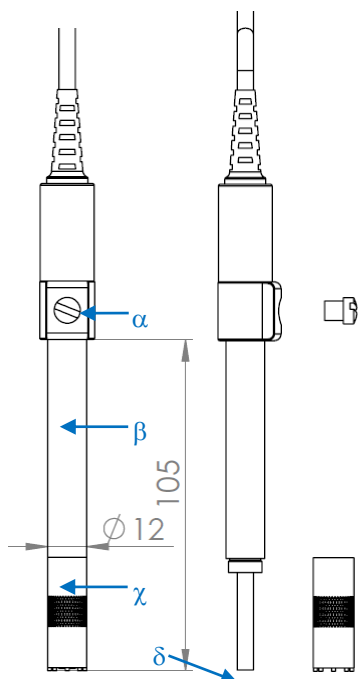
Note: The sensors contain lead, but according to Annex IV [1b] / for sensors with "lead anodes in electrochemical oxygen sensors" this is exempted from the restriction.



Scope of supply:

- Sensor body
- 2 Membrane heads
- Electrolyte
- Filling pipette
- 2 polishing foils (plastic, pink)

Design of Sensor GWO 5610



General

The oxygen sensor is an active sensor. It consists of a platinum cathode, a lead anode and potassium hydroxide (KOH) as an electrolyte. If oxygen is present, it is reduced on the platinum cathode and the sensor delivers a signal. If no oxygen is present, no signal is delivered. The anode is consumed by the oxygen measurement. The sensor ages. Furthermore, the sensor loses liquid through the permeable membrane, in particular, when it is stored in dry air. Therefore, it should be checked and maintained regularly and replaced as necessary. (*p.r.t. sensor maintenance*)



- Make it a rule to always store the electrode in a humid environment
- in the storage flask filled with water or
 - in another container filled with water

If electrode has not been used for some time, clean membrane with soft cloth and remove deposits, if any (algae, bacteria etc.).

Attention: The membrane is delicate – if damaged, caustic electrolyte gets lost and the sensor shows wrong signal.

Design

The electrode housing is made of ABS. With the exception of the electrode shaft all parts need to be maintained regularly and be replaced if necessary.

- o **Protective flask:** The protective flask is used to moisten the membrane. This prolongs service life of the electrode. The protective flask contains water.

Attention ! Use water only; never use potassium chloride (KCl); this is only required for storage of pH-electrode.

- o **Membrane head:** the membrane head is covered with a Teflon membrane.

It will be filled with KOH electrolyte and screwed onto the electrode shaft (no air bubbles). Damages in the membrane, large air bubbles or air bubble rings in the membrane head will result in erroneous measurements. This may also be the reason for errors in the calibration.

The membrane head (GWOK 02) is a spare part and can be ordered individually.

- o **Filling hole:** If the electrode is used at high temperatures or if it has been stored without its protective flask for a longer period of time, some electrolyte will be lost due to evaporation. Please refer to Refilling description below.

Attention when working with electrolyte:
The electrolyte is caustic! (strong base, KOH)
Avoid contact to skin, protect Your eyes !

Lifetime:

At the end of the Lifetime, the signal of the sensor is dropping rapidly. The sensor evaluation in % therefore can only be taken as a relative measure. An evaluation of 70% does not mean that 70% of lifetime is left, but that the electrode signal has 70% of a good state reference.

Note: The sensor state evaluation will be stored after a successful calibration of the oxygen sensor

The nominal lifetime may be reduced due to the application. Negative effecting are:

- Extreme storage and operation temperature
- Dirty water during measuring
- Mechanical stress to sensor membrane
- Dry storage of filled sensor
- Permanent use at higher CO₂-concentrations

Mounting/Operation Position:

The optimum position is with sensor membrane pointing downwards.

Measuring Precision:

The precision can be influenced due to:

- To less flow
- Water and sensor temperature have to be the same, most exact measuring is done, when calibrated at measuring temperature.

Visible Residues in the Inner of Membrane Head:

As a reaction product in operation, there will be lead oxide (red and brown – from the reaction with oxygen) and lead carbonate (white – from the reaction of carbon dioxide) in the inner of the sensor.

These substances may accumulate visibly at the membrane, but usually have now negative effect on the operability. Within a maintenance cycle the residues can be washed off the membrane nearly completely.

	Significant deposits on the membrane and matt platinum electrode. Deposits already have an effect on the measurement. => Carry out maintenance to remove these.
	Slight deposits on the edge of the electrode, predominantly blank platinum electrode. No significant influences on the measurement to be expected. => Maintenance is not absolutely necessary.
	Deposits on the membrane, bare platinum electrode. => no maintenance required.
	Polished platinum electrode during maintenance.

