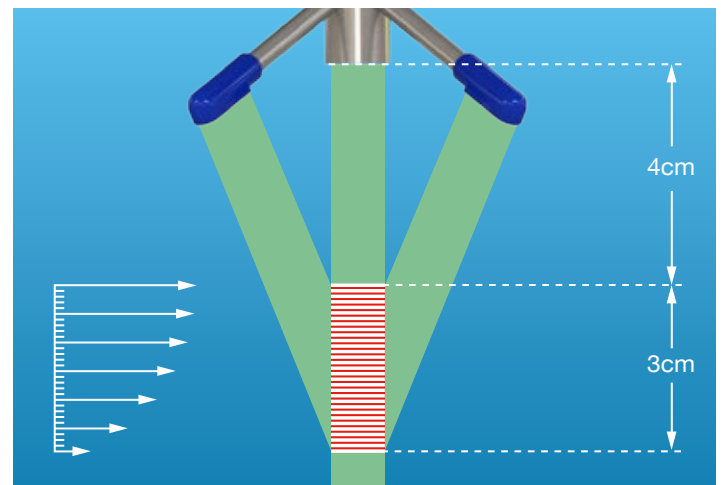
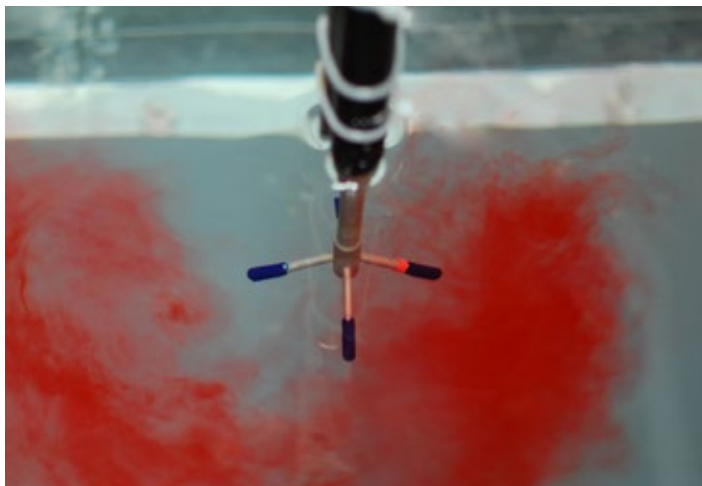


The Nortek Vectrino Profiler provides new and unique opportunities for high resolution profiling velocity measurements in the laboratory and in the field. With 1 mm vertical resolution over a range of 30 mm, the Vectrino Profiler moves beyond the classical acoustic Doppler velocimeter and opens the door to new types of velocity measurements.

# Vectrino Profiler

3D Profiling Velocimeter

- 100 Hz Velocity Profiles
- 10 Hz Distance Measurements
- Enhanced data collection software



The Vectrino profiler provides three-component velocity observations with a resolution as fine as 1 mm over a 3 cm range with an output rate as fast as 100 Hz. Simultaneously, it can measure the distance to the bottom at rates of up to 10 Hz by interleaving bottom detection and velocity profiling. New interface software provides enhanced capabilities such as real-time plots of velocity profiles, velocity standard deviation, energy spectra and color contour plots.

CURRENT AND WAVE MEASUREMENTS IN THE OCEAN, LAKE AND LABORATORY



Nortek AS  
 Vangkroken 2  
 1351 Rud, Norway  
 Tel: +47 6717 4500  
 Fax: +47 6713 6770  
 E-mail: inquiry@nortek.no



