

Signature 1000/500

A HIGH PERFORMANCE SCIENTIFIC POWERHOUSE

BROADBAND SERIES



TRUE INNOVATION MAKES A DIFFERENCE

SIGNATURE1000/500

A HIGH PERFORMANCE SCIENTIFIC POWERHOUSE



Signature1000 and Signature500, two advanced five-beam current profiling systems, are made with the most demanding scientific user in mind. Built on the entirely new AD2CP platform, Signature1000 and Signature500 are designed for unprecedented performance in high energy turbulent environments, while also giving users the freedom to employ two measurement schemes at one time.

Turbulence

Turbulence, as used here, refers to short-term variations in the current velocity. There are three aspects of the Signature Series that make it particularly suitable for measuring these variations:

Faster Sampling – Detecting variations is simplified if the instrument collects many independent current profiles in quick succession. The Signature1000 features sampling rates as high as 16 Hz, which effectively provide four times the information as previous instruments sampling at 4Hz.

AD2CP Broadband Technology – The use of new processing algorithms means that each velocity profile is more precise and has less instrument noise, making it easier to detect small velocity variations.

Five Beams – To measure turbulent kinetic energy and even turbulent stress, five beams provide a significant advantage because all five second-order variables can be estimated directly. This is in contrast to the mean current, which only requires three, or even just two beams to estimate all relevant velocity components.



The AD2CP is Nortek's broadband Doppler signal processing platform. It is the product of thousands of engineering man-hours and includes a series of innovative elements, which will open doors to new applications and inspire exciting research possibilities.

- ✓ AD2CP broadband combines frequency-modulated transmissions with fast sampling rates and adjustable bandwidth. The result is unparalleled performance in both standard and specialized applications.
- ✓ AD2CP hardware can alternate between multiple measurement modes. One instrument replaces several by offering concurrent or alternating measurements of currents, turbulence, waves and ice.
- ✓ AD2CP recorders will store all raw Doppler and sensor data. Improve data quality by removing contamination from fish or other influences.
- ✓ AD2CP Ethernet connection provides easy access to the instrument from any location, simple integration into instrumentation networks, and fast recorder download.
- ✓ AD2CP adjustable power output facilitates long endurance operation by allowing new short-range applications, which combine higher vertical resolution with lower power consumption.
- ✓ AD2CP blue light illuminates when power is applied and blinks when the transmitter is active. Deploy the instrument with the utmost confidence that it is operating.

