

Signature 55

- REVOLUTIONIZING LONG RANGE CURRENT PROFILING



1000 m RANGE



NORTEK

Signature Series

TRUE INNOVATION MAKES A DIFFERENCE

www.nortek-as.com

Signature55

- REVOLUTIONIZING LONG RANGE CURRENT PROFILING

Nortek is pleased to introduce the Signature55, a dual frequency long range current profiler that uses broadband processing and modern electronics to give you the most flexible current profiler available. Designed to be mounted on surface buoys, offshore platforms, and in other online applications, the instrument has a verified range of 1000m in the open ocean. It also comes with a host of new features, including a true Ethernet interface.

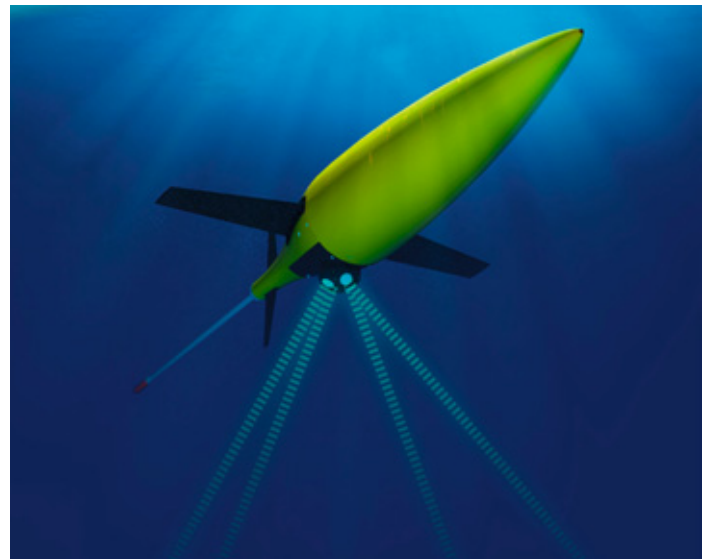


New functionality

- **Raw data storage:** All the raw data can be stored. This allows QA/QC procedures to be applied to every individual data set in post processing.
- **Storing raw magnetometer data:** In addition to compass direction and tilt, the 3-axis magnetometer data can be stored for every individual data sample. This makes it possible to conduct hard-iron calibration in post processing
- **Seasonal sampling:** To optimize power consumption, the instrument configuration, including power level and cell size, can be changed during the data collection period.
- **True Ethernet interface:** In addition to the traditional serial protocols, it is possible to communicate with the instrument over wired Ethernet. This makes it possible to download data from the recorder at data rates exceeding 20MBit (1 GigaByte in 6 minutes). It also makes it possible to connect the instrument to your in-house network for easy configuration and testing.
- **Broadband performance:** The Signature55 is a true broadband instrument, using frequency coding of the transmit pulse and auto-covariance processing. This reduces the power consumption by a factor of 10-30 in a high-power, long-range instruments like the Signature55.

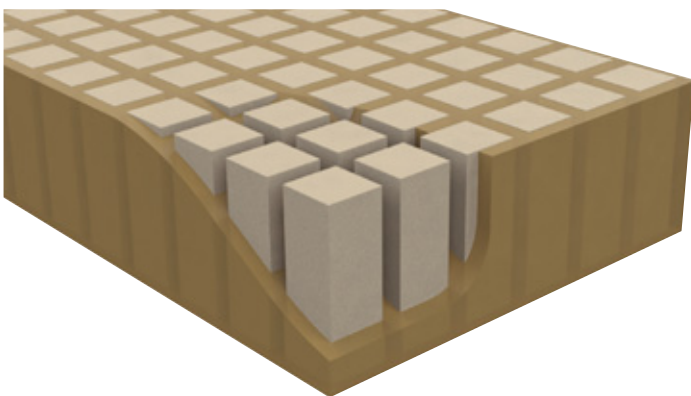
AD2CP - Next generation current profilers

The Signature55 is based on the AD2CP hardware platform. This new platform allows more flexibility than traditional ADCPs. Some of the possibilities include more transducers than the classical 3 or 4, transducers operating at multiple frequencies, and multiple measurement modes operating simultaneously. Select features and operating modes of the new AD2CP hardware generation are protected by US patent 8,223,588.



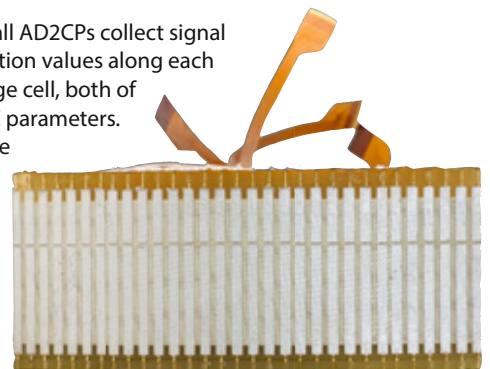
Signature55 Transducers

To achieve optimum efficiency and range, the Signature55 transducers are "piezo-composite" elements that have been designed and produced at Nortek Piezo in Aberdeen, Scotland. The three transducers are 25 cm in diameter.



