

Navis

Autonomous Profiling Float

The Navis float has a traditional layout, with the sensor head at the top, and the buoyancy bladders at the bottom. The Navis buoyancy engine uses a positive displacement piston pump to transfer silicon oil from internal to external reservoirs to increase the float volume and cause it to rise. This system provides improved energy efficiency, better parking stability, and increased depth range over existing floats.

The Navis buoyancy engine is augmented at the sea surface by inflation of an air reservoir. This surface-following function provides excess buoyancy to improve surface communications. The open-loop air buoyancy system uses a seamless, natural-rubber, external bladder and oil-augmented bladder crush prevention.

At the surface, Navis uses a Garmin 15xL-W GPS to acquire positional information. It then transmits the acquired data via an Iridium Transceiver 9523. The Iridium antenna is mounted on the CTD end cap, and is supported by the CTD cell guard.

The Navis aluminum hull has a smaller diameter and length than existing floats, providing a lightweight and cost-effective package that requires less energy to operate. The float is powered by twelve lithium DD batteries in a Sea-Bird battery pack. The battery pack provides sufficient power for 300 CTD profile cycles to 2000 dbars.

Features

- Sufficient power for 300 CTD profile cycles to 2000 dbars.
- SBE 41CP CTD; Argo standard
 - Pump-controlled, T-C ducted flow minimizes salinity spiking
 - Anti-foulant devices provide effective bio-fouling protection
- Iridium continuous circuit switched, 2-way communications for low-cost download of large amounts of data
- Self-ballasting, 1 day to equilibrate; ballasting and setup done at Sea-Bird prior to shipment
- Easy-to-use interface for mission programming, and for reprogramming while deployed
- Firmware based on field-proven Argo firmware
- Lightweight and easy to deploy (< 18.5 kg)
- Expandable and scalable design for future missions, such as biogeochemical floats, deep floats
- Warranty — 100 profiles at 100% of purchase price, pro-rated thereafter



CTD Operation

The SBE 41CP CTD measures temperature, conductivity, and pressure continuously at 1 Hz through ascent and provides high accuracy, resolution, and stability. The pump-controlled, T-C ducted flow configuration minimizes salinity spiking caused by mismatch of temperature and conductivity measurements. The carefully engineered anti-foul protection includes anti-foulant devices, a U-shaped flow path, and an integral pump. On the float's ascent, as it approaches 10 to 5 dbars beneath the ocean surface, the pump turns off. The U-shaped flow path prevents sea surface oils and contaminants from being ingested while proceeding through the ocean surface skin and sitting at the surface during data transmittal. Between profiles, the pump is off. The U-shaped flow path prevents water flow through the system caused by waves or currents; minute amounts of anti-foulant concentrate inside the conductivity cell to minimize bio-fouling.

Science Data (SBE 41CP CTD)

Temperature	Initial accuracy ± 0.002 °C; Stability 0.0002 °C/year
Salinity	Initial accuracy ± 0.002 PSS-78; Stability 0.001 PSS-78/year
Pressure	Initial accuracy ± 2 decibars; Stability 0.8 decibars/year

Float Operation

Depth Rating	2000 decibars
Communications	Iridium Transceiver 9523 — RUDICS, circuit switched
Position	GPS, Garmin 15xL-W
Park Interval	1 - 15 days
Materials	Aluminum hull, seamless natural-rubber external bladders
Ballasting	Self-ballasting, 1 day to equilibrate
Weight in air	Less than 18.5 kg
Self-Activation	Starts operating automatically on deployment, when pressure reaches user-programmable setpoint
Internal batteries	4 packs of 3 DD lithium sulfuryl chloride cells (cannot ship in passenger aircraft; Class 9 Dangerous Goods).
Power Endurance	10 years or 300 2000-dbar cycles
Memory	CTD stores one 2000-dbar CTD profile; Navis stores 64 2000-dbar CTD profiles
Dimensions	Hull diameter 14 cm, Ring diameter 24 cm, Total length 159 cm