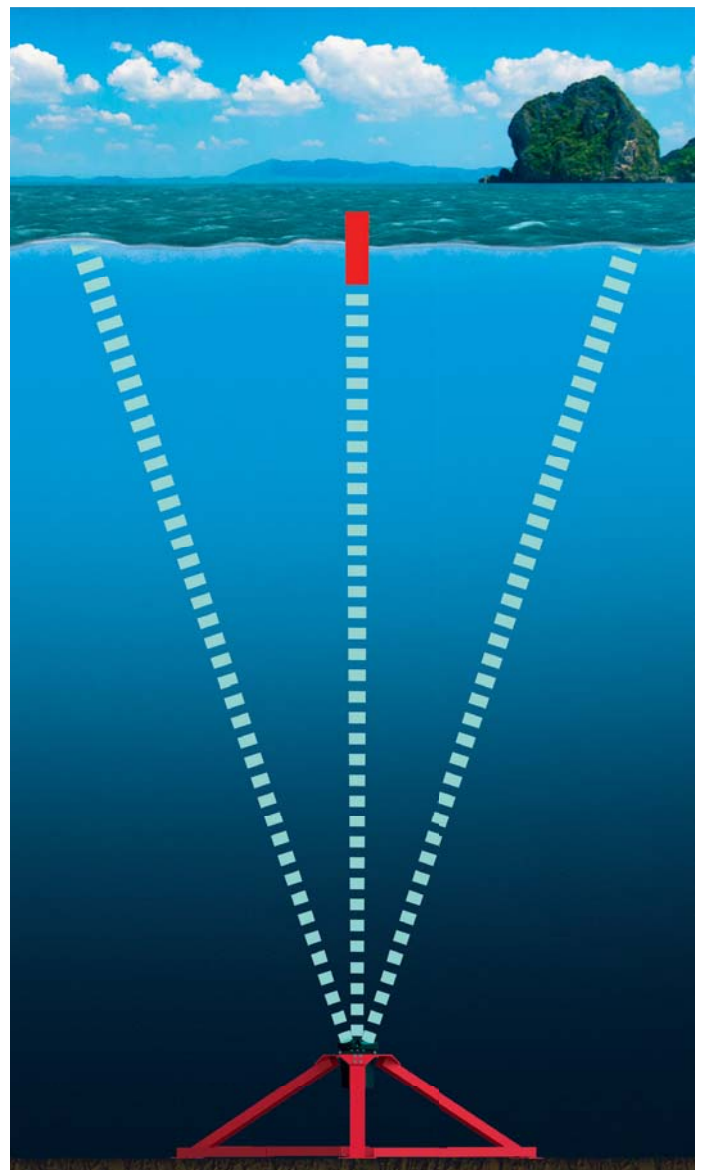
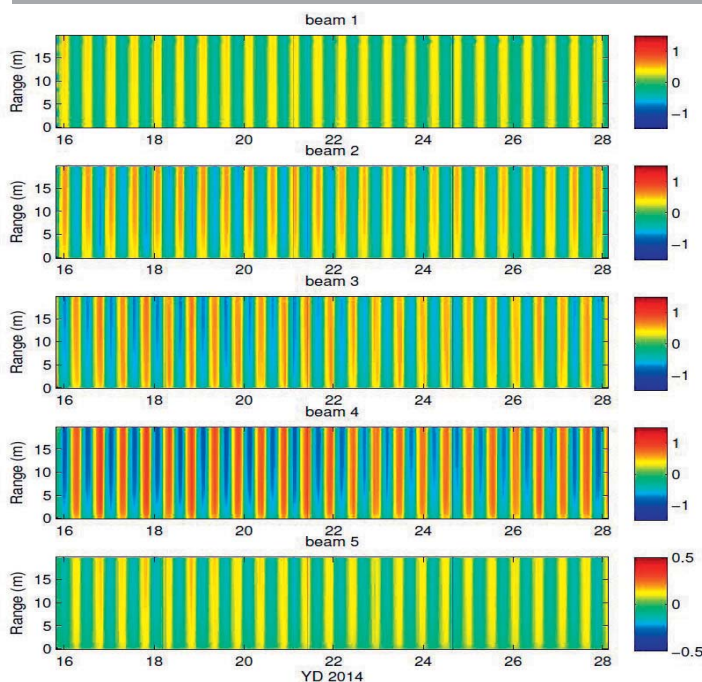
Concurrent Measurement of Velocity Profiles and Wave Height

The Signature series allows concurrent measurements of the velocity profile and the distance to the surface. This improves our understanding of the interaction between waves and currents. This data-intensive information is best suited for scientific applications.

In contrast, Acoustic Surface Tracking (AST) is implemented in the Nortek AWAC, an established device for measuring all common wave statistical parameters and the mean current profile. The AWAC, with its full suite of associated hardware and software, is recommended for efficient data transfer and power in online applications.

AD2CP: Beam Velocities

Data collected along 5 separate beams in the Bay of Fundy, Canada



Combined Ice Thickness and Ice Velocity

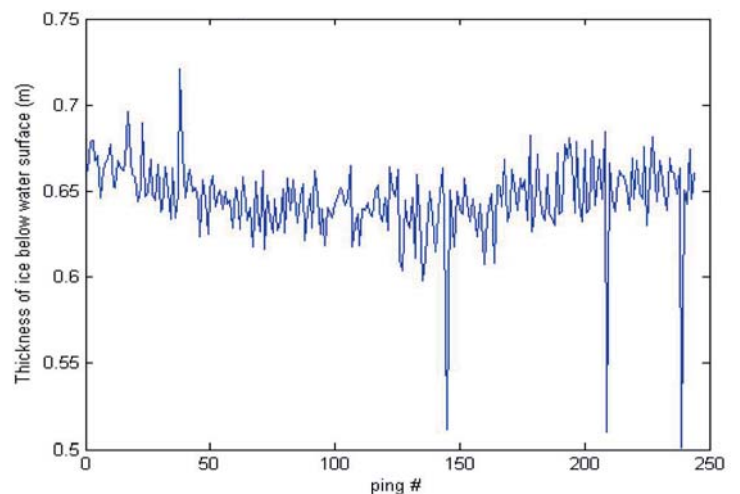


The Signature Series is the first line of scientific instruments to combine ice thickness and ice velocity measurements into a single unit. The ice draft is calculated as the difference between the pressure sensor reading and the distance to the ice keel utilizing the altimeter function.

