

Maintenance Oxygen Sensor

A maintenance becomes then necessary if the membrane head is defective, the sensor can't be calibrated anymore or if the setting time exceeds the specified value considerably.

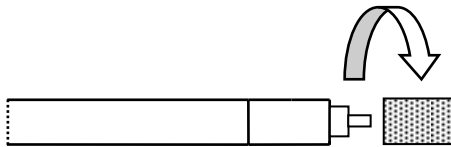
It includes the cleaning of the membrane, possibly the replacement of the electrolyte solution, the exchange of the membrane head and the cleaning of the electrode system. The maintenance interval depends on the particular measurement conditions, especially on the pollution degree of the measurement medium and the effect of disturbing substances, e.g. hydrogen sulfide, on the electrochemical measurement system. To recover the full functional efficiency of the sensor in case of disturbances, it is recommended to proceed with the steps described in detail below:

1. Cleaning of the membrane with a wet pulp.
Rinse the membrane carefully with water without removing the membrane head and clean it with a wet pulp. If a new calibration is not possible afterwards or if the sensor data deviate significantly from the specification then the electrolyte solution and the membrane head have to be replaced.
2. Changing electrolyte solution and membrane head.
Therefore unscrew the membrane head and examine the anode visually. Possibly the regeneration of the anode is necessary.
3. Regeneration of the anode

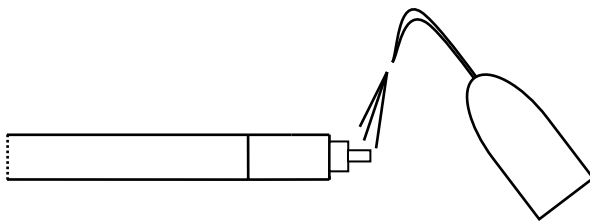
Change of electrolyte solution and membrane head

Working steps:

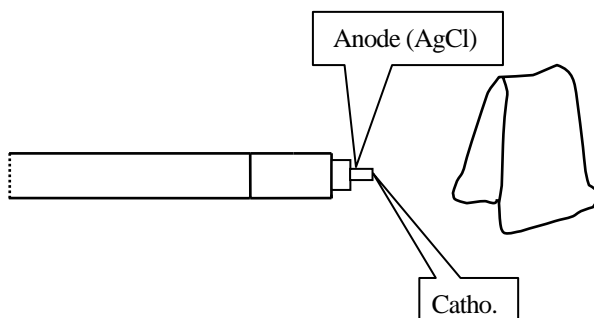
1. Disconnect the sensor from the measurement device
2. Unscrew the membrane head



3. Rinse the electrode system with deionized water



4. Wipe the silver/silver chloride-anode carefully with pulp.
Generally, this step is sufficient. Usually the anode is covered with a brownish up to a petunia silver chloride film. This film may not be removed in any case. After a longer operation, modifications can occur at the anode which lead to malfunctions of the sensor. Only in these very rare cases, the anode has to be treated as it is described in the paragraph „Regeneration of the anode“.