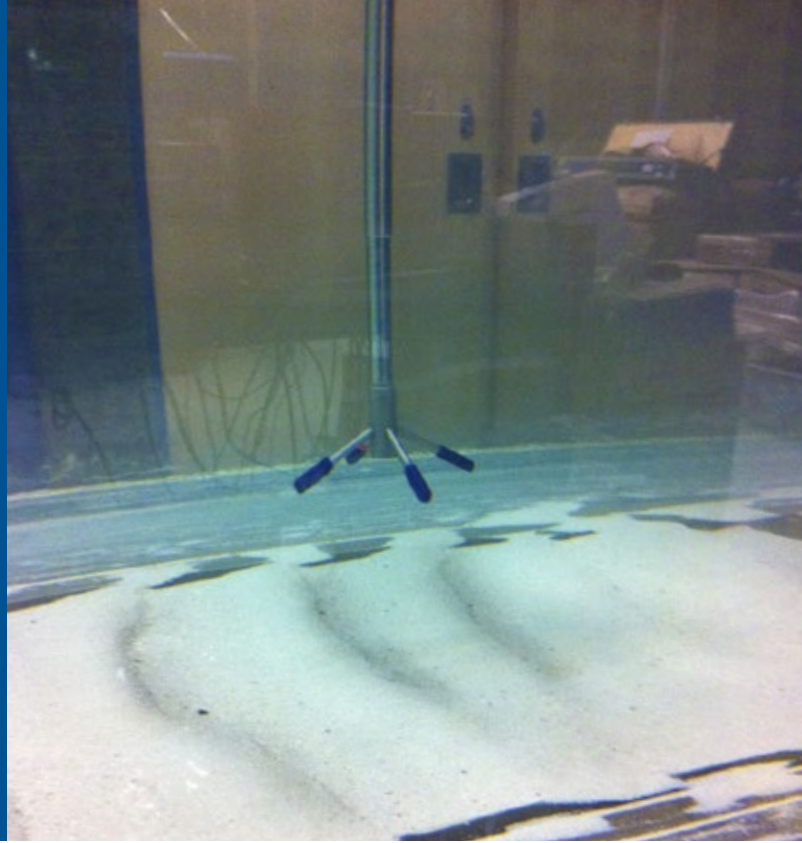
[www.nortek-as.com](http://www.nortek-as.com)

True innovation makes a difference

# Vectrino PROFILER

The next level in acoustic Doppler velocimetry

With the Nortek Vectrino profiler we have added profiling capability to classical acoustic Doppler velocimetry. Designed from the ground up to take advantage of modern electronics, we have also made a leap in temporal (100Hz) and spatial resolution (1 mm). We have also designed a new generation configuration and display software that provides real-time color contours plots and energy spectra. Add to all this an excellent performance in sediment flows and the Vectrino profiler leaves you free to pursue data collection schemes that were previously reserved for more complex and expensive technologies.

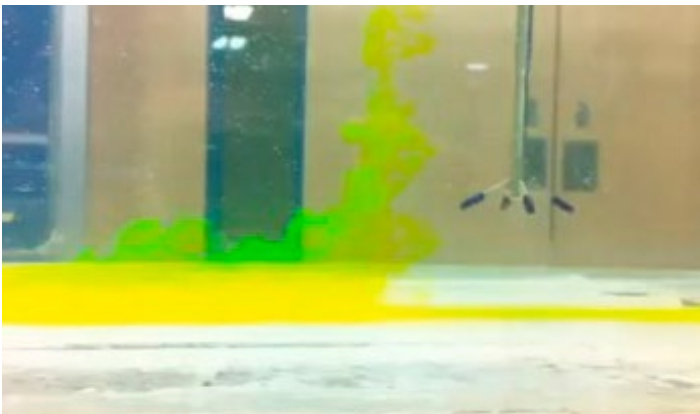


## Boundary Layer Measurements

The Vectrino Profiler is well suited for measuring near boundaries, able to capture a velocity profile at 1 mm resolution over a 30 mm profile. The 100 Hz sample rate allows visualization of structures within the flow providing a well resolved spatial and temporal data set for analysis. Coupled with the interleaved bottom distance measurements, the Vectrino Profiler can be used to determine bed stress and boundary movement during erosion studies.

