Fast optical DO sensors

RINKO series

ISO9001
JQA-0950

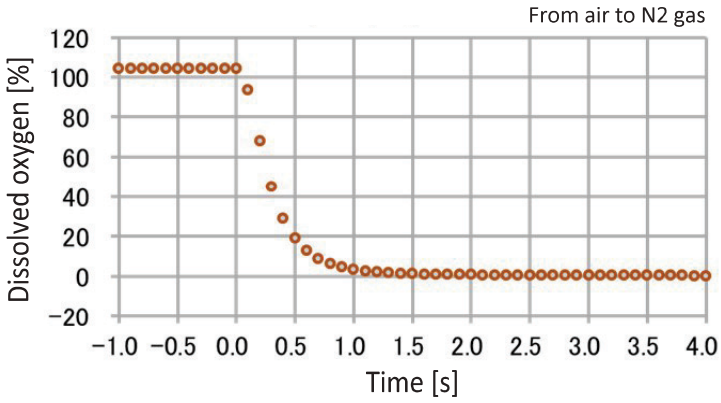
Incredibly fast DO measurements for any aquatic environment.

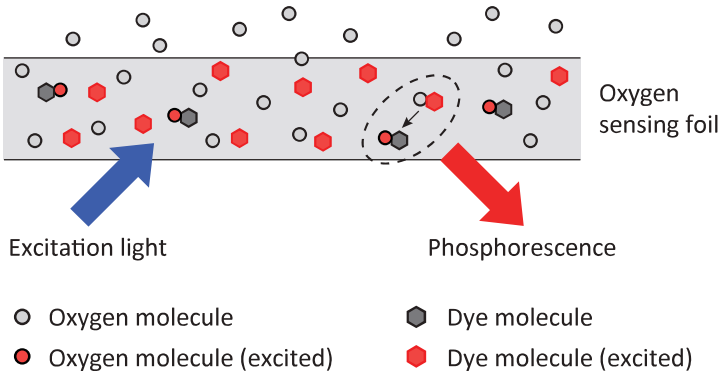
- Fast response (90%: less than 1s in air)
- High accuracy
- DO distribution at high spatial resolution
- Continuous vertical data sampling at 0.5 m s^{-1}

JFE

JFE Advantech Co., Ltd.

RINKO is a fast-response, high-accuracy, and high-resolution dissolved oxygen (DO) sensor based on phosphorescence principle. Compared to commercial galvanic, clark-cell, and optical DO sensors, RINKO has the fastest response time of less than 1 s in air (90% response, typical). This notable feature enables DO measurements with continuous DO profiling at high speed (~ 0.5 m s^{-1}) and to acquire high resolution DO distributions.

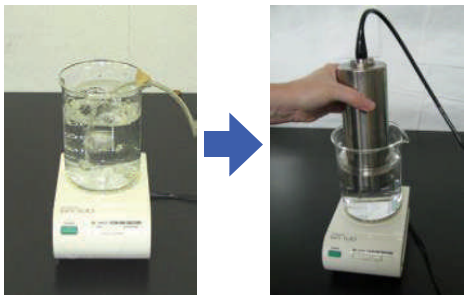




The DO sensor is coated with photostimulable phosphor (PSP) on the outside of the pressure-resistant acrylic optical window, measuring phosphorescence quenching phase shift. The excitation blue LED pulse generates a red phosphorescence pulse, which in turn has an inverse correlation with the oxygen partial pressure in the water. Since oxygen molecules are not consumed in this process, there is NO need for stirring.

The 2-point calibration compensates the time-drift of the sensing foil, ensuring reliable and accurate DO data. The method consists in recalibrating the DO sensor in two points using an air-bubbled water for DO 100% and a sodium sulfite solution for DO 0%.

