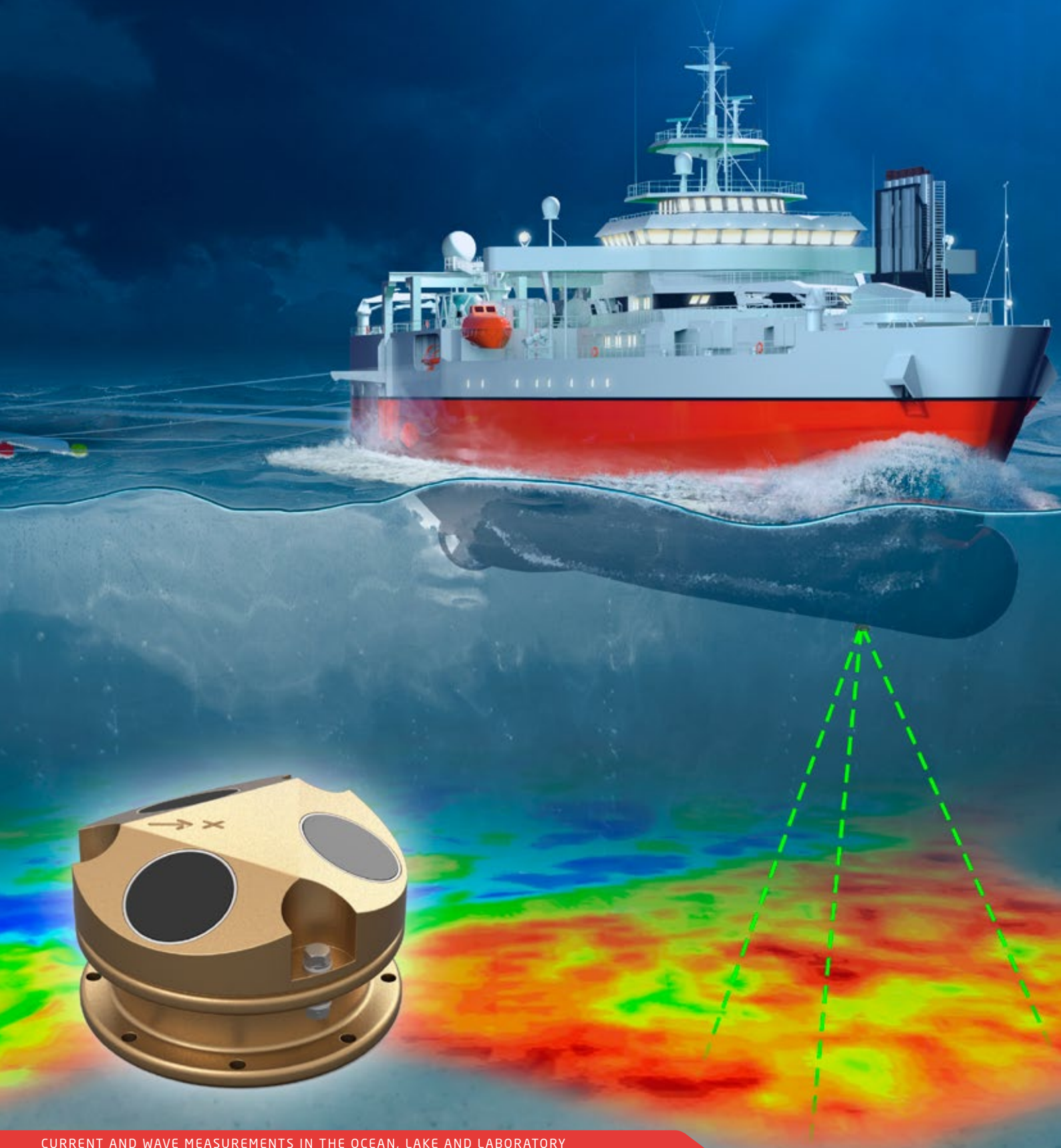


Ocean current measurements are important during production planning and execution of 3D/4D towed seismic surveys. Equipment precision and reliability as well as support center response time and flexibility are key elements serving this highly professional industry. Nortek instruments provide real time ocean current measurement capability to the majority of the world seismic fleet.

