

# Hydrographic Test Result



MARINE

TEST ENVIRONMENT



PRODUCT ON TEST



Ellipse-E



Ekinox-D

Hydrographic Survey Offshore of Pornic, France. Data collected with an Ekinox-D and an R2Sonic 2024 multibeam sonar. Courtesy of CADDEN.

## TEST CONDITIONS

### TESTED PRODUCTS

**Ellipse-E**, inertial navigation system connected to a Hemisphere VS330 GNSS with two antennas.

**Ekinox-D**, inertial navigation system integrating a bi-frequency GNSS receiver with two antennas.

Both products received RTK corrections during the test.

### TESTED PERFORMANCE

Roll, Pitch, Heading, and Heave

### DATE, PLACE

October 28th and 29th 2014 in Pornic, France.

**GET THE FULL REPORT:** Send an email to [sales@sbg-systems.com](mailto:sales@sbg-systems.com) to receive the complete version of this test.

The test performed a typical survey path. Each leg of the survey path was about 550 meters long. A warm-up period and sensor calibration was performed during the first minutes before running the survey.

Attitude performance was compared to a reference, a very high accuracy fiber optic gyro compass. This gyro compass provided much higher accuracy roll and pitch than the tested products. Heading accuracy, though, was comparable, so measured heading performance should be considered more as a consistency check than as an absolute accuracy measurement.

Heave performance was compared to a tide compensated RTK altitude outputted from the Ekinox-D.

Special thanks to the CADDEN company who conducted this test.



This test was conducted on a 9 meter survey vessel, equipped with an R2Sonic SONIC 2024 multibeam echosounder.

QINSy software was used for real-time acquisition and data processing.

# TEST RESULTS

## Attitude Accuracy

RMS error	Ellipse-E test	Ellipse-E specifications	Ekinox-D test	Ekinox-D specifications
Roll	0.06	0.2°	0.027°	0.05°
Pitch	0.066	0.2°	0.021°	0.05°
Heading	0.16	0.2° with 2 m baseline	0.069°	0.1° with 2 m baseline

The **Ellipse-E** roll and pitch accuracy is greatly higher than the specifications; heading accuracy is completely within. Low noise gyroscopes and advanced algorithms make the sensor highly reliable. The use of an RTK GNSS receiver additionally improves the sensor's performance.

The **Ekinox-D** shows very good results, in the range of 0.03° in roll and pitch. This results are higher than the specified accuracy, and are consistent with a previous test on a Hexapod (June 2013). Heading accuracy is within specifications, given that the baseline on this set-up was 2.4 meters. Higher heading accuracy can be achieved with a longer baseline between the 2 antennas (0.05° with a 3 m baseline).

## Heave Accuracy

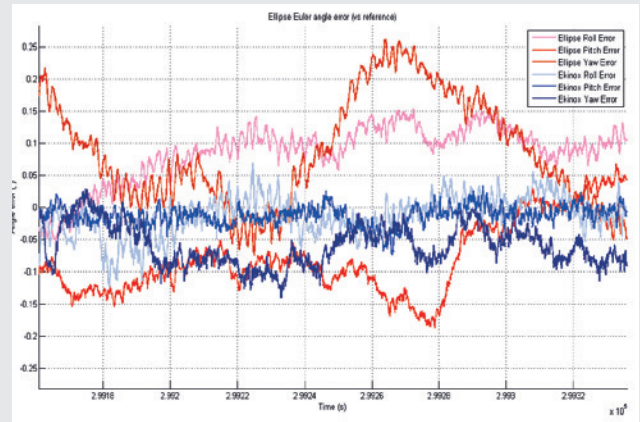
Error in RMS	Heave test result	Heave specifications	Wave Period specifications
Ellipse-E real-time	5.9 cm	10 cm	< 15 s
Ekinox-D real-time	3.9 cm	5 cm	< 25 s
Ekinox-D delayed	2.3 cm	2.5 cm	< 50s

**Ellipse-E** real-time heave is well beyond expectations with an average accuracy of 6 cm. Ellipse automatically adjusts heave measurement to the wave period, which greatly enhances its accuracy.

**Ekinox-D** real-time heave accuracy is much higher than specified. It benefits from automatic adjustment to the wave frequency, integrates high grade accelerometers, and computes heave over large wave period (up to 25 seconds).

**Ekinox-D** delayed heave accuracy is exceptionally highly accurate. The delayed heave makes use of past and future measurements to further enhance heave accuracy. This computation makes the measurement delayed of 450 seconds.

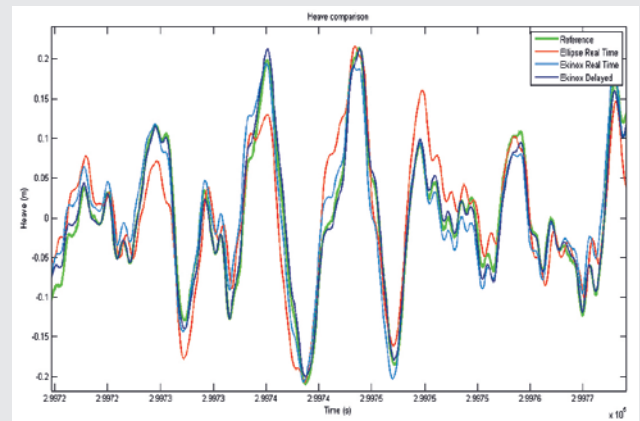
## ELLIPSE & EKINOX - ATTITUDE ERRORS



*Ekinox-D (blue lines) and Ellipse-E (red lines) instantaneous orientation errors when compared to the reference in terms of roll, pitch, and yaw angles.*

Both products provide excellent performance. This graph shows how stable the Ekinox outputs are.

## ELLIPSE & EKINOX - HEAVE ACCURACY



*Ellipse-E (red line) and Ekinox-D real-time (blue line) and delayed heave (dark blue line) in comparison with a reference, a tide compensated RTK altitude (green line).*

The Ellipse-E is able to measure the overall swell signal when the Ekinox-D provides lower phase errors. The Ekinox-D delayed heave (dark blue line) provides the best performance with preservation of the shape of the actual heave signal without any phase error.