First calibration (DO 100%)



Air bubbling water　　Span calibration

Second calibration (DO 0%)

Sodium sulfite solution　　Zero calibration

■ Sensor specifications

Product name	RINKO I / I D, RINKO II / II D, RINKO III		
Model name	ARO-USB, ARO05/1/2/5-USB, ARO-CAR/CAD, ARO05/1/2/5-CAR/CAD, ARO-CAV		
Parameter	DO	Temperature	Depth
Principle	Phosphorescence	Thermistor	Semiconductor
Range	Air saturation 0 to 200%	-3 to 45 °C	0 to 50 m (ARO05-USB/CAR/CAD) 0 to 100 m (ARO1-USB/CAR/CAD) 0 to 200 m (ARO2-USB/CAR/CAD) 0 to 500 m (ARO5-USB/CAR/CAD)
Resolution	0.01 to 0.04%	0.001 °C	Approx. 1/30,000 of full scale
Accuracy	Non-linearity ±2% of full scale (at 1 atm, 25 °C)	±0.02 °C (ARO-CAV: 3 to 31 °C) (Others: 0 to 35 °C)	±0.3% of full scale

RINKO I / I D

RINKO I (ARO-USB) is an autonomously deployable data logger. The instrument has various operating modes, offering flexibility when carring out abservations. The compact size containing the data logger and batteries allows for being easily integrated on deffierent platforms. **RINKO I D** (ARO05/1/2/5-USB) has an additional depth sensor, allowing for measurements of DO vertical distribution.

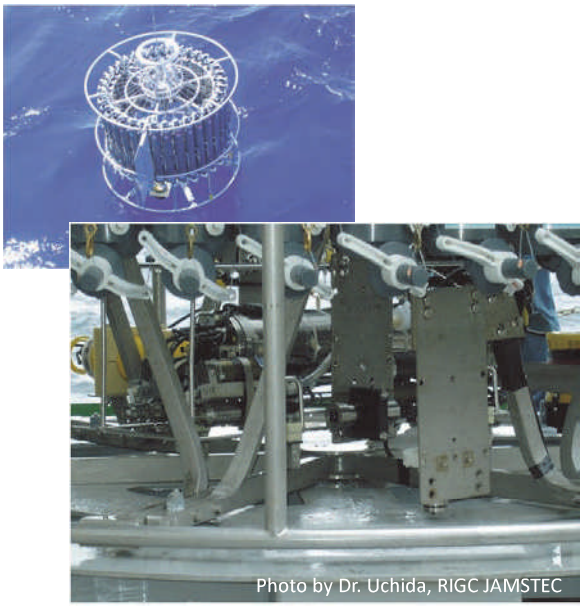
RINKO II / II D

RINKO II (ARO-CAR/CAD) is a digital output model (wired). The instrument can be easily integrated on different platforms (e.g., gliders), since it works with RS-232C (CAR) or RS-485 (CAD) communication protocols and external power (12 – 24 VDC). **RINKO II D** (ARO05/1/2/5-CAR/CAD) has an additional depth sensor, allowing for measurements of DO vertical distribution. These two models can monitor DO concentration in real time.

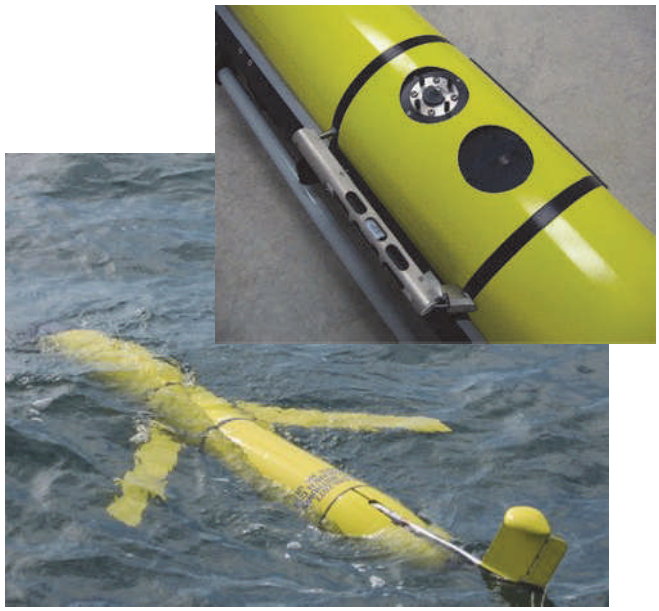
RINKO III

RINKO III (ARO-CAV) is an analog output model that works with an external 12 – 24 VDC power. The instrument seamlessly outputs the alalog data with 0 – 5 V. **RINKO III** can be easily installed on various platforms with an Impulse connector. The instrument provides high accurate DO data without limiting profiling speed.

