KONGSBERG MARITIME RENTAL

Kongsberg Maritime’s rental division supplies and supports our customers by providing a full rental solution anywhere in the world. The rental pool offers a range of KONGSBERG equipment to key markets including offshore oil and gas, subsea and merchant marine.

There are many benefits to renting equipment and it can often save you time and money. Through our rental service you can rent for short-term or long-term projects and you will have access to KONGSBERG’s expertise and customer support. We will develop a solution that meets your specific requirements.

UNITED KINGDOM
Kongsberg Maritime Ltd.
Thermopylae House
Prospect Road
Arnhall Business Park
Westhill
Aberdeen AB32 6FE
United Kingdom
Tel: +44 (0)1224 278300
E-mail: km.rental.uk@kongsberg.com

UNITED STATES OF AMERICA
Kongsberg Maritime Inc.
145 James Drive East
Saint Rose, LA 70087
United States of America
Tel: +1 504 712 2799
E-mail: km.rental.us@kongsberg.com

SINGAPORE
Kongsberg Maritime Pte. Ltd.
81 Toh Guan Road East
#04-01/02 Secom Centre
Singapore 608606
Singapore
Tel: +65 6411 6400
E-mail: km.sales.singapore@kongsberg.com

BRAZIL
Kongsberg Maritime do Brasil S.A.
Rua Teofilo Otono, 44 Centro -
Rio de Janeiro CEP: 20040 007
Brazil
Tel: +65 (21)3525 0251
Email: km.rental.rio@kongsberg.com
Content

02 UNDERWATER POSITIONING
24 UNDERWATER MAPPING
36 OCEANOGRAPHIC
38 DATA TELEMETRY
40 VESSEL REFERENCE
51 UNMANNED SURFACE VEHICLES
52 AUTONOMOUS UNDERWATER VEHICLES
HiPAP® 352P-MGC Portable System
Calibration Free Portable Hydroacoustic Positioning Reference
Long Base Line (LBL) and Supershort Base Line (SSBL) functionality
Fully compatible with Cymbal® and HPR400 acoustic protocols
Inbuilt motion and heading sensor: Seatex MGC® R3
Operating range: 1 - 5000 m
Main operational coverage area: ± 80°
Range detection accuracy (Cymbal): 2 cm
Angular accuracy (S/N [20 dB Rel. 1μPa]): 0.10°
Heading accuracy (GNSS aided): 0.1° RMS (secant latitude)
Dynamic accuracy roll & pitch: 0.01° RMS
Depth rating: up to 50 m
Length, diameter; weight (air): 661, 338 mm; 51 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied with an APOS laptop or 19” rack mounted computer
Optional system item:
• Responder drive kit.

HiPAP® 352P Portable System
Portable Hydroacoustic Positioning Reference
Long Base Line (LBL) and Supershort Base Line (SSBL) functionality
Fully compatible with all Cymbal® "M" channels
Inbuilt motion sensor type / accuracy: Seatex MRU-H / 0.05°
Operating range: 1 - 5000 m
Main operational coverage area: ± 80°
Range detection accuracy (Cymbal): 2 cm
Angular accuracy (S/N [20 dB Rel. 1μPa]): 0.10°
Depth rating: up to 50 m
Length, diameter; weight (air): 513, 341 mm; 42 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied with an APOS laptop or 19” rack mounted computer
Optional system item:
• Responder drive kit.

HiPAP® 351P-MGC Portable System
Calibration Free Portable Hydroacoustic Positioning Reference
Long Base Line (LBL) and Supershort Base Line (SSBL) functionality
Fully compatible with Cymbal® and HPR400 acoustic protocols
Inbuilt motion sensor type: Seatex MRU-5 / 0.02°
Operating range: 1 - 4000 m
Main operational coverage area: ± 80°
Range detection accuracy (Cymbal): 2 cm
Angular accuracy (S/N [20 dB Rel. 1μPa]): 0.18°
Heading accuracy (GNSS aided): 0.1° RMS (secant latitude)
Dynamic accuracy roll & pitch: 0.01° RMS
Depth rating: up to 50 m
Length, diameter; weight (air): 663, 341 mm; 51 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied with an APOS laptop or 19” rack mounted computer
Optional system item:
• Responder drive kit.