The velocity of the ice sheet or iceberg is then measured from the Doppler shift recorded at the water/ice surface. Finally, the times series are adjusted using atmospheric pressure data and periods of open water. (Nortek offers data analysis services for measurements collected under ice)

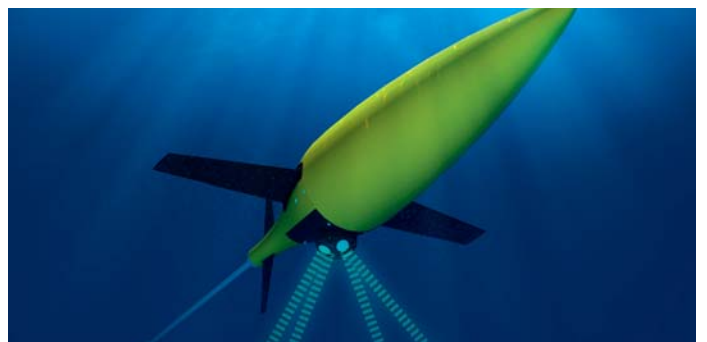


Signature500 Ice thickness measurement

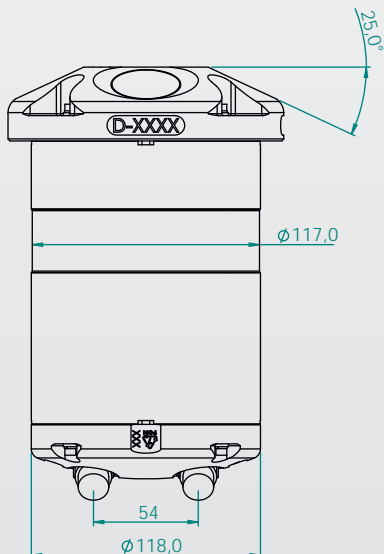
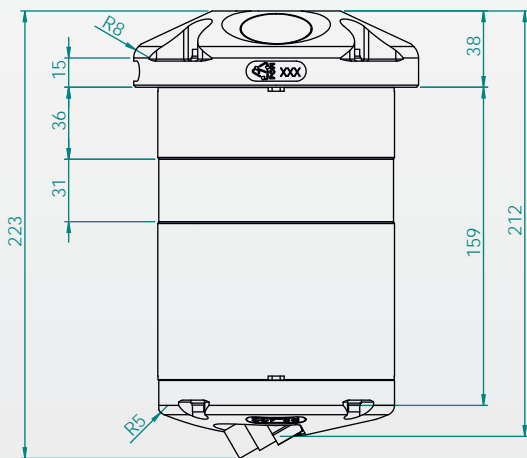
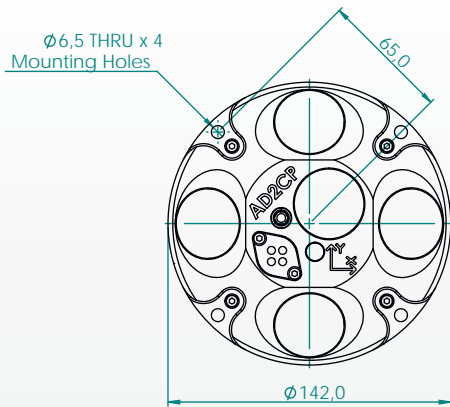


