MOSSELMONITOR®

Biological early warning system for continuous on-line water quality monitoring

DATASHEET
AquaDect
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PRODUCT DESCRIPTION

The MOSSELMONITOR® is a biological early warning system (BEWS) for the continuous, unattended monitoring of water quality. The system uses eight live bivalves (mussels, clams or oysters) as broad spectrum sensors. Two electromagnetic sensors follow the valve movement of each individual animal. Abnormal behaviour, such as prolonged closure, reduced opening, increased activity or gaping, is detected by the built-in microprocessor and converted into an alarm.

Where chemical monitoring measures only selected compounds, biological monitoring responds to a truly wide spectrum of contaminants, including substances that escape routine chemical analysis. The MOSSELMONITOR performs all tasks itself: measurement, evaluation and communication. It operates stand-alone, 24 hours per day, 7 days per week, for weeks without attendance. Alarms can trigger automated sampling for confirmation by chemical analysis.

> **Applications:** surface water, drinking water intakes, effluents, seawater, ground water and (chlorinated) drinking water. With the optional Automated Food Device (AFD) the system can also be applied in waters with insufficient natural food supply.

AVAILABLE VERSIONS

In situ version (submersible)

Submersible unit in HD-polyethylene housing with protective cover, for direct deployment in the water body at depths up to 15 m. Connected via a communication cable and cable reel with junction box (power, alarm contact, PC).

Flow-through version (laboratory)

PVC flow-through tank with light-excluding lids and removable mussel holders, for installation at pumping stations, laboratories and monitoring stations. Water supply 150 to 200 L/h.

MEASURING PRINCIPLE

A miniature induction coil is glued to each shell half. A 250 kHz signal through the transmitter coil induces a voltage in the receiver coil on the opposite shell. This voltage is a direct measure of the shell opening. The eight animals are measured sequentially (multiplexed) and digitized with a 10 bit A/D converter. Each mussel is evaluated individually against its own historical behaviour, which minimizes the influence of natural variability. Valve positions are automatically normalized to a 0 to 100% scale per individual. Water temperature and supply voltage are recorded in every measuring cycle.

BEHAVIOUR EVALUATION AND ALARMS

- **Closed alarm:** a user-defined number of mussels closed beyond a set percentage for a set time.
- **Decreasing average valve position:** reduction of the average opening (normally 70 to 80%).
- **Activity alarm:** increased open-close frequency compared with a previous time block.
- **Gaping alarm:** extreme opening without movement, indicating mortality.
- **System alarms:** low supply voltage detection, periodic OK message (watchdog).

All alarm criteria (number of mussels, thresholds, time windows, evaluation intervals) are user-adjustable, allowing the sensitivity and reliability of the system to be tuned to each application and minimizing false alarms. Alarms are reported on screen and via a potential-free alarm contact.

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Technical specifications

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MEASUREMENT AND EVALUATION

Test organisms	8 bivalves, measured and evaluated individually
Suitable species	Freshwater: *Dreissena polymorpha*, *Unio* sp., *Anodonta* sp.; marine: *Mytilus edulis*, oyster species
Sensor principle	High frequency (250 kHz) electromagnetic induction, two coils per animal, multiplexed
Signal digitization	10 bit A/D conversion
Valve position output	Normalized 0 to 100% per individual (automatic span adjustment, update period 1 to 50 days)
Measuring interval	Adjustable, 10 to 600 s
Additional parameters	Water temperature, supply voltage, date/time per measuring cycle
Alarm functions	Closed, decreasing average valve position, increased activity, gaping, low voltage; all criteria user-adjustable
Alarm buffer	Max. 500 lines (time and alarm recordings)
Operating temperature	0 to 40 °C

ELECTRICAL

Power supply	External max. 12 V DC, max. 0.5 A; supplied DC-adapter 100-240 V AC, 50/60 Hz, output 12 V DC, max. 1000 mA
Backup power	Uninterruptible power supply (UPS), standard external
Average current consumption	25 mAh at 120 s measuring cycle
Serial interface	RS422 with Xon/Xoff flow control, cable length up to 1,000 m; RS422-RS232 converter supplied; serial-to-USB adapter optional
Alarm contact	Potential-free; max. 10 VA, max. 24 V, max. 0.5 A

MECHANICAL, IN SITU VERSION

Housing	HD-polyethylene
Dimensions	Ø 320 mm, height 420 mm (incl. protective cover and ballast)
Weight	17 kg (excl. ballast); ballast 5 kg
Max. water depth	15 m
Lifting lug	Ø 20 mm
Cable reel	15 m cable supplied, standard

MECHANICAL, FLOW-THROUGH VERSION

Housing	PVC container with lid(s)
Dimensions	760 x 420 x 350 mm (L x W x H)
Tank volume	35 litres
Water inlet	PVC, Ø 20 mm
Water outlet	PVC, Ø 40 mm
Flow rate	150 to 200 L/h (150 L/h preferred)

COMPLIANCE

CE marking	EMC (89/336/EEC, 92/31/EEC, 93/68/EEC; immunity NEN-EN 50082-1, emission NEN-EN 50081-1); low voltage (73/23/EEC, 93/68/EEC); machinery (89/392/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC)
DC-adapter	Safety class ENEC 10 VDE