



Novel Self-Calibrating pH Sensors

9th EuroGOOS, May 2021

ANB Sensors

2015

ANB Sensors
Founded



2016

Market Feasibility
innovate UK

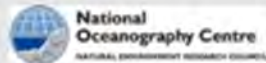
2017

Phase 1



Liver on a chip grant
innovate UK

OA sensors contract



2018

Phase 2



iCal sensor grant
innovate UK

pH sensor for AUVs grant



2019

Mixed solvents grant



2020

Investment round



Commercialisation of
oceanographic sensors
S1000 & S1100

S Series Product Portfolio

tailored for specific needs



Commercialised
Dec'21

S1000
Integration kit



Q3 2021

S1010
Shallow 25m



Commercialised
Dec'21

S1100
Ocean 300m



Q3 2021

S1200
Ocean 2000m



Q4 2021

S1300
Ocean > 2000m

Target markets:

Oceans

Aquaculture

Hydroponics

Water

Wastewater

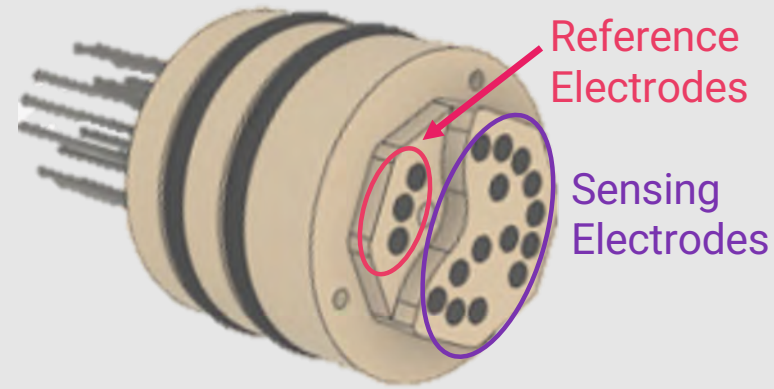
S Series Oceanographic pH Sensor

Calibration Free
Easy to use
Smart
Solid state

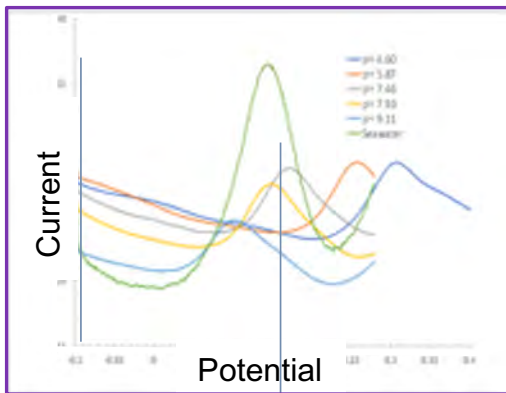
Accuracy +/- 0.05 pH units
Frequency > 30 secs



