

NORTEK QUICK GUIDE

Vectrino velocimeter

Oct. 2017

Please check that all expected items are included in the shipment:

- ■ The instrument
- ■ External power/signal cable
- ■ NORTEK equipment storage box/toolkit
- ■ USB to serial converter
- ■ AC/DC voltage transformer
- ■ Power cable (European or American)
- ■ 250 ml bottle with seeding
- ■ Software on USB memory stick
- ■ Final test check list
- ■ Packing list
- ■ Warranty card

Install the Nortek software

The instrument's software is located on the attached memory stick.

Please check the web regularly for updates on both software and firmware.

This Quick Guide provides you with the basic information you need to get the Vectrino/Vectrino+ up and running as quickly as possible. The Vectrino is an extremely powerful tool for flow measurement. It is a seemingly simple system but require consideration of many different parameters to produce the highest quality data. The biggest key to its successful use is an understanding of the basic concepts of its operation and the potential problems that can occur. Experience with the system is an important factor as well, and the value of test deployments cannot be overemphasized.

If you are new to our instruments and software, you should check out the Nortek Comprehensive Manual (available on the web), which includes principles of operation, mounting guidelines, troubleshooting, service manual and simple system integration. You will also find lots of useful information at the Nortek web: **www.nortekgroup.com**.

Preparation

- Install the software located on the USB memory stick. Once the installation is complete, launch the Vectrino/Vectrino+ software.
- Connect the sensor to your computer, either directly to a serial port or using the enclosed USB to serial adapter.
- Connect the sensor to a power supply.
- Select the correct serial port number in the Serial Port dialog box in the communication menu. Chose the default baud rate of 57600 first time connecting.
- Run a Functional Test as described in the Service Manual chapter of the Comprehensive Manual to ensure that the sensor works as expected. For Vectrinos, the Probe Check is the most relevant test.

Configuration

- Open the Configuration dialog box by selecting Edit Configuration in the Data Collection menu or clicking the Configuration toolbar button.
- The activated dialog contains all parameters required to specify the operation of the sensor. A description of each parameter can be found in the application help, accessible from the Configuration dialog box. One parameter that requires extra attention is the **Nominal velocity range,** which is a simple way of describing the maximum unambiguous velocity the sensor is be able to measure. The velocity range should be set as low as possible, to minimize measurement uncertainty and noise. If the actual values measured exceed the range, your data will be impaired and may become unusable. See the **Principles of Operation** for more information on wrapping. The Configuration pane on the right hand side of the dialog displays performance parameters that are automatically updated as you change the settings.
- When finished, press **OK** to accept the changes. By using the Open/Save commands in the File menu (or the corresponding toolbar buttons) the deployment parameters can be saved to file at any given time and re-loaded when it is time to actually start the data collection.

Start and Stop Data Collection

- Establish communication with the instrument.
- Select **Start Data Collection**.
- The real time displays shows velocity- and sensor data as it is collected.
- To record the data from the serial port, select Disk File Data Recording from the data collection menu or use the corresponding toolbar button. Chose a base name and folder (without extension). This will enable the Start Disk Recording and Stop Disk Recording menu items.
- Once data recording to disk has started, the status bar will show the name and size of the file.

Data Conversion

- To convert binary data files to a readable ASCII format select **Data Conversion**.. from the Data collection menu or the corresponding toolbar button.
- Add files to the Files to convert list by using the **Add file**... file selection dialog. To convert files select items in the list and press the blue arrow.
- Specify the location for the converted files in the Save in folder field. An optional pre- or postfix that will be added to the recorder filename may be specified.

Tip! Check the data collected before running the next data collection. If something is wrong with the sensor, the mounting of it, or the configuration, inspecting data is a way to detect this and the possibility of making the same mistake twice is avoided.

Mounting Guidelines

- Make sure that there are no obstructions between the sensor and the focal point (sampling volume) located about 5 cm from the center transducer.
- The Vectrino is a pulse coherent system, which means it is susceptible to pulse interference when measuring near boundaries. This interference is called “Weak spot” and should be avoided. More information about this can be found in the Comprehensive Manual – where a table presenting the distances where weak spots can occur can be found.
- Consider the effects of large objects on the flow itself. The flow disturbance is greatest directly downstream in the wake behind the object.
- All acoustic transducers must be submerged during data collection. Using the Vectrino with the transducers are out of water will not cause any damage. For side-looking probes, it is possible to collect 2D data with only the lower receiver arms (and center transducer) submerged.
- The best quality is achieved if the main flow direction is perpendicular to the transmit axis. Flow directly into the transmit axis should be avoided.
- Make sure your mounting structure is stable. Small vibrations in the mounting can generate large accelerations in the data.
- The sensor is not designed to be used in saline environments as this may cause corrosion on the probe.

