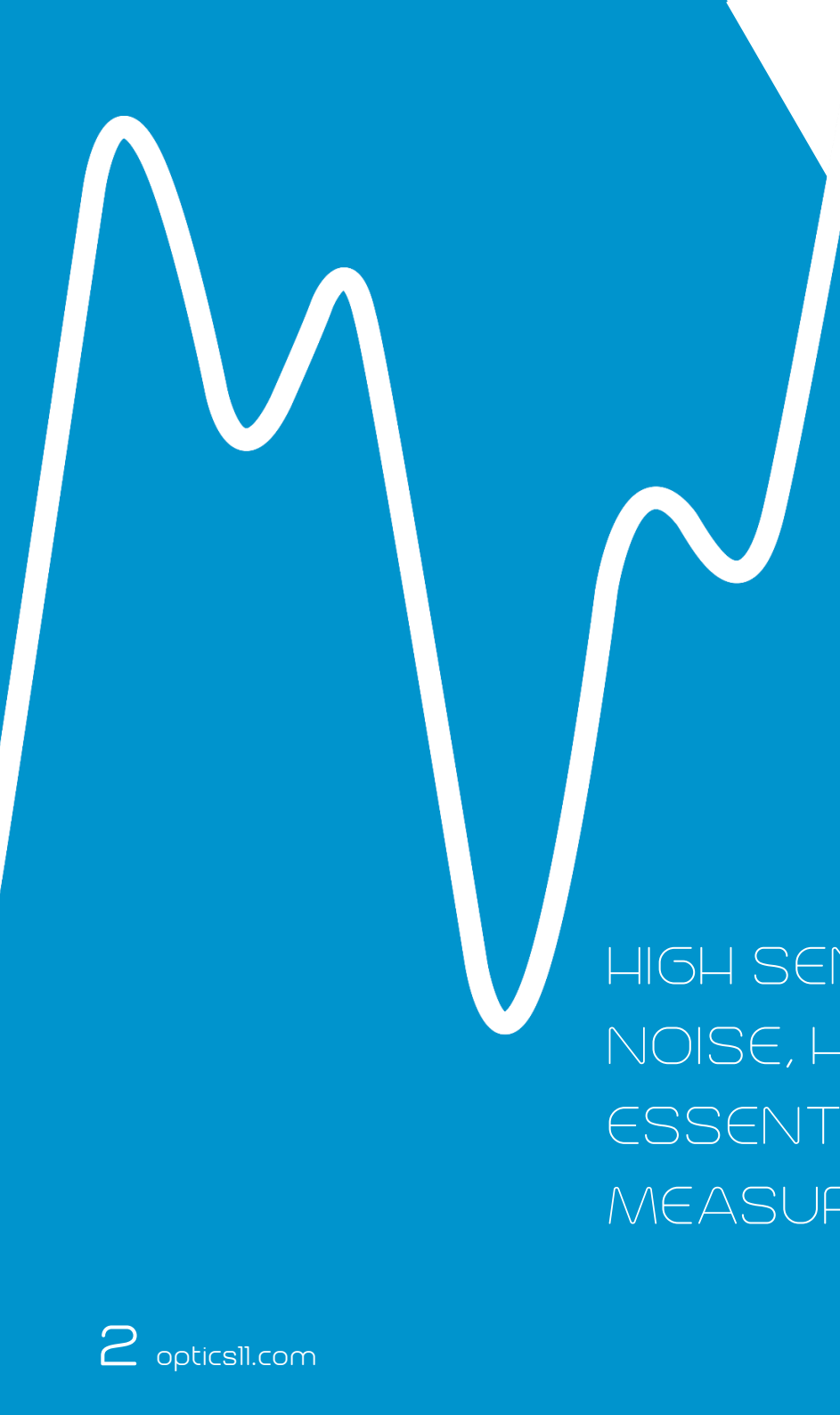


HYDROPHONES


# OPTICAL THIN LINE TOWED ARRAYS





OUR SOLUTION: MULTIPLE  
MINIATURE HYDROPHONES  
IN A FULLY OPTICAL ARRAY

HIGH SENSITIVITY, LOW  
NOISE, HIGH BANDWIDTH  
ESSENTIALS FOR QUALITY  
MEASUREMENTS

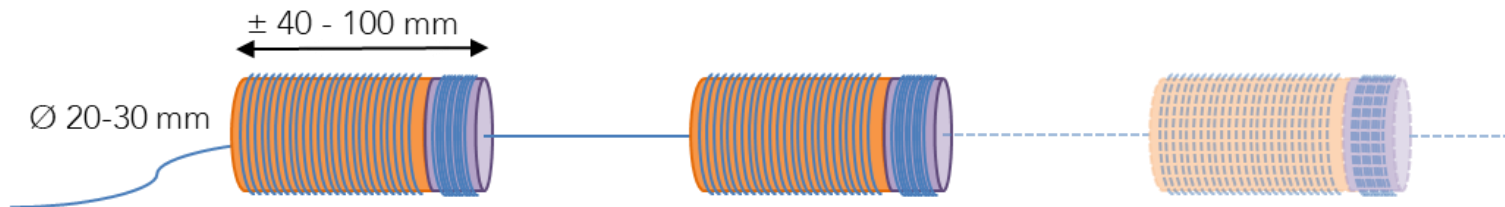


## MAXIMISE PERFORMANCE WITH ALL OPTICAL TOWED ARRAY

Do you have a need to measure acoustics subsea? And did you investigate in existing hydrophone solutions, however encountered challenges due to sensitivity, physical size & weight, power usage, maximum amount of sensing elements and/or complicated (costly) designs?

