

# Seapath™ 200



The Seapath 200 provides highly accurate, real-time heading, attitude and position information by blending the best characteristics of sensor-based inertial navigation and GPS continuous position update technologies. High-rate motion data obtained from the system's IMU (Inertial Measurements Unit) and precise position data from two, fixed baseline GPS carrier-phase receivers are integrated in a Kalman Filter within the Seapath Processing Unit. Based on analysis and extensive field testing, the Kalman Filter algorithms have been refined to insure maximum measurement fidelity and reliability.

The Seapath 200 IMU contains highly accurate linear accelerometers and Bosch Coriolis force angular rate gyros (CFG). Real-world precision accuracy is guaranteed by utilising the most accurate calibration methods and sophisticated production equipment available. Roll and pitch accuracy together with the linear acceleration performance are documented for each delivered IMU on a Calibration Certificate.

## Specifications

<b>Product</b>	Seapath™ 200
<b>Country of origin</b>	Norge
<b>Manufacturer</b>	Kongsberg Discovery

## Precise heading, attitude and positioning sensor

Accuracy, reliability and simplicity are now more than ever essential features for equipment used in demanding marine operations. Advancements in areas such as hydro acoustic positioning and seabed mapping systems mean auxiliary equipment must keep up. Within these considerations as the measure of our success, Seatex is pleased to present the third generation Seapath. Building on fifteen years of design and field experience with inertial and GPS technologies, this generation Seapath 200 highlights our commitment to supplying the most precise, reliable and easy-to-use heading, attitude and positioning sensor ever!

## Robust and reliable

The two, fixed baseline GPS antennas and their receivers that determine precise heading are also used as redundant GPS position and velocity sources. In case of missing data from one GPS receiver, then the other (remaining) receiver provides position and velocity. The Seapath 200 is robust against GPS dropouts by using the IMU to provide position, velocity and heading measurements when GPS is not available.

The Seapath 200 is equipped to utilise up to six different DGPS reference stations to insure robust and reliable DGPS position and velocity measurements. If data from more than six stations are available, the Seapath 200 automatically identifies and uses the six nearest stations. In addition EGNOS/WAAS (SBAS) correction signals can be utilized to improve position accuracy.

Consistency checking within measurements from the different sensors is performed internally to ensure reliability. Noisy data are automatically rejected or reported as inaccurate. The Seapath provides accurate roll and pitch under all conditions by tightly integrating the GPS and IMU data. With this feature, horizontal accelerations are observable, making the run-ins needed to stabilise conventional vertical reference systems unnecessary.

## Visual and flexible configuration

The new version of the Seapath configuration software, SCC, centralises configuration of all parts of the system, including the IMU. A 3D visual presentation of the vessel showing the centre of gravity, antenna and measurement point lever arms is used to simplify and promote an error free installation and calibration. Intuitive Help Wizards assist in system setup and operation to minimise operator interface and maximise work time.

## Output variables and protocols

Third generation Seapath data is available through an Ethernet interface making it easy to distribute the Seapath data to multiple users on board the vessel. Data synchronisation with multibeam echo sounders and other equipment is simplified by the availability of a 1-second time pulse (1PPS) on the Seapath data output. Output protocols for commonly used survey equipment are available on up to eight RS-232 or RS-422 individually configurable output serial lines and on Ethernet output. All the data are output in real-time, at high update rate, including the position data.

## Many applications

The Seapath 200 integrated navigation sensor is an excellent solution for applications such as hydrographic surveying, dredging, oceanographic research, seismic work and offshore construction where accurate compensation of multibeam echo sounders, hydro acoustic positioning systems and ADCP's or vessel motion monitoring are required. The Seapath can also be used for continuous calibration of gyrocompasses onboard a vessel.

## Features

- 0.02° in documented roll and pitch dynamic accuracy.
- No accuracy degradation in roll, pitch and heave measurements during turns
- Robust against GPS dropouts with IMU sensor-based backup
- Reliable and robust DGPS position ensured by combining up to six different correction signals
- Supports EGNOS/WAAS (SBAS) corrections
- Highly accurate heading during and after turns compared to heading from standard gyrocompasses
- All data have the same time stamp and the output is available in real-time
- Outputs on RS-232, RS-422 and Ethernet
- 100 Hz update rate
- Simple and error free installation ensured by using the graphical configuration software
- 2-years warrant
- The range of Seapath Models: Seapath 100, Seapath 200, Seapath 200 RTK and Seapath 200 M (with military receivers) suits a large numbers of applications.
- System performance specification extensively tested and verified with a Honeywell INS system as the reference system

## Performance

<b>Heading accuracy</b>	0.05° RMS (4 m baseline) 0.075° RMS (2.5 m baseline)
<b>Roll and pitch accuracy</b>	0.02° RMS for ±5° amplitude
<b>Scale factor error in roll, pitch and heading</b>	0.15% RMS
<b>Heave accuracy</b>	5 cm or 5% whichever is highest
<b>Heave motion periods</b>	1 to 25 seconds
<b>Position accuracy with SBAS</b>	0.7 m RMS or 1.5 m (95% CEP)
<b>Position accuracy with DGPS</b>	0.7 m RMS or 1.5 m (95% CEP)
<b>Velocity accuracy</b>	0.03 m/s RMS or 0.07 m/s (95% CEP) with DGPS

## Data outputs

<b>Communication ports</b>	8 serial RS-232/RS-422 lines and Ethernet UPD/IP
<b>Data output interval</b>	Programmable in 0.01-sec.steps and 1PPS pulse
<b>Output message formats</b>	NMEA 0183 ZDA, GGA, GLL, VTG, HDT and proprietary messages, Seatex Binary, Simrad EM1000 and EM3000, Echo sounder format, ADCP proprietary NMEA format 'PRDID', Atlas Fansweep, Submetrix and Lehmkuhl gyro repeater interface.
<b>Analog outputs</b>	3 user configurable channels

## Data inputs

<b>Communication ports</b>	5 serial RS-232/RS-422 lines
<b>Baud rate</b>	38.4k baud (max)
<b>DGPS corrections</b>	RTCM-104 version 2.2
<b>Gyrocompass</b>	NMEA 0183 HDT, Robertson 4 byte BCD

## Dimension and weight

<b>Seapath processing unit</b>	3U 19" rack unit, 430 mm (d) x 132 mm (h), weight 12 kg
<b>Video display unit</b>	343 mm (w) x 310 mm (h) x 170 mm (d), weight 3.7 kg
<b>Motion sensor</b>	Ø105 x 204 mm, weight 2.5 kg.
<b>Antenna beam</b>	2700 x 200 x 100 mm

## Operating temperature

<b>Seapath processing unit</b>	0 to +55°C
<b>Video display unit (optional)</b>	5 to +40°C
<b>Motion sensor</b>	-5 to +55°C
<b>Antenna beam</b>	-30 to +70°C

## Power

<b>Seapath processing unit</b>	85 to 265V AC, 100 W (max)
<b>Video display unit (optional)</b>	100 to 240V AC, 23 W (typical)

## Humidity

<b>Seapath processing unit</b>	10-95% relative non condensing
<b>Video display unit (optional)</b>	20-80% relative non condensing
<b>Motion sensor</b>	Hermetically sealed
<b>Antenna beam</b>	Hermetically sealed