



# UNDERWATER ACOUSTIC MODEMS

PRODUCT INFORMATION GUIDE

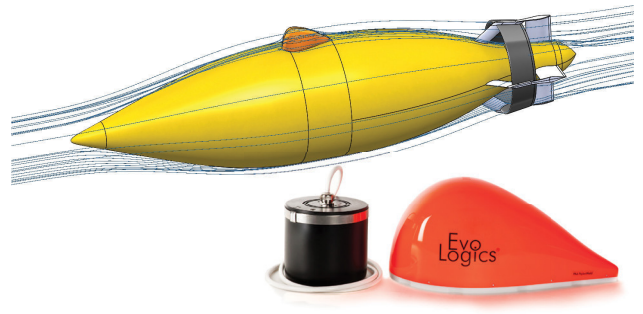


## UNDERWATER ACOUSTIC MODEMS

EvoLogics underwater acoustic modems provide full-duplex digital communication using EvoLogics' S2C (Sweep-Spread Carrier) Technology, delivering an excellent performance, resistant to the challenges of the dynamic subsea environment. Self-adaptive algorithms adjust the S2C parameters to maintain the highest bitrate possible in current conditions.

Every EvoLogics underwater acoustic modem implements advanced data delivery algorithms, supports addressing and networking and is easy to control with a comprehensive set of commands and software-configurable settings.

- Use as transponders, beacons and pingers - all modems are fully compatible with EvoLogics USBL/LBL positioning systems and can facilitate simultaneous communication and navigation.
- Sandbox and SDM devices offer extra opportunities for developers.
- OEM versions without housing and streamlined transducer units are available for system integration with UUVs.



## APPLICATIONS

### Oil & Gas

Support deepwater oil and gas exploration with a reliable communication system that provides real-time transmissions of sensor data or sending commands to remote equipment

### Unmanned Underwater Vehicles (ROVs and AUVs)

Real-time tracking and data acquisition, command transmissions with instant messaging feature - send commands on top of the main data flow from sensors or cameras

### Oceanography

Collect measurement data from various sensors in real-time or over periodic intervals, store and transmit data with adjustable priorities. Low power consumption and a power saving wake-up module enable long-term deployments

### Monitoring Stations

Integrate the communication system with a power source, multiple sensors and an acoustic releaser for a fully autonomous solution for long-term data collection missions