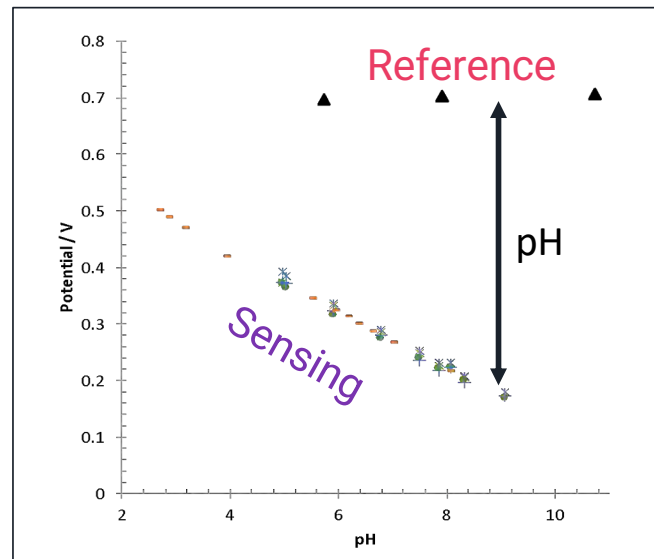
Sensing Element



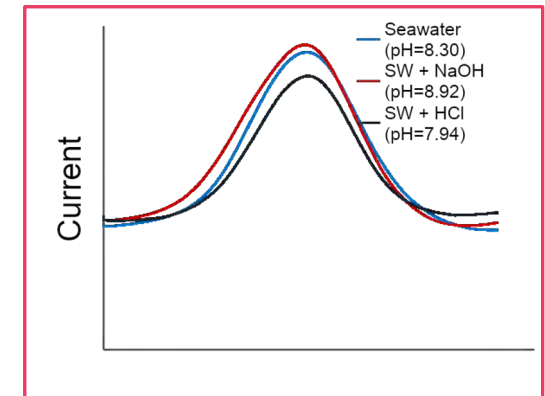
Sensing System



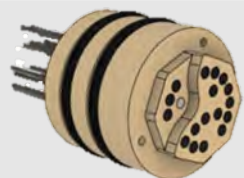
peak potential moves with pH



Reference System

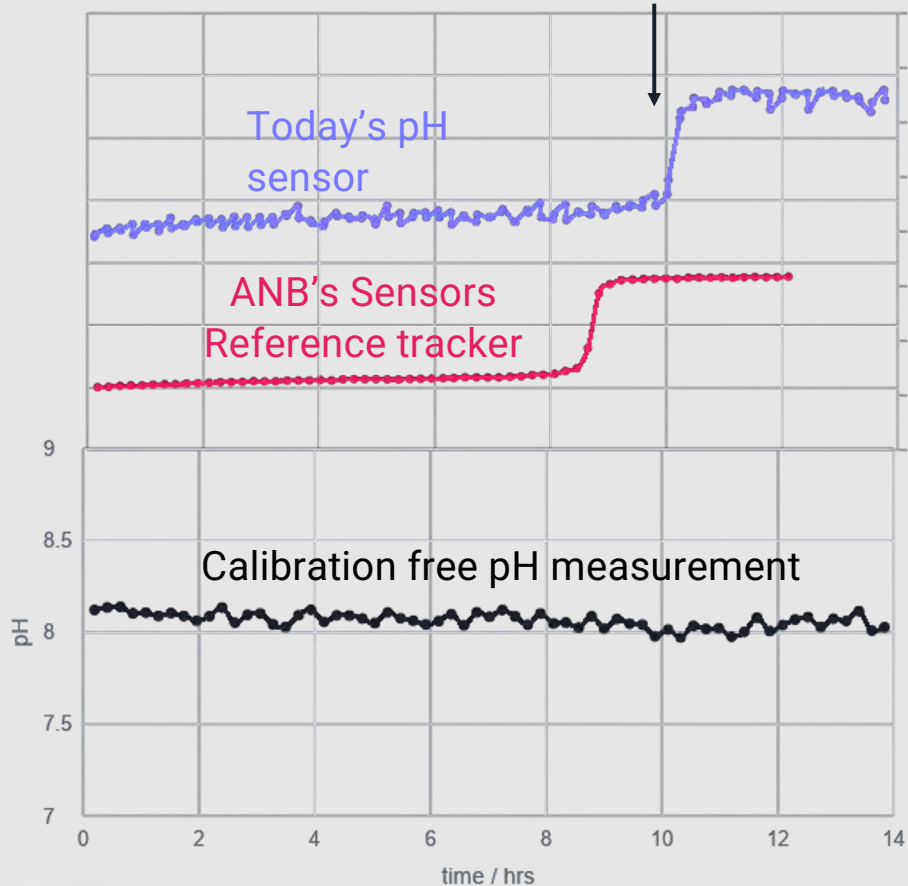