## Adaptive Ping Interval

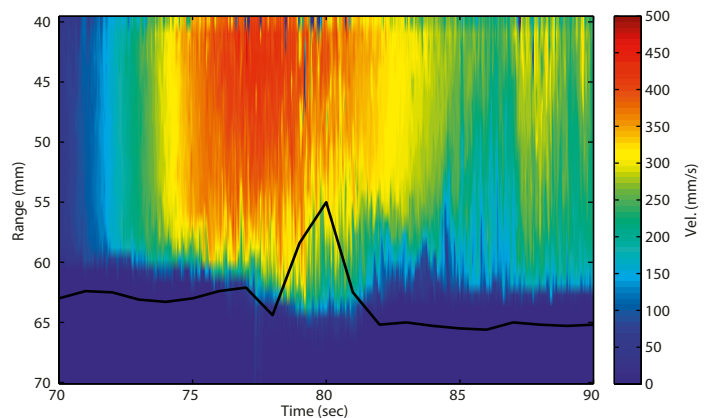
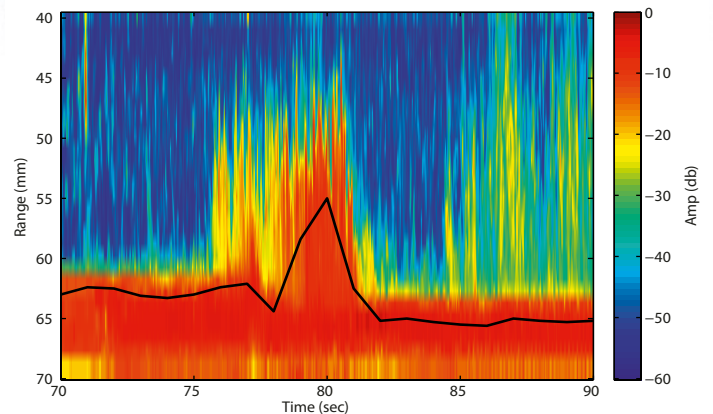
Pulse coherent profilers are susceptible to pulse interference when measuring near boundaries. The Vectrino Profiler is able to dynamically configure the pulse intervals by examining acoustic returns and identifying interference regions. The Vectrino Profiler can perform an adaptive check once at the start of data collection or continuously at intervals from 1 second to 1 hour. When measuring near dynamic boundaries which are eroding or accreting during data collection, or during the passage of bed forms, this is a valuable feature to improve data quality and reduce interference.



In this demonstration experiment at Cornell University, yellow dye is used to illustrate the flow structure. The Vectrino Profiler can measure the flow velocity as close as 3-4 mm from a solid boundary.

## Interleaved Distance Measurements

The Vectrino Profiler measures distance to a boundary using a special bottom ping interleaved at a sample rate up to 10 Hz with velocity measurements. Measurement range is user selectable, starting 20 mm from the central transducer while maximum range is limited by the boundary echo strength. Typically, a range is specified and divided into 1 mm range cells, resulting in an accuracy of 0.5 mm over a variety of surfaces. The ability to measure boundary distance on the same time scale as the velocity measurements allows the velocity measurements to be referenced to a coordinate system that moves as the bed geometry changes.



Color contour plot of amplitude from vertical acoustic beam (top) and along-channel velocity (bottom). The black line depicts the estimated position of the bottom.



Field experiment with Vectrino Profiler at UNC – Chapel Hill

### Wave Flume

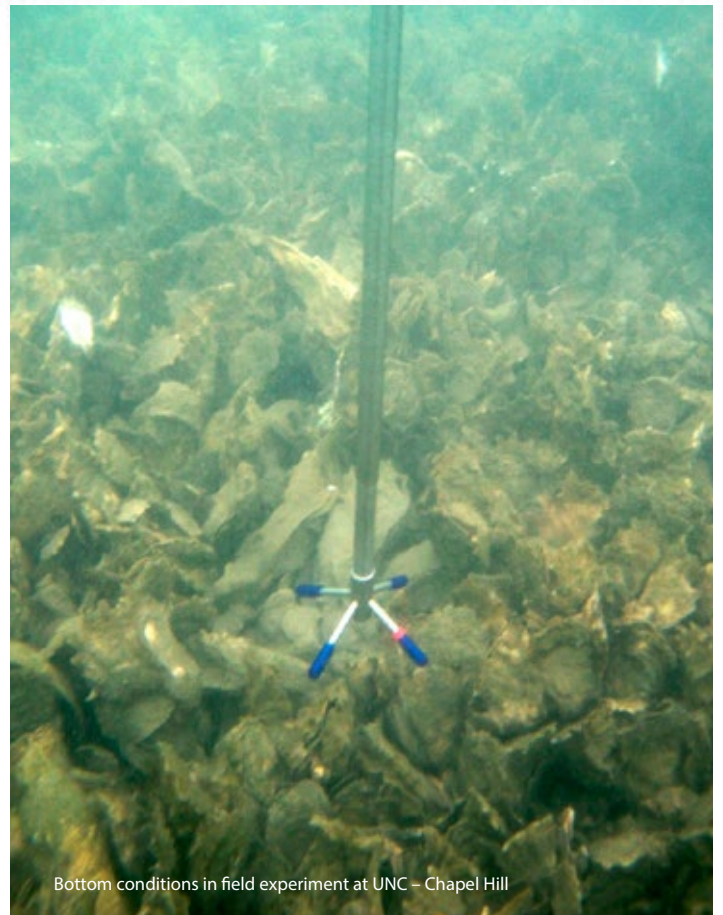
The Vectrino Profiler is well suited for measurements in wave flumes. The profiling capability allows multiple instantaneous observations over the wave boundary layer for each wave passing by and reduces the need for multiple individual instruments or repetitive test runs. The profile of velocity will also help to characterize flow around or behind a structure such as scale piling or bulkhead. Finally, the real-time velocity energy spectra can be used to monitor wave energy in the frequency domain.

