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O₂-Measuring Instrument with Galvanic Micro-sensor

Determination of dissolved oxygen without streaming the sensor membrane, parallel display of oxygen and temperature



The microprocessor-operated measuring instrument has been developed for the fast and accurate *in-situ* determination of dissolved oxygen without any sampling and without streaming the sensor membrane. The instrument is useful for the laboratory and for simple and fast measurements in the field. The instrument is equipped with an galvanic, membrane covered dissolved oxygen micro-sensor and with a temperature sensor. The display shows both the concentration of the measured dissolved oxygen in mg/l or the oxygen saturation in % and the temperature of the sample.

The measuring instrument is powered via the included power supply unit and can be operated also with batteries. The RS 232 interface allows to link the instrument to a PC or notebook.

By exchanging the oxygen sensor tip against the amperometric hydrogen peroxide micro-sensor tip, the measuring instrument could be changed fast and simply into a high performance H₂O₂ measuring instrument.

Furthermore the instrument is useful to store the calibration coefficients of up to 10 different chemical micro-sensors and to calculate the concentration units by means of the measured raw data. This allows also the fast and simple exchange of sensors and measuring ranges, if required. Apart from the already mentioned micro-sensors for the determination of oxygen and hydrogen peroxide, there are also micro-sensors available for the determination of dissolved H₂S/sulphide, hydrogen and ozone. All these sensors can be interfaced very simply to the measuring instrument.

The measuring system is delivered with a case for the transport and storage.

Advantages of the DO Measuring Instrument with Galvanic Micro-sensor

Compared with the other commercially available so called macro-sensors for the amperometric determination of dissolved oxygen and compared with the volumetric Winkler titration, the new measuring device with galvanic micro-sensor has the following advantages:

1. No streaming of the sensor membrane necessary because of the very low analyte consumption
2. Very fast response time of the sensor (down to some hundred milliseconds for $t_{90\%}$)
3. Sensor is self polarising, ready for use immediate after switching on, no polarisation time
4. Exchange of membrane and/or electrolyte is not necessary
5. Determination without sampling or adding of chemicals
6. Very low detection limit: down to 0,05 % saturation or 4 $\mu\text{g/l}$
7. Very high accuracy
8. High economic efficiency (no chemical consumption)
9. Measurements also in turbid, coloured, muddy and salt containing samples
10. Continuous *on-line* measurement (not only average values of a big volume)
11. High local resolution of the measurement (μm -steps)
12. Alternatively display of oxygen concentration in mg/l or oxygen saturation in %



Fig.: Galvanic dissolved oxygen micro-sensor, complete with titanium housing, integrated electronic device and exchangeable sensor tip

Technical Data of the Galvanic Micro-sensor:

- ☞ Measuring principle: galvanic, membrane covered micro-sensor, self polarising
- ☞ 3 sensor electrodes
- ☞ Ready to use immediate after switching on the sensor
- ☞ No streaming of the sensor membrane, no sample stirring, very low analyte consumption
- ☞ Concentration ranges: variable on customers request
 - standard: 0-250% saturation resp. 0-20 mg/l
 - and others for concentrations of up to 150 mg/l on request
- ☞ Accuracy of the sensor: better than 2% of the measuring value
- ☞ Measurements within a temperature range of 0°C to 30°C
- ☞ Response time: $t_{90\%}$: down to some hundred milliseconds
- ☞ Average life time: approx. 5...9 months
- ☞ No signal interferences in salt concentrations of up to 40 g/l
- ☞ Cross sensitivities: H_2S (leads to errors and reduced life times)
- ☞ unsuitable for measurements in strong alkaline solutions ($c > 0,02 \text{ mol/l OH}^-$), in strong acid solutions ($c > 1 \text{ mol/l H}^+$) and in organic solvents