

Harmful Algal Blooms (HABs) Detector Patented FBI T P CHL HAAD SEASON AHI-CAD FEIT P CHL FBI T P CHL FBI T P CHL AHI-CAD

- 4. A model equipped with a wiper is also available for telemetry use.
- 5. Effective for monitoring aquaculture fisheries. Early detection of harmful algal blooms (HABs) allows for prompt countermeasures such as stopping feeding and moving aquaculture rafts.
- 6. Utilizes a handy terminal with a proven track record in AAQ-RINKO, allowing immediate on-site confirmation of the presence of harmful species. *Detection results are not 100% guaranteed. Please confirm the presence of harmful species through water sampling and microscopy.

Overview

The HAI sensor utilizes the shift in the peak of the fluorescence spectrum to identify harmful phytoplankton species, specifically Karenia mikimotoi/serifolmis/ brevis, and Chattonella antiqua/marina, which are representative of HABs. These HABs, particularly those caused by Karenia mikimotoi/serifolmis and Chattonella antiqua/marina, occur in coastal areas with active aquaculture and can cause massive mortality of farmed fish and shellfish, leading to significant damage to fisheries. Therefore, fishery operators need to exercise special vigilance. Previously, fisheries laboratories and research institutions took considerable time to determine the species by examining samples collected from the field under a microscope. However, with the introduction of this instrument, fishery operators can conduct observations themselves, enabling easy and rapid identification. This allows for preemptive measures to be taken, thereby reducing the damage caused by HABs. Additionally, the device allows for early prediction of the onset and cessation of HABs, leading to more accurate feeding decisions for farmed fish. This results in more efficient farming and is expected to increase the quantity of fish available for shipment.

Measurement Principle

The presence of *Karenia mikimotoi/serifolmis/brevis* and *Chattonella antiqua/marina* in the water is detected using an index that indicates the shift in the fluorescence spectrum (FSI*). *FSI (Fluorescence Spectral Shift Index): Derived from the ratio of fluorescence intensities at wavelengths 670 nm and 690 nm.

Index Indicating the Shift in Fluorescence Spectrum "FSI (Fluorescence Spectral Shift Index) 690 nm Fluorescence / 670 nm Fluorescence



16

FSI of Various Phytoplankton





The left graph shows relative fluorescence intensity for various phytoplankton species. The right graph shows an example of species composition analyzed by water sampling and microscope: a bloom of Karenia mikimotoi in the mid-water column (green circle), where the light green dashed line denotes a 50 cells/ml threshold. The right panel shows the FSI estimated using the HAI sensor for the same period. The light green dashed line denotes the FSI threshold of approximately 1.9, and the purple dashed circle denotes the FSI estimated when the concentration of Karenia mikimotoi surpasses 50 cells/ml, indicating a possible harmful algal bloom is on its way.

** Depending on conditions such as the density of other dominant species, the fluorescence spectral characteristics may not be detected well due to the influence of other species.

Sensor Specifications

Parameter	FSI	Chlorophyll	Pressure (Depth)	Temperature
Sensor Type	Fluorescence Intensity Ratio Measurement	Fluorescence Measurement	Semiconductor Pressure	Thermistor
Range	_	0 to 400 ppb (Uranine reference)	0 to 0.5 MPa (equivalent to 0 to 50 m)	-3 to 45°C
Accuracy	Reproducibility ±0.05 (0 to 200 ppb)	Non-linearity ±1% FS (0 to 200 ppb)	Non-linearity ±0.1% FS, Reproducibility ±0.3% FS	±0.02°C (3 to 31°C)
Pressure Resistance	Equivalent to 50 m depth			
Dimensions	Approx. <i>Ф</i> 70 mm × 176 mm (excluding cable)			
Weight	Approx. 0.8 kg in air / Approx. 0.4 kg in water (excluding cable)			
Cable Length	30 m (maximum 50 m)			

Vertical Graph Sample

The vertical graph display allows you to check the depth of dispersal of harmful species at a glance. When the threshold (black line) is exceeded, the background color flashes yellow.

Handy Terminal (D-10H)

Screen	5-inch color LCD	
Operation Method	Touch panel and touch buttons on screen	
Display Content	Time information, GPS information, measurement data	
Memory Type	512 MB built-in memory (15 million data points)	
Measurement Method	Continuous measurement (fixed 0.1 sec interval)	
Calendar Information	Built-in (automatically corrected by GPS)	
Power Supply	Built-in rechargeable lithium-ion battery	
Dimensions	W126 mm × H215.7 mm × D33 mm	
Weight	Approx. 0.7 kg	
Dust and Waterproof Function	Protection rating IP 67 (when connector cap is tightened)	
Alarm Function	Screen flashes when set values are exceeded (excluding temperature and chlorophyll)	

Screen Sample

Denth	P 2541.1492 2019/11/06/224 E 12545.2094 6W66:00
Deput	6.00m
Temperature	Temp 26.16m
Estimated Cell Density (HAD)	44D
	160.57 cells/ml
FSI	FSI 2.06
Chlorophyll Concentration (Chl)	сы 5,16 ppb
Chl is the output value of the HAI sensor converted to the equivalent of AAQ-RINKO.	THE RECENT
*Chl is for reference only and is	
not guaranteed for accuracy."	







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