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## O<sub>2</sub>-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 parallel the concentration of the measured dissolved oxygen in mg/l or the oxygen saturation in % and the temperature of the sample.

The battery-operated measuring instrument can be equipped with a power supply unit and with a RS 232 interface. By means of exchanging the DO-sensor tip to another micro-sensor tip (e.g. H<sub>2</sub>S, H<sub>2</sub> or O<sub>3</sub>), the measuring instrument could be changed simply into a high performance measuring instrument for dissolved hydrogen or ozone or H<sub>2</sub>S/Sulphide.

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. All these sensor tips can be interfaced very simply to the measuring instrument. Instead the temperature sensor could be used also an combined pH/temperature sensor, if this is required.

The measuring system is equipped with a functional leather case for the whole system with shoulder strap and with belly carrier bag function for easy handling and with a quiver for the sensors. The operation of the measuring device is possible without removing the instrument from the bag. This ensures a simple and protected handling also during field measurements under difficult conditions.

## 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 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
4. Ready for use immediate after switching on the instrument, no polarisation time
5. Exchange of Membrane and/or Electrolyte is not necessary
6. Determination without sampling or adding of chemicals
7. Very low detection limit: down to 0,05 % saturation or 5  $\mu\text{g/l}$
8. High accuracy
9. High economic efficiency (no chemical consumption)
10. Measurements also in turbid, coloured, muddy and salt containing samples
11. Continuous online measurement (not only average values of a big volume)
12. High local resolution of the measurement ( $\mu\text{m}$ -steps)
13. Alternatively display of oxygen concentration in  $\text{mg/l}$  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 for use immediate after switching on the sensor
- ☞ No streaming of the sensor membrane, no stirring, very low analyte consumption
- ☞ Concentration ranges: variable on customers request
  - standard: 0-200% saturation/0-20  $\text{mg/l}$
  - and others for concentrations of up to 150  $\text{mg/l}$  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 because of salt concentrations of up to 40  $\text{g/l}$
- ☞ Cross sensitivities:  $\text{H}_2\text{S}$  (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 ( $c > 0,5 \text{ mol/l H}^+$ ) and in organic solvents