peak potential is stable with pH

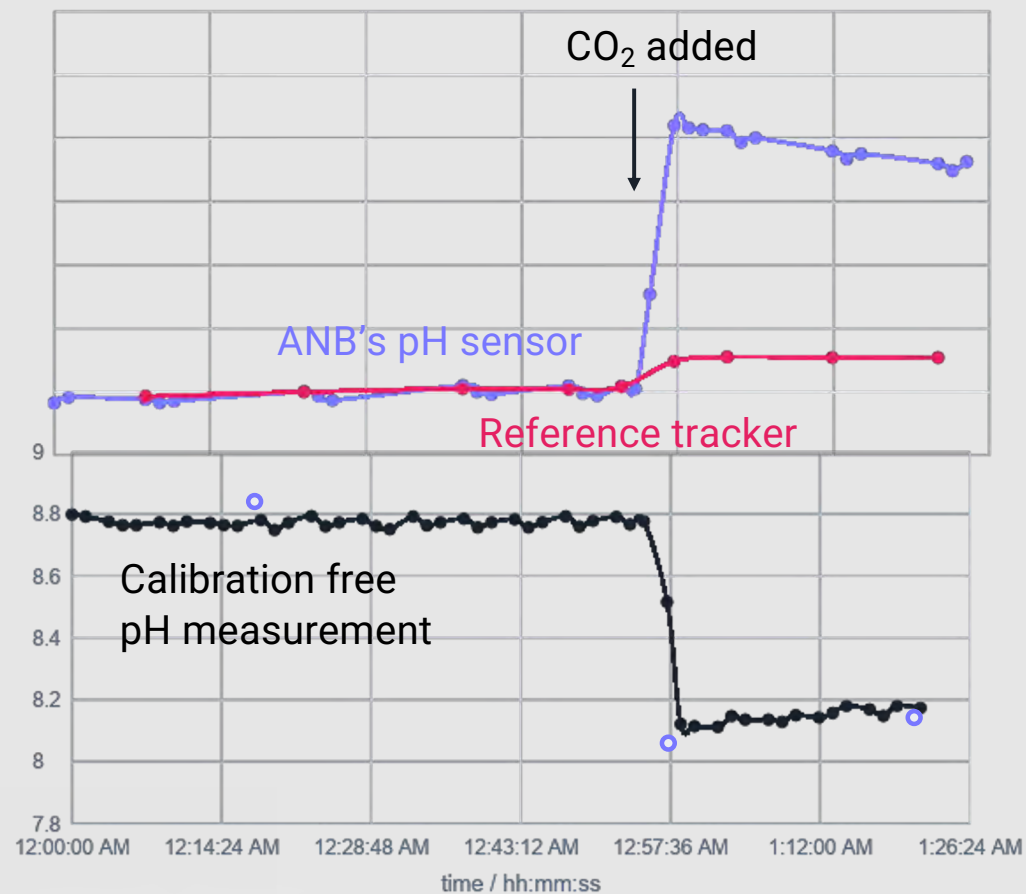


S Series in action

Reference shift

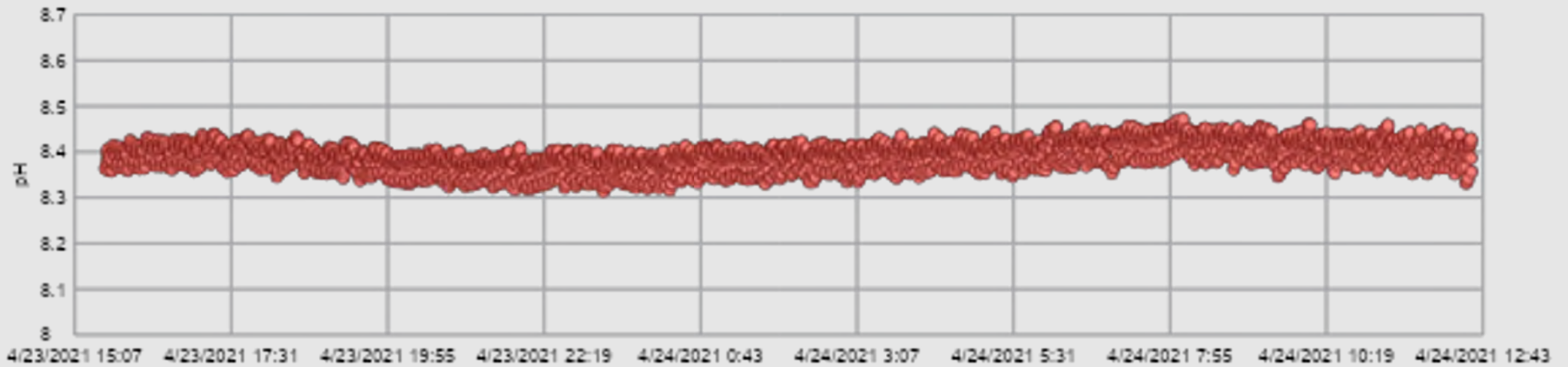


CO₂ added

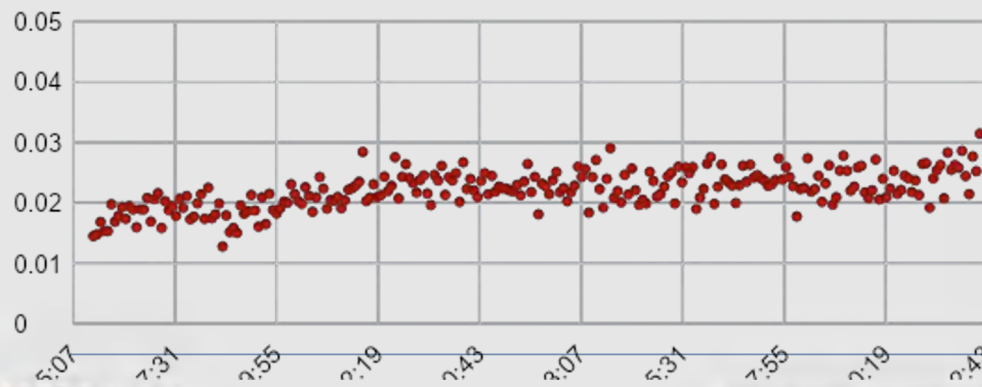


Tank test Data

