EvoLogics GmbH develops underwater information and communication systems based on bionic concepts, combining cutting edge engineering with the best ideas found in nature. The advanced product features have become enabling technologies for deep water exploration and production.

EvoLogics range of products offers highly reliable, flexible and cost-effective solutions for multiple underwater communication, positioning, navigation and monitoring applications. We strive for innovation and invest our vast experience into developing, manufacturing and supporting products that deliver an excellent performance and solve the most challenging tasks.

The company was founded in 2000 in Berlin, Germany, by a group of leading international scientists and maritime engineering experts. The company since focuses on developing innovative solutions for maritime and offshore industries, as well as smart robotic systems design and bionic research.
EvoLogics S2C LBL Underwater Positioning and Communication Systems

EvoLogics LBL systems bring the benefits of long baseline (LBL) acoustic positioning to offshore and maritime applications that demand highly accurate results. S2C R-series underwater acoustic modems that operate as transponders, deployed around the working area in an array of georeferenced baseline nodes, allow to track and navigate mobile targets with highest accuracy that does not depend on the depth. Combining highly accurate LBL positioning with full benefits of an S2C technology communication link, an S2C LBL system delivers an excellent all-round performance ideal for application scenarios that demand space-, energy- and cost-saving solutions. Switching between positioning and communication modes is not necessary: positioning data is calculated simultaneously with acoustic transmissions. Both features complement each other in a fully integrated positioning and communication system that opens new possibilities for a wide range of subsea applications.

- Patented S2C (Sweep Spread Carrier) Technology - spread spectrum technology based on extensive bionic studies
- LBL positioning with up to 1.5 cm accuracy
- Simultaneous LBL positioning and data transmissions
- Multiple target tracking
- “Silent” positioning mode: targets do not transmit beacon signals and self-position with broadcasts from baseline nodes
- Self-adaptive algorithms for reliable performance in adverse conditions, forward error correction and data compression
- Advanced communication protocol with several data delivery algorithms: send and receive large volumes of data with the highest bitrate possible in current conditions; send and receive short instant messages without interrupting the main data flow between devices
- Addressing and networking: build relay chains and underwater networks with broadcasting capabilities
- Low power consumption and additional power-saving options

APPLICATIONS

Positioning of offshore equipment
Track positions of offshore equipment during installation to ensure highly accurate placement at determined coordinates

Navigation of ROVs and AUVs
Simultaneously track positions of multiple ROVs or AUVs and control their missions with instant commands

Cartography
Locate underwater features with georeferenced coordinates when used together with GPS or differential GPS

Sensor network tracking
Track drifts of moored sensors and detectors for accurate geo-referencing of their measurements

Diver Tracking
Monitor positions of several divers and exchange information with them during the mission

MODULES AND OPTIONS

- AHRS (Attitude and Heading Reference System)
- GPS integration
- Integrated rechargeable battery
- Power-saving acoustic Wake-Up module
- Integrated data-logger
- Acoustic releases and floatation collars
- Short- mid- and long-range devices for shallow or deep water applications
- OEM versions available
- Compatible with S2C R modem and USBL solutions

SENSOR INTEGRATION

- ADCP: Acoustic Doppler Current Profiler
- SVP: Sound Velocity Profiler
- CTD: Conductivity, Temperature, Depth, Pressure sensors
- INS: Inertial Navigation System
- More options upon request
EvoLogics LBL Communication and Positioning System: typical configuration

An LBL positioning system uses an array of sea-floor mounted baseline transponders: their exact locations are known, so they are used as reference points for determining target positions. Baseline transponders reply to acoustic interrogation signals from target-mounted transceivers with their own acoustic pulses, allowing a target transceiver to calculate its position by measuring the distance between itself and each transponder of the baseline array.

Baseline transponders are either mounted in sea-floor stands or equipped with acoustic release mechanisms and flotation collars for easier recovery to the surface. They are deployed around the work site and carefully calibrated prior to LBL system operation. Target transceivers are mounted on positioning targets, for example, on autonomous underwater vehicles (AUVs), remotely operated vehicles (ROVs) etc., and use acoustic signals to determine distances to baseline nodes.

A GPS receiver is installed on the vessel for accurate calibration of the baseline transponder array after its deployment. During calibration, the vessel moves above the deployed baseline transponders to accurately determine their location. Coupled with a vessel transceiver, the GPS receiver provides the baseline nodes’ positions in real-world coordinates.

Third-party or built-in AHRS sensor (Attitude and Heading Reference System) provides information about the vessel’s orientation during calibration to eliminate positioning errors. The navigation computer is installed on the vessel, interfaced with the vessel transceiver and other external instruments and connected to the local computer network. EvoLogics positioning software, the SiNAPS, and the Transponder communication utility, a web-based tool to monitor and control the baseline transponders, are accessible from the navigation computer to configure, control and monitor the mission.

