



## Introduction

The SoneSys Aqua Defender™ line of sonar systems encompasses a family of sonar sensors, from very light and compact, ideal for mobile deployment, to ultra-long range for surveillance of open areas.

SoneSys uses patented receive beam-forming technology that allows us to build smaller, more efficient systems. Smaller size translates into lower weight, and higher efficiency results in a reduced environmental impact.

The SoneSys Engineering Team has over 30 years of experience in the design and development of Advanced Sonar Technology. The current product family represents the fourth generation of Diver Detection Sonar systems.

## Lighter& Stronger

Sonesys' proprietary and patented technology allows the Aqua Defender™ to be extremely compact, reliable, light-weight, and easy to deploy.



## Easy to Operate

The Software is highly intuitive and easy to use. The Graphical User Interface gives the operator a map-like depiction of the area under surveillance. With our patented micro-beam receiver technology, the Aqua Defender™ can operate in high ambient noise environments, and can easily distinguish between a marine mammal and an intruder.



## Aqua Defender™ Model 8

The Aqua Defender™ Model 8 is the smallest member of the family of underwater intrusion detection and prevention systems offered by SoneSys. It is a light-weight variant of our line of diver detection systems, and caters to applications where portability is paramount, where only a limited area is monitored, where multiple sensors are networked, or where rapid deployment and mobility are needed.

The Aqua Defender™ Model 8 weighs less than 8 kg and offers area surveillance at a full 360 degree field of view. With its small form factor and low price, the Aqua Defender™ 8 is unmatched in its ability to provide reliable surveillance of inlets, canals and small harbors.

## Mobile Deployment

The Aqua Defender™ 8, with its low weight of less than 8 kg, can easily be deployed by a single operator, and is ready to protect within minutes.

## Easy to Integrate

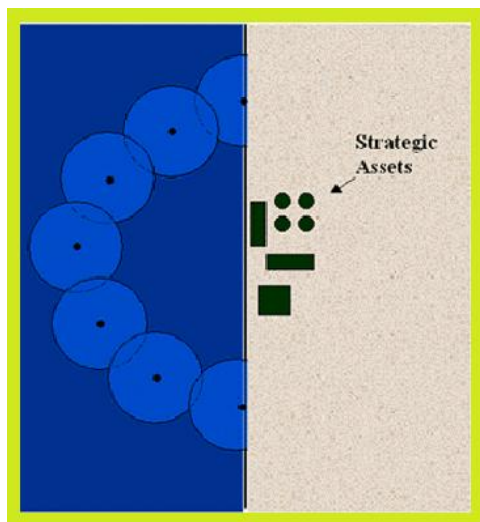
SoneSys' Aqua Defender™ Sensors are designed to be easily integrated into common Command and Control Systems. Our systems can be networked with other sensors to provide a seamless blanket of security for installations of all shapes and sizes.

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### **Aqua Defender™ Model 30**

The Aqua Defender™ Model 30 combines extended range detection (2 – 3 times the range of other commercially available systems) and low weight. This makes this system ideal for applications where range and portability are important. Its small size and light weight (less than 30 kg) allows for rapid single-handed deployment to protect vessels, assets surrounded by water and strategic installations bordered by bodies of water.



Exclusion zone using conventional Sonar



Exclusion zone using Aqua Defender™ Sonar

### **Aqua Defender™ Model P**

The SoneSys Aqua Defender™ Model P is the highest performance Diver Detection Sonar in the world today. With an effective detection range greater than conventional sonar alternatives, and with area coverage improved up to a factor of 100, the Aqua Defender™ Model P offers a wide range of advanced features. These include underwater loud-hailing and non-lethal deterrence capability, optional 360 degree coverage, automatic target detection and localization, target identification technology options, Low-Probability-of-Intercept (LPI) and Operational Reserve Modes, mono-static and multi-static operation, countermeasures mitigation, and pier side deployment.