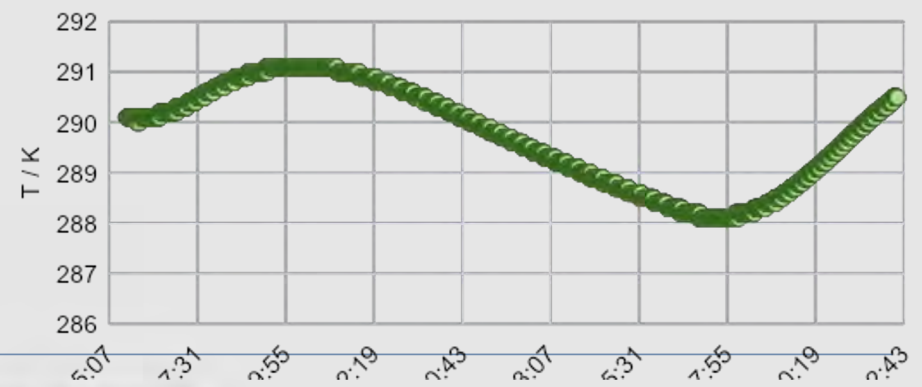
pH



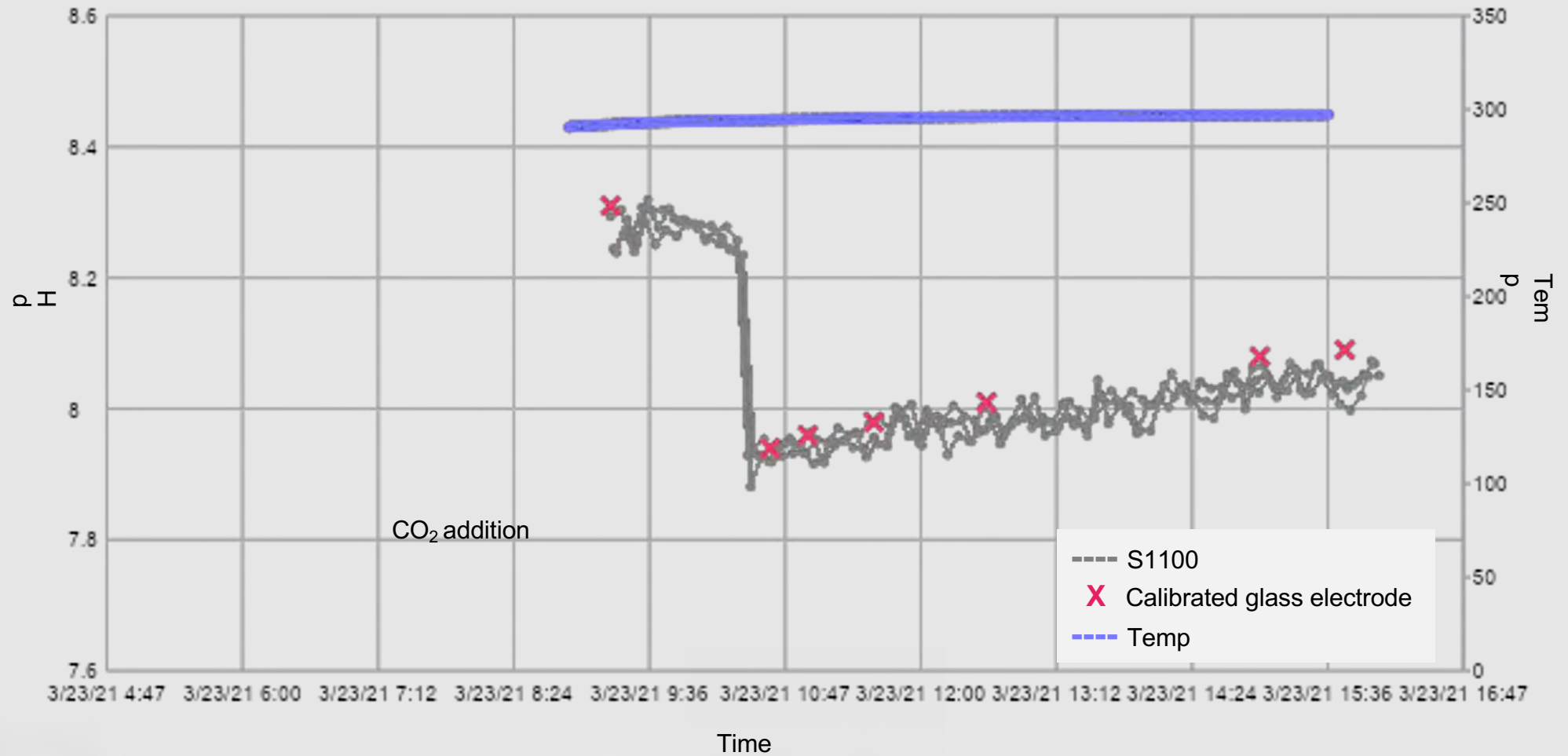
st dev



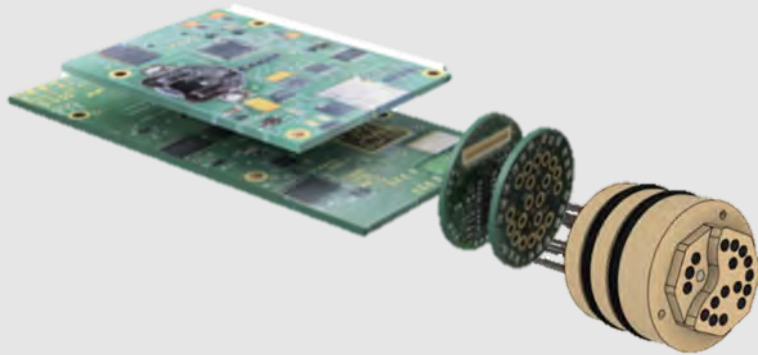
Temperature / K



Manipulating pH



Control Unit



Supply Voltage	External	6.5 to 20 VDC
Power Consumption	Sampling	ca. 110 mA