VM Profiler

Vessel Mounted Current Profiler



CURRENT AND WAVE MEASUREMENTS IN THE OCEAN, LAKE AND LABORATORY

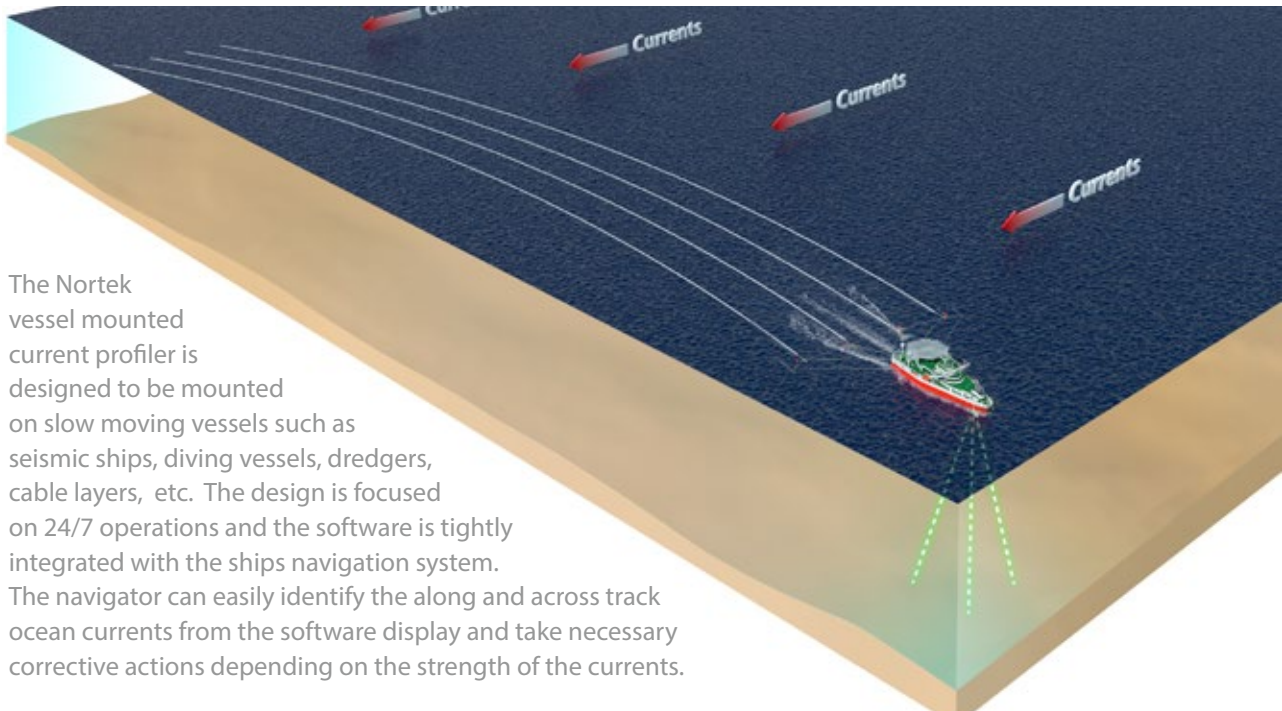


Nortek AS
Vangkroken 2
1351 Rud, Norway
Tel: +47 6717 4500
Fax: +47 6713 6770
E-mail: inquiry@nortek.no



www.nortek-as.com
True innovation makes a difference

Vessel Mounted Current Profiler



The Nortek vessel mounted current profiler is designed to be mounted on slow moving vessels such as seismic ships, diving vessels, dredgers, cable layers, etc. The design is focused on 24/7 operations and the software is tightly integrated with the ships navigation system. The navigator can easily identify the along and across track ocean currents from the software display and take necessary corrective actions depending on the strength of the currents.

Why leading seismic companies use the Nortek vessel mounted current profiler:

• Feathering

Currents crossing the vessel track will cause streamer deflection. Knowing and predicting this angle improves the positioning precision and the ability to determine the actual point of data acquisition.