### Seismic

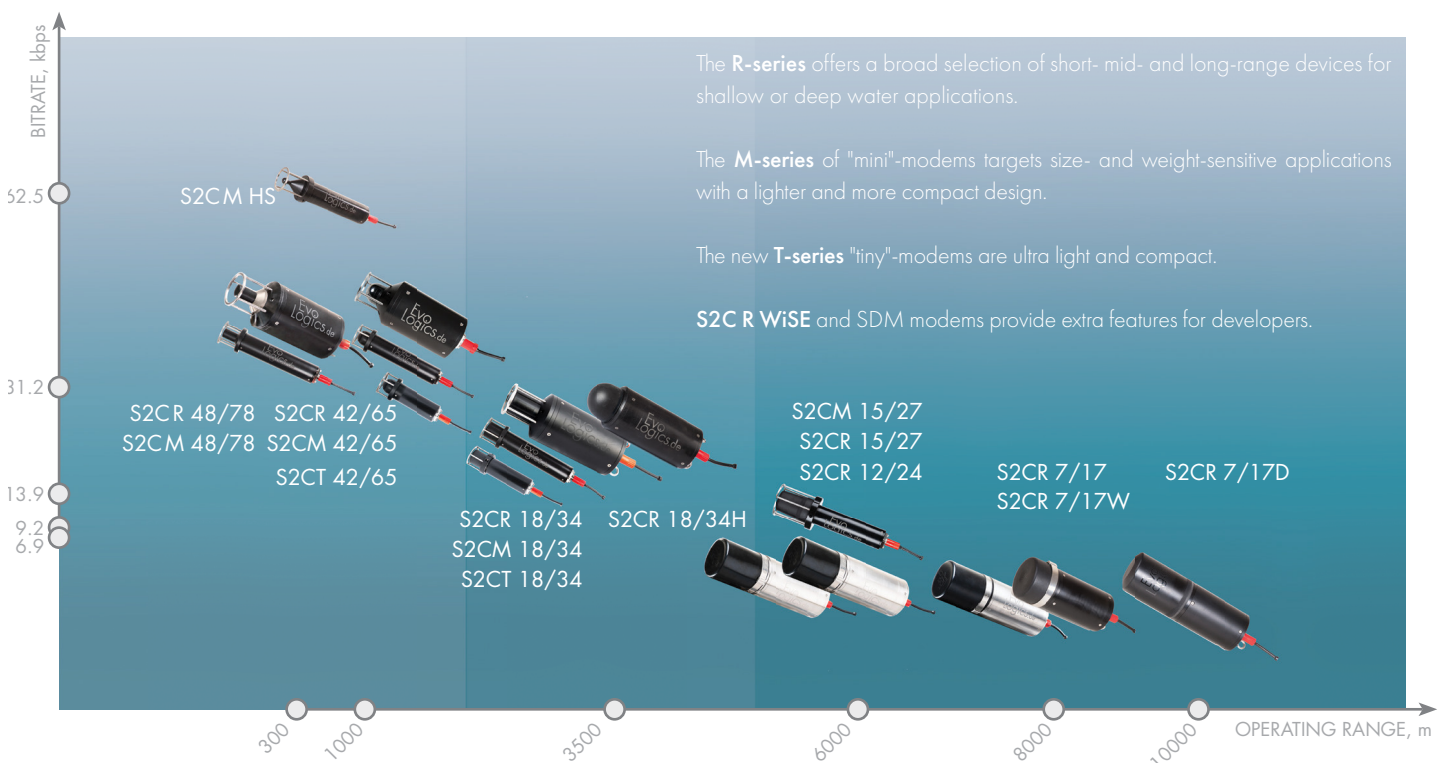
Collect seismic data and use the instant messaging feature for alarm-triggering events