### Field Experiments

The Vectrino Profiler has many uses in outdoor field experiments. Outstanding measurements have been made in the shallow swash zone, in the bottom boundary layer above a muddy tidal channel, and over various substrates such as sand ripples, and sea grass and oyster beds. The distance measurement feature allows the Vectrino Profiler to be positioned precisely above the bottom even in poor visibility conditions. High-speed communication and power supply are possible over cable lengths up to 100 m.



Demonstration experiment in wave flume at University of Quebec, INRS-ETE



Bottom conditions in field experiment at UNC – Chapel Hill

## Water Velocity Measurements

|                         |   |
|-------------------------|---|
| Velocity Range:         | Increments of 0.1 m/s to a maximum of 3.0 m/s |
| Adaptive ping interval: | Once, or at 1 second to 1 hour intervals      |
| Accuracy:               | $\pm 0.5\%$ of measured value $\pm 1$ mm/s    |
| Sampling rate (output): | 1-100 Hz                                      |

## Distance Measurements

|                |   |
|----------------|---|
| Minimum range: | 20mm  |
| Maximum range: | Up to 2 meters depending on signal strength |
| Cell Size:     | 1-4 mm (user selectable)                    |
| Accuracy:      | 0.5 mm at 1 mm cell size                    |
| Sampling rate: | 1-10 Hz                                     |

## Sampling Volume

|                |                          |
|----------------|--------------------------|
| Profile Range: | Up to 30mm               |
| Location:      | 45 - 75 mm from probe    |
| Diameter:      | 6 mm                     |
| Cell size:     | 1-4 mm (user selectable) |

## Echo Intensity

|                     |                    |
|---------------------|--------------------|
| Acoustic frequency: | 10 MHz             |
| Resolution:         | Linear & log scale |
| Dynamic range:      | 60 dB              |

## Sensors

|                      |                              |
|----------------------|------------------------------|
| <b>Temperature:</b>  | Thermistor embedded in probe |
| Range:               | -4°C to 40°C                 |
| Accuracy/Resolution: | 1°C/0.1°C                    |
| Time response:       | 5 min                        |

## Data Communication

|                          |   |
|--------------------------|---|
| I/O:                     | RS-485 (high speed RS-485-to-USB converter)                   |
| Communication Baud rate: | Up to 1.25 Mbps   |
| User control:            | Handled via Vectrino II configuration and collection software |
| Analog outputs:          | None  |
| Synchronization:         | SynchIn and SyncOut   |

## Software ("Vectrino II")

|                      |  |
|----------------------|--|
| I/O:                 | RS 485-USB support for devices with 1, 2, 4, and 8 serial ports.   |
| Operating system:    | Windows XP, Vista and 7 (32 and 64 bit)  |
| Functions:           | Instrument configuration, data collection, data storage. Probe test modes. Data file playback. Data export to MATLAB*.mat binary format. |
| Multi Unit Operation | Vectrino Profiler software allows multiple Vectrino Profiler to be run within a single instance of the program.                          |

## Power

|                   |                 |
|-------------------|-----------------|
| DC Input:         | 12-48 VDC       |
| Peak current:     | 2.5 A at 12 VDC |
| Max. consumption: | 4 W at 100 Hz   |

## Connectors

|           |   |
|-----------|---|
| Bulkhead: | MCBH-12-FS, bronze (Impulse) - see also drawings below. |
| Cable:    | PMCIL-12-MP - see also drawings below.                  |

## Materials

|                 |  |
|-----------------|--|
| Standard model: | Delrin® housing. Stainless steel (316) probe and screws. |
|-----------------|--|

## Environmental

|                        |               |
|------------------------|---------------|
| Operating temperature: | -4°C to 40°C  |
| Storage temperature:   | -15°C to 60°C |
| Shock and vibration:   | IEC 721-3-2   |

## Dimensions

|                               |         |
|-------------------------------|---------|
| See below for main dimensions |         |
| Weight in air:                | 1.2 kg  |
| Weight in water:              | Neutral |

## Options

- 4-beam down-looking probe. Fixed stem or 1m flexible cable
- 10, 20, 30 50 or 100 m cable with Impulse underwater connector
- RS 485-USB converter (one-to-one, four-to-one or eight-to-one)

