

# Lake and Riverwatch Buoy II



## Water Quality and Algae Monitoring

- Full onboard processing of all measured data
- Data presentation in real-time
- Insensitive to spinning and rough handling
- Enables long-term unattended operation
- Two-way communication link for ease of data transfer and control of buoy
- Easily deployed and operated by a small boat



The Riverwatch Buoy is a multi-purpose floating sensor platform for use in lakes, large rivers, reservoirs, estuaries and the sea. For marine application, it has been given the name Seawatch Mini.



### Water Quality Monitoring

The basic Riverwatch Buoy includes sensors for the most important water quality parameter groups:

From the monitored parameters others can be derived: for example, water hardness can be calculated from the conductivity, and suspended solids can be derived from turbidity.

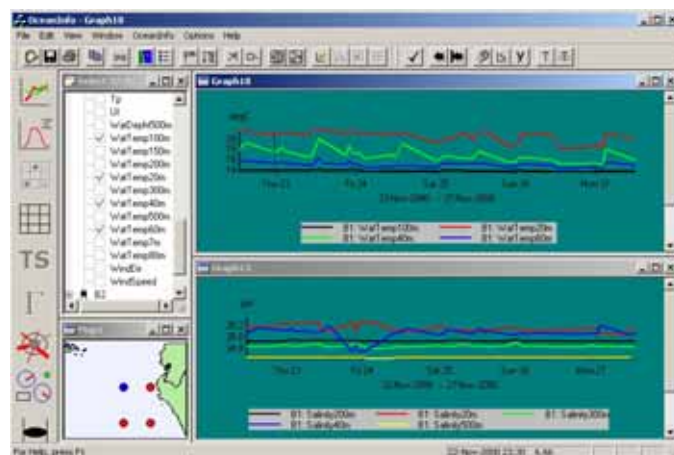
Measurement principles and sensors have been chosen to minimise the need for service and calibration. Each sensor has been selected to meet the needs for accuracy, robustness and easy maintenance.

Parameter	Group
Water temperature	physical condition
pH	acidic matter (acid, base)
Conductivity	dissolved matter (salt, ions)
Dissolved oxygen	dissolved gases (effect of organic matter)
Turbidity	particles (inorganic, and organic)

### Algal Monitoring

Lakes and reservoirs act as breeding places for algae, until one of the nutrients becomes the limiting factor for further population growth. Eutrophication and algal blooms may cause severe taste and odours problems when the water is used as a source of potable water.

The phytoplankton biomass is determined by monitoring chlorophyll. Dissolved oxygen (DO) concentrations and pH levels can also be used to monitor short and long-term cycles in phytoplankton levels. When plants photosynthesise, they produce oxygen and consume aqueous CO<sub>2</sub>, which causes DO and pH to increase during the day. During the night it is the opposite. Nitrate monitoring is also recommended, as it is an important nutrient and a good indicator of the use of fertilisers in agriculture. Sensors can also reliably measure it.



Output screen

### Data Presentation

OceanInfo is a PC-based system for the presentation of water quality and metocean data. It has the following presentations and analyses: time series plots; simple univariate statistics; univariate and bivariate distribution tables and curves; print, copy or export of graphs, maps and data; extreme analysis (based on a 3-parameter Weibull distribution fit), gamma spectrum and T-S diagrams (temperature/salinity).

### The Hull

The buoy's hull consists of two, horizontally split hemispheres. The lower part is made of polyethylene while the upper part consists of shock-proofed transparent ethylene, which allows the solar radiation to reach the solar panels located inside the hull. The two parts are clamped together by 20 stainless-steel bolts. Flashing light (with back-up in case of failure) and transmitting antenna are placed above the solar panels.