Power Limited Applications

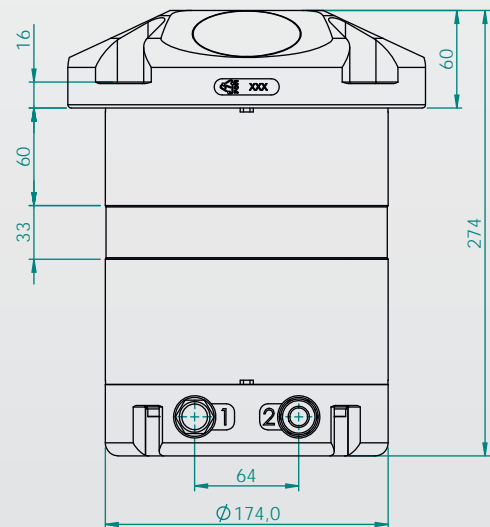
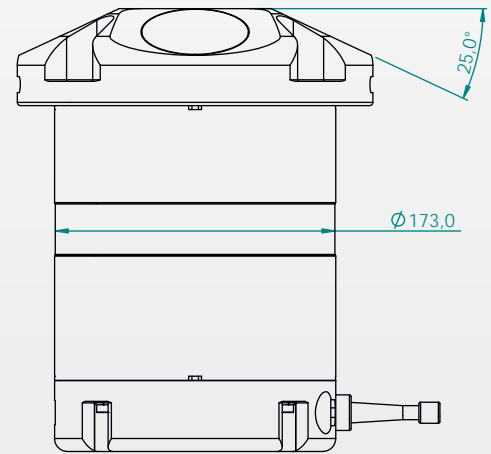
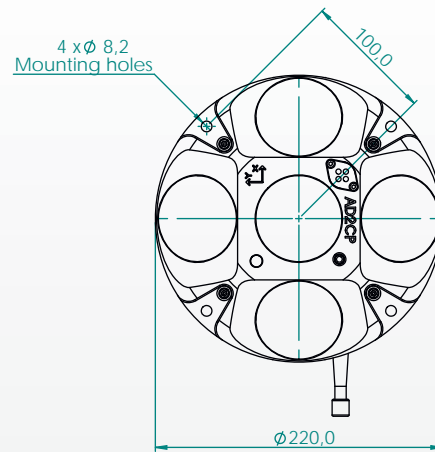
The Signature Series is very flexible, making it a great tool for investigating many different aspects of ocean movement. The Signature Series instruments can operate with low output power and high velocity precision modes to significantly extend battery life. This technology has been employed in ocean gliders, where power is a limiting factor for deployment duration. The Nortek Glider-AD2CP, originally developed for the SeaGlider, is now also installed on Spray Gliders operating in the Pacific Ocean.



Signature1000



Signature500



Technical Specifications

Water Velocity Measurements

	Signature1000	Signature500
Profiling Range*	30m	70m
Cell Size	0.2 - 2m	0.5 - 4m
Min. Blanking	0.1m	0.5m
Max # cells	128(burst)/200(average)	128(burst)/200(average)
Velocity Range (along beam)	User Selectable 1.0, 1.25, 2.5, 3.75, 5.0, 20 m/s	User Selectable 1.0, 1.25, 2.5, 3.75, 5.0, 20 m/s
Minimum accuracy: (Inquire for more accurate firmware or hardware versions)	0.3% of measured value + 0.3cm/s	0.3% of measured value + 0.3cm/s
Velocity Resolution	0.1 cm/s	0.1 cm/s
Max Sampling Rate	16Hz	8Hz
Max Sampling Rate Five beams	8Hz	4Hz

*) maximum range depends on transmit power and acoustic scattering conditions

Echo Intensity

Sampling:	Same as velocity
Resolution:	0.5dB
Dynamic range:	70dB
No. of beams:	5, 4 slanted at 25°, 1 vertical
Beam width:	2.9°

Sensors

Temperature:	Thermistor embedded in head
Range:	-4°C to 40°C
Accuracy/Resolution:	0.1°C/0.01°C
Time response:	2 min
Compass:	Solid State Magnetometer
Accuracy/Resolution:	2° for tilt <20°/0.01°
Tilt:	Solid State Accelerometer
Accuracy/Resolution:	0.2° for tilt <30°/0.01°
Maximum tilt:	Full 3D
Up or down:	Automatic detect
Pressure:	Piezoresistive
Standard Range:	0-100m (inquire for options)
Accuracy/Precision:	0.1% FS / Better than 0.002% of full scale

Data Communication

I/O:	Ethernet or configurable RS-232/RS422
Serial Communication Baud rate:	300-1250000 baud
Recorder download baud rate:	20 Mbit/s (Ethernet only) - 1 GByte in 6 minutes
Controller Interface:	ASCII command interface with telemetry options over Telnet and serial interface. Complete data download over standard Ethernet FTP. Telemetry file downloadable over serial interface. See interface manual for more information.

