

Nucleus 1000 - 1000 m



A deep-water-rated sensor hub that makes vehicle control and navigation possible.

The Nucleus 1000 is a sensor package that has all the necessary sensors and data products to aid in subsea navigation and vehicle control. This includes estimates of distance from the surface and bottom, attitude, heading and velocity. To learn more about the Nucleus 1000's capabilities, [click here](#).

A shallow water (300 m rated) version of the [Nucleus 1000](#) is also available.

Highlights

- ✓ Compact size optimal for small ROVs and AUVs
- ✓ Integrated AHRS for pre-calibrated attitude and heading information
- ✓ Dedicated vertical beam for altimeter information

Applications

- ✓ Integration with small ROVs or AUVs where payload is limited
- ✓ Navigation for vehicles which don't require survey-grade accuracy
- ✓ Backup navigational aid for coastal USVs
- ✓ Increase vehicle capabilities with combined current profiling and navigation solution

Technical specifications

→ Bottom tracking

Maximum altitude	50 m
Minimum altitude	10 cm
Long-term accuracy	<0.3% (export-controlled), >1% (license-free)
Velocity resolution	0.01 mm/s
Single ping standard deviation	0.5 cm/s
Maximum ping rate	8 Hz ¹⁾

¹⁾ Maximum ping rate is range dependent

→ Water tracking

Minimum accuracy	0.5% of measured value / +-0.5 cm/s
Minimum range	2.0 m

→ Current profile

Minimum accuracy	0.5% of measured value / +-0.5 cm/s
Velocity resolution	0.1 cm/s
Interval	User specified N th ping
Maximum range	30 m
Blanking	0.1 m
Cell size	0.2-2.0 m
Max # cells	150

→ Altimeter

Range	50 m
Accuracy	1% of measured value
Resolution	1 cm

→ INS

Position accuracy of distance travelled ²⁾	2% (export controlled), 4% (license-free)
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Output rate	Configurable
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²⁾ Nominal position error, given as % of Distance Travelled. Value given is a reflection of a given set of operational conditions. Note that deviations from this specification can be expected in line with varying environmental conditions and integration parameters.

→ AHRS

Pitch and roll accuracy	0.35 deg
Heading accuracy ³⁾	0.5 deg (export controlled), 2.5 deg (license-free)
Output rate	Configurable

³⁾ Heading accuracy for nominal conditions. Vehicles or environments which disturb the magnetic field will degrade performance

→ Pressure sensor

Pressure accuracy	0.3% FS (precision better than 0.003% of full scale per sample)
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Temperature	-4° to +40°C ± 0.1 °C
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→ Magnetometer

Range	800 μT
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Repeatability over ±200μT	20 nT
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Noise	50 nT
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Sampling	75 Hz
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→ Accelerometers

Range	40 g
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Bias - repeatability	6 mg
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Velocity random walk	0.039 m/sec/√hr
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Bias instability	135e-6 m/sec ²
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Scale factor stability	0.10 %
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Sampling rate	100 Hz
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→ Gyroscopes

Range	2000 deg/sec
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Bias - repeatability	1.4 deg/sec
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Angular random walk	0.3 deg/√hr
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Bias instability	8 deg/hr
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Linear acceleration effect	$1.02 \times 10^{-3} (\text{deg/sec}) / (\text{m/sec}^2)$
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Vibration rectification error	$5.6 \times 10^{-6} (\text{deg/sec}) / (\text{m/sec}^2)^2$
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Sampling rate	100 Hz
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→ Environmental

Operating temperature	-4 to +40 °C
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Storage temperature	-20 to +60 °C
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→ Mechanical design

Depth rating	1000 m (300 m version available)
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Height	47 mm
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Diameter	90 mm
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Weight in air	690 g
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Weight in water	415 g
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→ Power

Voltage range	10-28 Volts
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Average power	< 4 W
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Maximum peak power	35 W
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→ Communication

Serial	RS-422 / RS-232
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→ Communication

Ethernet	10/100 Mbits Auto MDI-X.TCP/IP, UDP/IP. Fixed IP /mDNS/DHCP client /Auto IP address assignment. (Multiple simultaneous data format transmission possible). Data formats Nortek proprietary.
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→ Hardware

Frequency of operation	1 MHz
Beam width	3.4°
Slanted beam angle	20 deg