

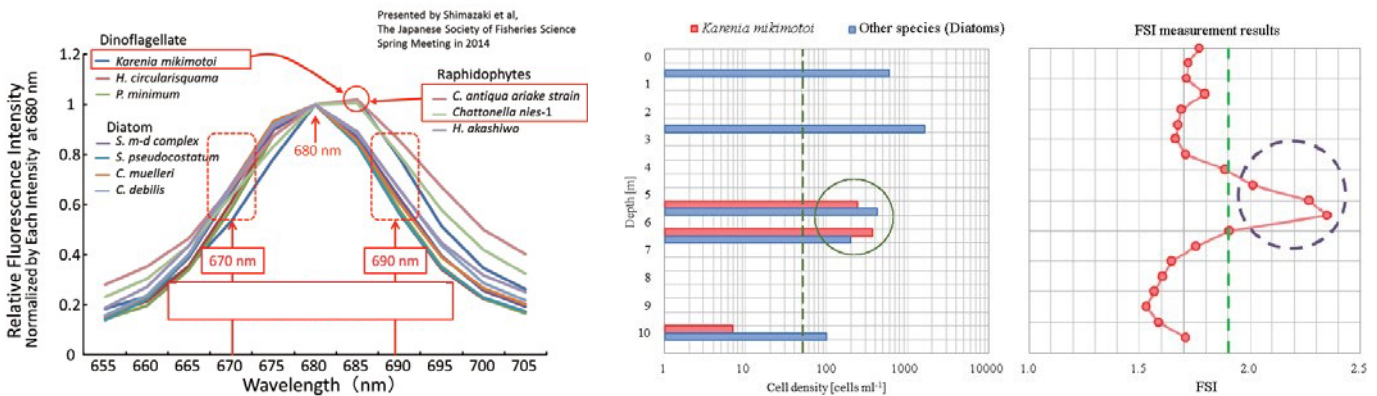
HAI – Harmful Algal Indication

For HAB monitoring & prediction.

- Quick assessment of Harmful Algal Bloom risk
- Compact, robust and portable
- Easy deployment and real time monitoring
- Continuous vertical data sampling at 10 Hz

The HAI sensor (Harmful Algal Indication) is designed to identify two phytoplankton species that are well-known to cause harmful blooms: *Karenia mikimotoi* and *Chattonella antiqua*. The instrument takes advantage of the Fluorescence spectral Shift Index (FSI)* of these two species that is relatively high when compared to other species.

*Fluorescence spectral Shift Index (FSI) is the ratio of fluorescence intensity at 690nm to that at 670nm in wavelength



The left panel shows relative fluorescence intensity for various phytoplankton species. The middle panel shows an example of species composition estimated by water sampling and microscope analysis: a bloom of *Karenia mikimotoi* in the mid water column (green circle), where the dark green dashed line denotes 50 cells/ml threshold. The right panel shows the FSI estimated using 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 concentration of *Karenia mikimotoi* surpasses 50 cells/ml indicating a possible harmful algal bloom is on its way.

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

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Sensor Specifications:

Parameter	Chlorophyll	Temperature	FSI	Pressure
Range	0 to 400 ppb	-3 to 45 °C		0 to 50 dbar
Accuracy	± 1% FS (0 to 200 ppb) ⁽¹⁾	±0.02 °C (3 to 31 °C)	±0.05 (0 to 200 ppb) ⁽²⁾	±0.3% FS (Repeatability) ±0.1% FS (Non-linearity)

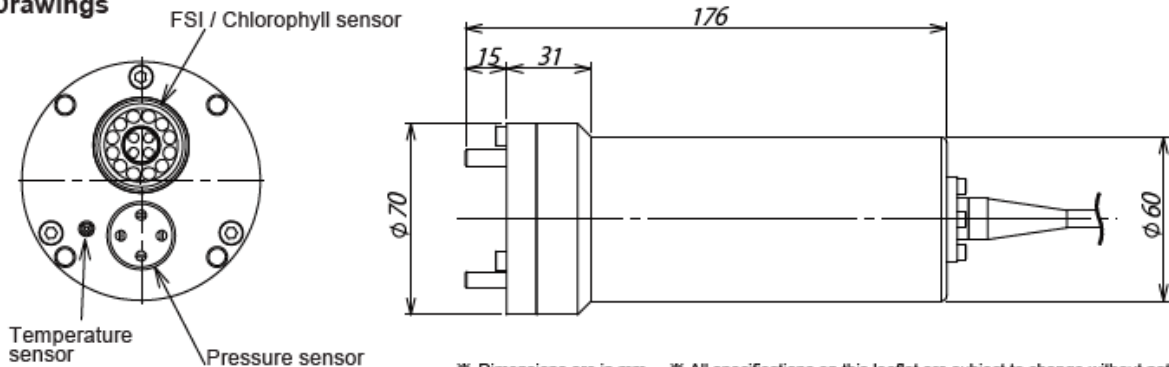
Instrument

Communication	RS-485 (through Hand-held unit)
Weight	0.8 kg (in air and excluding cable)
Depth rating	50 m
Dimensions	<170 mm x 176 mm (excl. cable)
Power consumption	less than 120 mA (using DC12 V)
Materials	Titanium (grade 2)
Cable length	30 m (maximum of 50 m)

Hand-Held Unit

Screen	4 x 20-line LCD
Display Info	Chlorophyll, depth, temperature, FSI, time and battery voltage
Sampling Rate	Continuous (at 0.1, 0.2, 0.5, 1, 2, 5, 10 s)
Dimensions	85 x 115 x 255 mm
Memory	512 MB CF card
Power	8 AA alkaline batteries, 100 to 240 V

Drawings



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

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