

VIABLE ORGANISM ANALYZER



VOA1000K

**Zooplankton
and
Phytoplankton**



VOA1000K

SATAKE CORPORATION

Feature④

IMO-Approved analysis method

4

SATAKE's pulse counting FDA method has been approved to be compliant with the guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2) by IMO Marine Environment Protection Committee (MEPC), 68th session in May 2015.

Satake's inspection apparatus has adopted a recommended indicative analysis method by IMO

Ballast water discharge standard (D-2)

Organism category	Standard	
Minimum dimension $\geq 50 \mu\text{m}$ (Large size: Mostly zooplankton)	<10	viable organisms /1m ³
Minimum dimension $10 \mu\text{m} \leq x < 50 \mu\text{m}$ (Small size: Mostly phytoplankton)	<10	viable organisms /1mL
Toxicogenic <i>Vibrio cholerae</i> (O-1, O-139)	<1	cfu/100mL (cfu: colony forming unit)
<i>Escherichia coli</i>	<250	
Intestinal Enterococci	<100	

"Pulse counting FDA" makes it possible to estimate the number of both large and small viable organisms, and is recommended by IMO.

IMO recommended indicative analysis methods

Indicator	General approach
Large size	Visual counts or stereo-microscopy
Large size	Visual inspection
Small size	Variable fluorometry
Large and small size	Photometry, nucleic acid, ATP, bulk fluorescein diacetate(FDA), chlorophyll a
Large and small size	Flow cytometry
Large and small size	Pulse counting FDA
Enterococci	Fluorometric diagnostic kit
<i>Escherichia coli</i>	Fluorometric diagnostic kit
<i>Vibrio cholerae</i> (O1 and O139)	Test kits

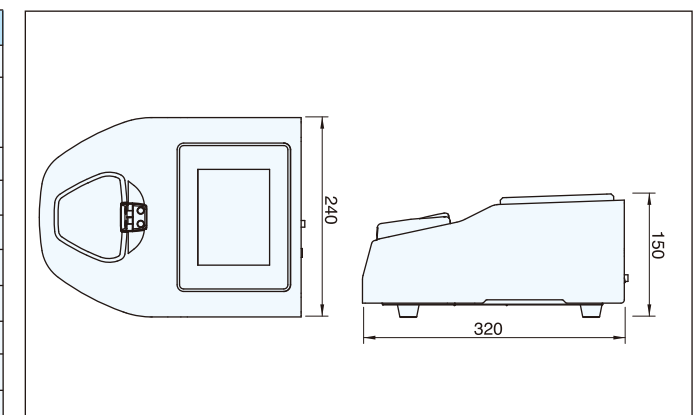
From "Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)" (BWM.2/Circ42/Rev.1)

Specifications

Name	VIABLE ORGANISM ANALYZER
Model	VOA1000K
Target Organism	Organisms greater than or equal to $50 \mu\text{m}$ in minimum dimension (Large size) and organisms less than $50 \mu\text{m}$ and greater than or equal to $10 \mu\text{m}$ in minimum dimension (Small size)
Detector	Photomultiplier tube
Analysis Time	Large size: 10 minutes for staining, 1 minute for analysis Small size: 15 minutes for staining, 1 minute for analysis
Display Device	Touch panel display
Standards	UL/cUL, FCC, RCM, KC, CE, CB
Power Supply	AC100~240V 50Hz/60Hz Single Phase
Power Consumption	60W
Weight	Approx. 4.0 kg

* Staining reagent is required for analysis.

Dimensions (mm)



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ISO 9001 Certification
(Quality Management Systems)

ISO 14001 Certification
(Environmental Management Systems)

SATAKE CORPORATION has obtained ISO9001 and ISO14001 certification. These international standards for management systems ensure Satake will continue to provide high quality products and services.

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More information:



New monitoring method

pertaining to ballast water indicative analysis.



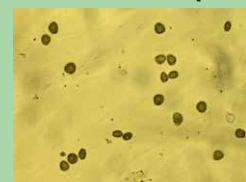
*FDA (Fluorescein Diacetate) ... FDA is widely used in biological and medical science fields as a staining reagent that fluoresces only living cells. Decomposition by the body enzyme results in green fluorescence under blue light.

Feature①

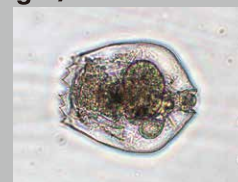
Pinpoint both Large/Small size of Phytoplankton and Zooplankton

Unlike conventional method of measuring chlorophyll of Phytoplankton, the Ballast Eye is able to analyze both Phytoplankton and Zooplankton by utilizing FDA vital stain to react with enzymes which exist in both microorganisms. Ballast Eye also estimates the number of both large and small size organisms, specified with D-2 standards of the Ballast Water Management Convention.