Note: When mounting the Vectrino, use the recessions to strap the sensor to the structure. Never use the probe stem or cable as mounting point.

Proper mounting of the sensor is crucial for collecting high quality data. Read more about this in the Mounting Guideline.

Side-looking (2D/3D) Vectrino

The Vectrino software provides estimates of Z1 and Z2. These are independent measurements of the vertical velocity for the standard down looking probe. The side looking probe does not have a secondary measurement of the vertical velocity, thus Z1 will be the vertical velocity, while Z2 will be output as zero.

Seeding

In order to measure water velocities, the sound waves emitted by the center transducer must be reflected by scattering material suspended in the water. The velocity that is measured is hence the velocity of the water, assuming the particles move with the same average speed as the surrounding fluid. If the instrument is to be used in a laboratory environment, seeding has to be added. If you are unsure about the amount of particles to add, please check the Manual or contact Nortek for further guidance.

Basic Principles
Pulse coherent instruments utilize a pair of acoustic pulses with a known time lag to determine a Doppler induced phase shift. This measured phase shift is converted to velocity by scaling with the speed of sound in water.

The Vectrino use separate transducers to transmit and receive the acoustic signal, and is thus a so-called bi-static sensor.

For more information about the principles of operation, check out the Pulse Coherent Primer available at Nortek Wiki.

Software
The Vectrino/Vectrino+ software is designed to aid in the configuration and operation of the Vectrino/Vectrino+. It can be used to set up data collection parameters, and display velocity data and other useful information in real-time as graphs and tables. The data are recorded in compressed binary files on the hard disk, and can be converted to ASCII format using the built-in data conversion program. Note: The software is not designed for rapid data collection at high sampling rates or for controlling multiple Vectrino velocimeters. For this use, we recommend Polysync. For more about this software, check out our web site.

Communication

The power and communication cable supplies external DC power (12-48 V) and provides two-way serial communication with an external computer. It also provides four analog outputs (0-5 V DC), one for each velocity component. In addition, the cable provides synchronization options when the Vectrino is used as a master or a slave to synchronize measurements with other Vectrinos and/or other instruments. Communication Baud rate: 300-115200 Baud, 57600 is default.

The Vectrino is shipped with a 12-pin connector and cable. The waterproof connector (MCBH-12-FS) and the corresponding pin-outs can be seen to the right. The Vectrino power lines are diode protected, hence, there is no need to worry about wiring the Vectrino power backwards.

Ensure that the connectors and dummy plugs are lubricated with dielectric silicone. We recommend 3M silicone spray. Note that the silicone grease included in the shipment should be used on the O-rings only.

For more information about the analog input and output, synchronizing of the instruments and description of all available commands and modes of communication, check out the **System Integrator Manual.**

Pin. No	Wire Color	Function
1	White	X
2	Black	Y
3	White/Grey	Z1
4	White/Purple	Z2
5	White/Black	Gnd (analog)
6	White/Blue	Sync+
7	White/Green	Sync-
8	White/Yellow	Gnd (digital)
9	White/Orange	Tx
10	White/Red	Rx
11	White/Brown	Power -
12	Black/Red	Power + (12-48 V)

Above: The pin-outs of the connector. Below: The waterproof connector and a drawing highlighting the pin numbers.



Troubleshooting

As most problems are caused by simple mistakes, please initially check if

- you have forgotten to power the system
- the connector has fallen out of the computer
- you are using the wrong serial port or baud rate

You may find that there is a lot of noise in the velocity data. This may be caused by

- not enough particles in the water
- the velocity range being set too high
- the sampling volume being located beyond the bottom
- reflection and reverberation conditions at the bottom
- probe malfunction. Test the probe with the Probe Check feature

When all obvious mistakes are ruled out, please turn to our **Troubleshooting Guide**. The FAQ site may also be helpful.

If the problem is still present contact Nortek support at support@nortekgroup.com