biological · biophysical · engineering

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The BenthoTorch

A unique instrument for quick and easy phytobenthos measurements

For measurements on substrates of ...

- green algae
- cyanobacteria and
- diatoms

Various algal species have adapted their nutrient uptake systems enabling them to survive in shallow water close to the shoreline where sunlight still penetrates to the sea or river bed. This habitat is home to benthic algae, ranging from the microscopic to the enormous. Such flora, attached to the sea bed sediments, play an essential role in primary production.

The European Water Framework Directive (2000) stipulates that the ecological status of water masses must be assessed. In order to do this, several biological elements must be considered, including benthic algae. As a result, it has become obligatory to study the development and abundance of benthic communities. The collected data satisfactorily contribute to the assessment of the water quality in aquatic ecosystems.

Traditional methods include sampling of benthic algae by scraping surface materials or rapid deep-freezing and subsequent chlorophyll extraction. However, these methods cannot determine different algal groups. Alternatively the use of time-consuming microscopy is limited to accessible objects, rarely found in the field.

bbe BenthoTorch: for measurement of benthic algae on different substrates

The bbe Bentho Torch enables quick and easy analysis of benthic algae in real time and in situ by utilising the fluorometric characteristics of the different algal pigments in the intact cell. Thus, no sample preparation is needed.

The amount of red light fluorescence arising from excitation at different wavelengths gives a quantitative estimate of the algal density and its classification. The BenthoTorch is pre-calibrated for the most prominent algal classes to be found in the field. This technique has been well-proven for pelagic phytoplankton, by extensive application of the bbe FluoroProbe, and has now been successfully adapted to measure benthic algae concentrations.

Features

- no sample preparation
- automatic substrate correction
- integrated instrument display
- GPS sensor
- cable-free operation
- datalogger function
- internal rechargeable batteries
- USB connection to PC

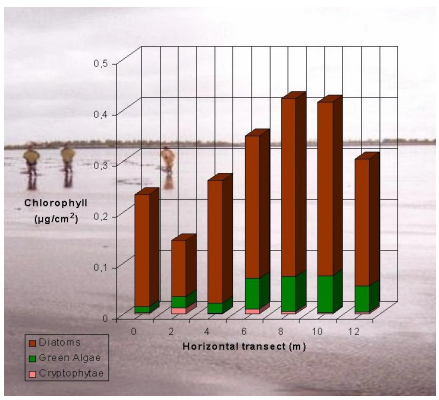
Operation

To switch the bbe BenthoTorch on, simply tilt it upwards and then downwards in one swift movement. To operate the instrument, four contact keys are situated on the housing next to the display. An intelligibly presented menu enables one-step measurement. The illuminated display gives clear readings of results even in bright sunlight. After starting a measurement, all steps are processed automatically: the countdown, the LED tuning and the display of the results. A vibration signal informs about the completion of the measurement.

Measurement

The bbe BenthoTorch is a robust, field instrument for the fast quantification of green algae, cyanobacteria and diatoms on different substrates such as sediments and stone surfaces.

A measurement needs less than 15 seconds. Just turn it on, place on the substrate, and read off the results.



Distribution of benthic algae: a horizontal transect in the tidelands of the North Sea near Westerhaver

Applications

- EU Water Framework Directive water quality parameters
- restoration / rehabilitation projects
- environmental monitoring
- limnological work
- research and education

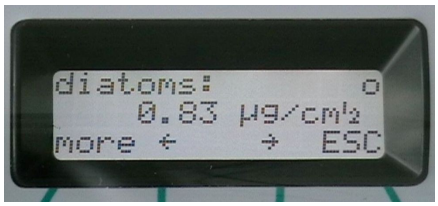
Instrument software functions

- start/stop of measurement
- access to all stored data
- (re-)calibration of instrument
- settings: measurement duration, interval, GPS on/off

PC software functions

- display of time data as graphic
- data retrieval and management
- data export to ASCII files
- GPS data export to e.g. Google Earth

BenthoTorch used in the **AQUAREHAB** project in Denmark and Belgium



BenthoTorch LCD display

Technical Data

Measurands	concentration of green algae [µg chl-a/cm²]
	concentration of blue-green algae [µg chl-a/cm²]
	concentration of diatoms [µg chl-a/cm²]
	GPS co-ordinates
Measuring range	0 - 10 µg chl-a/cm²
Resolution	0.2 µg chl-a/cm²
Weight	1.8 Kg
Size (H x Ø)	500 x 60 mm
Power supply	110/230 V @50/60 Hz - 12V DC
Protection class	IP68
Depth range	10 m
Data interface	USB
Memory capacity	1,000 datasets
Software	bbe data evaluation software for Windows
Options	telescopic rod