• In-fills

Turning a seismic rig around takes hours, and the operational cost for a seismic vessel is considerable. The ability to plan ahead, reducing the number of "extra" runs is crucial.

• Streamer Handling

Knowledge about local currents improves the ability to avoid costly entanglement and delays during streamer deployment, handling and recovery.

• Close passes

4D runs are becoming more in demand. Predicting streamer path is vital in order to avoid collisions with existing infrastructure. Today's streamers can be repositioned vertically in the water column into layers with more favorable currents.

Hardware

A Nortek VM current profiler system comprises of the following components :

- 1. Hull or pole mounted acoustic Doppler current profiling transducer.**
- 2. Power/communication interface unit**
- 3. Computer with multiple serial port or networking capability**



The system computer requires input from the following external devices in order to provide current measurements corrected for vessel motion and heading :

- A. DGPS
- B. Gyro/GPS heading
- C. HPR (heave-pitch-roll, optional)
- D. Latitude (optional)

Transducer

In terms of measurement performance a low frequency transducer will be the choice for long range measurements whereas high frequency units provide better accuracy and resolution. The VM AWAC is available in three versions with either 1MHz, 600kHz or 400kHz acoustic system frequency, offering 25m, 40m or 80m measurement range respectively.

Power/Interface Unit

A power/interface unit is delivered with each transducer that is shipped from Nortek. The Nortek interface box is

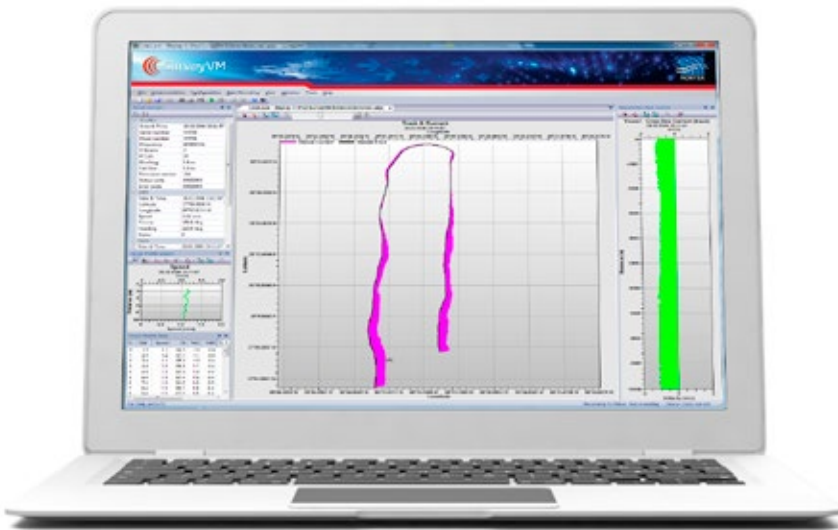
designed for use with long cables and with effortless and reliable long time online monitoring in mind. The basic functionality is to provide instrument power and data communication via RS422 protocol. It is powered via AC input and allows communication with the system computer via with USB or RS232 serial interface. The Power/Interface unit is equipped with extensive protective circuitry, minimizing the risk of e.g. electrical shorts/opens causing system breakdown.

Computer

The VM profiler system is delivered with a rugged and reliable 19" rack mountable chassis computer. A marine certified rack mountable computer is available on demand.

Software

SurveyVM II



The SurveyVM family of software products has by reputation a very intuitive user interface, which has been greatly appreciated by navigators ever since its introduction back in 1996.

A hull mounted current profiling sensor will measure the water speed and direction relative to the vessel, i.e. the vessel speed through water. What SurveyVM II does, is to combine "raw" current profile data from the sensor with speed and heading data from external inputs like DGPS/Gyro. The corrected values, or difference between the two, represent the net ocean current relative to ground.

The SurveyVM II software provides real time monitoring of current speed and direction at different depths below the vessel. A variety of graphical and

numerical screens enable customized presentations tailored to your specific preferences or requirements.

The SurveyVM II software package, introduced in Aug 2012, is an all new platform offering extended and updated functionality as well as improved flexibility towards adapting to future developments, requirements and technology. The user friendliness and simplicity that made SurveyVM I a success has however been carefully preserved.

