

FastBallast

Portable compliance monitor

Rapid on-board testing of treated ballast water to ensure compliance with the IMO D-2 & USCG Discharge Standards





FastBallast Portable Compliance Monitor

BALLAST WATER MONITORING

Invasive species cause devastation to marine habitats worldwide. In 2004 the International Marine Organisation (IMO) introduced the *Ballast Water Management Convention* to prevent the spread of harmful organisms through ballast water. All ships must now meet the IMO D-2 Performance Standard which states that discharged ballast water must not contain more than 10 viable cells/mL in the 10-50 µm size range (smallest dimension).

FastBallast is a rapid, on-board Compliance Monitor Device (CMD) designed to assist in meeting these standards. FastBallast uses Single Turnover Active Fluorometry (STAF) to provide an accurate count of living cells. While most systems only provide an indicative result, FastBallast can provide a compliance-level test in under 10 minutes.

Step	Standard procedure	FastBallast procedure
1	Inspection of documents and BWMS	
2	Detailed inspection and check against plan	
3	On-board indicative test	On-board compliance test
4	Shore-based compliance test (e.g. microscopy)	

Table 1: FastBallast provides an on-board compliance-level test

PROBLEM

False results on your ballast water testing are a very expensive business for vessels:

- A false negative can cost 10s of 1000s because of the need to go back out to sea, exchange ballast water and return to port
- Conventional port laboratory tests take a long time with local shore laboratories using microscopy to complete creating a vessel delay expense that is not necessary

SOLUTION

FastBallast, using Single Turnover Active Fluorometry (STAF) technology, provides a revolutionary new, quick and accurate method to test ballast water

- **Quick** – compliance level test in under 10 minutes
- **Cost effective** – no need for laboratory involvement or time delays
- **Accurate** – the most accurate indicative instrument on the market
- **Simple** – all-in-one portable instrument including tablet operated by a single person

USER

FastBallast is a must-have for key players in the maritime industry:

- Manufacturers of ballast water management systems (BWMS)
- Port state authorities
- Field testing service companies
- Repair yards
- Shipowners

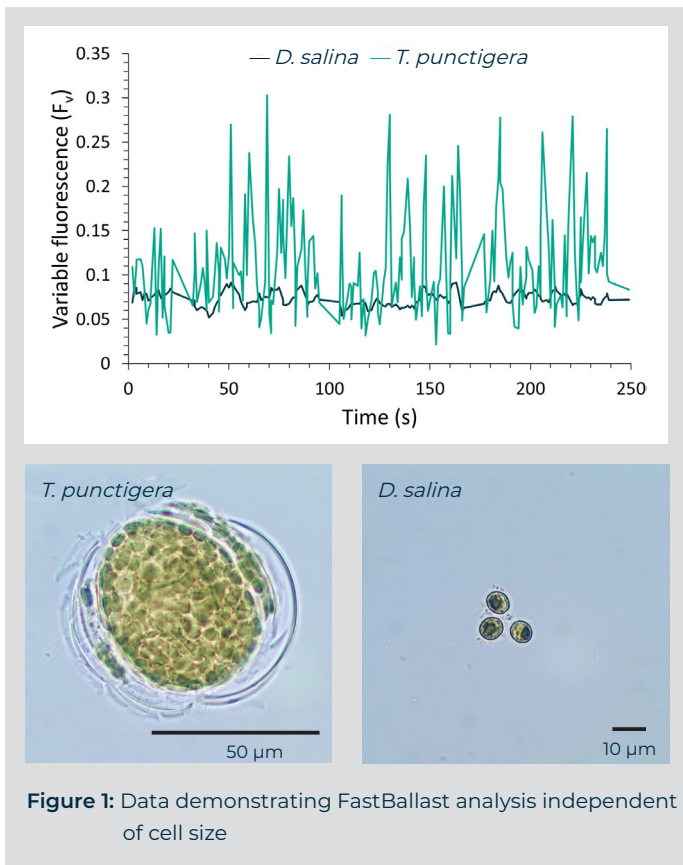


Figure 1: Data demonstrating FastBallast analysis independent of cell size

Standard parameter	<i>T. punctigera</i>	<i>D. salina</i>
F_v	0.254	0.263
Cells per mL		
Level 1	111 (FAIL)	94 (FAIL)
Level 2	8.8 (PASS)	360 (FAIL)
Microscope	7.0 (PASS)	427 (FAIL)
SCF	0.0288	0.0007