HiPAP® 351P-5 Portable System
Portable Hydroacoustic Positioning Reference
Long Base Line (LBL) and Supershort Base Line (SSBL) functionality
Fully compatible with Cymbal® and HPR400 acoustic protocols
Inbuilt motion sensor type: Seatex MRU-5 / 0.02°
Operating range: 1 - 4000 m
Main operational coverage area: ± 80°
Range detection accuracy (Cymbal): 2 cm
Angular accuracy (S/N [20 dB Rel. 1μPa]): 0.18°
Depth rating: up to 50 m
Length, diameter; weight (air): 513, 341 mm; 42 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied with an APOS laptop or 19” rack mounted computer
Optional system item:
• Responder drive kit.
**Hipap® 351P Portable System**
Portable Hydroacoustic Positioning Reference
Long Base Line (LBL) and Supershort Base Line (SSBL) functionality
Fully compatible with Cymbal® and HPR400 acoustic protocols
Inbuilt motion sensor type / accuracy: Seatex MRU-H / 0.05°
Operating range: 1 - 4000 m
Main operational coverage area: ± 80°
Range detection accuracy (Cymbal): 2 cm
Angular accuracy (S/N [20 dB Rel. 1μPa]): 0.18°
Depth rating: up to 50 m
Length, diameter; weight (air): 513.341 mm; 42 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied with an APOS laptop or 19” rack mounted computer
Optional system item:
- Responder drive kit.

**μPap® 201-H System**
Portable Hydroacoustic Positioning Reference
Operational modes: SSBL, LBL and data telemetry
Fully compatible with all Cymbal® “M” channels
Inbuilt motion sensor type / accuracy: Seatex MRU-H / 0.05°
Operating range: 1 - 4000 m
Angular accuracy: 0.25°
Position accuracy: 0.45% (1 Sigma, SNR > 20dB rel. 1μPa in bandwidth)
Data telemetry: up to 2.5kBit/s (application dependent)
Transducer beam width: ± 80°
Material, depth rating: Bronze/Stainless steel, up to 50 m
Length, diameter; weight air/water: 400.190 mm; 17 kg/9 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied as standard with an APOS laptop computer
Optional system item:
- Responder drive kit.

**μPap® 201-3-NEL System**
Portable Hydroacoustic Positioning Reference
Operational modes: SSBL, LBL and data telemetry
Fully compatible with all Cymbal® “M” channels
Inbuilt motion sensor type / accuracy: Xsens / <1.0°
Operating range: 1 - 995 m
Angular accuracy: 0.25°
Position accuracy: 0.45% (1 Sigma, SNR > 20dB rel. 1μPa in bandwidth)
Data telemetry: up to 2.5kBit/s (application dependent)
Transducer beam width: ± 80°
Material, depth rating: Bronze/Stainless steel, up to 50 m
Length, diameter; weight air/water: 400.190 mm; 17 kg/9 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied as standard with an APOS laptop computer
Optional system item:
- Responder drive kit.

**Note:** No export licence required.

**μPap® 200-NEL System**
Portable Hydroacoustic Positioning Reference
Operational modes: SSBL, LBL and data telemetry
Fully compatible with all Cymbal® “M” channels
Inbuilt motion sensor type / accuracy: Xsens / <1.0°
Operating range: 1 - 995 m
Angular accuracy: 0.25°
Position accuracy: 0.45% (1 Sigma, SNR > 20dB rel. 1μPa in bandwidth)
Data telemetry: up to 2.5kBit/s (application dependent)
Transducer beam width: ± 80°
Material, depth rating: Bronze/Stainless steel, up to 50 m
Length, diameter; weight air/water: 250.190 mm; 13 kg/8 kg
Supplied with a 50 m or 70 m length transducer cable
Supplied as standard with an APOS laptop computer
Optional system item:
- Responder drive kit.

