

Acoustic Subsea Monitoring

Small, wireless sensors



Courtesy: Teekay

Scanmatic now offers exceptionally small, low cost and low powered sensor transmitters with acoustic communication.

While primarily developed for the purpose of providing health information and id-tracking of fish, these units have a wide-ranging potential for offering integrity monitoring of subsea infrastructure.

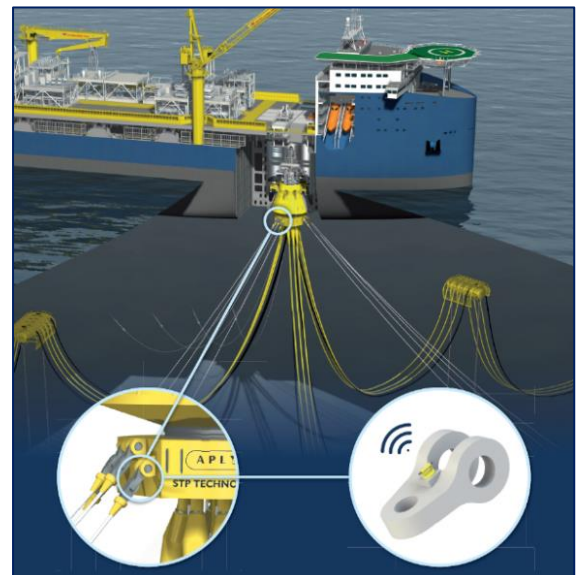
In many cases these units can offer the same situational awareness and early warning functionality as traditionally bulky and costly acoustic transponders.

Applications:

- Mooring Line Integrity Monitoring
 - Early warning of mooring line failure
 - Increased situational awareness
- Depth monitoring of subsea buoyancy elements
- Detect movement or changes to subsea pipelines, templates or other infrastructure
- Temporary operations, e.g. rig moving, equipment deployment

Features:

- Tilt/Inclinometer
- Movement/Accelerometer
- Depth/Pressure
- Wireless acoustic communication
- > 500 m range
- More than 10 years battery life
- Low cost, small footprint
- Easy deployment and retrofit
- Data acquisition and system integration
- “Internet of Things under Water”



Courtesy: APL Norway

Operation:

The transmitters measures tilt, depth or movement. They are attached to mooring lines, subsea buoyancy elements or other objects of interest by use of customized solutions, ranging from cable ties, diver fasteners or ROV clamps.

The acoustically transmitted sensor information is received by a cabled receiver which for permanent installations typically interfaces with a top side control system for relevant presentation and alarm handling. For temporary operations, the receiver could for example communicate with a field test suitcase or distribute the information directly to web-based solutions.

The technology is well proven in the aquaculture market, with more than 20 000 units deployed in Norway since 2006. Scanmatic has delivered Mooring Line Monitoring Systems using this technology for Teekay's Petrojarl Knarr FPSO, NOV/APL's Jubilee BLT buoy and Nordlaks' Ocean Farm.

Technical data:

Acoustic receiver:

Dimensions

- 230 mm length, 75 mm diameter
- New from Q2 2020: Smaller receiver available!

Material

- Delrin, polyurethane and stainless steel

Operational depth

- 0 - 500 m (pressure tested to 1000 m)

Signal processing

- True and parallel multichannel reception in the 60 – 80 kHz band
- Advanced digital signal processing to reduce noise influence
- Signal intensity and background noise logging
- Range estimate to transmitter based on signal intensity

Battery life

- Stand-alone logger: 8 – 9 months
- Real time version: Optional 4 months backup battery which enables buffering of data in the eventuality of power outage. When power is restored, receiver automatically transmits stored values.

Input voltage

- Real time version: 6 – 12 VDC

Data storage

- 1 500 000 detections

Communication interfaces

- Realtime version: RS485
- Stand-alone version: Bluetooth and USB

Other

- Integrated temperature sensor
- Three-color LED diode for status indication
- Intuitive PC software for import, .csv export, filtering and graph view
- Straight forward integration to top side control systems with alarm handling
- Customizable cabling, connector and fastening solutions

Acoustic transmitter:

Dimensions

- Sensor: 75 mm length, 16 mm diameter
- Sensor mount is project specific.

Material

- Delrin, polyurethane

Hydroacoustic

- Power output 158 dB re 1µPa@1m
- Transmit range 500 m, depending on local conditions
- Transmit frequency 60 – 80 kHz (configurable)

Battery life

- More than 10 years with 5 min transmitting interval (configurable)

Operational depth

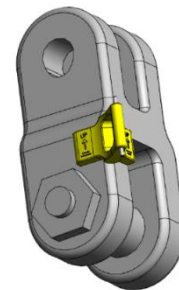
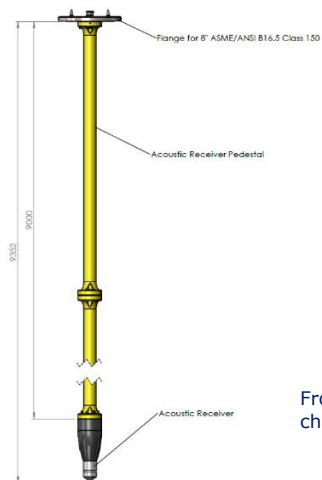
- 0 – 300 m

Sensors

- Depth
 - Resolution 0.1 cm
 - Accuracy +- 10 cm (at 60 – 200 m depth)
- Inclinator
 - Range 0 – 180 degrees
 - Resolution 0.1 degree
 - Accuracy 1 degree
- Movement
 - 3-axis MEMS accelerometer

Other

- Activated with magnetic key
- Possibility of 1 Hz continuous sampling and internal statistical calculation for e.g. transmitting max, min, mean, standard deviation



From left: Segmented pipe solution for getting receiver positioned through a pipe or I-tube, diver changeable redundant sensor clamp, magnetic ROV clamp with redundant sensors.