

## Fast optical DO sensors

# RINKO series



Incredibly fast DO measurements for any aquatic environment.



***RINKO I***

***RINKO II***

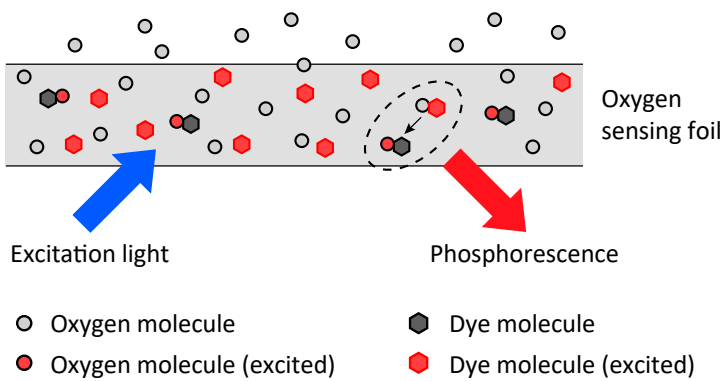
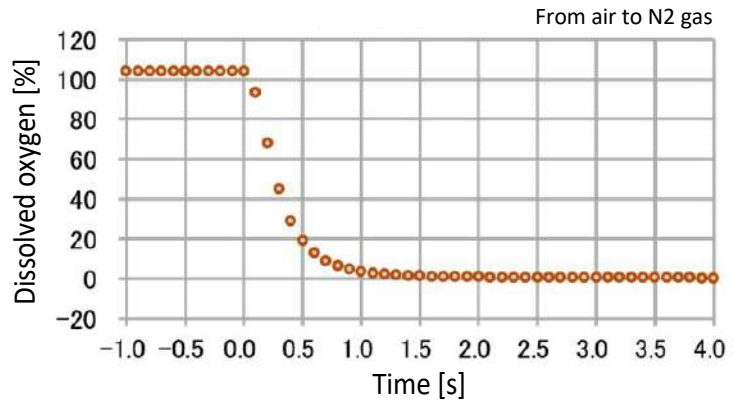
***RINKO III***

- 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<sup>-1</sup>



**JFE Advantech Co., Ltd.**

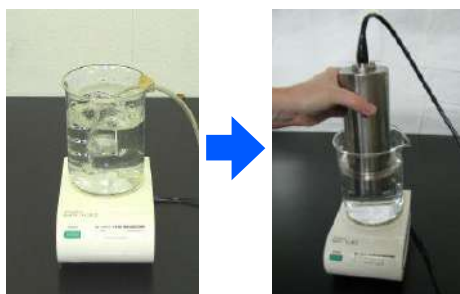
**RINKO** is a fast-response, high-accuracy, and high-resolution dissolved oxygen (DO) sensor based on phosphorescence principle. Compared to commercial galvanic, Clark-cell, and optical DO sensors, **RINKO** has the fastest response time of less than 1 s in air (90% response, typical). This notable feature enables DO measurements with continuous DO profiling at high speed ( $\sim 0.5 \text{ m s}^{-1}$ ) 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	<b>RINKO I / RINKO II / RINKO III</b>	
Model name	ARO-USB, ARO-CAR/CAD, ARO-CAV-CM	
Parameter	DO	Temperature
Principle	Phosphorescence	Thermistor
Range	Air saturation 0 to 200%	-3 to 45 °C
Resolution	0.01 to 0.04%	0.001 °C
Accuracy	Non-linearity $\pm 2\%$ of full scale (at 1 atm, 25 °C)	$\pm 0.02$ °C (ARO-CAV: 3 to 31 °C) (Others: 0 to 35 °C)

**RINKO I**



**RINKO I** (ARO-USB) is an autonomously deployable data logger. The instrument has various operating modes, offering flexibility when carrying out observations. The compact housing containing the data logger and batteries allows for being easily integrated on different platforms.