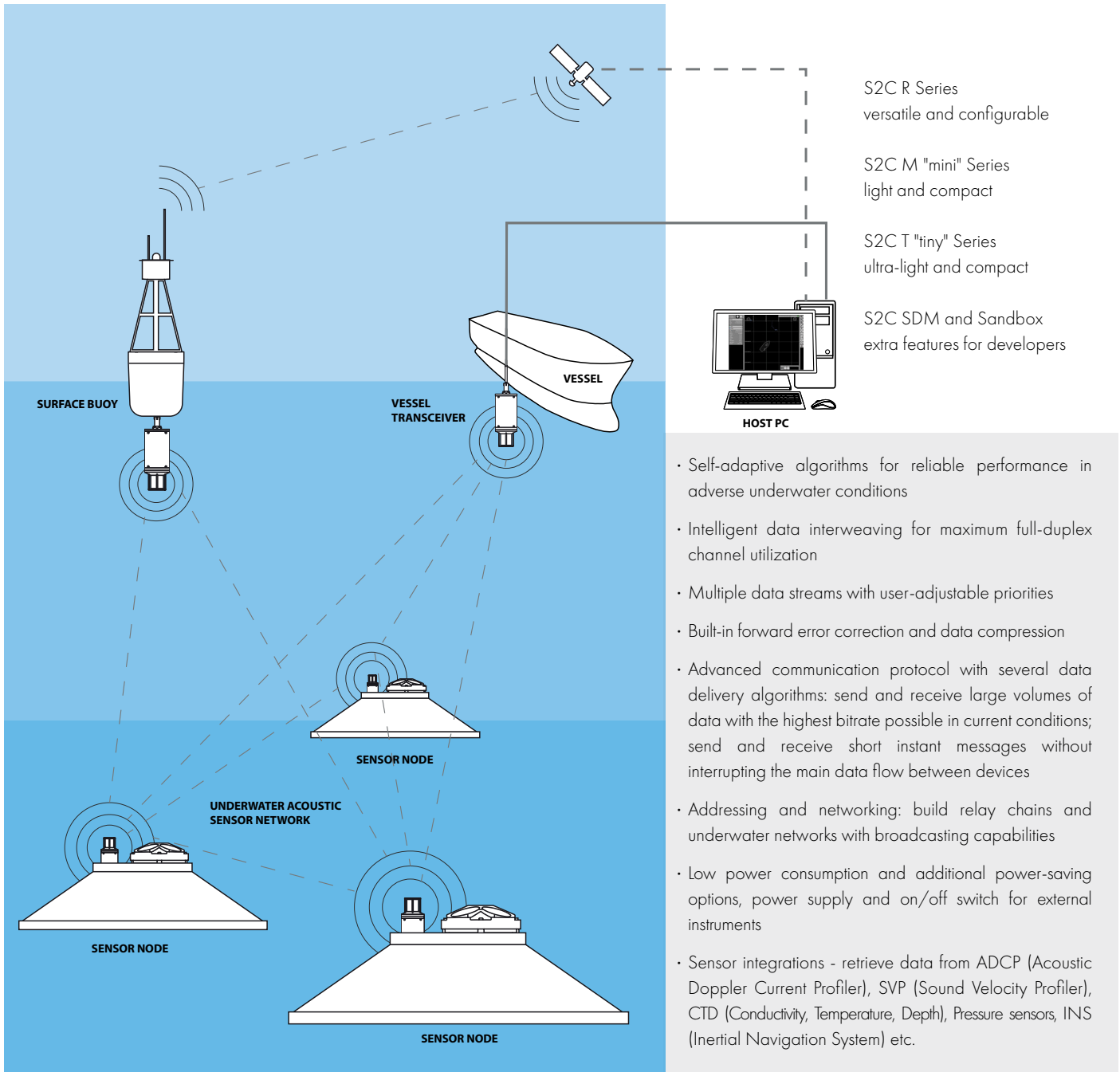
### Networks and Relay chains

Transmit information over longer distances or cover a larger area

### Information and Communication Centers

Advanced data management and expandable modular design can become the central point for all your underwater communication needs





#### DEVELOPER TOOLS

**Sandbox modems:** the sandbox is an embedded network protocol development platform and provides an excellent testbed. Run custom networking scripts, sensor-specific data preprocessing scripts and modules directly on real hardware in real-world conditions.

**S2C Modem Emulator:** test protocols and/or application solutions without underwater modems. A time-saver for code debugging and refinement. Solutions, designed and tested with the emulator, are easy to export to modem hardware. Available over remote access or as a standalone Evologics Modem Emulator Box.

**Software Defined Modem (SDM) mode:** transmit and receive arbitrary waveforms and set a reference to trigger signal detection.

#### MULTI-PROTOCOL SUPPORT

Besides Evologics S2C, the modems support the **JANUS** NATO standard (STANAG 4748) and **SWiG** underwater communication protocols

#### S2C SANDBOX Modems

GENERAL	Same as R-, M and T-series modems
FIRMWARE	16-64 MB sandbox (extendable up to 64 GB with SD card)