	Sleep	5 mA
Storage		8 GB
Communication		RS485, RS232

Stand

alone

Sensor runs on pre-set measurement cycle

Data downloaded after deployment

User

Control

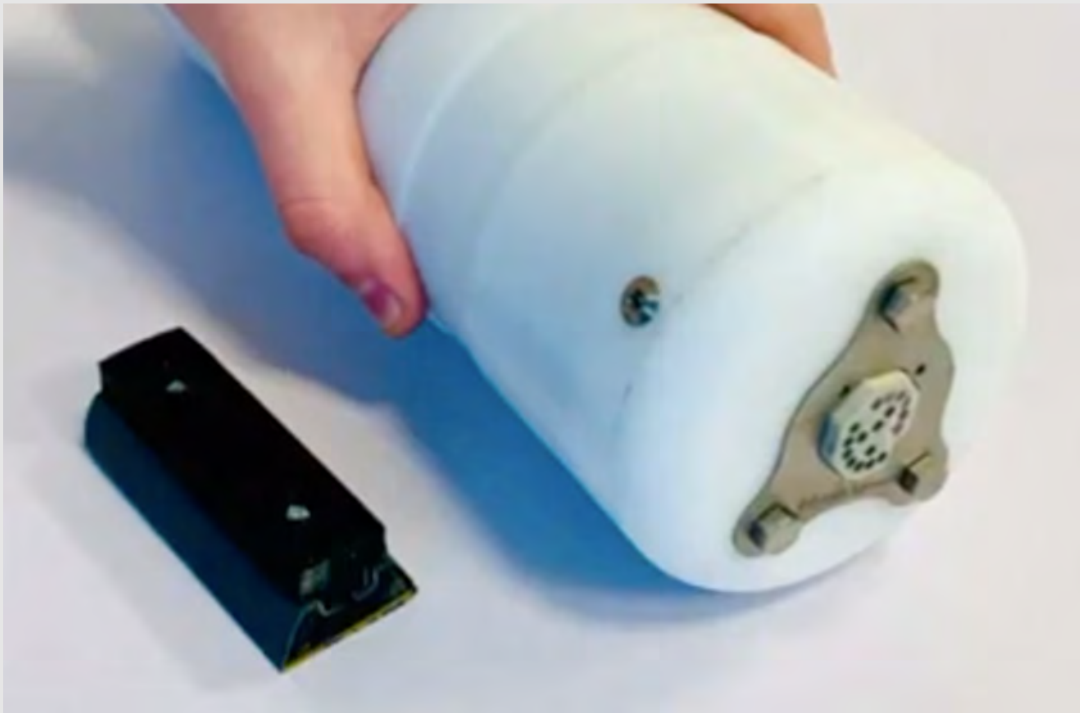
Sensor runs using simple command structure:

