



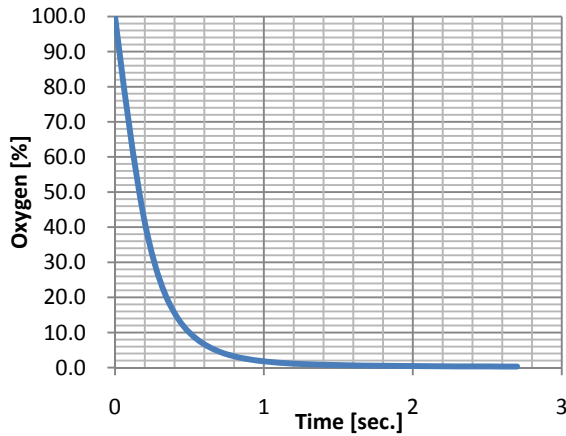
RINKO Fastest-Optical Oxygen Sensor

RINKO is a fast-response, high-accuracy and high-resolution oxygen sensor based on an optical (phosphorescence) principle. Compared with other manufactures' sensors (galvanic, clark-cell and optical), the sensor has the fastest response time of <1-second (90%-response). The resolution (0.01% at the low concentration) and the accuracy ($\pm 2\%$ at 1-atm., 25 °C) are also the highest level in the commercialized oceanographic oxygen community. JFE-ALEC released RINKO-I [an autonomously deployable data logger model] and RINKO-III [analog-output model to easily integrate with third party platforms (e.g. CTD-RMS, AUV, glider...)] as the first of the RINKO family. Both models provide profiling of oxygen concentration gradients with the sub-meter resolution to the full ocean depth (7000m rated).

RINKO-I
(Autonomously deployable data logger)



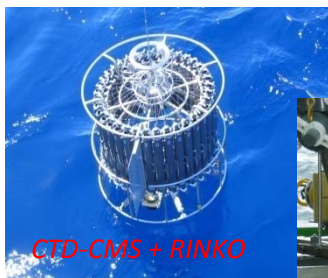
RINKO-III
(Analog output)



The response time
(from air to 100% N2 gas at 25 °C)

Integrations in oceanographic platforms:

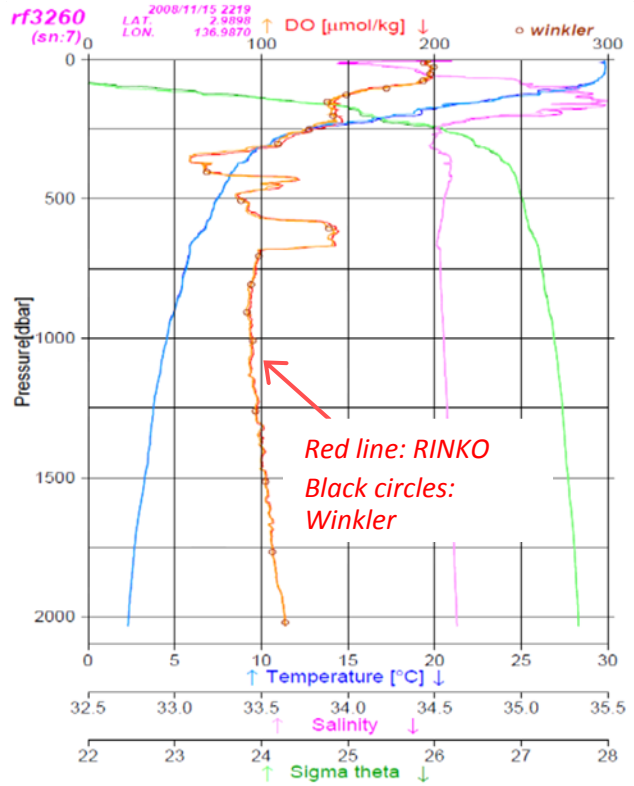
- CTD-RMS(CMS)
- AUV
- Glider
- Autonomous winch system



CTD-CMS + RINKO



RINKO



A field profile and comparison with winkler titration samples [by Dr.Sasano, MRI, at 137E, 3N in Pacific Ocean]