Before screwing the membrane head on sensor body again they should be washed off, to avoid them getting in between platinum cathode and membrane.

A fast occurrence shortly after first filling or an unusual high amount of them (e.g. within some days) may be a sign of air in the sensor – either because of incorrect filling (bubbles), not sufficiently closing membrane head or filling screw or a leaking membrane.

First start of operation of dry sensor GWO 5610 / Refilling of GWO 5610

The GWO 5610 can be delivered dry as an option. Therefore, the sensor is easily storable over a long time.

The sensor has to be filled timely towards the measuring. After filling, a time of ~ 2 hours has to be considered, until the sensor has stabilized.

Wear suitable gloves*) and protect your eyes with safety goggles when filling the electrolyte!

Do not touch the electrolyte with bare skin, if there was contact rinse sufficiently with water.

Material:

- Sensor GWO 5610 with membrane head
- Filling-pipette
- Electrolyte KOH
- Flat blade screw driver
- Paper towel
- Suitable gloves *), safety goggles
- Wash basin

First Filling:

- Check membrane head GWOK 02: is it in good state? Is Membrane undamaged?
- Open filling screw
- Fill pipette with KOH
- First, fill the membrane head up to $\frac{3}{4}$ of its height, screw on membrane head tightly, rinse excess KOH with water.
- Then carefully fill the sensor, try to flick at the shaft from time to time, helping air bubbles coming out. In sum the sensor filling takes around 5 ml.
- If there are no more air bubbles and the filling hole is full, close with filling screw.
- Rinse excess KOH with water
- Turn sensor upwards: Are air bubbles visible below the membrane? If so: Refill once again.
- Wait approximately 2 hours for the sensor to stabilize, afterwards calibrate the sensor – the electrode state evaluation should deliver 100%.



Figure: Filling with pipette

*) suitable gloves: Acc. to DIN EN 420, e.g. natural latex, natural rubber, butyl rubber, nitrile rubber, polychloroprene, fluorinated rubber.

Sensor Maintenance of GWO 5610

If the sensor can no more be calibrated or only unstable values are displayed, it has to be maintained or even the membrane head has to be exchanged.

Wear suitable gloves*) when filling the electrolyte! Do not touch the electrolyte with bare skin. If there was contact rinse sufficiently with water.

Material:

- Sensor GWO 5610, eventually spare membrane head GWOK 02
- Filling pipette
- Electrolyte KOH
- Flat blade screw driver
- Paper towel
- Polishing foil (pink)
- Suitable gloves *), Safety goggles
- Wash basin

Maintenance is the same as the first filling, but first the membrane head is unscrewed and the old electrolyte is removed.

Unscrew the membrane head and the refill opening - Attention! Old electrolyte will now leak out!

If the membrane is undamaged and free of deposits, the membrane head can be used again.

The platinum electrode must be bright and free of deposits!

Wipe off existing deposits from the platinum electrode with a cloth, if necessary polish the electrode using the pink polishing foil.

The filling of the sensor is like described before.

Hints for Operation:

- Treat device and sensor carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plug and socket from soiling.
- The electrode are only suitable for the devices GMH5630, 5650. Unsuitable devices may lead to the destruction of the measuring device and the oxygen sensor.
- A protective cap, such as GSKA 3600 in plastic or GSKA 3610 in red bronze is recommended for protection of the membrane, e.g. for use in bodies of water.



Safety guidelines:

This device has been designed and tested in accordance with the safety regulations for electronic devices.

However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

- Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under "Specification".

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Do not use these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury or material damage.
Failure to comply with these instructions could result in death or serious injury and material damage.

DANGER

- Attention, caustic!** The sensor contains **KOH** electrolyte (Potassium Hydroxide).

KOH may cause burns!

Avoid the contact to leaking liquid!



When there was contact:

- to skin: immediately flush with water for several minutes
- to clothing: take off affected clothing.
- to the eyes flush with water for several minutes, get medical aid.

In case of ingestion:

Drink plenty of water immediately, do not induce vomiting! Get medical aid.

Disposal instructions



The electrode contains lead and corrosive electrolytic liquid and must not be disposed of in the residual waste bin. Do not dispose of together with batteries, risk of explosion!
Return it to us, freight prepaid. We will then arrange for the proper and environmentally-friendly disposal.



Private end users in Germany have the possibility of dropping off the product at the municipal collection centre