

## Optical Fast Oxygen sensor “**RINKO**” integrated CTD-Profiler scheduled to be released in Dec.

The fast response optical oxygen sensor, “RINKO” will be integrated in COMPACT-CTD and AAQ series. JFE ALEC will release them in December, 2009. In 2007, JFE ALEC decided to develop a new optical (phosphorescence) oxygen sensor which has a capability of fast response, high resolution and high accuracy. Since a year ago, we have tested, evaluated and modified the prototype sensors in cooperation with some valuable customers and finalized to meet all the target values. The response time of <1 second (90%) is the fastest response time in the world. The accuracy (linearity: <2%) and the resolution (0.1%) are also the highest level compared with the other current oceanographic and limnologic sensors. The sensor stability and depth rating are clearly better than our galvanic sensors. It provides the sub-meter resolution of oxygen gradients to ocean, lakes and rivers.

### The COMPACT-CTD and AAQ series with “RINKO” make drastic changes in aqua-oxygen profiling.

- *Sub-meter oxygen structure available*  
The oxygen sensor marks the response time of <1 second (at 25 °C in atmosphere). The resolution indicates 0.1%. Those properties should be sufficient enough for profiling observation to realize the microstructures of oxygen in the field.
- *No need to stay at the target depths*  
The fast response capability will avoid the instrument to stay at each measuring depth. The instrument can be continuously moved at the speed of 0.5 m/sec.
- *No need to change the membrane*  
The galvanic sensor requires changing the membrane filter in the sensor with a short cycle. RINKO does not need it because it has an optical principle. The stability (<5%/month) is better than the galvanic models.
- *No oxygen consumption, mixing not required*  
The optical principle does not consume oxygen around the sensor. In addition, RINKO provides high-accuracy measurement without mixing the surrounding water.



Galvanic type sensor  
(COMPACT-DOW)

- Lower response
- Required changing of the membrane
- Oxygen consumption on the membrane



Optical “RINKO” sensor

- High response (90%-response < 1 sec)
- No membrane.
- No Oxygen consumption

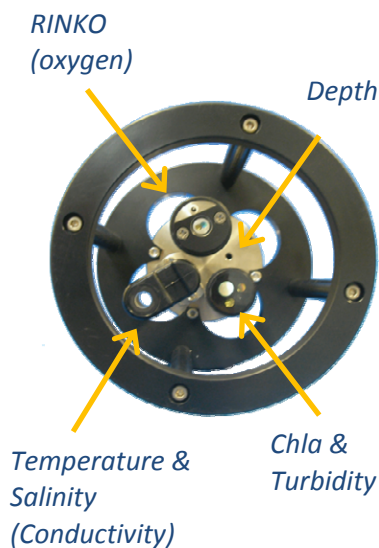
They easily provide high-accuracy and high resolution oxygen profiles without any stresses. Why don't you select them if you want to measure multi-parameters with oxygen?

## RINKO-Profiler (COMPACT-CTD+RINKO)

### - Self-recording profiler-

The model integrates a RINKO sensor in COMPACT-CTD (See ALEC technical express, Vol.2. Available to downloading from ALEC website: [www.jfe-alec.co.jp](http://www.jfe-alec.co.jp)). It can simultaneously profile temperature, depth, salinity, Chla, turbidity and oxygen. The profile data are automatically saved in the internal memory during the deployment.

The instrument has two measuring mode with different trigger to measure and save their parameters. One is “depth-trigger”. The user can arbitrarily defined sampling depths before the measuring. The other one is “time-trigger”. This mode can obtain the data at user-defined time interval.



RINKO-profiler  
(COMPACT-CTD+RINKO)

Interface  
(For sensor charging,  
setup, data down  
loading)



PT-10  
(Interface &  
printer)



## Sensor Specification

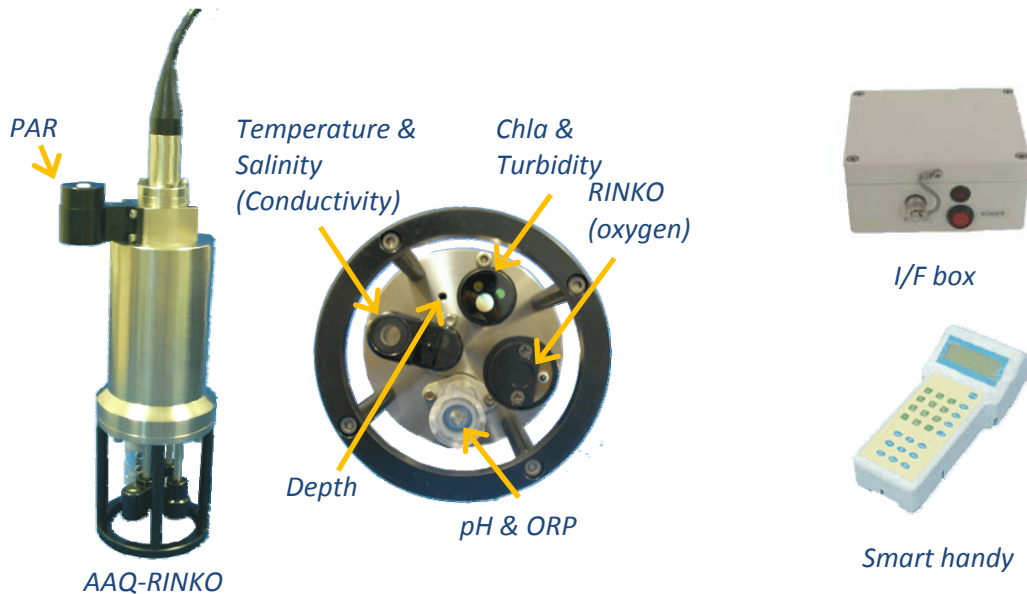
	Measurement principle	Rage	Resolution	Accuracy	Response time
<b>Oxygen</b>	Phosphorescence	0 to 20mg/l (0 to 200%)	0.001mg/l (0.01%)	± 0.4mg/l (±2%)	1 sec.
<b>Temperature</b>	Thermistor	-5 °C to 40 °C	0.001 °C	±0.01°C	0.2sec.
<b>Conductivity</b>	Electrode	0 to 65 mS/cm	0.001mS/cm	±0.01mS/cm	0.2sec
<b>Depth</b>	Semiconductor	0 to 1000m	0.02m	±0.3% FS	0.2sec.
<b>Salinity</b>	(UNESCO formula)	0 to 40 (psu)	0.001 (psu)	±0.01 (psu)	0.2sec.
<b>Turbidity</b>	Backscattering	0 to 1000FTU	0.03FTU	±2%	0.2sec.
<b>Chla</b>	Fluorescence	0 to 400ppb (Calibrated against Uranine solution)	0.01ppb	±1%	0.2sec.

