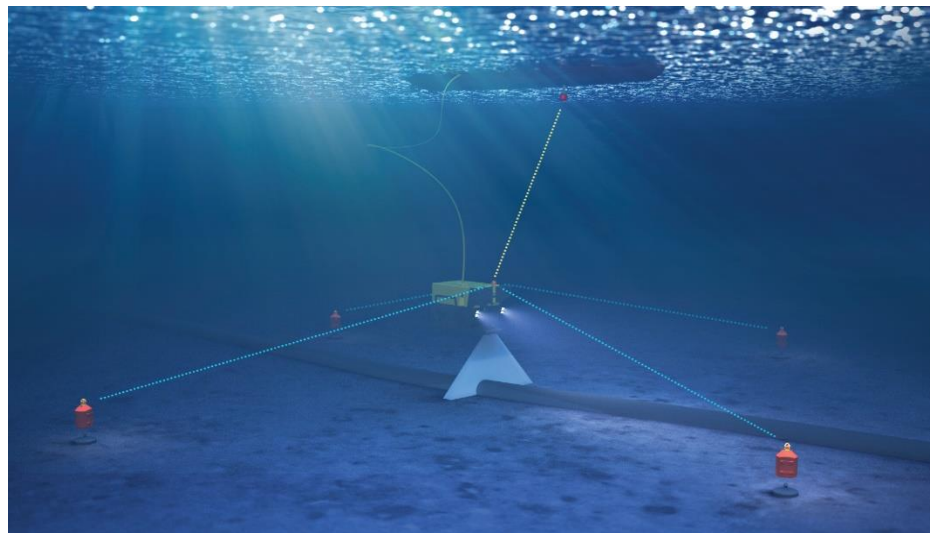




KONGSBERG

# HAIN Subsea 7000

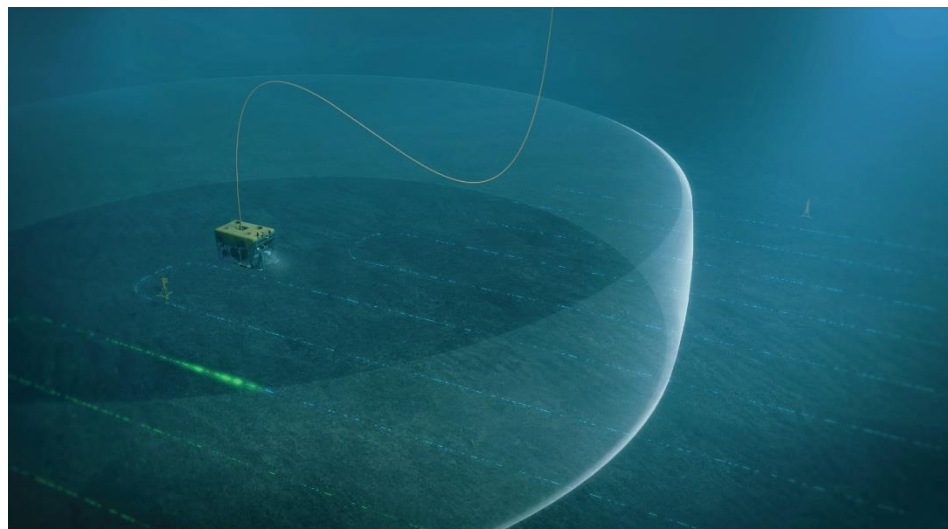


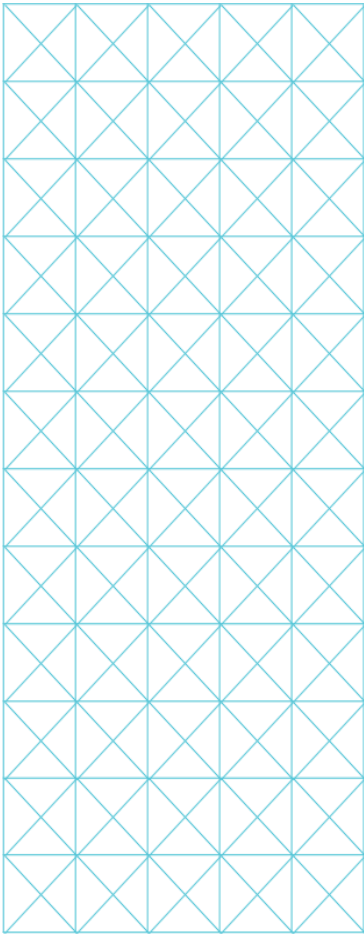
## HAIN Subsea 7000 INTEGRATED INERTIAL NAVIGATION SYSTEM

The HAIN Subsea 7000 with co-located DVL is a fully integrated inertial navigation system for subsea vehicles. The system can be aided from acoustic positioning systems, doppler velocity and pressure sensors.

The integrated solution designed for operation on an AUV, ROV, towed fish and any other subsea vehicle down to 7000 meters water depth, consists of an inertial measurement unit, doppler velocity log and onboard navigation processing. The HAIN unit receives the subsea vehicle position aid from an SSBL system on a surface vessel or a sparse LBL system on the subsea vehicle. In addition, to further improve position accuracy, the co-located DVL and pressure sensor can be used as aids to the inertial solution.

- 7000m rated
- Integrates DVL, Sound Velocity, Pressure and LBL data into one subsea unit
- Precise, smooth and accurate positioning
- High position update rate
- Estimation and compensation of sensor errors
- Post-processing for improved accuracy, precision and integrity





## Application

HAIN Subsea 7000 is designed to provide fast precise position updates with full attitude output for deep sea mining, cable trenching, ROV survey, AUV navigation and towed fish tracking.