**RINKO II** (ARO-CAR/CAD) is a digital output model. The instrument can be easily integrated on various 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**



**RINKO III**



**RINKO III** (ARO-CAV-CM) is an analog output model. It is powered by an external power (12 – 24 VDC) and seamlessly outputs the analog data (0 – 5 V). **RINKO III** can be easily installed on various platforms and provides high accurate DO data without limiting profiling speed.

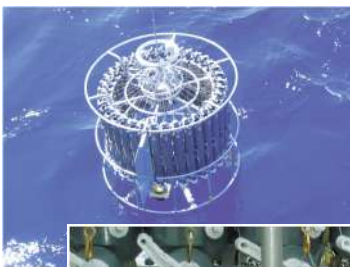


Photo by Dr. Uchida, JAMSTEC

RINKO on CTD-RMS

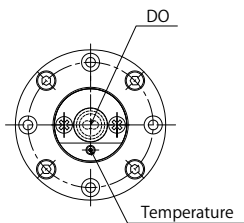


RINKO on Glider

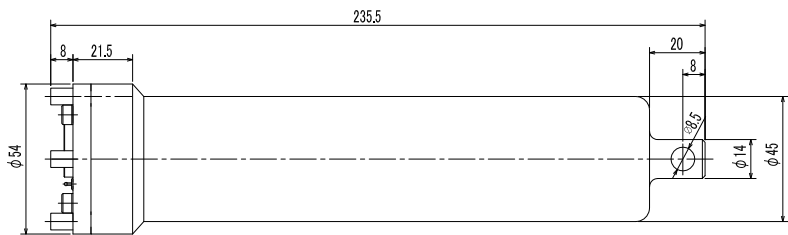
■ Instrument specifications

Product name	<b>RENKO I</b>	
Model name	ARO-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	
Current drain	125 mA	
Material	Titanium (Ti-6Al-4V)	
Dimensions	Φ54 × 235.5 mm	
Weight	Approx. 0.9 kg in air, 0.6 kg in water	
Pressure rating	7,000 m depth equivalent	
Product name	<b>RENKO II</b>	<b>RENKO III</b>
Model name	ARO-CAR/CAD	ARO-CAV-CM
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 × 185 mm (w/o connector)	Φ54 × 164.5 mm (w/o connector)
Weight	Approx. 0.5 kg in air, 0.3 kg in water	Approx. 0.8 kg in air, 0.5 kg in water
Pressure rating	1,000 m depth equivalent	7,000 m depth equivalent
Connector	Fixed type (standard) or detachable type	Standard: MCBH8MTI or Option: AG306-HP

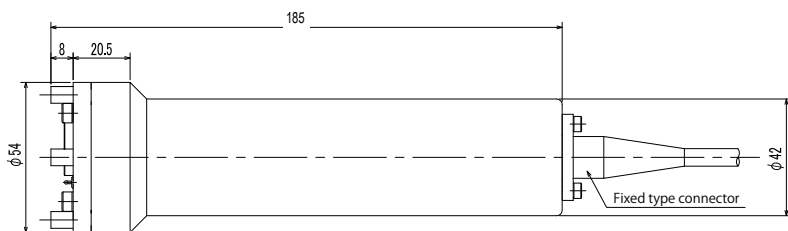
■ Drawings



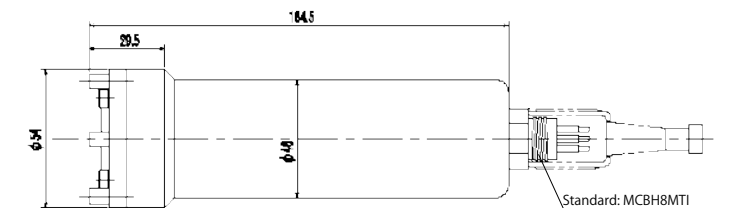
**RENKO I**



**RENKO II**



**RENKO III**



Dimensions are in mm.

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



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