

# CO<sub>2</sub> Probe

## Membrane / NDIR

*In situ measurement of dissolved CO<sub>2</sub>*



### Applications

- Monitoring of fish ponds
- Determination of CO<sub>2</sub> in food industry
- Carbon balance studies in lakes and rivers
- Manage and optimization of industrial processes
- In situ measurements in oceanography

### Advantages

- No disturbances due to silicates, phosphates, HCO<sub>3</sub><sup>-</sup> et CO<sub>3</sub><sup>2-</sup>
- RS485 digital output, or analog 4-20 mA / 0-5VDC possible without additional external transmitter
- Stability of measurements < 1% drift of measurement per year
- Measuring chamber heated to prevent condensation

### Submersible for in situ measurements

The measurement of dissolved carbon dioxide is a very important parameter for the assessment of pond water quality in fish farming, the optimization of industrial processes and the monitoring of marine and freshwater waters.

The determination of dissolved CO<sub>2</sub> concentrations by techniques using samples, proves tedious and imprecise due to the influence of other compounds on the pH, such as phosphates, silicates, hydrogenocarbonates and carbonates. In addition, a direct-reading immersed sensor is necessary to allow measurement without altering the temperature and pressure parameters which have a direct influence on this dissolved gas.

The CO<sub>2</sub> sensor allows the measurement of the partial pressure of carbon dioxide directly in the water, thanks to a specific membrane permeable only to gases covering an infrared sensor. This partial pressure must be coupled by a measurement of the temperature of the field for the calculations of concentrations, calculation formulas are provided.

### Wide range of applications

The CO<sub>2</sub> probe covers a wide range of applications thanks to its titanium body and its possible use for water up to 1000 meters deep (1000 dbar pressure) and temperatures up to 60 ° C.



- Pin 1 : power ground
- Pin 2 : analogue ground
- Pin 3 : CO<sub>2</sub>-signal output :  
4 ... 20 mA
- Pin 4 : power supply 11 ...  
+20 V DC

The probe is equipped with a silicone membrane making it possible to isolate the volume of the measuring chamber from the liquid medium in which the probe is immersed. Only the gases pass through the side walls, so once the sensor is immersed, the partial pressures of CO<sub>2</sub> equalize between the middle and the internal volume of the sensor.

An optical sensor is placed inside, it uses the principle of non-dispersive infrared absorption (NDIR). The CO<sub>2</sub> molecules present in the measurement chamber absorb some of the infrared radiation emitted by the sensor. The radiation attenuation is therefore directly proportional to the amount of CO<sub>2</sub>. This partial pressure measurement must be coupled by the values of temperature and atmospheric pressure to calculate the concentration of dissolved CO<sub>2</sub> in mg/l (formulas provided).

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### Technical specifications

Measurement technology	Measuring chamber Detector	Silicone membrane NDIR dual-beam infrared single beam optical sensor
Principle of measurement		Absorption by attenuation
Parameter		pCO <sub>2</sub>
Measurement ranges	Type I	0...15 mg/l CO <sub>2</sub>
	Type II	0...30 mg/l CO <sub>2</sub>
	Type III	0...340 mg/l CO <sub>2</sub> (others on request)
Measurement accuracies	0 - 5 mg/l CO <sub>2</sub>	+/- 0,06 mg/l
	5 - 15 mg/l CO <sub>2</sub>	+/- 2 % of the measuring value
	15 - 50 mg/l CO <sub>2</sub>	+/- 3,5 % of the measuring value
	50 - 80 mg/l CO <sub>2</sub>	+/- 1,5 mg/l
	80 - 340 mg/l CO <sub>2</sub>	+/- 6 mg/l
Probe Body Materials		Titanium
Dimensions (L x d)		225 mm x 33 mm
Connector		SubConn MCBH4M
Interface	Digital	RS-485
	Analog	4-20 mA, 0...5 VCC
Power supply		12...30 VCC (with digital output or 0-5 VCC) - 20...30 VCC (with 4-20 mA output)
Consumption		< 0,5 W
Maintenance		<0.1h / week (standard use - membrane cleaning)
Calibration interval		24 months - drift <1% of the measure per year
Warranty		24 months in the European Union
Maximum pressure		1,000 meters / 1,000 dbar
Temperature of the medium / sample		+ 0 ... + 60 °C
Ambient temperature		- 5 ... + 55 °C
Storage temperature		- 20 ... + 80 °C