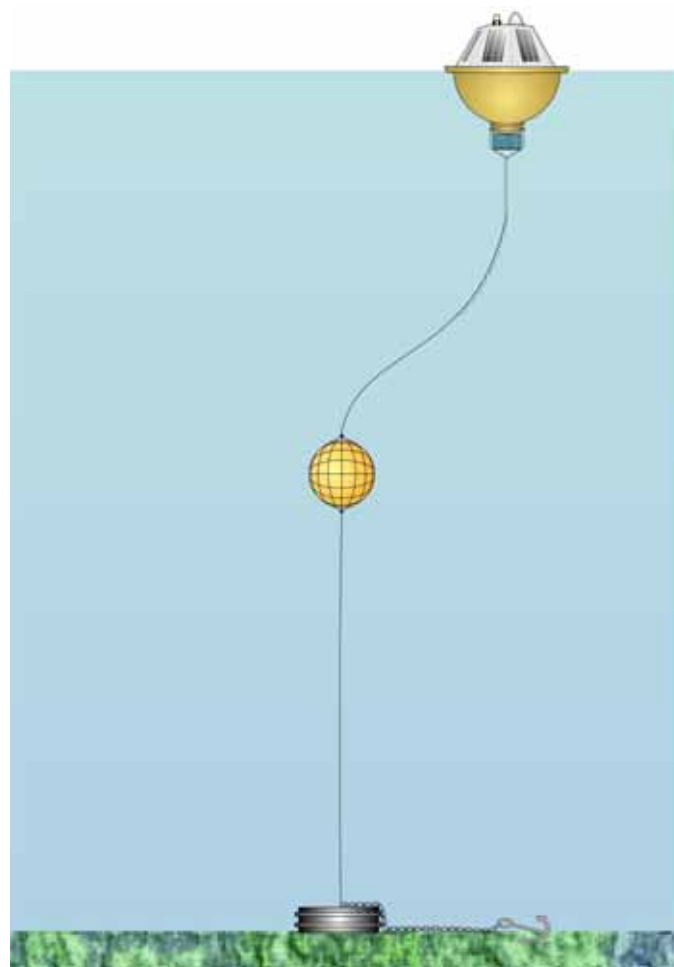
The lower part of the buoy hull contains all the electronic modules and the power package. These are mounted in splash-proof compartment boxes to secure safe handling of sensitive electronics. The choice of materials ensures a low risk of corrosion and sulphation, while external connections make it easy to configure the buoy, retrieve stored data and supply power to the lead-acid batteries.

### Operation

The buoy can be towed onto location and is easily deployed and operated by a small boat. The sensors are mounted in a cage just below the buoy. This can be released from its position and swung to the surface for easy access to the sensors for servicing and calibration.



**Workshop testing of buoys**



**Single-point mooring**

The operational cost is generally low. The solar panels provide power free of charge. The main external cost is communication charges, depending on the frequency of data transmission.

### Mooring

The mooring system is insensitive to spinning. The choice of mooring materials takes into consideration the depth, currents and the possibility of fish bite on the mooring line.

### Power Supply

Maintenance-free solar panels and sealed, lead-acid, back-up batteries enable long-term unattended operation. The accumulated charging and load currents are transmitted to control the power consumption.

## Technical Specifications

### Buoy Dimensions and Environmental Data

Weight:	320kg
Diameter:	1.25m
Net buoyancy:	410kg
Operating Temperature:	-5 to +60°C

### Storage Capacity

Flash memory for data:	28Mb, sufficient for approx year of raw data
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### Communication

Radio:	UHF error correcting modem, up to 10W output power
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*Optional: Argos, Inmarsat-C and GSM*

### Power

Solar Panels:	60W
Lead-acid battery bank:	124Ah
<i>Optional: Lithium batteries:</i>	<i>480Ah</i>

### General

Material:	Polyethylene
Flash Light:	LED based, 3-4 nautical miles range, IALA recommended characteristic
Processing:	On-board calculation of all parameters
Positioning:	GPS Receiver

### Sensor Options:

Directional waves, surface current speed and direction, surface temperature and salinity, temperature and salinity profiles, dissolved oxygen, light attenuation, chlorophyll-a, hydrocarbons, air temperature, air pressure, wind speed and direction.

Please enquire for other parameters.

### Basic Water Quality Sensor Specification

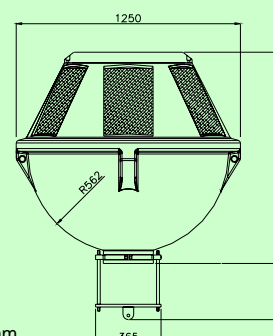
Parameter	Range	Accuracy
Temperature	0-50°C	±0.1°C
pH	1-13	±0.1
Conductivity	0.02 - 00mS/cm	±2 % FS
Oxygen	0-20mg/l	±0.1mg/l
Turbidity	0-750NTU	±10%

In the basic version the sensors are mounted just below the buoy, at ~0.8m depth.

### Additional or Alternative Sensors

- Chlorophyll (algae biomass)
- Nitrate
- Water Temperature string (stratification)
- Directional Wave Sensor
- Surface current (velocity and direction)
- Water Level (sensor fixed to the anchor)
- Radioactivity (Radam)

Where there is a need for collecting a full range of wave, meteorological, hydro-physical and water quality parameters, an alternative is to use the larger Seawatch buoy from Fugro.



Measurements in mm

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