Measurement Specifications

Parameter	Dissolved Oxygen Sensor	Temperature Sensor
Measurement principle	Phosphorescence lifetime (optode)	Thermistor
Response time ¹⁾	0.4 sec (63%) 0.9 sec (90%)	0.2 sec
Range	0 to 200% (0 to 20 mg/L)	-5 to 45 °C
Resolution ²⁾	0.01 to 0.4% (2 to 8 µg/L)	0.001 °C
Accuracy ^{3), 4)}	± 2% (at 1 atmosphere, 25 °C)	± 0.02 °C
Stability ⁵⁾	±1% (24 hours) ±5% (1 month)	

- 1) Standard response time in gaseous atmosphere.
- 2) Resolution decreases with increasing oxygen partial pressure.
- 3) The instrument measures phosphorescence quenching phase shift due to oxygen partial pressure. The phase shift is affected by temperature and water pressure, so these parameters must be measured at the same time for converting data to oxygen saturation values. Temperature is measured by the RINKO instrument; water pressure must be measured by other means.
- 4) Accurate temperature limits in the region 3–31 °C. The accuracy of oxygen saturation is limited by temperature linearity errors.
- 5) Compensation of temperature/pressure within ±5%.

Instrument Specifications

RINKO-I (INFINITY-RINKO) -Autonomously deployable data logger -

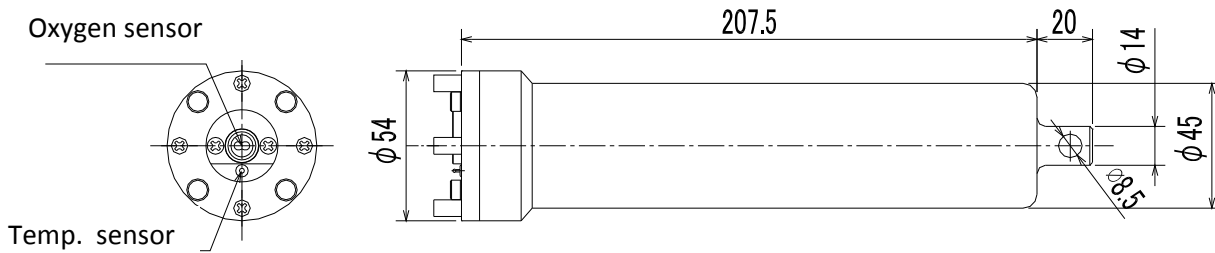
RINKO-I (Data Logger)	
Model designation	ARO-USB
Memory Medium	Mini-SD Card 1GB (up to 2 GB available)
Data Capacity	9 million data sets
No. of files (per SD card regardless of capacity)	Format FTA16 : ~ 100 (depending length, max: 128) Format FAT32: ~ 60,000 (depending length, max: 65,535)
Battery	CR-V3 3.3Ah Photo Lithium battery (1 or 2 pieces)
Operating Voltage	2.5 – 3.6 V
Communication Interface	USB 2.0 (ver 1.1. compatible)
Data Transfer Rate	~ 50 KByte/s (~ 2MB/s standard commercial card reader/writer)
A/D Converter	16-bit
Sampling Intervals	0.1 seconds, 1 – 600 seconds
Burst Sampling Interval	1 to 1440 minutes (1 min increments)
Number of Samples per Burst	1 to 6000 samples
Current consumption	110 mA (during measurement) / 12 µA (during sleep mode)
Dimensions	Length 235.5 mm (overall), max. diam. 54 mm, mooring hole diam. 8.5 mm
Weight	570 g (in water), 900 g (in air), including two batteries
Depth rating	7000 m
Materials	Housing : Titanium (Ti-6Al-4V), Optical Window: transparent Acrylic resin (PMMA)
Other	Software interface for saturation calibration, Buzzer function 1 – 1440 minute interval

