Nortek Vector Velocimeter

High Resolution 3D Current Meter

The core of the Vector is an acoustic Doppler velocimeter, used to achieve accurate and non-intrusive velocity data at rates as high as 64 Hz. The system comes standard with compass, tilt, pressure, and temperature sensors and it can be used both in self-contained and online mode.

Leading oceanographers, coastal engineers, and hydraulic engineers all over the world commonly use the Vector for a wide range of high-resolution applications. The most common uses are:

✔ **Studies of surf-zone dynamics**

✔ **Turbulence studies in rivers, estuaries, and coastal areas.**

✔ **Combined wave and current monitoring**

✔ **Boundary layer studies**

In most cases, the Vector is deployed as a self-contained instrument with internal recorder, or operated from an on-line PC. It can also be operated from any third-party controller using RS-232 or RS-422 communication.

For integration with other data acquisition systems the three analog outputs (one for each velocity component) are commonly used.

The Vector was designed from the outset as an integrated open water system. This gives the Vector some unique advantages:

✔ **Single-canister system with internal memory and batteries**
✔ **Small and light weight**
✔ **Titanium probe and plastic canister provides mechanical strength and prevents corrosion**
✔ **No moving parts that can be blocked, or sensitive parts that are easily damaged**
✔ **Biological fouling does not affect accuracy**

External OBS, conductivity or other analog sensors can be integrated with the Vector using the analog input lines.

Wave directional spectra

The Vector can be configured to sample the high-resolution pressure sensor and the three velocity components at a rapid rate in user specified burst intervals. This type of data, known as "wave triplet data", can be used to calculate the wave directional spectrum or to look at individual wave records for transient phenomena such as ship waves. External analog sensors can be sampled at the same rate as the velocity and pressure.

Ease of Use

The Vector comes standard with Windows software both for real time data collection and for controlling autonomous deployments. Different views and menus guide the user through the process from configuration to data conversion. The software has an on-line help section and requires no special skills.

Statistical analysis of the Vector velocity data can be performed with the Win32 post-processing software ExploreV (Explore for Velocimeters).

Upgrades in the form of new firmware versions from Nortek can be loaded into the Vector using the standard software, removing the traditional need for opening the canister and replacing components.

NORTEK AS

www.nortek-as.com

Water Velocity Measurement

Range	± 0.01, 0.1, 0.3, 2, 4, 7 m/s (software selectable)
Accuracy	± 0.5% of measured value ± 1 mm/s
Sampling rate (output)	1 - 64 Hz
Internal sampling rate	100 - 250 Hz

Sampling Volume

Distance from probe	0.15 m
Diameter	15 mm
Height (user selectable)	5 - 20 mm

Doppler Uncertainty (noise)

Typical uncertainty at 16 Hz	1% of velocity range

Echo Intensity

Acoustic frequency	6 MHz
Resolution	0.45 dB
Dynamic range	90 dB

Sensors

Temperature	**Thermistor embedded in end bell**	
	-Range	-4°C to 40°C
	-Accuracy/Resolution	0.1°C / 0.01°C
	-Time response	10 min
Compass	**Flux-gate with liquid tilt**	
	-Maximum tilt	30°
	Accuracy/Resolution	2° / 0.1°
Tilt	**Liquid level**	
	-Accuracy/Resolution	0.2° / 0.1°
	Up or down	Automatic detect
Pressure	**Piezoresistive**	
	-Range	0-20 m (standard)
	-Accuracy/Resolution	0.25% / Better than 0.005% of full scale

Data Communication

I/O	RS-232 or RS-422
Baud rate	300 - 115200
User control	Handled via Vector WIN32 software, ActiveX function calls, or direct commands
Analog outputs	3 channels standard, one for each velocity component. Output range is 0-5V, scaling is user selectable.

Analog Inputs

No. of channels	2
A/D converter	16 bit
Power source	Battery voltage, 5VDC or 12VDC (please specify)

Software ("Vector")

Operating system	WIN95/98, NT 4.0, WIN2000
Functions	Deployment planning, start with alarm, data retrieval, ASCII conversion. Online data collection and graphical display. Test modes.

Data Recording

Capacity (standard)	2 MB, expandable to 21MB or 78MB
Data record	24 bytes at sampling rate + 28 bytes/second

Power

DC Input	9 - 16 VDC
Peak current	2.5 amp at 12VDC (user selectable)
Max consumption at 64 Hz	1.5W
Typical consumption at 4 Hz	0.6 - 1.0 W
Sleep consumption	0.0013 W
Battery capacity	50 Wh
New battery voltage	13.5 VDC
Data collection capacity	Refer to planning section in software

Connectors

Bulkhead (Impulse)	LPMBH-8-FS (bronze, titanium optional
Cable	LPMIL-8-MP on 10-m polyurethane cable

Materials

Standard model	Delrin housing. Titanium probe and screws

Environmental

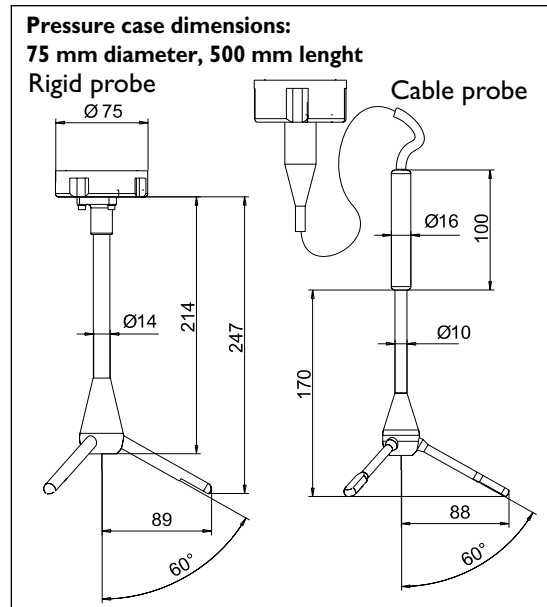|	
Operating temperature	-5°C to 45°C
Storage temperature	-15°C to 60°C
Shock and vibration	IEC 721 - 3 - 2
Pressure rating	300 m for canister. Pressure sensor can tolerate depths of 1.5 x pressure range.

Dimensions

Cylinder	Diameter: 75 mm Length: 550 mm or 450 mm
Weight in air	5.0 kg
Weight in water	1.5 kg

Options

Acoustic beams	Probe mounted on fixed stem or on 2-m cable (see drawing)
Battery	Lithium and Rechargeable Ni-Mn available
External battery	4 battery packs in 75mm diameter, 500mm lenght. External canister

Pressure case dimensions:
75 mm diameter, 500 mm lenght

Rigid probe
Ø 75
Ø14
214
247
89
60°

Cable probe
Ø16
100
Ø10
170
88
60°

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