

FAST*tracka*

Fast Repetition Rate Fluorimeter



APPLICATIONS

- Monitoring of photosynthetic parameters in marine phytoplankton
- Environmental monitoring of phytoplankton populations
- Oceanographic, estuarine, limnological and riverine studies
- Ocean optical properties research
- Fisheries and ecosystems monitoring and studies



FEATURES

- Measurement of variable fluorescence parameters in real time and in-situ.
- Measures PAR.
- Up to 10 different FRRF user definable & programmable protocols, plus factory supplied default.
- Deployable alone or as an integrated intelligent instrument in moorings, profiling systems or as part of the payload of our towed vehicles.
- Low power gives many weeks of low frequency logging on a single charge.
- Powered by a rechargeable battery pack or direct (host) power.
- Dual optical channels allow simultaneous light chamber/dark chamber experiments.
- Large memory is non-volatile to safeguard stored data (24MB standard).
- Easily integrated to host CTDs.

FAST^{tracka}

The Chelsea Technologies' FAST^{tracka} was designed at Brookhaven National Laboratory as a means to measure variable fluorescence of marine phytoplankton. Delivering a rapid series of high frequency (200kHz) flashes, the instrument enables the measurement of the absorption cross section of Photosystem II, the rate of photosynthetic electron transport and the level of photochemical quenching. This measurement occurs optically, in real time and in-situ, and the simultaneous measurement of photosynthetically active radiation (PAR) by the FAST^{tracka} allows for estimates of phytoplankton primary productivity to be made. The optical head has dual sample chambers allowing comparisons to be made of ambiently-irradiated and dark adapted phytoplankton samples.

The heart of the instrument is a special patented fluorescence excitation system capable of generating a train of excitation flashes at rates exceeding 200kHz. A 16 MHz clock microcontroller monitors the digital acquisition of both the stimulated fluorescence and the excitation flashes, while simultaneously measuring PAR. The fluorescence emission and flash excitation data are compared onboard, immediately providing fluorescence yield data, which is used to calculate the biophysical parameters which pertain to photosynthesis. These parameters are stored on an internal PCMCIA "flash" non-volatile memory card, with a 24MB capability. Later, the resulting data can be downloaded through an RS232 link from the FAST^{tracka} to a host PC, where users can tailor the data stream to their experimental and analytical requirements.

The instrumentation is highly flexible, allowing users to program up to 10 (flash) protocols in addition to the factory supplied default. Onboard diagnostic software automatically evaluates performance periodically e.g., warning users of potential problems with nearly full flashcards, unusual instrument settings, or out of tolerance detectors. For long term deployments (e.g. a mooring application), the wake/sleep ratio can be modified to fit the user's needs, thus allowing temporal resolution from a matter of minutes to a matter of days. Although such flexibility allows advanced users to perform complicated experiments without expensive factory customization, the FAST^{tracka} is easy to operate for standard measurements of variable fluorescence.

Given the computing power and flexibility available with Chelsea Technologies' FAST^{tracka}, the experimental applications are virtually limitless. For customers with special requirements, Chelsea Technologies' technical staff may be able to integrate other external sensors to the FAST^{tracka}, or conversely reconfigure it to communicate via RS422 with other intelligent instrumentation. The FAST^{tracka} has been successfully deployed on a wide variety of experiments on many different platforms world-wide.

SPECIFICATION

Physical

Length:	990mm with battery pack 635mm without battery pack
Diameter:	160mm
Exterior Materials:	Titanium and Annealed Delrin
Weight in air:	39kg with battery pack 23kg without battery pack
Weight in water:	24kg with battery pack 15kg without battery pack

Operational

Data Storage	24MB
Power Requirements	650mA @ 1Hz FSRR @14V 300µA @ sleep model @14V
External Power Volt. Range	10.5-72 VDC
Maximum Operating Depth	500m
Data Communications	RS422@9600 BAUD Data Download @ 57600 BAUD or 9600 BAUD
Chlorophyll-a Sensitivity	0.1 - 30 µg/l

Additional Sensors

PAR detector, Pressure Sensor (optional)



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