

# DepthPod

## Modular Buoyancy Control and Underwater Sensing

Integrated control. Standalone sensing.

### OVERVIEW

DepthPod provides modular buoyancy adjustment, energy-efficient vertical maneuverability and independent closed-loop depth control. Integrate it into an underwater vehicle or configure it as a standalone sensing platform for water-column measurements.

### Self-Contained Depth Control

Demonstrated control. A working prototype has demonstrated closed-loop depth holding in water during laboratory testing.

Simple interface. The host supplies depth setpoints. An onboard pressure sensor and controller regulate depth without requiring host depth measurements.

Flexible deployment. Intended configurations include internal or external vehicle modules and standalone instruments with sensors, data logging and telemetry.

### CORE BUOYANCY TECHNOLOGY

A flooded architecture with pressure balancing is designed to provide substantial buoyancy adjustment in a compact package. Prototype test data have supported high-fidelity model validation within tested conditions; model extensions evaluate configurations up to 40 N.



*Actual laboratory prototype*



*DepthPod standalone sensing concept  
Sensor and telemetry configurations proposed*

### SPECIFICATIONS

Preliminary portfolio targets; larger configurations are model-derived.

| Parameter           | Value                      |
|---------------------|----------------------------|
| Buoyancy control    | $\pm 4$ to $\pm 40$ N      |
| Package volume      | 1.5–16 L                   |
| Design-depth target | Up to 1,000 m              |
| Modeled endurance   | Up to 2 weeks <sup>1</sup> |

### Flexible Interfaces and Payloads

Configurable mechanical mounting, electrical power and data interfaces support host integration and mission-specific payloads.

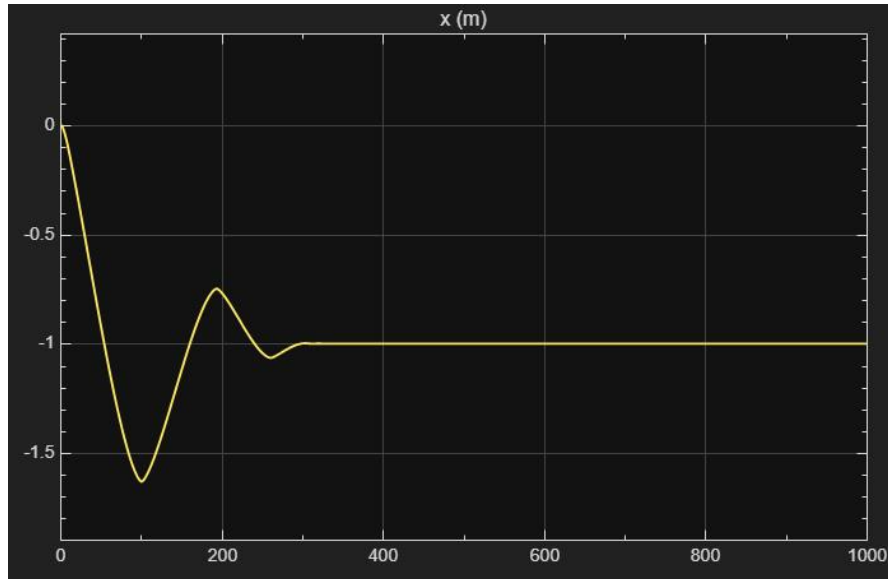
Sensor options include hydrophones, conductivity-temperature-depth (CTD) instruments, water-quality and chemical sensors, and magnetometers.

Communications options include acoustic modems underwater and satellite links at the surface. GPS enables surface position fixes and position reporting for tracking and recovery.

## TECHNICAL DATA AND MODELED RESPONSE

A high-fidelity Simulink/Simscape model incorporates the prototype's PI controller and mechanical configuration parameters. Measured test traces agree with model predictions. The simulation shown below targets a 1 m depth setpoint: position approaches  $-1$  m following an initial overshoot and settling response.

*Predicted depth response versus time (s). The 1 m depth setpoint corresponds to  $x = -1$  m in the model coordinate convention.*



## DISCUSS YOUR APPLICATION

Share your buoyancy range, operating depth, payload, depth-profile frequency and reporting needs. Modeled endurance is up to two weeks at constant depth; repeated depth changes reduce endurance. The 1,000 m design target requires a suitable pressure-balancing gas supply and component validation.

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