Versatility



In addition to offering important functionality to the seismic fleet VM Profilers are considered useful in a number of maritime applications well beyond seismic surveys. Basically, whenever there is a need for real time current monitoring from a moving vessel or platform the VM profiler will provide accurate and reliable access to current data, intuitively displayed in a flexible and modular user interface.

Examples:

- Jack up vessels / barges
- Offshore Service/support vessels
- Dredging applicatons
- Oceanographic Survey
- Hydrographic Survey

Support

Dedicated and experienced Nortek professionals are available for support whenever a system problem is suspected. We take pride in keeping response time to a minimum and will provide expert guidance in terms of onboard investigation and fault location. Running the Diagnosis software and emailing the report to inquiry@nortek.no along with the actual dataset and setup file will be a good start.

Installation / training

Installation is crucial in terms of optimizing performance, ensuring quality data and reliability. Nortek has trained personnel available for supervision and assistance during installation and startup. Experience shows that unattended installations by unskilled personnel may cause serious strain and damage to vital parts. Considering the importance of continuous data access and reliability we strongly recommend presence by Nortek expertise during installation.

Diagnosis

The Nortek Diagnosis software is included with all system shipments. It is also available for free download from the Nortek webpage www.nortek.no. It is a very useful tool in terms of first line onboard testing, and provides a basic understanding about system and transducer performance.

System

Acoustic frequency:	1MHz, 600kHz or 400kHz
Acoustic beams:	3 beams 120° apart, slanted at 25°
Vertical beam opening angle:	1.7°

Current Profile

Maximum range:	30m (1MHz), 50m (600 kHz), 100m (400kHz) (depends on local conditions)
Depth cell size:	0.25 – 4.0m (1MHz) 0.5 – 8.0m (600kHz) 1.0 – 8.0m (400kHz)
Number of cells:	Typical 20–40, max. 128
Maximum output rate:	1Hz

Velocity measurements

Velocity range:	±10 m/s
Accuracy:	1% of measured value ±0.5 cm/s

Materials

Standard:	1MHz, 600kHz – Bronze housing 400kHz - Delrin Housing Titanium screws, polyurethane plastics
-----------	--

Environmental

Operating temperature:	-4°C to 40°C
Storage temperature:	-20°C to 60°C
Shock and vibration:	IEC 721-3-2

Dimensions:

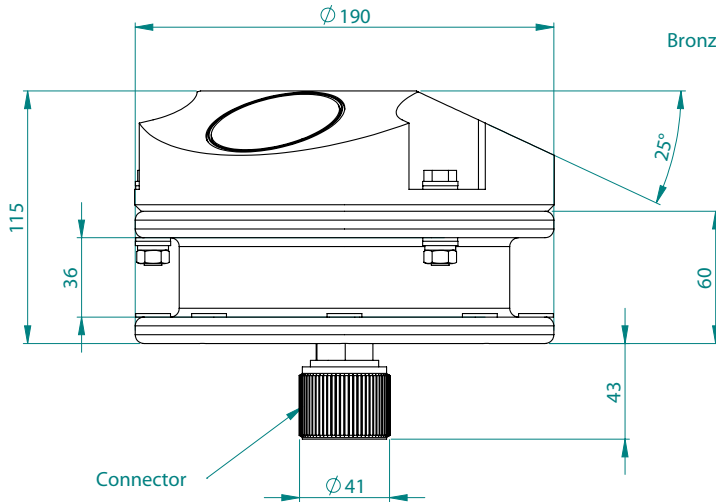
Weight in air:	7.3 kg (0.4MHz), 6.2 kg (0.6MHz), 6.1 kg (1MHz)
Weight in water:	3.6 kg (0.4MHz), 2.9 kg (0.6MHz & 1MHz)

