Lab-on-Chip Total Alkalinity Sensor

Technology description

The lab on chip total alkalinity (TA) sensor is an autonomous submersible sensor which performs a single-point open cell titration with spectrophotometric measurement. A custom designed pump and multiple solenoid valves process environmental samples, reference materials, and chemical reagents within the device. A custom electronics package controls the system, logs data, and provides communications. The sensor is based on hardware that has previously operated at full ocean depth (6000 m) by using an oil-filled pressure-compensated housing, although the TA sensor itself has only been demonstrated to 120 m.

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Environments and platforms where technology has been demonstrated

Laboratory, estuaries, CTD casts, benthic landers, remote-operated vehicle

Analytical performance

The sensor is under continual development but has been demonstrated to the following specifications

Max. sample rate:	12 minutes (un-calibrated), 36 minutes (fully calibrated)
Calibration method:	analysis of on-board reference materials
Accuracy & precision:	~5 umol/kg
Sample volume:	3.6 mL per measurement
Range:	Adjustable, but a range of approx.. 600 umol/kg
Deployment depth:	demonstrated to 120 m, should go to 6000 m
Endurance:	600 measurements with every measurement calibrated
Temperature range:	5-30°C (demonstrated, could probably be used from -1-35°C)

Power and communications requirements

Voltage range:	10 V to 16 V default, up to 24 V if requested
Power consumption:	2.0 W (typ.)
Current draw (12 V):	180 mA average, 385 mA maximum
Output interface :	RS232, RS485, USB
Connector type :	IE55 6-way or SubConn MCIL8M

Dimensions and weight

Dimensions:	17 cm long, 15 cm diameter (without reagent housing)
	56 cm high, 20 cm diameter (sensor with reagent housing)
Weight in air:	3.6 kg (without reagent housing)
	6 kg (sensor with reagent housing)
Weight in water:	0.85 kg

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