**Note:** No export licence required.
**cPAP® 34, Subsea LBL Positioning System**  
**ROV Mount Transceiver**  
30 kHz band (MF)  
FSK and PSK (Cymbal®) signalling modes  
For use in support of Long Base Line (LBL) positioning operations  
Polyurethane coated aluminium housing, depth rated to 4000 m  
RS-232/422/485 isolated interfaces  
110/220 Vac external power interfaces (100-300 W)  
Transceiver supplied with the following items:  
- 2 x Transducer 34-30H for cPAP (part no. 345773)  
- 2 x Subsea Cable for cPAP to transducer, 6 m, (part no, 345772)  
- 1 x Subsea Pigtail for cPAP (part no. 345771).  
Optional system item:  
- HiPAP® Survey APOS Operator Station.

**cPAP® 34 MKII, Subsea LBL Positioning System**  
**ROV Mount Transceiver**  
30 kHz band (MF)  
FSK and PSK (Cymbal®) signalling modes  
For use in support of Long Base Line (LBL) positioning operations  
Polyurethane coated aluminium housing  
Depth rated: up to 4000 m  
APOS interface: RS-232  
User interface: RS-232/422/485  
Power supply: 20-28 Vdc, 1 Ampere (max)  
Internal battery type: Lithium Iron Phosphate (Li-Fe - rechargeable)  
Length, diameter; weight air/water: 278,105 mm; 4.2 kg/2.2 kg  
Transceiver supplied with the following items:  
- Transducer 34-30H for cPAP (part no. 345773)  
- Subsea Cable for cPAP to transducer, 6 m, (part no, 345772)  
- Subsea Pigtail for cPAP (part no. 408094).  
Optional system item:  
- cNODE® MiniS / Micro Battery Charger  
- HiPAP® Survey APOS Operator Station.

**cPAP® 30, Portable Telemetry Unit**  
**Portable Medium Frequency (MF) Transceiver Unit**  
Fully compatible with all Kongsberg (MF) acoustic channels, including  
Cymbal® protocol  
Supplied with a TDD 180 dunking transducer (70 m cable on reel)  
Operation temperature: -5 to +55°C  
Splash proof IP 54 case  
Internal rechargeable lead/acid battery pack (3 hours operation)  
Power supply: 100-240 Vac  
Diameter, weight: 488 x 185 mm, 16 kg.  

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the "HiPAP®", "μPAP™" and "cPAP™" systems. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
**UNDERWATER POSITIONING – TRANSUDCERS**

### μPAP® 201-3-NEL Transducer

- **Part No.** 334422
- **Operational modes:** SSBL, LBL and data telemetry
- **Fully compatible with all Cymbal® M channels**
- **Inbuilt motion sensor type / accuracy:** Seatex MRU-3 / 0.08°
- **Operating range:** 1 - 895 m
- **Transducer beam width:** ± 80°
- **Material, depth rating:** Bronze/Stainless steel, up to 50 m
- **Length, diameter; weight air/water:** 400,190 mm; 17 kg/9 kg

**Note:** No Export Licence required.

### cPAP® 34-30H Transducer

- **30 kHz band (MF)**
- **For use in Long Baseline (LBL) mode**
- **Aluminium housing, depth rated to 4000 m**
- **30° horizontal beam pattern**
- **Connector type:** Subconn MCBH4MSS
- **Diameter, length, weight (air/water):** 77, 213 mm, 1.54 kg/0.8 kg

### cPAP® 34-40V Transducer

- **30 kHz band (MF)**
- **Aluminium housing, depth rated to 4000 m**
- **40° vertical cone beam pattern**
- **Connector type:** Subconn MCBH4MSS
- **Diameter, length, weight (air):** 100, 200 mm, 1.54 kg

### cPAP® 34-180 Transducer

- **30 kHz band (MF)**
- **Aluminium housing, depth rated to 4000 m**
- **180° (omni) directional beam pattern**
- **Connector type:** Subconn MCBH4MSS
- **Diameter, length, weight (air):** 86, 200 mm, 1 kg

### Dunking Transducer TDD 180 MF Transducer & Cable

- **Part No.** 320822
- **180° beam pattern transducer**
- **Supplied with 70 m kevlar armoured cable on drum**
- **Compatible with cPAP® 30 portable transceiver unit**
- **Width, height, depth:** 430, 500, 590 mm

### Dunking Transducer TDD 30V MF Transducer & Cable

- **Part No.** 320680
- **30° vertical beam pattern transducer**
- **Supplied with 70 m kevlar armoured cable on drum**
- **Compatible with cPAP® 30 portable transceiver unit**
- **Width, height, depth:** 430, 500, 590 mm

