Fast optical DO sensors



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Incredibly fast DO measurements for any aquatic environment.







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



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	



RINKOI/ID



RI.VKO 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. **RI.VKO I D** (ARO05/1/2/5-USB) has an additional depth sensor, allowing for measurements of DO vertical distribution.

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-6AI-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	RINKOII	RINKOIID		RINKOIII	
Model name	ARO-CAR/CAD	RO-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-6AI-4V)	
Dimensions	Φ54 × 184 mm (w/o connector)	Φ70 × 173 mm (w/o connector)		Φ 54 × 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





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