Phytoplankton (e.g.: *Prorocentrum micans*)



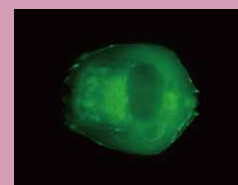
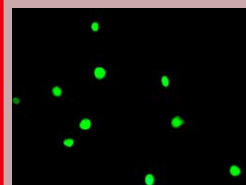
Zooplankton (e.g.: *Brachionus plicatilis*)



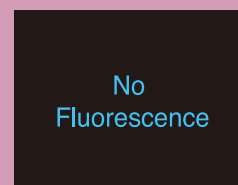
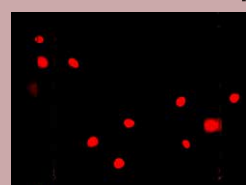
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<Fluorescence Reaction>

<FDA method>



<Chlorophyll method>



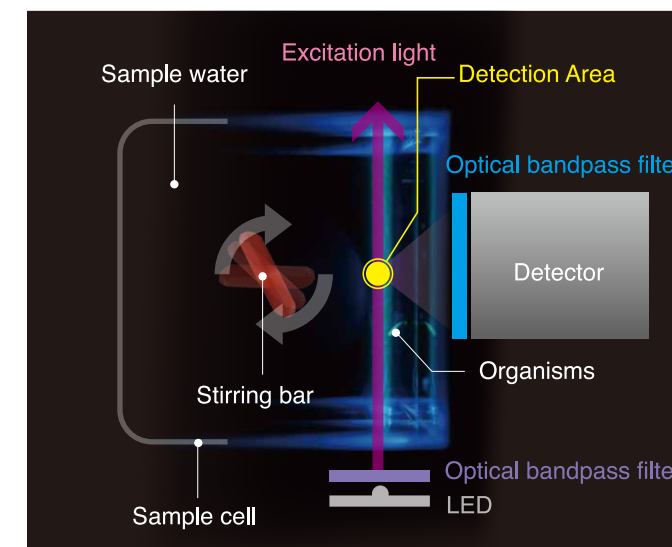
No
Fluorescence

Feature②

Fast and Accurate Measurement

Capturing the total fluorescence intensity of the sample does not provide the number of organisms within. For the best accuracy, Satake's Ballast Eye counts actual number of organisms passing in front of the detector without being affected by the light intensity.

Detection Mechanism

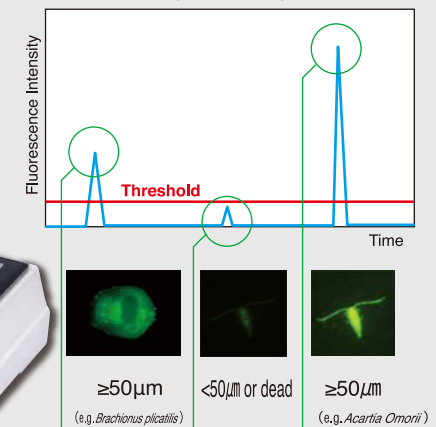


Measuring method

A FDA-stained organism passes through detection area in stirring sample water, then it emits green fluorescence under excitation light. As a results, a pulse signal is recorded by detector. Viable organisms show strong pulse signals, dead organisms show weak/no pulse signals. Only these strong signals from viable organisms will be calculated while a suitable threshold is employed.

Detecting Pulse Signals

ex) Large size organism



Fast Measurement

15 minutes to obtain the results

The results will be given promptly at the inspection site.

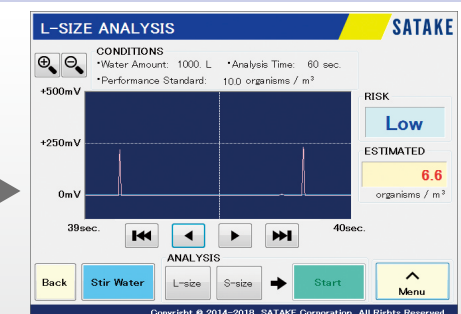
Inspection Procedure



1. Add a stain reagent to the sample water.



2. Set the sample cell to start analysis.



3. Results (number of viable organisms / risk status) are displayed in 1 minute.



4. Results can be printed out.

Feature③

Portable Design

With its compact portable design, Ballast Eye can be used for both Port State Control (PSC) indicative analysis and self-inspection. Using a custom backpack makes it convenient to go on board. Hands-free backpack also provides an added safety to transport Ballast Eye within the narrow passages in the vessel.