## Seamless compatibility with HiPAP

As the Hain Subsea 7000 has its own on board processor, interfacing to any HiPAP system is easy and without the need for an additional topside computer. The new user friendly HAIN interface is now assessable on HiPAP and uPAP APOS operator stations.

## SSBL and Sparse LBL Aiding

Position aiding to HAIN can be provided by an SSBL system or via a Sparse LBL ranges. A cPAP LBL Transceiver can be interfaced to the HAIN directly and measures LBL ranges to cNODE transponders on known seabed reference points.

## Fast Calibration of Sparse LBL Arrays

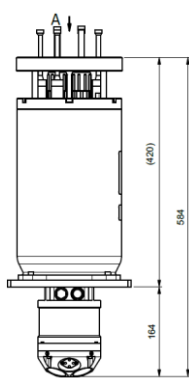
Fast absolute position calibration of seabed reference transponders is possible with an ROV adaptive box-in. With this technique the ROV is positioned with SSBL and HAIN whilst flying a circle around the seabed transponder and simultaneously measuring LBL ranges with a cPAP Transceiver. Relative position accuracy can be further improved with baseline measurements between the seabed transponders.

## Interfacing made easy:

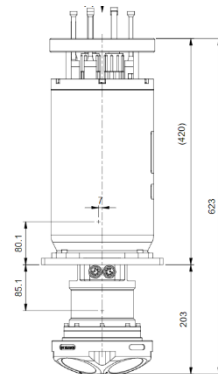
Connection and power to the aiding sensors is made directly via the HAIN unit with 3 x 24VDC and 1 x 12VDC outputs available. Therefore only one connection is required between the vehicle and the HAIN system, simplifying connection to the vehicle MUX . Attitude output and 1pps time sync is also available from HAIN to multibeam, laser and navigation systems on the vehicle.

## DVL Aiding

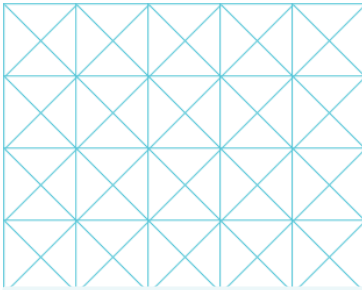
Industry standard DVLs like Nortek can be co-located with the HAIN to improve the robustness of the INS position . The units can be pre-calibrated together with the HAIN post processing software prior to mobilisation.



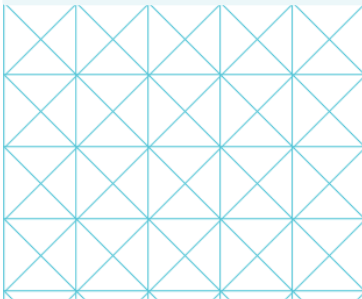
Outline with Nortek DVL 1000 collocated



Outline with Nortek DVL 500 collocated



**cPAP MK II**



**cNODE MiniS**



## TECHNICAL DATA

Position Accuracy with DVL aid over travelled distance	0.08% (CEP50)
Free inertial drift CEP50/16	@1min: 0.10m/ 0.13m @2min: 0.72m / 0.93m @3min: 1.46m / 1.87m
Angular rate range, all axis	±180°/s
Integrated position accuracy	Up to 3 times better than aiding position
Acceleration range, all axis	-5g to +5g
Gyro type	RLG
Angular range (R,P,H)	±180°
Accuracy R,P	0.01° RMS
Accuracy heading	0.08° RMS sec.lat
Power input	24VDC 200W (20 – 32V input range)
Power output to sensors	3x24VDC, total 60W. 1x12VDC, 60W. Isolated
Data inputs	Pressure sensor: Digiquartz, Valeport, Ethernet, RS232 Velocity: Nortek DVL, Ethernet Sound velocity: SAIV, Valeport, Ethernet, RS232 LBL: cPAP MK II, RS422 SSBL: PSIMSSB format (available from all major suppliers), via APOS
Data Outputs	Position, Roll/Pitch/Heading, QC: Ethernet R/P/H: RS 232 Sync: 1PPS output File logging: All input data, Sound velocity, pressure
Post Processing	Postea
DVL	Nortek DVL 1000 & 500 (Others on request)
GUI	HAIN and APOS integrated on one computer APOS Survey or Vessels HIPAP System
Weight (air/water)	HAIN Subsea: 21.8/8.3kg (7000m rated) Nortek DVL 1000: 2.7/1.7kg (4000m rated) Nortek DVL 500: 7.0/4.1 kg (6000m rated) Mounting bracket: 2.5/2.0kg Complete unit w/DVL 1000: 27.0/12.0kg Complete unit w/DVL 500: 30.3/13.5kg
Outline (Length/Diam.)	With Nortek 1000: 584/ 190 mm With Nortek 500: 623/190 mm

*Specifications subject to change without any further notice.*

Doc no: 476666 Rev B

Kongsberg Maritime  
P.O.Box 483  
NO-3601 Kongsberg  
Norway

Switchboard: +47 815 73 700  
Global support 24/7: +47 33 03 24 07  
E-mail sales: [km.sales@km.kongsberg.com](mailto:km.sales@km.kongsberg.com)  
E-mail support:  
[km.support.hpr@kongsberg.com](mailto:km.support.hpr@kongsberg.com)