



## DHI SOLUTION

# ENVIRONMENTAL MONITORING BUOY SYSTEM FOR OPEN WATERS

## The technology behind the buoys

### DESIGN YOUR MONITORING BUOY BASED ON THE STANDARDS OF DHI'S BUOY SYSTEM

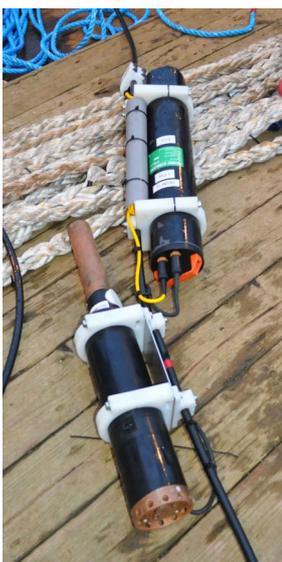
A standard buoy from DHI offers the perfect backbone of your customised offshore online SCADA (Supervisory Control And Data Acquisition) system. Learn more about your benefits when using DHI's environmental monitoring system.

### BUOY COMPONENTS

The major parts of the setup are:

- The hull
- AquaGuard—the central computer
- The mooring system, including an inductive data bus
- Environmental instruments

### THE HULL

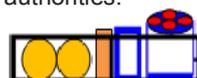


The hull is a tube containing the essential logistics necessary for daily operation. The central part of the buoy is the combined computer and telemetry equipment. The hull also hosts the red floating element. It is possible to attach instruments on the side of the hull below the water surface as the main part of the buoy is submerged. Finally, the hull carries the battery powering the buoy functions (instruments are self supplied with battery capacity).

### AQUAGUARD - THE CENTRAL COMPUTER

The core of the buoy is the AquaGuard (AG). At predefined intervals, the AG scans all attached instruments for data and sends them to the server on the Internet via the primary telemetry channel. The AG also takes care of local activities such as recording the battery status, temperature and geographical position (especially relevant for drifting buoys). Moreover, the AG handles the buoy navigation light, ie the light

characteristics as defined by the local authorities.



### SUMMARY

- On-line data transmission – GSM/GPRS or satellite systems
- Inductive mooring system
- Industry 'state of the art' hydraulic & biological sensors
- Modular, flexible concept
- Two way communication for data migration and system service
- Individual duty cycling intervals
- Self-contained instruments with internal memory and battery
- GPS watch guard system
- Navigation light according to IALA
- Acoustic release system for selected instruments
- Low service interval (typical 6 months)
- Weather and ice pressure resistance
- Suitable for areas with limited tidal variations



Besides, the AG accepts various commands from the server on the Internet, opening up for a flexible setup of the operation.

### THE MOORING WITH INDUCTIVE DATA BUS

The DHI monitoring buoy is prestressed, i.e. it is fixed to its position by means of a 16 mm steelwire connecting the buoy to an anchor block on the seabed.

The length of the wire is adjustable to the corresponding water depth. A plastic jacket isolates the wire from the water, allowing for an electrical circuit that provides data bus activities. Using the wire as the active part of the circuit and the sea water as the ground, it is possible to attach instruments to the wire and communicate with them by means of inductive signal transfer. The advantage of using inductive transfer is that there is no need to design a cable with predefined connection points. It is easy and very fast to relocate instruments from one position to another. This concept allows for instruments to be mounted to the mooring cable as well as to the buoy.

### ENVIRONMENTAL INSTRUMENTS

DHI's environmental monitoring buoy can host a number of different sensors, such as temperature, conductivity, turbidity, chlorophyll, oxygen, loggers as well as wave and current meters. By means of two inductive strings (one on the side of the buoy and one as the mooring cable) data from the instruments are collected by the Aqua Guard, the central computer of the buoy, at predefined intervals and stored for later transmission to the end user.



Lowering the current/wave meter during deployment of the buoy. The floating buoy can be seen in the background.

### OPERATING THE BUOY

DHI offers a number of services for optimal use of the buoys, including instrument service. These include:

- Data reception/storage
- Alarm/warning functions (e-mail and SMS)
- Data distribution to end users
- Data format transformation

- Forecasts
- Modelling of received and third party data
- Consulting regarding optimal location of the buoy
- Calibration
- Service and maintenance



### SPECIFICATIONS

#### SENSOR PLATFORM & MOORING

- Sabik Plastic spar buoy incl. float
- POLYPEH/Polystyrene—permanent colour pigment, ice pressure resistance
- Dimensions: length 7-10 m, diameter 0.5 m, weight 250 kg
- Navigation light, programmable International Association of Lighthouse Authorities (IALA) standard, light and radar reflector
- Antenna: GPS, GSM & Satellite
- Pre-stressed plastic jacketed steel wire, 16 mm (inductive mooring)
- Anchor block: 5 - 6 t of concrete
- Acoustic releaser unit, including rope canister, subsea buoys and salvage textile rope

#### TYPICAL SENSORS

- Temperature, conductivity, turbidity, chlorophyll, dissolved oxygen and pressure based on Seabird and WetLabs inductive modem loggers such as Microcat and NTU & WQM units
- Acoustic doppler current profiler, RDI Sentinel Workhorse ADCP
- Acoustic doppler current profiler, including online wave processing module RDI Sentinel/NEMO ADCP
- All sensors include internal memory for data back-up

#### SYSTEM CONTROLLER – ELECTRONICS

- AquaGuard control and data acquisition unit, including multiplexer, GSM, satellite & GPS modules
- Seabird IMM (inductive modem module)
- Seabird UIMM (underwater inductive modem module)

#### TELEMETRY OPTIONS

- GSM/GPRS mobile phone
- Thuraya Satellite
- Iridium Satellite
- Inmarsat Satellite
- ARGOS
- VHF/UHF

#### POSITION CONFIRMATION

- GPS package for indication of drifting buoy
- PowerPrimary battery (buoy): AL 14-18 Volt, DC/200 Ah
- Separate battery packages for each sensor unit
- Minimum 6 months` operation

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