The purpose of the large size is to increase the directivity, and hence the profiling range. This also reduces the potential interference from objects that are located within the profiling range.

For QA/QC purposes, all AD2CPs collect signal amplitude and correlation values along each beam and in each range cell, both of which are effective QC parameters. It is also possible to use the measured vertical velocity for QA/QC purposes, just as in all Nortek systems employing the standard three transducer design.





When can you profile over 1000 meters?

The profiling range of a current profiler is primarily determined by the acoustic frequency but a host of instrument and environmental parameters strongly influence how far the instrument can accurately measure velocity.

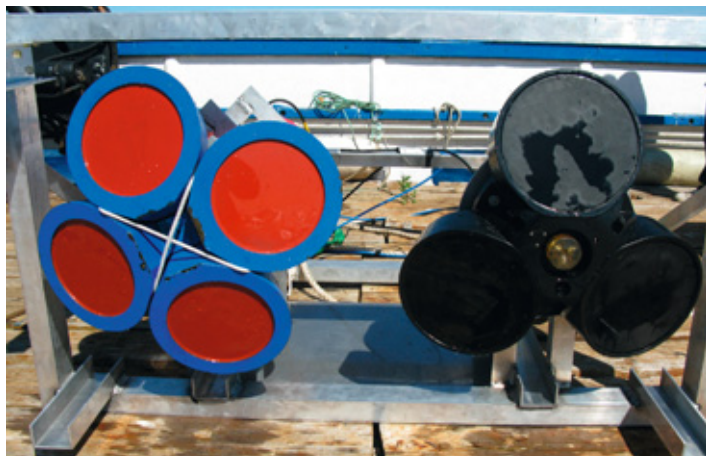
Important instrument parameters:

- Transmit power and cell size
- Size and efficiency of transducers
- Receiver noise level

The transmit power and cell size linearly affects the power consumption. Therefore, the highest power level and largest cells are normally reserved for applications where power consumption is not a concern. If the transmit power or cell size is doubled, the range at 55 kHz increases by 40-60 meters but at the penalty of doubling the power consumption.

Larger transducers increase range because the acoustic energy is more tightly focused. Efficiency is important because it improves the sensitivity of the ceramic element to the slight pressure vibrations found in the acoustic echo. The receiver noise level is critical because a well-designed and noise-immune current profiler can easily get 100-200m more range than a system that is subject to external or internal noise.

The main goal of the Signature55 hardware development was to optimize the system performance in all of the above areas. In the final product, nothing has been left to chance and each hardware element has been worked and reworked until they were all optimized for data quality and maximum profiling range.



In a test offshore Toulon, France, the data from the Signature55 was compared directly to a Teledyne RDI 75 kHz WH. Both systems were operated in every available mode to ensure a correct comparison.

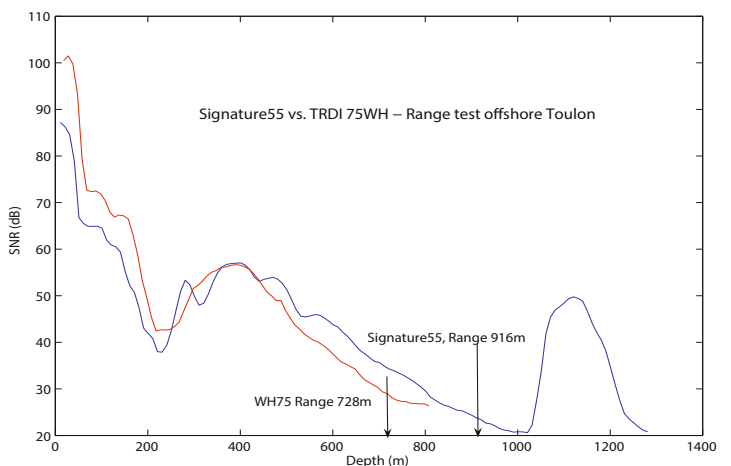
Important environmental parameters:

- Salinity
- Acoustic backscattering cross section per volume

Salinity effects the molecular acoustic losses, which are lower in fresh water than in salt water. As result, the profiling range is often longer in lakes.

The acoustic backscattering cross section varies with the presence of scattering material in the water column and it is a difficult parameter to predict. Because the biological activity in the ocean is patchy, it changes with location, depth and time of year. In a comparative test conducted outside the coast of France (see below), the scattering level varied by more than 30dB over the profiling range. The implication of this variability is that the profiling range in one area can be 50% shorter when compared to another location in a more target rich environment.

Given what we know about scattering variability, it is not meaningful to state a precise value for the expected range of the Signature55. Instead, the stated maximum range of 1000 meters is a reflection of testing at various frequencies in equivalent scatter conditions against the WH75, which has a stated range of 600m. The demonstration test outside Toulon showed an operating range of almost 1000m at 62 kHz and further testing has extended profiling range past 1000m at 55 kHz.



