

## **Nucleus 1000**

300 m

A 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 deep water (1000 m rated) version and an OEM housing version of the Nucleus 1000 are 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 <sup>1)</sup>

<sup>1)</sup> 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 profiling	
Minimum accuracy	0.5% of measured value / +-0.5 cm/s

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Current profiling	
Velocity resolution	0.1 cm/s
Interval	User specified N <sup>th</sup> ping
Maximum range*	30 m
Blanking	0.1 m
Cell size	0.2-2.0 m
Max # cells	150

<sup>\*</sup>Dependent on measurement conditions

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

INS	
Position accuracy of distance travelled <sup>2)</sup>	2% (export controlled), 4% (license-free)
Output rate	Configurable

<sup>2)</sup> 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 <sup>3)</sup>	0.5 deg (export controlled), 2.5 deg (license-free)
Output rate	Configurable

<sup>3)</sup> 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)
Temperature	-4° to +40°C ± 0.1 °C

Magnetometer		
Range	800 μΤ	
Repeatability over ±200μT	20 nT	
Noise	50 nT	
Sampling	75 Hz	

Accelerometers	
Range	40 g
Bias - repeatability	6 mg
Velocity random walk	0.039 m/sec/√hr
Bias instability	135e-6 m/sec²
Scale factor stability	0.10 %
Sampling rate	100 Hz

Gyroscopes	
Range	2000 deg/sec

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Gyroscopes	
Bias - repeatability	1.4 deg/sec
Angular random walk	0.3 deg/√hr
Bias instability	8 deg/hr
Linear acceleration effect	$1.02 \times 10^{-3} (\text{deg/sec})/(\text{m/sec}^2)$
Vibration rectification error	$5.6 \times 10^{-6} (deg/sec)/(m/sec^2)^2$
Sampling rate	100 Hz
Environmental	
Operating temperature	-4 to +40 °C
Storage temperature	-20 to +60 °C
Mechanical design	
Depth rating	300 m (1000 m version available)
Height	42 mm
Diameter	90 mm
Weight in air	535 g
Weight in water	295 g
Mechanical design, OEM version	
Depth rating	300 m
Height	46 mm
Diameter	100 mm
Weight in air	570 g
Power	
Voltage range	10-28 Volts
Average power	< 4 W
Maximum peak power	35 W
Communication	
Serial	RS-422 / RS-232
Ethernet	10/100 Mbits Auto MDI-X.TCP/IP. Fixed IP /mDNS/DHCP client /Auto IP address assignment. (Multiple simultaneous data format transmission possible). Data formats Nortek proprietary.
Hardware	
Frequency of operation	1 MHz
Beam width	3.4°
Slanted beam angle	20 deg

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