RINKO-III -Analog output model that easily integrates with CTD equipment-

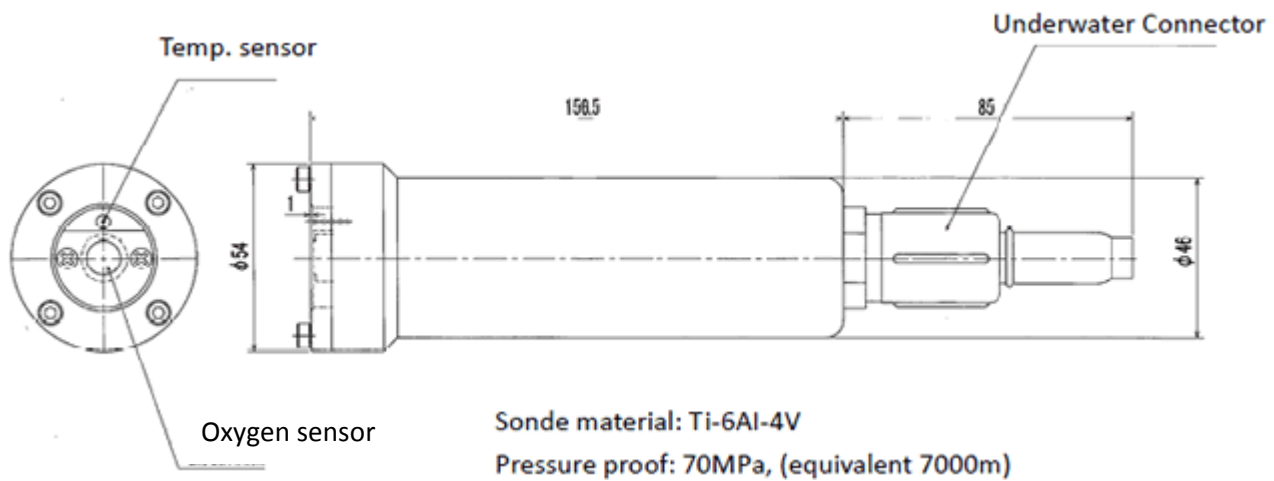
RINKO-III (Analog Output)	
Signal Output	0 to 5 V (2 channels, oxygen and temperature)
Power Supply	9 to 15 VDC, 50 to 60 mA
Dimensions	Length 157 mm (excluding connector), diameter 54 mm
Weight (in air/water)	1000 g / 600 g
Depth rating	7000 m
Materials	Housing : Titanium (Ti-6Al-4V), Optical Window: transparent Acrylic resin (PMMA)
Connector	AG306-HP (Impulse Enterprise Inc.)

Drawing

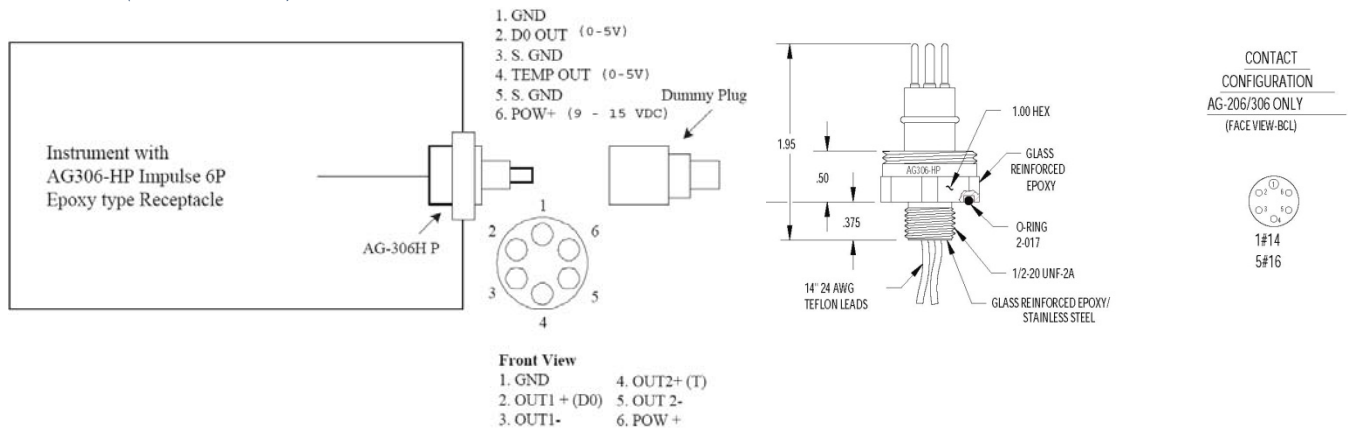
(RINKO-I)



(RINKO-III)



Pin-out (RINKO-III)



Software

Setup, data acquisition and the function for user-calibration (RINKO-I only)

- Infinity series acquisition tools

Data processing for analog output data (RINKO-III only)

- Do converter
- * We can provide the Matlab code (p-code) for the processing.

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For sales and technical support contact:

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