Because of its unique exploitation of parametric sonar principles and advanced receiver technology, the Aqua Defender™ Model P is the ultimate Diver Detection System for protecting high value assets.

### **Parametric Array Sonic Echo Ranging Sonar Technology**

The Aqua Defender™ Model P offers the most sophisticated implementation of patented technology. This technology enables sonar systems to develop narrow laser-like beams of sound at low frequencies, which are electronically scanned to cover a large search area. The narrow beams are generated using a unique form of the Westervelt Parametric Transmitting Array to ensonify targets without generating significant amounts of unwanted reverberation and clutter. The wide bandwidth spread spectrum waveform processing, as well low side-lobe levels of the transmit beam response minimizes counter-detection, and provides resistance to sonar counter-measures, while simultaneous transmission and reception eliminates the need for range-blanking, and allows lower peak power operation.

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### **Technical Specifications Aqua Defender™ Model 8**

Field of View:	360 degrees
Peak Power:	< 50 Watts
Frequency:	28 KHz Nominal
Bandwidth:	4000 Hz
Beam Width:	10 degrees Nominal
Position Accuracy:	0.25 meters in X,Y
Pulse Length:	1 -1000 Milliseconds
Waveforms:	Chirped FM, Pulsed CW
Weight (in air):	8 Kg
Detection Range:	170 Meters
Cable Length:	25 Meters
Operating depth:	25 Meters
Options:	Seabed Frames Over the Side Mount Pier Mount Pitch and Roll Compensation Extended Cable Underwater Loud-Hailing
Surface Station:	Water-resistant Laptop PC
Detection Range:	175 meters

### **Technical Specifications Aqua Defender™ Model 30**

Field of View:	360 degrees
Frequency:	22-48 KHz
Bandwidth:	26 KHz
Beams:	288
Azimuthal Beamwidth:	3 degrees
Vertical Beamwidth:	25 degrees
Source Level:	208 dB
Weight (in air):	30 Kg
Pulse length:	40-100 ms (FM Chirp)
Max Operating Depth:	50 M
Options:	Seabed Frames Over the Side Mount Pier Mount Pitch and Roll Compensation Extended Cable Underwater Loud-Hailing
Surface Station:	Water-resistant Laptop PC
Detection Range:	1,000 meters

All Specifications are subject to change without notice.

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## **Technical Specifications Aqua Defender™ Model P**

Primary Source Level (High Band) @ 26 KHz: In excess of 230 dB  
Secondary Source Level (Low Band) @ 5 KHz: In excess of 200 dB  
Horizontal Transmit Beam Width: 7 degrees  
Vertical Transmit Beam Width: 8 degrees  
Available beams can be selected in .2 (2/20) degree increments  
Primary (High) Operating band: 21-33 KHz  
Secondary (parametric, low) Operating band: 4-7 KHz  
Power (electrically): 3 – 12 KW, power consumption during transmit  
Arrays: Separated phased arrays for transmit and receive, in the same housing  
Processor: COTS processor with available fiber optic communications to/from "wet end".  
Reception in both bands can be obtained.  
All beams are stabilized with rate-gyro inertial measurement unit, selectable in geodetic coordinates.  
Coverage (azimuth): up to 360 degrees

### **Modes:**

- Automatic Detection in all modes with CFAR detector, Plan-Position Indicator and/or map overlay display.
- Fully automatic 360 degree search
- Adjustable to increase revisits for rapid update tracking of detected targets.
- Simultaneous transmission and reception for high duty-cycle – no range blanking
- Fully automatic sector search mode
- Manual single beam, ping-repeat mode
- Data logging mode

Maximum pulse length is 3 seconds. Typical pulse length for Diver Detection Mode is 100 ms. Typical spread bandwidth is 1000 Hz for small target detections.

Classification: Option of active echo-based classification processing. Dynamics tracking feeds classification algorithms based track data.

Underwater Loud-Hailing & non-lethal deterrence capability

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