SEAPATH® 320-R SERIES

The Seapath 320-R series is developed specifically for the hydrographic and other high precision applications where heading, position, roll, pitch, heave and timing are critical measurements. The product series combines inertial technology together with GPS and GLONASS satellite signals. The MGC part of the Seapath 320-R series functions both as IMU in the Seapath and as a stand-alone IMO type approved gyrocompass.

Integrated inertial/GNSS product
The Seapath 320-R offers the best possible combination of GNSS signals and inertial measurements for demanding operations in challenging environments. This Seapath product includes the MGC inertial navigation sensor, providing up to 0.01° RMS roll, pitch and heading accuracy. This accuracy is achieved by the use of accurate linear accelerometers and unique ring laser gyros. The combination of GNSS signals and inertial data enables a much better performance than each of the signals alone with a high output data rate (up to 200 Hz), zero delay on output data, data available in up to eight different monitoring points and a total of sixteen configurable serial lines and Ethernet ports, together with three analog channels.

Accuracy and reliability
The redundancy of the Seapath measurements is improved by using the two built-in GNSS receivers for position and velocity determination. In case of missing data from one GNSS receiver, then the other (remaining) receiver provides position and velocity, and the inertial sensor provides heading from its internal rate sensors. Improved heading and position availability when passing bridges and close to high buildings is made possible due to the combined GPS/GLONASS solution. The Seapath 320-R is robust against GNSS dropouts by using the inertial sensor part of the product to provide position, velocity and heading measurements when GNSS signals are not available. No user actions are required.

Product range
The Seapath 320-R series is delivered in the following product range:

<table>
<thead>
<tr>
<th>Product</th>
<th>Roll/Pitch [RMS]</th>
<th>Heading [RMS]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seapath 320-R2</td>
<td>0.02°</td>
<td>0.03°</td>
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<tr>
<td>Seapath 320-R3</td>
<td>0.01°</td>
<td>0.02°</td>
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System configuration
This Seapath product is a two-module solution with a Processing and an HMI Unit connected via Ethernet. The Processing Unit runs all critical computations independent from user interface on the HMI Unit to ensure continuous and reliable operation. Multiple HMI Units can be connected to the same Processing Unit in a networked architecture. The HMI Units present the vessel motion in a clear and easy-to-understand format. The Seapath is operated through the operator software installed on one or several HMI Units. This software is used for performance monitoring, configuration and troubleshooting of the system.

Applications
This integrated navigation product is a unique solution for applications within hydrographic surveying, dredging, oceanographic research, seismic work and offshore construction where accurate compensation of multibeam echo sounders, hydro acoustic positioning systems and ADCPs or vessel motion monitoring are required.
FEATURES

- 0.01° to 0.02° roll, pitch and heading accuracy dependent on MGC model
- IMO type approved gyrocompass part of the product
- 2 cm heave accuracy by use of the PFreeHeave® algorithms
- Meets IMO special order requirements
- Robust against GNSS dropouts due to the inertial sensor part of the product
- Multiple satellite constellation support (GPS and GLONASS)
- Multiple differential correction support including SBAS
- All data have the same time stamp and to an accuracy of 0.001 s to the actual measurement time
- Outputs on RS-232, RS-422, Ethernet and analog channels
- Up to 200 Hz data output rate

TECHNICAL SPECIFICATIONS
SEAPATH 320-R SERIES

PERFORMANCE
Heave accuracy (real-time) 5 cm or 5 % whichever is highest
Heave accuracy (delayed signal) 2 cm or 2 % whichever is highest
Heave periods (real-time) 1 to 25 seconds
Heave periods (delayed signal) 1 to 50 seconds
Position accuracy (DGPS/GLONASS) 1 m (95 % CEP)
Position accuracy (SBAS) 1 m (95 % CEP)
Position accuracy (RTK corrections) 0.20 m (95 % CEP)
Velocity accuracy 0.07 m/s (95 % CEP)

DATA OUTPUTS
Communication ports 8 serial RS-232/RS-422 lines and 16 Ethernet UDP/IP ports
Data output interval Programmable in 0.005-sec. steps and 1PPS pulse
Data update rate Up to 200 Hz
Analog output 3 user configurable channels, +/- 10 Volt
1PPS signal accuracy 220 nsec

POWER SPECIFICATIONS
Processing Unit 100 to 240 V AC, 75 W (max)
HMI Unit 100 to 240 V AC, 40 W (max)
Monitor 100 to 240 V AC, 23 W (max)
IMU 24 V DC from Processing Unit
GNSS antenna 5 V DC from Processing Unit

WEIGHTS AND DIMENSIONS
Processing Unit 5.4 kg, 89 x 485 x 357 mm
HMI Unit 3.8 kg, 44 x 485 x 330 mm
Monitor 3.8 kg, 383 x 380 x 170 mm
IMU 8.1 kg, 188 x 189 x 189 mm
GNSS antenna 0.5 kg, 69 x 185 mm

ENVIRONMENTAL SPECIFICATIONS
Operational temperature range Processing and HMI unit -15 to +55 °C
Monitor +5 to +40 °C
IMU -15 to +55 °C
GNSS antenna -40 to +85 °C
Storage temperature range Processing and HMI unit -20 to +70 °C
Monitor -20 to +60 °C
IMU -25 to +70 °C
GNSS antenna -40 to +85 °C
Enclosure protection Processing and HMI unit IP 21 (rear)
Monitor IP 21 (rear)
IMU IP 66
GNSS antenna IP 66
Cables IP 67
Connectors IP 67

Mechanical Vibration IEC 60945/EN 60945

Electromagnetic compatibility Compliance to EMI, immunity/emission IEC 60945/EN 60945

PRODUCT SAFETY
Compliance to LVD, standard used IEC 60950-1/EN 60950-1

Specifications are valid without multipath, without shadowing of antennas and with vessel in motion.