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the “HiPAP® and cPAP® transducers.” In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER POSITIONING – CABLES

HiPAP® 35xP / μPAP® 20x Transducer Cable
Option of 50 m or 70 m length transducer cable
Cable diameter: 12 mm
Subsea plug diameter: Approx 44 mm
Length, weight: 50 m, 10 kg.
UNDERWATER POSITIONING – HAIN SYSTEM

Subsea Hydroacoustic Aided Inertial Navigation System

HAIN System minus Inertial Measurement Unit

The Subsea HAIN solution offers:

• Improved position accuracy compared to acoustics only
• Smoother position output compared to acoustics only
• Higher position update rate
• Continuous position output in event of acoustic dropout
• Accurate heading, roll and pitch measurements
• Increased QA and QC
• Accurate velocity measurements.

Compatible IMU types: Seatex MGC® R3, CDL MiniRLG/POS 2, Honeywell HG 9900, IXSEA IMU90/120 and TSS Orion.

Subsea HAIN computer type: MP8300/MP5810

Computer specifications:

- 8-port Serial card: 4 x RS-232 and 4 x RS-422/485
- Ethernet Ports: Net A, B and C
- Dimensions (L x W x H): 425 x 425 x 185 mm; Weight: 17 kg
- Power: 90-132 / 180-264 V ac, 80 W

Note: additional ROV sensors required:

• Inertial Measurement Unit
• Paroscientific Digiquartz® Depth Sensor
• RDI 300/600/1200 kHz Doppler Velocity Log.

Inertial Measurement Unit for Subsea HAIN System

IMU type: Kongsberg Seatex MGC® R3

Product specification:

- Heading accuracy (GNSS aided): 0.1° RMS (secant latitude)
- Dynamic accuracy roll & pitch: 0.01° RMS
- Dynamic accuracy heave: 5 cm or 5 % (whichever is highest)
- Angle random walk: 0.008° / sq root hour
- Bias repeatability: 330 micro g (1 Sigma)
- Dynamic range (Accelerometers): ±30 g
- Data output type/rate: Ethernet 10/100 Mbit / 200 Hz
- Power requirements: 10-36 Vdc, 20 W (max)
- Housing connector type: SubConn (1 x 16-pin and 2 x 8-pin)
- Titanium housing, depth rating to 4000 m
- Length, diameter: 337, 281 mm
- Weight in air / water (estimated): 18.2 / 7.5 kg.

Note: Non ITAR product.

Inertial Measurement Unit for Subsea HAIN System

IMU type: Honeywell HG 9900

Product specification:

- Heading accuracy: 0.03° sec (lat), (>0.5 hr operation)
- Pitch & Roll accuracy: 0.01°
- Angle random walk: <0.002°/vhr
- Gyro bias: <0.003°/hr
- Gyro scale factor: <5 ppm
- Accelerometer bias: <25 micro g
- Accelerometer scale factor: <100 ppm
- Data output type/rate: Ethernet 10 or 100 Mbit, 300 Hz
- Power requirements: 16-75 Vdc, <15 W
- Housing connector type: 19-pin Gisma (10.00.4.19.1.10)
- Titanium housing, depth rating to 4000 m
- Diameter, length, weight (air/water): 240, 280 mm, 29 kg/16 kg

Note: Non ITAR product.

Note: The Honeywell HG 9900 and Seatex MGC-R3 IMUs are subject to export control restrictions. The equipment can only be operated in approved territories and will not be shipped or used in any country listed in the Norwegian, UK or US embargoed country list. In most instances an end user statement will be required from the customer prior to despatch of equipment.
UNDERWATER POSITIONING – HAIN POST-PROCESSING SOFTWARE

**NavLab Post-Processing Computer**
Installed with latest NavLab software
Supplied with software licence dongle
Used for post-processing of real time subsea HAIN data.
Improves quality of the logged real-time subsea HAIN position.

**IMPORTANT NOTES:**
The Doppler Velocity Log calibration is processed using the NavLab software. Without NavLab software available onboard the vessel, the system cannot be setup correctly as it will not be possible to do a correct Doppler Velocity Log calibration.

