Operating Manual

GWO 3610 / GWO 5610

Dissolved Oxygen Sensors for GMH 3611, GMH 3651 / GMH 5630, GMH 5650

Specification:

Measuring range:

Oxygen partial pressure: 0 ... 1200 hPa O_2

Temperature: -5,0 ... 50,0 °C

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

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

Life time: 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: ca. 170 mm incl. cable gland

Integration length: ca. 100 mm

Weight: ca. 120 g

Connection:

GWO 3610 (for GMH 36 Series): ca. 2 m cable, Mini-DIN plug.

GWO 5610 (for GMH 56 Series): ca. 2 m cable, 7-pole bayonet plug.
(optional longer cables possible)

Working temperature: 0 ... +40°C

Storage temperature: 0 ... +60°C

Scope of supply:

- Sensor body
- 2 Membrane heads
- Electrolyte
- Filling pipette

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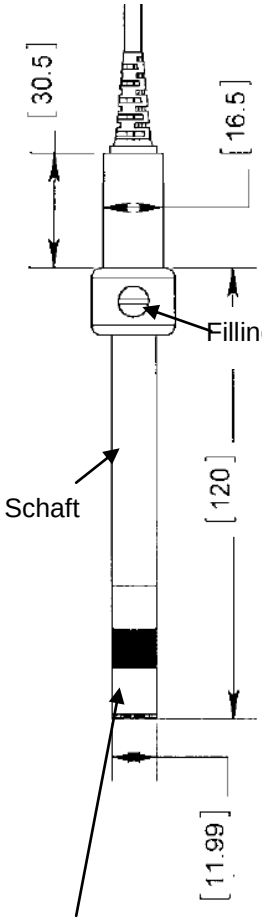
Design of Sensor GWO x610



The oxygen electrode is an active electrode consisting of a platinum cathode and a lead anode with the electrolyte being potassium hydroxide (KOH). In case of oxygen being present it will be reduced at the platinum cathode, i.e. the electrode supplies a current. No oxygen means no current either. The oxygen measurements uses up the lead anode. The sensor is subject to ageing. Also the e sensor may lose electrolyte due to high temperature or dry operation. Therefore, we recommend to maintain the electrode at monthly intervals (p.r.t. 0 Sensor Maintenance of GWO 5610)

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

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 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!

Life Time:

At the end of the Lifetime, the signal of the sensor is dropping rapidly. The sensor evaluation in % therefore e can only be taken as a relative measure. An evaluation of 70% does not mean that 70% of life time 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 life time 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 CO_2-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.
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 Cap or filling screw or a leaking membrane.

First Start of Operation of Sensor GWO 5610 / Filling

The state of delivery of the sensor is “dry”. 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 when filling the electrolyte! Do not touch the electrolyte with bare skin, if there was contact rinse sufficiently with water.

Material:

- Sensor GWO x610
- Filling-pipette
- Electrolyte KOH
- Flat blade screw driver
- Paper towel
- Suitable gloves *)
- Wash basin

Figure: Filling with pipette

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 ¾ 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%.

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 or 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
- Suitable gloves *)
- Wash basin

The maintenance is performed similar to the first filling, at first the membrane head is screwed off and the old electrolyte is washed out. Attention! Do not touch the electrolyte with bare skin!
Mount new membrane head. (If the membrane head is undamaged, it may be reused)
The filling of the sensor is like described above.

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

Hints for Operation:

a.) Treat device and sensor carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plug and socket from soiling.

b.) The electrode are only suitable for the devices GMH 3611, 3651 / GMH5630, 5650. Unsuitable devices may lead to the destruction of the measuring device and the oxygen sensor.

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.

1. 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".

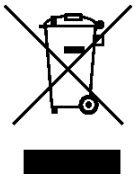
2. 

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.

3. 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 of affected clothing.
- to the eyes flush with water for several minutes, get medical aid.
In case of ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

4. Disposal instructions


The electrode contains lead and caustic electrolyte. Dispose as special waste.
According to the ElektroG *(law for bringing into market, the return and the environmentally friendly disposal of electronic equipment)* we accept the return of this electrode.
Send the electrode directly to us (sufficiently stamped), if it should be disposed.
We will dispose it appropriately and environmentally friendly.