EvoLogics SiNAPS positioning software is a client-server application. SiNAPS server is installed on the navigation computer and interfaced with the vessel transceiver and other external instruments. SiNAPS server receives, processes and stores data from the transceiver and external instruments.

SiNAPS client is the web-based user interface of the positioning system. It displays real-time information about the positions of the vessel and the targets, provides access to data management tools and system configuration settings. The UI can be opened in most current web-browsers on multiple devices in the local computer network at once.
Evologics LBL Positioning System uses S2CR Underwater Acoustic Modems in baseline transponder configuration.

Standard S2CR-Series and S2CM-Series modems can be configured as target transceivers.

Specifications subject to change without notice. © Evologics GmbH - April 2015
from the navigation computer to configure, control and monitor the mission. During calibration to eliminate positioning errors. The navigation computer is installed on the vessel, interfaced with the vessel transceiver, the GPS receiver provides the baseline nodes’ positions in real-world coordinates.

A GPS receiver is installed on the vessel for accurate calibration of the baseline transponder array after its deployment. During sea-floor mounted baseline transponders:

- **Third-party or built-in AHRS sensor (Attitude and Heading Reference System)** provides information about the vessel’s orientation.

**ANLFOGics LBL Positioning System** uses an array of underwater acoustic modems in baseline transponder configuration. The system includes:

1. **Transponder**
2. **Target**
3. **Vessel**
4. **Baseline**

**Target** and **Baseline** transceivers communicate through **acoustic interrogation signals** from targets to baseline transponders. Since their exact locations are known, so they are used for navigation purposes.

**Configuration Options**

<table>
<thead>
<tr>
<th>HOUSING</th>
<th>DELRIN</th>
<th>Plastic non-magnetic corrosion-resistant housing, depth rating 200 m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ALUMINIUM ALLOY</td>
<td>Light metal housing for short-term deployments, depth rating 2000 m</td>
</tr>
<tr>
<td></td>
<td>STAINLESS STEEL</td>
<td>Robust metal housing, suitable for long-term deployment in harsh environments, depth rating 2000 m</td>
</tr>
<tr>
<td></td>
<td>TITANIUM</td>
<td>Corrosion resistant, suitable for long-term deployment in harsh environments, depth rating 6000 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERFACE</th>
<th>1 CONNECTOR</th>
<th>RS-232 or Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 CONNECTORS</td>
<td>RS-232 + RS-232 or RS-232 + Ethernet</td>
</tr>
</tbody>
</table>

**WAKE-UP MODULE**

<table>
<thead>
<tr>
<th>Interface Options</th>
<th>RS-232 interface</th>
<th>Ethernet interface</th>
<th>RS-232 + RS-232 interface</th>
<th>RS-232 + Ethernet interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Ethernet</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>RS-232 + RS-232</td>
<td>✓</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>RS-232 + Ethernet</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

**INTERNAL AHRS**

<table>
<thead>
<tr>
<th>Interface Options</th>
<th>RS-232 interface</th>
<th>Ethernet interface</th>
<th>RS-232 + RS-232 interface</th>
<th>RS-232 + Ethernet interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232</td>
<td>x</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ethernet</td>
<td></td>
<td>x</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>RS-232 + RS-232</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>RS-232 + Ethernet</td>
<td></td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
</tbody>
</table>

**ACOUSTIC RELEASE**

- Acoustic release mechanism for reliable recovery to the surface. Available as OEM version for system integration.

**FLOATATION COLLAR**

- Robust floatation collar for fast recovery.

Unique application scenarios might require additional customizing. EvoLogics experts are always ready to address any special requests!

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1) See the Configuration Options for available standard interface combinations.
2) RS-485 protocol does not support duplex communication and must be customized. Contact EvoLogics for more information.
3) User-configurable Listen Mode is only available with a Wake-Up module installed. Power consumption in Listen Mode depends on Listen Mode settings.
4) Power consumption for the RS-232 interface option. Add 600 mW for the Ethernet interface option.
5) Contact EvoLogics for more information on power supply options!
6) S2CR 42/65 - dimensions of a Delrin housing, other builds are slightly larger; S2CR 12/24, 7/17 - dimensions of a titanium housing, other builds are slightly smaller. Contact EvoLogics for more information on device dimensions!
7) One RS-232 Interface can be replaced with either RS-485 or RS-422 interface. More interface configurations available by special request. Contact EvoLogics for more information!
8) The Wake Up Module turns the rest of the device on if it detects incoming acoustic signals or incoming data on the host interface. Once the device completes receiving or transmitting data, it switches itself off. Please note: the Wake Up Module is only compatible with the RS-232 interface! It is not compatible with Ethernet, RS-485 or RS-422.