S2C EMULATOR BOX

SPECIFICATIONS AND CONFIGURATION OPTIONS

		R 48/78	R 42/65	R 18/34, 18/34 D, 18/34H	R 15/27	R 12/24	R 7/17, 7/17D, 7/17W	M 48/78	M 42/65	M 18/34	M 15/27	M HS	T 48/78	T 42/65	T 18/34	T HS		
GENERAL	OPERATING DEPTH	Delrin 200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	200 m	
		Aluminium Alloy 2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	not available					not available					
		Stainless Steel 2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
		Titanium 2000 m	2000 m	2000/6000 m (18/34D)	6000 m	6000 m	6000/10000 m (7/17D)	2000 m	2000 m	2000 m	6000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
	OPERATING RANGE	1000 m	1000 m	3500 m	6000 m	6000 m	8000/10000 m (7/17D)	1000 m	1000 m	2000 m	6000 m	300 m	1000 m	1000 m	2000 m	300 m		
FREQUENCY BAND	48 - 78 kHz	42 - 65 kHz	18 - 34 kHz	15 - 27 kHz	13 - 24 kHz	7 - 17 kHz	48 - 78 kHz	42 - 65 kHz	18 - 34 kHz	15 - 27 kHz	120 - 180 kHz	48 - 78 kHz	42 - 65 kHz	18 - 34 kHz	120 - 180 kHz			
TRANSDUCER BEAM PATTERN	horizontally omnidirectional	wide - angle 100 degrees	horizontally omnidirectional hemispherical (18/34H)	wide-angle 120 degrees	directional 70 degrees	hemispherical (7/17 and 7/17W) directional 80 degrees (7/17D)	horizontally omnidirectional	wide - angle 100 degrees	horizontally omnidirectional	wide-angle 120 degrees	omnidirectional	horizontally omnidirectional	wide - angle 100 degrees	horizontally omnidirectional	omnidirectional			
CONNECTION	ACOUSTIC CONNECTION	up to 31.2 kbit/s	up to 31.2 kbit/s	up to 13.9 kbit/s	up to 9.2 kbit/s	up to 9.2 kbit/s	up to 6.9 kbit/s	up to 31.2 kbit/s	up to 31.2 kbit/s	up to 13.9 kbit/s	up to 9.2 kbit/s	up to 62.5 kbit/s	up to 31.2 kbit/s	up to 31.2 kbit/s	up to 13.9 kbit/s	up to 62.5 kbit/s		
	BIT ERROR RATE	less than 10 <sup>-10</sup>					less than 10 <sup>-10</sup>					less than 10 <sup>-10</sup>						
	INTERNAL DATA BUFFER	1 MB, configurable					1 MB, configurable					1 MB, configurable						
	INTERFACE <sup>1)</sup>	Ethernet or RS-232					Ethernet or RS-232					Ethernet or RS-232						
	INTERFACE CONNECTORS	up to 4 connectors, Ethernet and serial combinations							1 connector					1 connector				
POWER	POWER CONSUMPTION <sup>2)</sup>	Stand-by Mode 2.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW	0.5 mW	2.5 mW	2.5 mW	2.5 mW	2.5 mW		
		Listen Mode 5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	5 - 285 mW	
		Receive Mode 0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	
		Transmit Mode up to 60 W	up to 40 W	up to 65 W	up to 65 W	up to 57 W	up to 45 W	up to 55 W	up to 35 W	up to 55 W	up to 60 W	up to 11 W	up to 25 W	up to 35 W	up to 25 W	up to 8 W		
POWER SUPPLY OPTIONS <sup>3)</sup>	External 24 VDC (12 VDC)	24 VDC (12 VDC)					24 VDC (12 VDC)					24 VDC (12 VDC)						
	Internal Rechargeable battery 5 Ah or 10 Ah	Rechargeable battery 5 Ah or 10 Ah							Rechargeable battery 3.350 Ah					Rechargeable battery 3.350 Ah				
PHYSICAL	HOUSING OPTIONS	Delrin Plastic non-magnetic corrosion-resistant housing for short-term deployments, depth rating 200 m					✓					✓						
		Aluminium Alloy Light metal housing for short-term deployments, depth rating 2000 m					not available					not available						
		Stainless Steel Robust metal, suitable for long-term deployments in harsh environments, depth rating 1000 m or 2000 m					✓					✓						
		Titanium Corrosion resistant housing, suitable for long-term deployment in harsh environments, depth rating 6000 m					not available					not available						
	DIMENSIONS <sup>4)</sup>	Delrin housing Total length	∅ 110 x 178 mm 265 mm	∅ 110 x 178 mm 265 mm	∅ 110 x 178/218 mm (18/34H) 265/300 mm (18/34H)	∅ 110 x 178 mm 295 mm	∅ 110 x 178 mm 322 mm	∅ 110 x 178 mm 322 / 338 mm (7/17D) 246 mm (7/17W)	∅ 63 x 235 mm 310 mm	∅ 63 x 235 mm 300 mm	∅ 63 x 235 mm 310 mm	∅ 63 x 235 mm 350 mm	∅ 63 x 235 mm 310 mm	∅ 63 mm x 170 mm 250 mm	∅ 63 x 170 mm 240 mm	∅ 63 x 170 mm 250 mm	∅ 63 mm x 170 mm 250 mm	