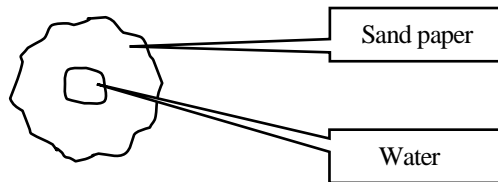


5. Regenerate cathode

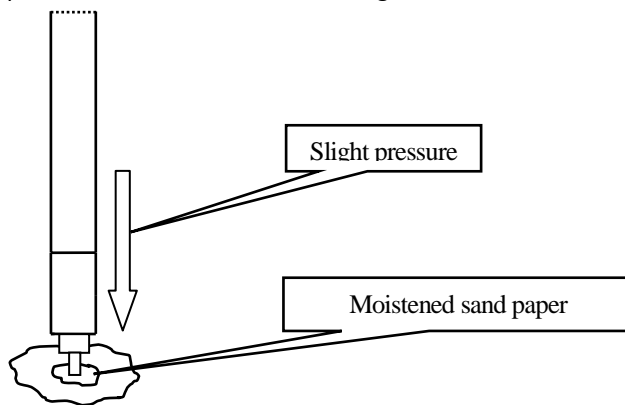
The condition of the cathode influences considerably the sensitivity of the sensor. During the course of the measurements, i.e. in polarized state, silver films develop on the surface of the cathode. If the sensor is stored for a longer time (> 2 months) without being polarized, the state of the surface can also change through the development of surface oxides. These accumulations have to be removed. Here you have to proceed very carefully, since already little scratching marks influence the measurement function.

The regeneration of the cathode is carried through as follows:

- The supplied abrasive (sand) paper is moistened with water and laid onto a firm underlay.

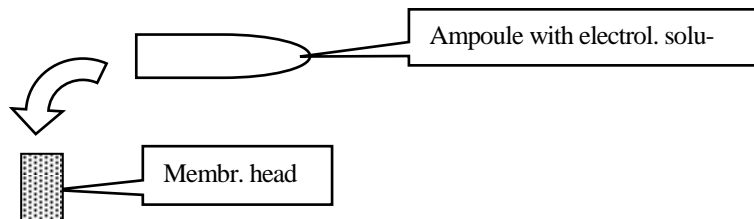


- The sensor is put vertically with a slight pressure - similar to writing with a pencil - onto the abrasive paper. Then it is pulled several times only with a slight pressure in a straight direction over the paper. The step is repeated, whereas this time the moving direction is vertical to the previous one.



With this procedure, a film of only a few μm thick which is on the cathode, shall be removed, i. e. the cathode surface shall only be polished.

6. Fill new membrane head with electrolyte solution (1 ampoule)



7. Rinse the electrode system with electrolyte solution (use additional ampoule).
Here no electrolyte may accumulate in the space between metal part and glass shaft (if necessary remove it with pulp).
8. Connect the sensor with the measurement device.
9. Screw the membrane head onto the base body.
Here the sensor has to be held diagonally downwards and the excessive electrolyte which escapes via the winding has to

be dabbed with pulp. The membrane head is slowly unscrewed to avoid an overpressure in the interior. The display of the measurement device increases to 100 ... 200 % saturation with each turn of the membrane head. If a mechanical resistance can be noticed, then after each rotation (only a few degree) enough time has to elapse to enable the compensation of the internal overpressure, shortly before the membrane head seals the electrode space completely. The membrane may not swell in any case.

10. After ca. 30 to 60 minutes the sensor is ready to use.

Regeneration of the anode

Working steps:

Working steps 1 to 3:

The working steps 1 to 3 have to be carried out as they are described in the paragraph „Change of electrolyte solution and membrane head“.

4. Wipe the silver/silver chloride-anode carefully with pulp.

A grey or white film on the anode is caused by the silver oxide which accumulates if the electrolyte doesn't contain enough potassium chloride anymore. In this case, the electrode body is submerged for ca. 10 min in a 3 m ammonium carbonate solution (anode cleaner). Afterwards it has to be rinsed with enough deionized water.

If measurements are carried through in a medium containing hydrogen sulfide, there is the risk that hydrogen sulfide can get into the electrolyte. On the anode, a black film of silver sulfide accumulates, which has the effect that the sensor loses its measurement function. An anode poisoned this way you can treat with a solution that is composed as follows:

Thiocarbamide	8 parts by weight
Hydrochloric acid, conc,	5,1 parts by weight
Surfactant	0,5 parts by weight
Water	added up to 100 parts by weight

The sensor is first submerged only for a few seconds into this solution. If the desired effect has not been reached yet, you repeat the procedure until the black film has been removed. After that you have to rinse especially intensive with water and electrolyte solution.

Working steps 5 to 8:

These steps are again carried out as it is described in the paragraph „Change of electrolyte solution and membrane head“ under the points 6 to 9.

9. After this treatment the sensor is possibly able to measure again after several hours.