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New membrane covered optical CO₂ sensor for monitoring Online determination of the dissolved carbon dioxide in water

The measurement of dissolved carbon dioxide (excluding HCO₃⁻ and CO₃²⁻) in water is one of the most important parameters for water monitoring. AMT GmbH has developed now a new membrane covered optical CO₂ sensor with titanium housing and other improved characteristics. So the new AMT-CO₂ sensor is designed for depths of up to 1,000 m, has an analogue or digital output, a reduced current uptake and includes an automatic internal temperature compensation. The sensor is designed to be interfaced externally to CTD probe systems, to own measuring systems or as stand alone sensor.

The measuring principle:

The inner sensor volume is separated from the sample by means of a gas permeable silicone membrane. Liquids and solids are not able to pass the membrane. If the sensor is dived into a sample, the CO₂ partial pressure equalisation is achieved between the inner sensor volume and the sample. Inside the sensor there is an optical sensor mounted. It's working principle is based on the Single-Beam Dual Wavelength NDIR. This measurement of the CO₂ partial pressure has to be accompanied by the measurement of the temperature in the water and by the air pressure for calculating the carbon dioxide concentration.

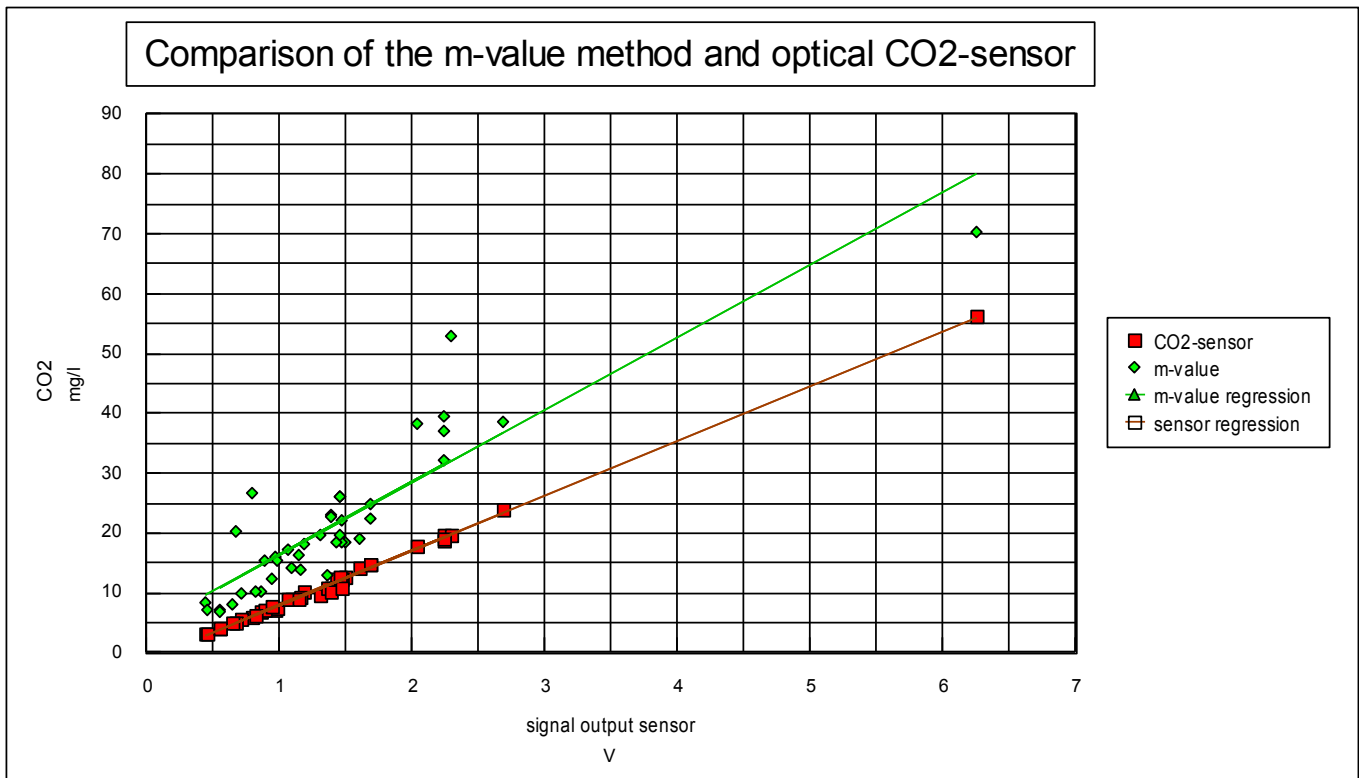
Main features of the Carbon Dioxide Sensor:

- submersible direct reading sensor for natural and industrial waters and sea water
- detects CO₂ and total inorganic carbon when measuring additionally pH
- no signal interferences to silicate, phosphate, HCO₃⁻ and CO₃²⁻
- built-in reference measurement for superior stability
- calibration coefficients stored internally
- for depths of up to 1,000 m
- less than 0.5 W power consumption
- with analogue or digital output (please select)
- with internal temperature compensation
- compensation of humidity and other influences
- heated sensor head to avoid condensation



Fig.: Membrane covered optical carbon dioxide sensor.

The optical carbon dioxide sensor has some advantages compared with the so called m-method, because there are no signal interferences to silicate, phosphate, HCO_3^- and CO_3^{2-} as found in a comparison.



Technical data of the membrane covered optical carbon dioxide sensor:

Carbon Dioxide:

- ☞ Measuring ranges: 15 mg/l, 50 mg/l, 340 mg/l and others on request (please select one)
- ☞ Accuracy: 0...5 mg/l CO₂: ± 0.06 mg/l
 - 5...15 mg/l CO₂: ± 2 % of the measuring value
 - 15...50 mg/l CO₂: ± 3.5 % of the measuring value
 - 50...80 mg/l CO₂: ± 1.5 mg/l CO₂
 - 80...340 mg/l CO₂: ± 6 mg/l CO₂

General:

- ☞ Dimensions: 225 mm length, 33 mm diameter
- ☞ Housing material: Titanium
- ☞ Connector: Subconn MCBH4M
- ☞ Power supply: 12-30 V DC when using the digital or voltage output or 20-30 V DC when using the current output
- ☞ Power consumption: < 0.5 W
- ☞ Warm up time: < 12 seconds, < 2 minutes for full accuracy
- ☞ Maximum deployment depth: 1,000 m/1,000 dbar
- ☞ Available outputs: 4...20 mA, 0...5 V DC or digital output RS485
- ☞ Temperature range for storage and measurement: 0...60°C
- ☞ Internal temperature compensation
- ☞ Compensation of humidity and other influences