**NavLab:** software package can also be used to improve the real-time estimates of ROV position and attitude produced by the on-line subsea HAIN system. NavLab is a software system intended not only for navigation data post-processing, but also for navigation system research and development and navigation system accuracy analysis. It can therefore be used to also analyse the on-line performance of the subsea HAIN system and fine-tune its parameters, and be used for these purposes during system fault finding.

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the “NavLab Post-Processing Computer”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER POSITIONING – DIVER TRANSPONDERS (cNODE MICRO)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cNODE® Micro 31-180</strong></td>
<td>Shallow Water ROV / Diver Positioning Transponder</td>
</tr>
<tr>
<td>30 kHz band (MF) Transponder / Responder</td>
<td>Fully compatible with Cymbal® acoustic protocol</td>
</tr>
<tr>
<td>SSBL and LBL positioning modes</td>
<td>Beamwidth: ± 90 degrees</td>
</tr>
<tr>
<td>Max source level: up to 170 dB</td>
<td>Internal tilt sensor: ± 90 degrees</td>
</tr>
<tr>
<td>Polyurethane coated aluminium housing, depth rated to 600 m</td>
<td>Polyurethane coated aluminium housing, depth rated to 600 m</td>
</tr>
<tr>
<td>Rechargeable battery pack (Li-Ion)</td>
<td>External power: 24 Vdc, 1A</td>
</tr>
<tr>
<td>Battery Lifetime (quiescent): &lt; 10 days</td>
<td>Length, diameter (housing / transducer): 227 mm, 55 mm</td>
</tr>
<tr>
<td>Battery Lifetime (operational): &gt; 28 hours (Cymbal® (Low power, 1 sec update rate))</td>
<td>Weight in air / water: 1.0 / 0.4 kg.</td>
</tr>
<tr>
<td><strong>cNODE® Micro Battery Charger</strong></td>
<td>Suitable for cNODE® Micro and MiniS transponders</td>
</tr>
<tr>
<td>Automatic fast / trickle charge modes</td>
<td>Permit fast charge between 5° C and 40° C</td>
</tr>
<tr>
<td>Maximum transponder battery charge time: 165 min</td>
<td>Supply voltage: 110-230 Vac</td>
</tr>
<tr>
<td>Supply voltage: 110-230 Vac</td>
<td>Enclosure protection: IP 30 rated</td>
</tr>
<tr>
<td>Width x Height x Depth: 256 x 83 x 355 mm</td>
<td>Weight: 2.9 kg.</td>
</tr>
</tbody>
</table>

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the “cNODE Micro transponder”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER POSITIONING – ROV TRANSPONDERS (MST)

**MST 319/N**
ROV Positioning Transponder
Small lightweight HPR series mini-transponder
Fully compatible with HiPAP® and HPR systems
Beamwidth: ± 90 degrees. Sensitivity 110/100 dB
Switchable source level 192/188 dB
Rechargeable battery pack
Polyurethane coated aluminium housing: depth rating to 1000 m
Length, diameter; weight air/water: 328, 75 mm; 1.7/0.7 kg

**MST 342/N**
ROV Positioning Transponder
Small lightweight HPR series mini-transponder
Fully compatible with HiPAP® and HPR systems
Beamwidth: ± 20 degrees. Sensitivity 100 dB
Switchable source level: 200/203 dB
Rechargeable battery pack
Polyurethane coated aluminium housing: depth rating to 4000 m
Length, diameter; weight air/water: 349, 82 mm; 4.1/2.2 kg

**MST Battery Charger**
Battery Charger Kit
Suitable for MST 319, 324 and 342 mini-transponders
Automatic fast/trickle charge modes
Supply voltage: 110-230 Vac
Charges MST's in less than 90 minutes

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the "MST mini-transponder". In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER POSITIONING – ROV TRANSPONDERS (cNODE MINIS)

**cNODE® MiniS 34-180**
ROV Positioning Transponder
30 kHz band (MF) Transponder / Responder
Fully compatible with Cymbal® and HPR400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: ± 90 degrees
Max source level: up to 188 dB
Internal tilt sensor: ± 90 degrees
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (Li-Ion)
Battery Lifetime (quiescent): >30 days
Battery Lifetime (operational): >2.5 days (Cymbal® (Low power, 1 sec update rate))
External power: 24 Vdc (18-36 Vdc), 1A
Length, diameter housing / transducer: 305.5 mm, 106 mm
Weight in air / water: 4.0 / 2.1 kg.