Impulse connector AG306-HP



RINKO on CTD-RMS



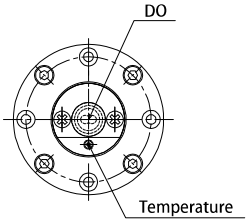
RINKO on Glider

Instrument specifications

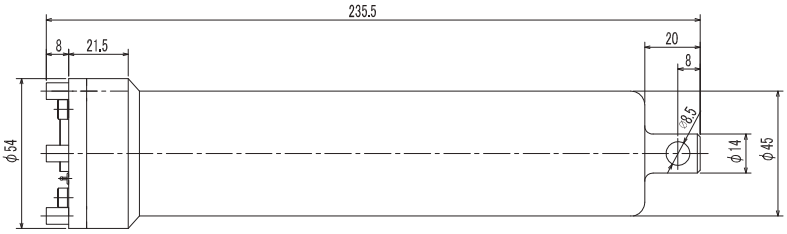
Product name	RINKO I	RINKO ID
Model name	ARO-USB	ARO05/1/2/5-USB
Measuring mode	Continuous mode, Burst mode	
Measuring interval	0.1 to 0.9 s (0.1 s increment), 1 to 600 s (1 s increment)	
Burst sampling interval	1 to 1,440 min	
Number of samples	1 to 18,000	
Memory medium	1 GB miniSD card	
Communication	USB 2.0 (ver. 1.1 compatible)	
AD converter	16 bit digital conversion	
Battery	CR-V3 3.3Ah Lithium battery / max 2 pieces	CR-V3 3.3Ah Lithium battery / max 4 pieces
Current drain	125 mA	130 mA
Material	Titanium (Ti-6Al-4V)	Titanium (grade 2)
Dimensions	Φ54 × 235.5 mm	Φ70 × 232 mm
Weight	Approx. 0.9 kg in air, 0.6 kg in water	Approx. 1.2 kg in air, 0.6 kg in water
Pressure rating	7,000 m depth equivalent	Depends on the pressure sensor rating

Product name	RINKO II	RINKO IID	RINKO III
Model name	ARO-CAR/CAD	ARO05/1/2/5-CAR/CAD	ARO-CAV
Signal output	CAR: RS-232C, CAD: RS-485		0 to 5 V analog
Communication	Handshake		—
AD converter	16 bit digital conversion		—
Power	12 to 24 VDC		
Current drain	35 mA		
Material	Titanium (grade 2)		Titanium (Ti-6Al-4V)
Dimensions	Φ54 × 184 mm (w/o connector)	Φ70 × 173 mm (w/o connector)	Φ54 × 164.5 mm (w/o connector)
Weight	Approx. 0.5 kg in air, 0.3 kg in water	Approx. 1.0 kg in air, 0.5 kg in water	Approx. 0.8 kg in air, 0.5 kg in water
Pressure rating	1,000 m depth equivalent	Depends on the pressure sensor rating	7,000 m depth equivalent
Connector	LEMO or fixed type		AG306-HP (Impulse Technologies, Inc.)

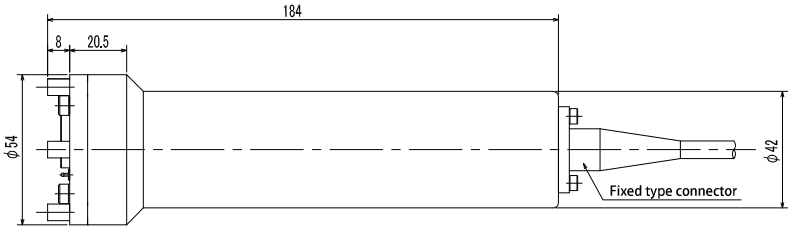
Drawings



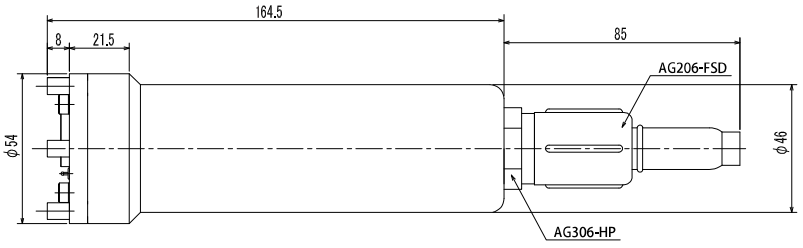
RINKO I



RINKO II



RINKO III



Dimensions are in mm.

※ All specifications on this leaflet are subject to change without notice.

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