The plot shows the strength of the acoustic echo as a function of depth for Signature55 operating at 62 kHz and the WH75 operating in narrowband, high power mode. The cut-off for the profiling range was set to the point where the correlation value drops to 50% of its original value.

Water Velocity Measurements

Profiling range*:	1000m (55kHz), 600m+ (75kHz)
Cell size:	5–20m
Min. blanking:	2 m
Max. # cells:	200
Velocity range:	User selectable 1.25, 2.5, 3.75, 5.0 m/s
Accuracy:	1% of measured value ± 0.5cm/s
Velocity resolution:	0.1cm/s

*) Maximum range depends on power consumption and acoustic scattering conditions

Echo Intensity

Sampling:	Same as velocity
Resolution:	0.5dB
Dynamic range:	70dB
Transducer acoustic frequency:	55 and 75 kHz
No. of beams:	3, slanted at 20°
Beam width:	4.5°-5.5°

Sensors

Temperature:	Thermistor embedded in head
Range:	-4°C to 40°C
Accuracy/Resolution:	0.1°C/0.01°C
Time response:	10 min
Compass:	Solid State Magnetometer
Accuracy/Resolution:	2°/0.01° for tilt < 20°
Tilt:	Solid State Accelerometer
Accuracy/Resolution:	0.2° /0.01°
Maximum tilt:	30°
Up or down:	Automatic detect
Pressure:	Piezoresistive
Standard Range:	0–100m, inquire for options
Accuracy/Resolution:	0.1%FS / Better than 0.005% of full scale per sample

Data Communication

I/O:	Ethernet or configurable RS-232/RS422
Serial Communication Baud rate:	300–115200 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):	4GB
Data record:	86 bytes + 12×Ncells
Mode:	Stop when full

Real Time Clock

Accuracy:	±1 min/year
Clock retention in absence of external power:	1 year

Software

Operating system:	Windows® 7
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:	15W
Typical average consumption:	0.2-0.5W. Ethernet adds 0.75W
Sleep Consumption:	100µA, power depends on supply voltage.
Transmit power:	2–200W, adjustable levels
Ping sequence:	Multiplexing or Parallel

Materials

Standard model:	Delrin® with titanium bolts. Reinforced polyurethane transducer cups.
-----------------	---

Connectors

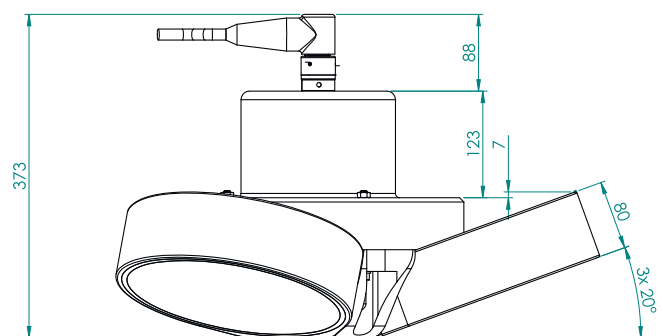
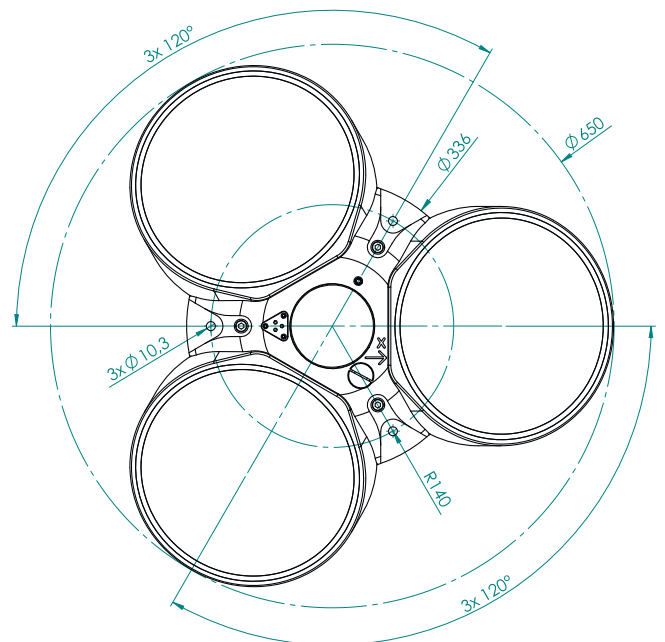
Bulkhead:	Birns 3M-14B-OR-CA SS316
Cable:	Birns 3M-14B-CP-CA on 10-m polyurethane cable

Environmental

Operating temperature:	-4°C to 40°C
Storage temperature:	-20°C to 60°C
Shock and vibration:	IEC 721-3-2
Pressure rating:	1500m

Dimensions

See drawing	
Weight in air:	45kg
Weight in water:	19kg



TS-032-en-02.2014

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
inquiry@nortek.no

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
info@NortekMed.com

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

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

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