Data Recording

Capacity (standard):	16 GB / Optional 64 GB
Data record:	86 bytes + 4 x Nbeams x Ncells
Mode:	Stop when full

Real Time Clock

Accuracy:	±1 min/year
Clock retention in absence of external power:	1 year
Backup battery recharges automatically when the instrument is powered	

Software

Operating system:	Windows® 7 or later
Functions:	Deployment planning, start with alarm, data retrieval, conversion to ASCII and Matlab format.
Online data:	Collection and graphical display.

Power

DC input:	12-48VDC
Max. average consumption at 1Hz:	8 Watts. Peak currents 1.5A at 12V, 1A at 24V. Ethernet adds 0.75 W
Typical average consumption:	See deployment software

Sleep Consumption:	100uA, power depends on supply voltage
Transmit power:	0.3-30W per beam, adjustable levels
Ping sequence:	Parallel

Materials

Connectors:	MCBH6F-G2-WB with water block MCBH2F-G2-WB with water block
Standard model:	Delrin® with titanium bolts.

Environmental

Operating temperature:	-4°C to 40°C
Storage temperature:	-20°C to 60°C
Shock and vibration:	IEC 60068-1/IEC60068-2-64
Depth rating:	300 m

Batteries

Internal:	1MHz:100Wh, 500kHz:180Wh
External:	Single or double alkaline 540Wh or lithium 1800 Wh
Duration	See deployment software

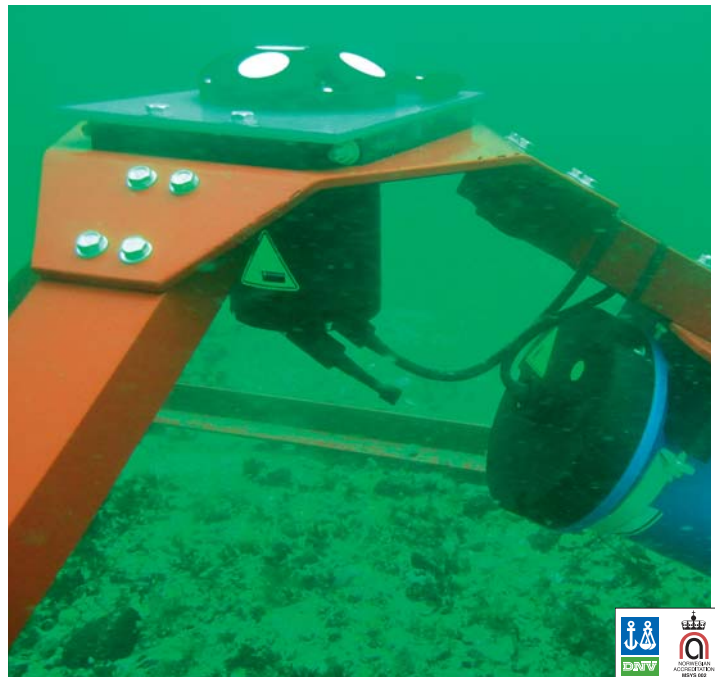
The battery consumption is a complex function of the instrument configuration. Please consult the Signature deployment software for more information

Dimensions

	See drawings	
	Signature1000	Signature500
Weight in air:	2.92Kg	8.20Kg
Weight in water:	0.62Kg	1.45Kg

Wave Measurement option

Maximum Depth:	30 /70m
Height Range:	-15 to +15m
Accuracy/Resolution (Hs):	<1% of measured value / 2cm
Accuracy/Resolution (Dir):	2° / 0.1°
Period Range:	2-50s
Cut-Off Period(Hs):	25m depth; 1 sec 50m depth; 2 sec
Cut-off Period (dir):	Please inquire
Sampling Rate (Velocity and AST):	4Hz
Max altitude	1MHz: 30m, 500kHz: 100m
Min Altitude	1MHz: 1m, 500kHz: 2m
Precision	2 cm



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