**cNODE® MiniS 34-40V**
ROV Positioning Transponder
30 kHz band (MF) Transponder / Responder
Fully compatible with Cymbal® and HPR400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: ± 20 degrees
Max source level: up to 203 dB
Internal tilt sensor: ± 90 degrees
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (Li-Ion)
Battery Lifetime (quiescent): >30 days
Battery Lifetime (operational): >2.5 days (Cymbal® (Low power, 1 sec update rate))
External power: 24 Vdc (18-36 Vdc), 1A
Length, diameter housing / transducer: 321 mm, 105 mm
Weight in air / water: 4.6 / 2.1 kg.

**cNODE® MiniS 37-40V-Ti**
ROV Positioning Transponder
30 kHz band (MF) Transponder / Responder
Fully compatible with Cymbal® and HPR400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: ± 20 degrees
Max source level: up to 203 dB
Internal tilt sensor: ± 90 degrees
Polyurethane coated titanium housing, depth rating to 7000 m
Rechargeable battery pack (Li-Ion)
Battery Lifetime (quiescent): >30 days
Battery Lifetime (operational): >2.5 days (Cymbal® (Low power, 1 sec update rate))
External power: 24 Vdc (18-36 Vdc), 1A
Length, diameter housing / transducer: 321 mm, 105 mm
Weight in air / water: 4.6 / 2.1 kg.

**cNODE® MiniS Battery Charger**
Suitable for cNODE® MiniS 34-40V and 34-180 transponders
Automatic fast / trickle charge modes
Permit fast charge between 5° C and 40° C
Maximum transponder battery charge time: 165 min
Supply voltage: 110-230 Vac
Enclosure protection: IP 30 rated
Width x Height x Depth: 256 x 83 x 355 mm
Weight: 2.9 kg.

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the “cNODE MiniS transponder”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER POSITIONING – cNODE MINI TRANSPONDERS

cNODE® Mini 34-180
Positioning Transponder
30 kHz band (MF) Transponder / Responder
Fully compatible with Cymbal® and HPR400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: ± 90 degrees
Max source level: up to 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (NiMH)
Battery Lifetime (fully charged): Quiescent 60 days, 1 ping per sec / max
source level 100,000 replies
External power: 15 ±10% Vdc, Min 300 W
Length, diameter housing / transducer: 598, 85 / 88 mm
Weight in air / water: 6.7 / 3.4 kg
Note: Battery pack does not take charge from external power supply.

Note:

cNODE® Mini 34-40V
Positioning Transponder
30 kHz band (MF) Transponder / Responder
Fully compatible with Cymbal® and HPR400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: ± 20 degrees
Max source level: up to 203 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (NiMH)
Battery Lifetime (fully charged): Quiescent 60 days, 1 ping per sec / max
source level 100,000 replies
External power: 15 ±10% Vdc, Min 300 W
Length, diameter housing / transducer: 600, 85 / 100 mm
Weight in air / water: 6.7 / 3.4 kg
Note: Battery pack does not take charge from external power supply.

Note:

cNODE® Mini Battery Charger
Suitable for cNODE® Mini 34-40V and 34-180 transponders
Automatic fast / trickle charge modes
Permit fast charge between 5° C and 40° C
Maximum transponder battery charge time: 165 min
Supply voltage: 110-230 Vac
Enclosure protection: IP 30 rated
Width x Height x Depth: 256 x 83 x 355 mm
Weight: 2.9 kg.

Note:

cNODE® Mini Power Convertor Module
Unit for supplying cNODE® Mini transponder with high DC power when
not using the internal battery
Depth rating to 4000 m
Input: 110 / 230 Vac
Output: 15 Vdc / 300 W.