Table 2: Data demonstrating FastBallast analysis independent of cell size

Living cells and cell viability

Although no existing compliance monitors for on-board testing can determine if cells are viable (capable of reproduction), the STAF technology incorporated within FastBallast provides a reliable probe of the capacity for photosynthesis by phytoplankton. This provides a highly reliable method for detection of living cells and represents one of the key indicators of cell viability.

Size matters

Most compliance monitors that rely on active fluorometry assume that a fixed level of variable fluorescence (F_v) is emitted from each phytoplankton cell. In reality, F_v varies enormously among species. In the example shown left, *Thalassiosira punctigera* (a large diatom) emits around 40 times the F_v per cell of *Dunaliella salina* (a small chlorophyte). Consequently, although the average F_v emitted from each cell sample was very similar, the cell densities were very different. It follows that systems relying on a fixed F_v per cell can generate wildly inaccurate values of cell density.

FastBallast vs. indicative testing

Here, FastBallast stands out from the crowd. If the Level 1 indicative test is neither a confident PASS or confident FAIL, FastBallast performs a detailed Level 2 test. This test incorporates analysis of the distribution of 480 F_v values and uses Poisson theory to generate an estimate of cell density and calculate the actual F_v per cell (Standardised Cell Fluorescence, SCF). As a result, FastBallast Level 2 testing provides a rapid, size-independent cell count that is as accurate as shore-based analysis, as demonstrated in Table 2.

ABOUT CHELSEA TECHNOLOGIES

Chelsea Technologies designs and manufactures environmental monitoring technology to make the world safer, cleaner and smarter. Across shipping, marine science, water quality, defence and industrial process control, our best-in-class sensor and system solutions are trusted by environmental researchers, scientists and plant managers for their sensitivity, accuracy, reliability and sophistication.

Chelsea's specialist expertise has been built up over 50 years, introducing pioneering technology to monitor water quality, gauge shipping emissions, explore the oceans, create healthier fisheries, optimize crop spraying, improve production efficiency and monitor climate change.



YOU MIGHT ALSO BE INTERESTED IN:

- Chelsea's SeaSentry cabinet is an IMO approved solution for vessels equipped with a wet scrubber to monitor discharge water. The washwater used by wet scrubber systems to remove pollutants from exhaust gas needs to be monitored in order to ensure that it meets the relevant IMO regulations for water quality prior to discharge
- The IMO has established new regulations through its Marine Environment Protection Committee (MEPC). Ships operating both globally and in Emission Control Areas must now reduce NOX, SOX and particulate emissions. With the global sulphur limit dropped to 0.5% in 2020, the shipping industry must implement strategies to meet this target.
- SeaSentry is suitable for retro fit and new installation on open, closed loop and hybrid scrubber systems.
- SeaSentry has full compatibility with all scrubber system flow rates.
- Two year calibration intervals allowing for uninterrupted monitoring.

FASTBALLAST USERS:



Indicative test	Confident PASS	PASS level unknown: could be 100x D-2 threshold	Confident FAIL
FastBallast Level 1	Confident PASS	Go to Level 2 test	Confident FAIL
FastBallast Level 2	Confident PASS		Confident FAIL

Table 3: The measurement approach used by FastBallast

Specifications

User interface	Surface Go 3 or Windows PC running FaBtest GUI
Sample volume	20 mL
Interrogated volume	0.5 mL
Excitation	Four channels: royal blue, blue, green, and red
Sensitivity	<1 cell/mL
Dynamic range	0-4000 cells/mL
Time to result	<2 minutes for Level 1 <10 minutes for Level 2
Power	Internal rechargeable battery pack provides 8h continuous operation
Connectivity	USB or Bluetooth
Dimensions	339 x 295 x 152 mm
Mass	6.0 kg
IP rating with lid closed/open	IP67
Service interval	>2 years

*In view of our continual improvements, the designs and specifications of our products may vary from those described.



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