WEIGHT, dry/wet	Delrin	2250/400 g	2300/300 g	2245/400 g 3100/1200 g (18/34H)	3850/1080 g	2990/490 g	4700/600 g 6200/600 g (7/17D) 3000/490 g (7/17W)	1120/330 g	1210/420 g	1265/480 g	2360/1570 g TBC	1200/300 g	1050/300 g	1150/350 g	1200/400 g	1050/300 g		
MODULES AND OPTIONS	WAKE-UP MODULE <sup>5)</sup> not compatible with Ethernet	The Wake Up Module turns the rest of the device on if it detects incoming acoustic signals or incoming data on one host interface. Once the device completes receiving or transmitting data, it switches itself off. 2-connector version available for R-series						✓ single-connector version only					✓ single-connector version only					
	POWER SWITCH <sup>6)</sup> not compatible with Ethernet	The Power Switch allows to provide power supply to up to 4 external instruments and turn them on/off on command						not available					not available					
	ADVANCED TIMEKEEPING MODULE	Allows to accept 1 PPS input from GPS, optionally includes a Chip Scale Atomic Clock for highly precise timekeeping						✓					✓					
	SDM VERSION	Software Defined Modem mode: transmit/receive arbitrary waveforms and set a reference to trigger signal detection						✓					✓					
	ACOUSTIC RELEASE DEVICE	Reliable mechanism for recovery of underwater assets to the surface. Also available in OEM version for system integration						not available					not available					
	FLOATATION COLLAR	Floatation collar for fast recovery to the surface						not available					not available					
	PRESSURE SENSOR	Accurate pressure measurements						not available					not available					
	CABLE - MOUNTED TRANSDUCER	Separated transducer for easier system integration. Standard cable length 1.5 m, other upon request						✓					✓					
	OEM VERSION	Version without housing: transducer and electronics for system integration						✓					✓					
APPLICATIONS	Fast short and medium range transmissions in horizontal channels	Fast short and medium range transmissions in vertical, slant and horizontal channels	Medium range transmissions in horizontal channels	Long range transmissions in vertical and slant channels, long-term deployment	Long range transmissions in vertical and slant channels, long-term deployment	Long range transmissions in vertical and slant channels, depth-rated	Fast short and medium range communication for UUVs	Fast short and medium range communication for UUVs	Medium range communication for UUVs	Long range transmissions in vertical and slant channels	High-speed short range communication for UUVs and divers	Fast short and medium range communication for compact UUVs	Fast short and medium range communication for compact UUVs	Medium range communication for compact UUVs	High-speed short range communication for UUVs and divers			

<sup>1)</sup> One RS-232 Interface can be replaced with a RS-422 interface. Contact Evologics for more information!

<sup>2)</sup> Power consumption for RS-232 interface. Add 500 mW if an Ethernet interface is installed. Add 300 mW if the Wake-Up Module is installed. User-configurable Listen Mode is only available with a Wake-Up module installed. Power consumption in Listen Mode depends on Listen Mode settings.

<sup>3)</sup> Contact Evologics for more information on external and internal power supply options!

<sup>4)</sup> Dimensions of a build in Delrin housing, other builds are slightly larger. Dimensions vary depending on housing type and installed options. Contact Evologics for more information on device dimensions and weights, request a drawing if necessary.

<sup>5)</sup> **The Wake Up Module is only compatible with RS-232 interface!** It is not compatible with Ethernet or RS-422. 2-interface Wake Up Module version reacts to incoming data on two serial interfaces.

<sup>6)</sup> **The Power Switch is only compatible with RS-232 interface!** It is not compatible with Ethernet or RS-422.

## ABOUT US

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.



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