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**Phisical Specifications and Configuration Options**

<table>
<thead>
<tr>
<th>Feature</th>
<th>S2CR 48/78</th>
<th>S2CR 42/65</th>
<th>S2CR 18/34</th>
<th>S2CR 12/24</th>
<th>S2CR 7/17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td>Ø110 x170 mm</td>
<td>100 degrees</td>
<td>Ø110 x170 mm</td>
<td>100 degrees</td>
<td>Ø110 x170 mm</td>
</tr>
<tr>
<td><strong>Transmit Mode</strong></td>
<td>5.5 W, 250 m range</td>
<td>5.5 W, 250 m range</td>
<td>2.8 W, 1000 m range</td>
<td>2.5 W, 1500 m range</td>
<td>3 W, 2000 m range</td>
</tr>
<tr>
<td><strong>Receive Mode</strong></td>
<td>less than 1.1 W</td>
<td>less than 1.1 W</td>
<td>less than 1.6 W</td>
<td>less than 1.1 W</td>
<td>less than 1.1 W</td>
</tr>
<tr>
<td><strong>Listen Mode</strong></td>
<td>5 - 285 mW</td>
<td>5 - 285 mW</td>
<td>5 - 285 mW</td>
<td>5 - 285 mW</td>
<td>5 - 285 mW</td>
</tr>
<tr>
<td><strong>Operative Depth</strong></td>
<td>2000 m</td>
<td>2000 m</td>
<td>2000 m</td>
<td>2000 m</td>
<td>2000 m</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>8000/5800 g</td>
<td>8000/5800 g</td>
<td>9800/5800 g</td>
<td>8000/5800 g</td>
<td>8000/5800 g</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>External 24 VDC (12 VDC optional) or internal rechargeable battery (optional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>6.9 mW</td>
<td>6.9 mW</td>
<td>13.9 mW</td>
<td>9.2 mW</td>
<td>6.9 mW</td>
</tr>
<tr>
<td><strong>Transducer Beam Pattern</strong></td>
<td>100 degrees</td>
<td>100 degrees</td>
<td>100 degrees</td>
<td>100 degrees</td>
<td>100 degrees</td>
</tr>
<tr>
<td><strong>Maximum Temperatures</strong></td>
<td>48 - 78 kHz</td>
<td>42 - 65 kHz</td>
<td>18 - 34 kHz</td>
<td>13 - 24 kHz</td>
<td>7 - 17 kHz</td>
</tr>
<tr>
<td><strong>Operative Depth</strong></td>
<td>2000 m</td>
<td>2000 m</td>
<td>2000 m</td>
<td>2000 m</td>
<td>2000 m</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>2250/400 g</td>
<td>1390/690 g</td>
<td>2445/400 g</td>
<td>2990/490 g</td>
<td>2990/490 g</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>(optional)</td>
<td>(optional)</td>
<td>(optional)</td>
<td>(optional)</td>
<td>(optional)</td>
</tr>
<tr>
<td><strong>Configuration Options</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stand-by Mode</strong></td>
<td>2.5 mW</td>
<td>2.5 mW</td>
<td>2.5 mW</td>
<td>2.5 mW</td>
<td>2.5 mW</td>
</tr>
<tr>
<td><strong>POWER CONSUMPTION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INTERNAL DATA BUFFER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BIT ERROR RATE</strong></td>
<td>up to 31.2 kbit/s</td>
<td>up to 31.2 kbit/s</td>
<td>up to 13.9 kbit/s</td>
<td>up to 9.2 kbit/s</td>
<td>up to 6.9 kbit/s</td>
</tr>
<tr>
<td><strong>TRANSDUCER BEAM PATTERN</strong></td>
<td>horizontally</td>
<td>horizontally</td>
<td>horizontally</td>
<td>horizontally</td>
<td>horizontally</td>
</tr>
</tbody>
</table>
| **TRANSPONDER WITH ACOUSTIC RELEASE**

Robust floatation collar for fast recovery.

Acoustic release mechanism for reliable recovery to the surface.

Available as OEM version for system integration.

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**SiNAPS** is a web-based user interface for all EvoLogics products. It gives access to data management tools and system configuration settings. The UI can be opened in most current web-browsers on multiple devices.

**SiNAPS Positioning Software** is available as a local application or as an online platform. The online platform connects to the device through WiFi, mobile network or a wired connection. EvoLogics experts are always ready to address any special requests!
ABOUT US

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