

Système de positionnement acoustique

Aquamark

Répulsif à Dauphins



Acoustic Marine Mammal Deterrents

The AQUA*mark* series of pingers are the result of bioacoustics research dating back to the mid-1990's.

Their primary application is to reduce the unintentional catch of marine mammals in commercial fisheries and other marine operations. A large-scale trial in a Danish commercial fishery in 1997 showed a highly significant reduction in harbour porpoise bycatch on nets fitted with AQUA*mark* 100 deterrent

technology. Current observer programmes indicate that the pingers still remain very effective in preventing porpoise deaths.

Further trials in the Mediterranean in 2001 with the AQUA*mark* 200 showed a similar reduction in dolphin bycatch. The deterrent technology has also helped reduce gear damage and catch reduction by cetaceans that specifically target fishing nets and lines for food.

The patented AQUAmark beacon technology comprises a battery, microprocessor-controlled electronics, acoustic transducers, and an immersion switch. When it is fully immersed in water, the pinger begins to transmit acoustic signals programmed in to suit the particular application. Four devices are currently available:

General Description

AQUAmark 100: Tested and approved for harbour porpoise deterrence. Uses randomly spaced chirps optimised for porpoise auditory response to minimise habituation.

AQUAmark 200: Lower frequency version of the AQUAmark 100 for use with dolphins and killer whales. Suggested applications include reduction of bycatch in trawls, and reduction of predation from long lines.

AQUAmark 210: Higher output deterrent with increased randomness in transmission cycle, intended for more problematic predation in static nets.

AQUAmark 300: Specially developed to meet the US NMFS regulations for pingers required as part of the Pacific Offshore Cetacean Take Reduction Plan, and the Harbor Porpoise Take Reduction Plan.

Outline specification

| Caractéristiques techniques | |
|-----------------------------|--|
| Acoustic Output | Wideband frequency modulated waveforms, each 200-300ms long, with harmonic energy in the 20kHz to 160kHz band Typically 145dB re 1µPa @ 1m |
| Dimensions | 164mm (6.5") long x 58mm (2.3") diameter at widest point |
| Weight | 410 g (15 oz) in air; 135 g (5 oz) in water |
| Attachment | Dual point attachment through 11mm (0.4") holes 19mm (0.75") from ends, or by placement in bait bags |
| Maximum depth | 200 m |
| Recommended spacing | Every 200 m |
| Shelf life | Up to 4 years |
| Battery life | 1 to 2 years with continuous immersion, dependent on temperature. Up to 4 years in typical fishery with seasonal or discontinuous deployment, as devices switch off when not in water. |

The problem of accidental bycatch of harbour porpoises and other marine mammals in Northern European waters, off the East Coast of the USA, and elsewhere in the world, has been known for some time. All EC nations are committed under the 1992 European

Habitats Directive and other international agreements to monitor and reduce the numbers of porpoises and other marine mammals caught in nets.

In the late 1990's, research at Loughborough University, UK, identified a range of ultrasonic signal types that had a strong deterrent effect on the harbour porpoise. The various signals were developed by careful work with two captive animals, and then tested in open sea, both in experimental situations, and in a large-scale fisheries trial. The system concept, including its microprocessorbased electronics, with the PICE (Porpoise Incidental Catch Eliminator) trademark, has been patented both in the UK and USA.

At about the same time, trials in the USA revealed similar deterrent effects using a simple 10kHz pinger

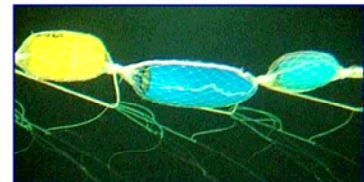
The trials subsequently led to the requirement for pingers of this specification to be attached to certain types of nets as part of the NMFS Harbor Porpoise Take Reduction Plan and Pacific Offshore Cetacean Take Reduction Plan. Meanwhile in Denmark, similar regulations requiring the use of either the 10kHz or PICE pingers in the wreck net fisheries were introduced in August 2000.

A licence was awarded to manufacture and market the device in 1999 under the AQUAmark name. We then worked with Loughborough in developing both the electronics, the software, and mechanical design and have now acquired the full patent rights. The new device was launched at the Oceanology International 2000 trade show in Brighton, UK in March 2000, where visitors to the stand showing interest in this product included UK Fisheries Minister Elliot Morley.

Further trials around the world have subsequently shown the AQUAmark technology to be very effective in cutting dolphin bycatch in driftnet fisheries. Meanwhile, Mediterranean fishermen plagued by damage to their nets from dolphin attacks have also found the AQUAmark to be an effective deterrent

How to Use the AQUAmark

The AQUAmark is designed to be attached to fishing gear at regular intervals, typically on a head rope for bottom set nets, or on a foot rope for drift nets. It should not be allowed to rest on the seabed or be buoyed into the swell, as this will mask the sound. The device includes two eyes to allow it to be attached using rope. It can also be braided, possibly with additional flotation (see right), to minimise any risk of snagging. Some fishermen have also used bait bags as a convenient method of fixing.



To ensure adequate acoustic coverage for porpoise deterrence, the AQUAmark 100 should be attached to the ends of the gear, and at separations not exceeding 200 metres. This spacing has also been found acceptable for the AQUAmark 200 where dolphin bycatch is a problem, although closer spacing may be necessary when there is deliberate predation from fishing gear. The US NMFS regulations specify a 300ft maximum spacing for pingers such as the AQUAmark 300

Maintenance and Testing



The AQUAmark is virtually maintenance free. It contains a built-in battery that is sealed in. The typical life in a seasonal fishery, where nets are also taken out of the water during the fishing season, can approach the stated battery shelf life of 4 years. This is because the device includes a contactless immersion switch that senses complete immersion. Even when the devices are wet, but out of the water, the switch will detect this and turn off the pinger.

Out of season, the devices should be rinsed in fresh water and placed in a dry environment. If they can be stored at normal room temperature, this will improve battery life. Battery life will not deteriorate out of season unless they are left in a cold outdoor environment, or in direct sunlight.

Operational integrity is verifiable by periodic testing. For those with good hearing, the AQUAmark 200, 210 and 300 are audible. All pingers emit a coded signal incorporating serial number and battery level when they first switch on after immersion. A trained ear can count the battery transmissions (5=Full to 1=Empty battery). Alternatively, easy to use testers are available for in-air or in-water testing. These are essential for the AQUAmark 100, whose ultrasonic transmissions are generally inaudible. They provide audible and visual indication of correct function.