Data Communication

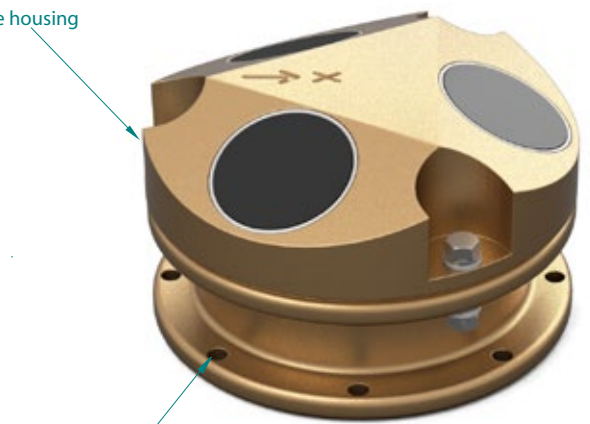
I/O:	RS 422
Communication baud rate:	300-115200
User control:	Handled via SurveyVM Software

Power / Interface Unit

AC Input Voltage:	100-240VAC, 50-60 Hz
Maximum Power consumption:	25W
Output Voltage:	18VDC
Maximum Output Current:	400mA
Open/short circuit protection:	Automatic reset
Maximum time, cable break – power shutdown:	3s
Startup procedure after cable break:	Turn input power off / on.

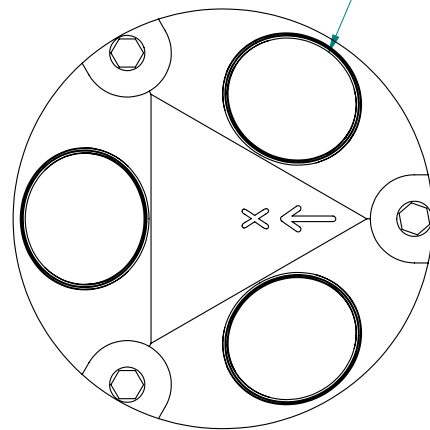
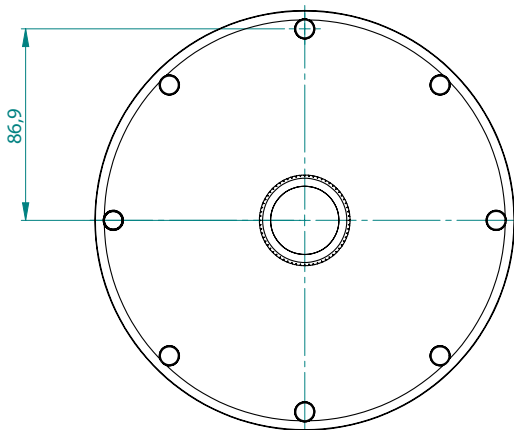


Bronze housing



$\varnothing 8$ mm Mounting holes

Transducers



<http://www.youtube.com/NortekInfo>



<http://www.facebook.com/norteknews>



<http://twitter.com/norteknews>

TRUE INNOVATION MAKES A DIFFERENCE

NortekMed S.A.S.
Z.I Toulon Est
67, Avenue Frédéric Joliot-Curie
BP 520, 83078 Toulon Cedex 09
Tel: + 33 (0) 4 94 31 70 30
Fax: +33 (0) 4 94 31 25 49
E-mail: info@NortekMed.com

NortekUK
Tresanton House
Bramshott Court
Bramshott
Hants
GU30 7RG, UK
Tel: +44- 1428 751 953
E-mail: inquiry@nortekuk.co.uk

NortekUSA
27 Drydock Avenue,
Mailbox 32, Boston,
MA 02210-2377
Tel: 617-206-5750
Fax: 617-275-8955
E-mail: inquiry@nortekusa.com

青岛诺泰克测量设备有限公司
地址: 中国青岛香港西路65号
汇融广场 1302
邮编: 266071
Tel: 0532-85017570, 85017270
Fax: 0532-85017570
E-mail: inquiry@nortek.com.cn

Nortek B.V.
Schipholweg 333a
1171 PL Badhoevedorp
Nederland
Tel: +31 20 6543600
Fax: +31 20 6599830
email: info@nortek-bv.nl

Nortek Brasil
Av. Nilo Peçanha nº 50,
grupo 2910 – Centro - Rio de Janeiro -
RJ – Cep 20020-906.
Tel: +55 (21) 4126-5954
Cel: +55 (21) 85046798
E-Mail nortek@nortekbrasil.com.br