SCAN - starts sensor scanning

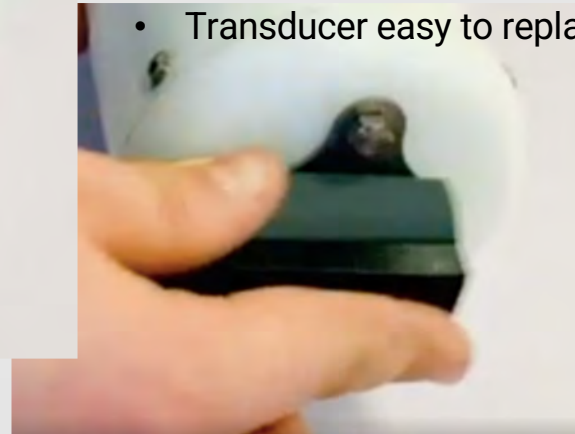
SHUTDOWN - stops sensor

Capable of being deployed as a stand alone system or onboard an UV

Transducer Lifetime



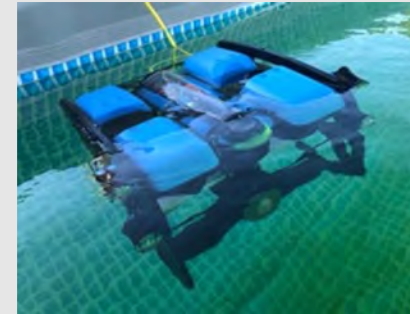
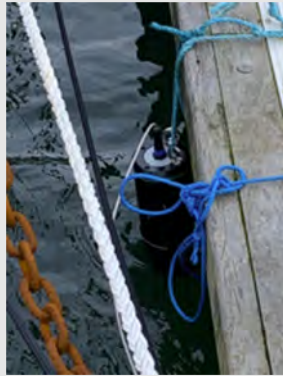
- Lifetime is scan dependent
- Quick abrasion of surface with abrasion block is all the maintenance needed, no recalibration required
- Sensor will tell customer when abrasion is necessary
- After several abrasions, transducer requires replacement
- Transducer easy to replace



Field Trials



Ferry,
Helsinki-Stockholm



Solution	ANB pH	Glass pH
Sea water (32C)	8.35	8.39
Sea water (23C)	8.22	8.25
Sea water (10C)	8.06	8.09

Product Line



Sensor

Parameter	Range	Accuracy	Resolution	Response Time
pH	2-10	0.05 pH	0.005 pH	Instantaneous

Technology designed to remove reference electrode drift

Solid state design provides robust interface

Voltammetry provides end-user with QAQC on signal

Field trials show system works in operational environment

Physical Characteristics

	S1000	S1100	S1200	S1300
Housing Material	None	Delrin	Delrin + pressure insert	Titanium
Diameter (mm)	60	90	90	47
Length (mm)	150	286	286	175
Approx. Weight in Water (Kg)	N/A	-0.7 or 0.2	2.0	0.3
Approx. Weight in Air (Kg)	0.2	1.75	3.8	0.5

Environmental

Operating Temperature	-5 to 40 C
Salinity Range	10 to 35 PSU
Depth Range	up to 200 bar

Acknowledgements



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Chemistry



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Mech. Eng.



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Physics



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Thankyou

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 www.anbsensors.com