

2 October 2026

E Sonar Subsea AUV Charging & Data Docking Node

Autonomous Docking • Wireless Charging • High-Speed Data Transfer • Fast Turnaround

Product Overview

The **E Sonar Subsea AUV Charging & Data Docking Node** is being developed to extend the operational endurance of autonomous underwater vehicles by enabling vehicles to autonomously locate, dock, recharge and exchange mission data without recovery to the surface. The system employs Solace Power Inc's Nova wireless power transfer technology.

Designed initially around the **BeeX A.IKANBILIS AUV**, the node combines E Sonar underwater acoustic navigation and situational-awareness technology with wireless power-transfer technology from Solace Power. The modular architecture is intended to support vehicle-specific docking configurations and future higher-power charging systems.

The node provides an acoustic homing reference that can be detected by E Sonar's AUV situational-awareness system. Ultra-short baseline (USBL) techniques provide relative guidance to the docking location. Once the AUV enters the docking structure, vehicle-specific mechanical guidance establishes the position required for magnetic capture and alignment with the wireless charging interface.

Following successful docking, the node automatically detects the vehicle and activates the charging electronics. The AUV can simultaneously establish a local high-bandwidth Wi-Fi connection for mission-data offload, new mission parameters, diagnostic information and authorized software updates.

At completion of charging and data transfer, the vehicle can command the node controller to release the magnetic docking lock and begin its next autonomous mission.

Key Features

- **Autonomous AUV docking** — Acoustic guidance supports autonomous approach to a known subsea charging location.
- **E Sonar acoustic homing and guidance** — Node-generated acoustic signals are detected by the vehicle's E Sonar situational-awareness system, supporting USBL-based relative positioning and docking guidance.
- **Vehicle-specific docking interface** — Mechanical guides position the AUV within the required capture and wireless-power alignment envelope.
- **Magnetic vehicle capture** — Magnetic locking positively retains the AUV during charging and data exchange.
- **Automatic vehicle detection** — Arrival and capture of the vehicle initiate the controlled power-up and charging sequence.
- **Contactless wireless charging** — No exposed electrical charging contacts are required at the vehicle/node interface.
- **High-bandwidth wireless data exchange** — Local Wi-Fi supports rapid offload of mission data and upload of mission plans, configuration information and authorized software updates.
- **AUV-controlled release** — The vehicle can request release through the node controller following successful charging and mission preparation.

- **Modular architecture** — Docking structures can be adapted to the geometry and operating characteristics of different AUVs.
- **Higher-power development path** — The initial system uses an entry-level wireless power module, with higher-power charging planned for larger vehicles and shorter turnaround times.

Preliminary Specifications

Parameter	Preliminary Specification
Node Body	Black Delrin subsea housing
Body Dimensions	14 × 8 × 2 in. (356 × 203 × 51 mm)
External Cable	9.5 mm OD, exiting midpoint of one 8-in. end
Initial AUV	BeeX A.IKANBILIS
Docking Configuration	Vehicle-specific mechanical alignment structure
Vehicle Retention	Electrically controlled magnetic locking
Docking Navigation	E Sonar acoustic guidance / USBL methodology
Final Positioning	Mechanical guidance into magnetic capture and charging alignment
Vehicle Detection	Automatic detection initiates charging electronics
Power Transfer	Contactless wireless power
Charger Input	36 VDC
Vehicle-Side Output	12 VDC
Peak Wireless Output	Up to 30 W (development goal is up to 500 Watts)
Continuous Output	20 W
Transfer Efficiency	Up to 70% at 20 W
Coil-to-Coil Distance	Up to 40 mm
Misalignment Tolerance	±20 mm
Wireless Power Module Size	85 × 85 × 33 mm
Docked Data Interface	High-bandwidth Wi-Fi (initially 100Mb moving to Gb)
Data Functions	Mission-data offload, new mission upload, configuration and authorized software updates
Release	AUV-requested electrical release through node controller
Future Development	Increased wireless charging power for larger AUV batteries and rapid recharge

The electrical figures above come from the supplied Solace Nova specification. The current module has a 36 V transmitter input, 12 V receiver output, up to 30 W peak/20 W average output and up to 70% efficiency at 20 W.

The Solace specification of up to **40 mm coil-to-coil transmission distance and ±20 mm misalignment tolerance** are integrated into the docking-system design. These values provided preliminary mechanical alignment targets for the AUV capture system that are further supported by the node's magnetic capture system.

Wireless Power Technology
The initial node incorporates Solace Nova wireless power-transfer technology adapted to the subsea docking application. Solace describes its Adaptive Wireless Power technology as maintaining power delivery despite imperfect transmitter/receiver alignment.

The current Nova technology provides a practical platform for demonstrating autonomous underwater docking, power transfer and mission turnaround. The supplied Solace documentation also specifically notes that wireless power-transfer performance can be optimized for customer-defined specifications.

For the prototype AUV application, **20 W continuous charging is the initial MVP capability rather than the long-term product power level**. The development roadmap targets substantially higher transfer power to support faster recharge and progressively larger autonomous vehicles.

Autonomous Docking and Mission Cycle
Locate → Approach → Dock → Capture → Charge → Exchange Data → Release → Resume Mission
The AUV navigates toward the known node location and acquires the node's acoustic guidance signal. E Sonar's onboard situational-awareness system determines the relative location of the node and guides the vehicle into the docking approach corridor.

The vehicle-specific docking structure then passively corrects residual position and orientation errors. Once the AUV reaches the capture position, the magnetic lock secures it inn place and vehicle detection initiates the charging sequence.

While docked, the AUV receives wireless power while communicating with the node over Wi-Fi. Large mission datasets can be offloaded without relying on low-bandwidth underwater acoustic communications. New mission instructions and approved software or configuration updates can similarly be transferred before the next deployment.

When charging and data exchange are complete, the AUV requests release. The node controller disengages the magnetic retention system, and the vehicle autonomously departs for its next mission.

Why It Matters
A subsea charging node changes the operating model for an AUV from **deploy–operate–recover–recharge–redeploy** toward a persistent **resident autonomous system**.

The principal benefits are increased mission endurance, fewer vehicle recoveries, reduced dependence on surface vessels and personnel, faster turnaround between missions, high-volume underwater data retrieval, autonomous mission reassignment and the potential for persistent subsea inspection, monitoring and surveillance.

Target Applications
Remote monitoring applications • Offshore infrastructure inspection • Defence and security • Ports and harbours • Resident subsea robotics • Environmental monitoring • Aquaculture • Subsea asset monitoring • Long-duration autonomous survey

Development Status
Technology under development. Preliminary specifications subject to change.
The initial system is intended to demonstrate the complete autonomous docking, capture, wireless charging, data-transfer and release cycle using the BeeX A.IKANBILIS platform. Development is expected to progress toward higher wireless power levels, faster battery recharge and interfaces supporting additional AUV classes.

For more information, email E Sonar Inc. at sales@e-sonar.ca.