Optics11 offers a fully optical towed array that deals with these challenges. The array consists of miniaturized mandrills wrapped with fiberglass that operates with high sensitivity @ sea state zero behind any surface or underwater platform.

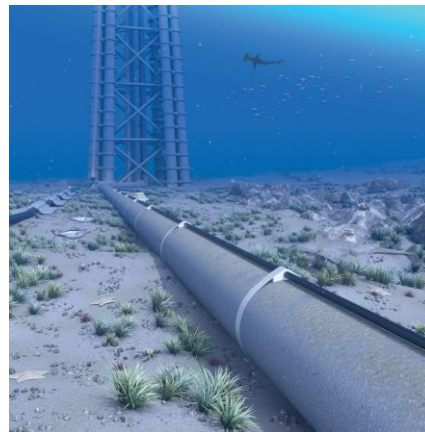
Highly sensitive, low weight, small size and low power usage.



## APPLICATIONS

There are many applications or platforms that benefit from our solution:

- Surface and underwater vessels (gliders and UAV)
- Marine mammal monitoring
- Harbour surveillance and protection
- Environmental monitoring and vessel noise characterisation
- Anti-Submarine Warfare
- Vertical array/grid monitoring
- Asset monitoring and protection
- Condition monitoring



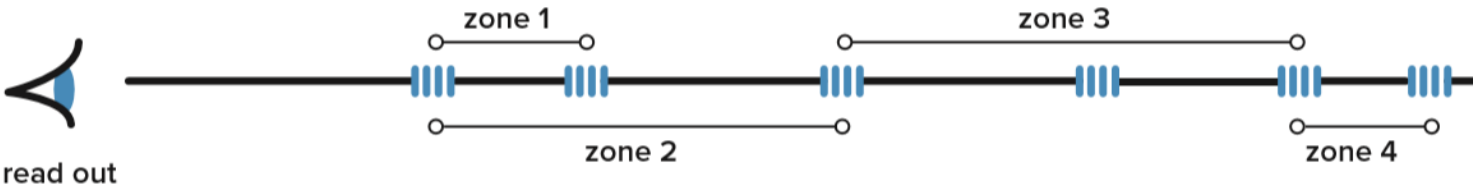
unique  
patented  
technology

# TECHNOLOGY

Extreme sensitivity in exceptionally harsh environments is best achieved using optical fiber technology. Very low noise floor (sea state zero) and garden hose size dimensions of the all optical hydrophones is possible by using a unique patented technology, the ZonaSens technology.

This interferometric principle measures between two reflective parts in a fiber (FBGs), therefore making that part of the fiber extremely sensitive to strain. Even minute changes to the fiber caused by acoustic waves will be detected.

Besides the optical advantages – such as the possibility to have hundreds of meters of fiber between the platform and hydrophones or adding sensors without the increase of power / reducing measuring speed and the resistance to liquids – our sensors are fully passive. Just a mandrill wrapped with fiberglass, no electric signals involved. Simple and elegant.





# TECHNICAL SPECIFICATIONS

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## Hydrophones<sup>1</sup>

Sensitivity	-140 dB re rad/ $\mu$ Pa
Acoustic noise floor	42 dB re 1 $\mu$ Pa/ $\sqrt{\text{Hz}}$
Noise equivalent	Sea state zero
Dynamic range	>130 Db
Available frequency range	10 Hz up to 10 kHz
Measurement direction	Radially sensitive
Dimensions	$\varnothing$ 20 x 30 mm
Operation depth	300 meters
Execution options	Oil-backed Air-backed (near future)

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## Hardware

Amount of sensors	10 now; >100 near future
Power usage	< 20 Watts
Data output	ethernet

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<sup>1</sup> Hydrophones are available in different designs, listed specifications can therefore vary between designs. Please contact us for full details.

## ABOUT OPTICS11

Optics11 is a fast-growing high-tech company that offers revolutionary new optical fiber measurement systems for applications in acoustic monitoring, acceleration & strain sensing and more.

The combination of unique interferometry concepts and advanced mechanical transducers (MEMS) provides exceptional characteristics of our systems. The underlying shared technology enables our systems to be more sensitive, affordable and have a higher bandwidth compared to existing industry standards.

**We love making cutting-edge technology fit for use!**

Please contact us at [info@optics11.com](mailto:info@optics11.com) for more information, technical data sheets, or to speak with a representative.



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