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O_3-Measuring Instrument with Amperometric Micro-sensor

Very fast and accurate determination of dissolved ozone in aqueous solutions without streaming the sensor's membrane

The microprocessor-operated measuring instrument has been developed for the fast and accurate *in-situ* determination of dissolved ozone without any sampling. The instrument is useful for the laboratory and for simple and fast measurements in the field (e.g. swimming pools, drinking water, chemical industry). The instrument is equipped with an amperometric, membrane covered O_3-micro-sensor, which has not to be streamed and with a temperature-sensor. The display shows the concentration of the measured dissolved hydrogen in mg/l 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 O_3-sensor tip against a galvanic oxygen micro-sensor tip, the measuring instrument could be changed fast and simply into a high performance oxygen 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 O_3 and oxygen, there are also micro-sensors available for the determination of dissolved hydrogen, H_2S/Sulphide and hydrogen peroxide. 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 Ozone Measuring Instrument with amperometric Micro-sensor

Compared with the other commercially available so called macro-sensors and compared with the other available high-tech and very expensive instruments (especially optical instruments), the new measuring instrument with amperometric micro-sensor has the following advantages:

1. No streaming of the sensor's membrane necessary, very low analyte consumption
2. No exchange of membrane or electrolyte for maintenance
3. Very fast response time of the sensor (some seconds for $t_{90\%}$)
4. Analysis without any sampling or adding of chemicals
5. Very low detection limit: down to 0,02 mg/l
6. High accuracy
7. High economic efficiency (no chemical consumption)
8. Measurements also possible in turbid, coloured, muddy and salt containing samples
9. Continuous on-line measurements (not only average measurements of a big volume)
10. High local resolution of the measurements (µm-steps)
11. Immediate display of the ozone concentration (mg/l)

Fig.: Amperometric ozone micro-sensor, complete with titanium housing, integrated electronic device and exchangeable sensor tip

Technical Data of the Amperometric Micro-sensor:

- ☞ Measuring principle: amperometry, membrane covered micro-sensor with redox catalyst
- ☞ Polarisation voltage is realised by the integrated electronic device after switching on
- ☞ Polarisation time: approx. 5 minutes
- ☞ 3 sensor electrodes
- ☞ Streaming or stirring not necessary, very low analyte consumption
- ☞ Concentration ranges: variable on customers request
  standard: 0,02...10 mg/l and others on request
- ☞ Accuracy of the sensor: better than 2% of the measuring value
- ☞ Measurements and storage is possible within a temperature range of 0°C to 30°C
- ☞ Response time: $t_{90\%}$: 4,5 seconds
- ☞ Average life time: approx. 5...10 months
- ☞ No signal interferences if the sample contains up to 40 g/l salt
- ☞ Cross sensitivities: H_2S (may lead to errors or sensor damage),
  H_2O_2 (concentrations of more than 2 Vol.%)
- ☞ No cross sensitivities in case of chlorine and oxygen
- ☞ Not suitable for measurements in strong alkaline solutions (c>0,02 mol/l OH^-) and in strong acid solutions (c>0,5 mol/l H^+)