## AAQ-RINKO

- Real-time monitoring profiler -

A water quality instrument, AAQ series gets an optical DO sensor, RINKO instead of a galvanic sensor for oxygen measurements. The instrument can observe up to 9-parameters (temperature, depth, salinity, Chla, Turbidity, pH, PAR, ORP and oxygen) regarding water qualities. User can work monitoring and watch the profiles with the display in real time.

Depending on the monitoring style and demanded parameters, the user can select one of 4 instrument models (AAQ-1180, 1182, 1183, 1186) and one of processing units (smart handy and interface unit). If interface unit is selected, the user needs to prepare a PC to monitor and save profiling data.



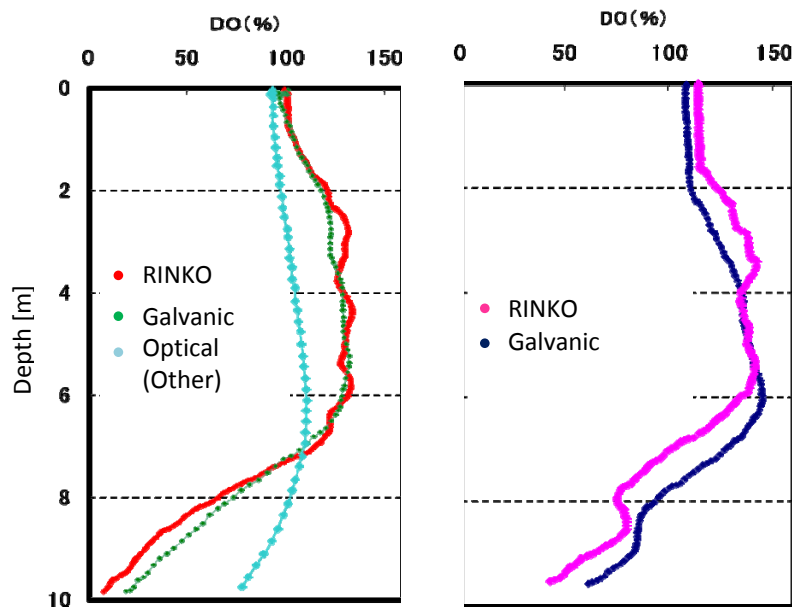
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<b>Turbidity</b>	Backscattering Near-infrared photodiode	0 to 1000FTU	0.03FTU	±2%	0.2sec.
<b>Chla</b>	Fluorescence photodiode	0 to 400ppb (Calibrated against Uranine solution)	0.01ppb	±1%	0.2sec.
<b>PAR</b>	Photodiode	0 to 5000µmol/m <sup>2</sup> /s	0.1µmol/m <sup>2</sup> /s	±5%	0.2sec.
<b>pH</b>	Glass electrode	pH2 to pH14	pH0.01	±pH0.2	10sec.
<b>ORP</b>	Electrode	±1000mV	0.1mV		10sec.

### A comparison among 3-type commercialized sensors

Here are oxygen profiles by 3-type oxygen sensors [A: optical sensor of another manufacture, B: galvanic sensor of JFE ALEC, C: RINKO] at a Japanese coastal station (Ago bay) in summer. According to catalog specifications, the response times of A-sensor, B-sensor and C-sensor (RINKO) have 15 seconds (63%-response), 5 seconds and 1 second (90%-response), respectively. The profiling (down-falling) speed was 10cm/second. The station had a Chla maximum layer in the middle of the water column and hypoxic-oxygen water near the bottom.

The left figure shows a comparison among 3-type sensor. The profile of A-sensor showed a smooth line. Other manufacture's optical sensor seemed that it did not observe the correct oxygen profile because of the longer response time. There were differences in both profiles of the galvanic sensor and the RINKO. Especially, the difference was significant in the layers with high gradients. The right figure is a new vertical profile to compare the galvanic sensor with the RINKO. As well as the left figure, the profile indicated differences in the maximum layer and around the bottom water. We think both profiles figure out an importance of the fast response in oxygen profiling, even though the profiling speed is slow such as 10cm/second.



A field comparison among 3-type sensors (RINKO, galvanic sensor and other manufacture's optical sensor). The left shows oxygen profiles by the 3-sensors. The right is a profiling plot by the RINKO and the galvanic sensor.

For more information and contact:



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