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the “cNODE Mini transponder”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
cNODE® Midi 34-180
Positioning Transponder*
30 kHz band (MF) Transponder with release mechanism
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D24-Li), Reg no. 322374)
Length, diameter: 704.5, 166 mm
Weight in air / water: 16.5 / 8.5 kg.

cNODE® Midi 34-180-Si
Positioning Transponder* with Sensor Interface Module
30 kHz band (MF) Transponder
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Fitted with a modular end cap that can interface up to 3 (max) eternal sensors via RS-232/422/485 serial communications lines
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D24-Li), Reg no. 322374)
Length, diameter: 704.5, 166 mm
Weight in air / water: 16.5 / 8.5 kg
Note: External power source required if transponder is to be interfaced to a Gyrocompass.

cNODE® Midi 34-180-MTS/I
Positioning Transponder*
30 kHz band (MF) Transponder and Modular Top Section (MTS) fitted with inclinometers
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D24-Li), Reg no. 322374)
Length, diameter: 888.5, 166 mm
Weight in air / water: 21 / 10 kg
Modular top section incorporates inclinometers
Sensor specifications:
• Inclinometers: 0.05° (range +/- 90 degrees).

*Note: Supplied with a lithium battery pack which is subject to the IATA Dangerous Goods Regulations UN3090/UN3091 for transportation by air.

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the “cNODE Midi transponder”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
**cNODE® Maxi 34-180**

**Positioning Transponder**
- 30 kHz band (MF) Transponder
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Beamwidth: +/- 90 degrees
- Max source level: 190 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554)
- Length, diameter: 1014, 166 mm
- Weight in air / water: 28 / 12.6 kg

**cNODE® Maxi 34-180-Si**

**Positioning Transponder with Sensor Interface Module**
- 30 kHz band (MF) Transponder
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Beamwidth: +/- 90 degrees
- Max source level: 190 dB
- Fitted with a modular end cap that can interface up to 3 (max) eternal sensors via RS-232/422/485 serial communications lines
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554)
- Length, diameter: 1034, 166 mm
- Weight in air / water: 28 / 12.6 kg
**Note:** External power source required if transponder is to be interfaced to a Gyrocompass

**cNODE® Maxi 34-180-R**

**Positioning Transponder**
- 30 kHz band (MF) Transponder with release mechanism
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Beamwidth: +/- 90 degrees
- Max source level: 190 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554)
- Length, diameter: 1219, 166 mm
- Weight in air / water: 30 / 14 kg

**cNODE® Maxi 34-180-MTS/I**

**Positioning Transponder**
- 30 kHz band (MF) Transponder and Modular Top Section (MTS) fitted with inclinometers
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Beamwidth: +/- 90 degrees
- Max source level: 190 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554)
- Length, diameter: 1198, 166 mm
- Weight in air / water: 32 / 15 kg
- Modular top section incorporates inclinometers
  - Sensor specifications:
    - Inclinometers: 0.05° (range +/- 90 degrees).
cNODE® Maxi 34-180-R-MTS/Sv Positioning Transponder*
30 kHz band (MF) Transponder with release mechanism and
Modular Top Section (MTS)
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D48-Li), Reg no. 319554))
Length, diameter: 1403, 166 mm
Weight in air / water: 34 / 15 kg
Modular top section incorporates a Valeport sound velocity sensor
Sensor specifications:
- Sound Velocity: +/- 0.02 m/s (25 mm path length).

---

cNODE® Maxi 34-180-R-MTS/PI Positioning Transponder*
30 kHz band (MF) Transponder with release mechanism and
Modular Top Section (MTS)
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D48-Li), Reg no. 319554))
Length, diameter: 1403, 166 mm
Weight in air / water: 34 / 15 kg
Modular top section incorporates a Paroscientific Digiquartz® pressure
sensor and Inclinometers
Sensor specifications:
- Depth: +/- 0.01% FS (FS = 6000 psi)
- Inclinometers: 0.05° (range +/- 90 degrees).

---

cNODE® Maxi 34-180-R-MTS/SvPI Positioning Transponder with instrumented modular end cap*
30 kHz band (MF) Transponder
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D48-Li), Reg no. 319554))
Length, diameter: 1165 (approx.), 230 mm
Weight in air / water: 34.6 / 15 kg
Modular end cap incorporates an external serial sensor interface,
Paroscientific Digiquartz® pressure sensor and Inclinometers
Sensor specifications:
- Sound Velocity: +/- 0.02 m/s (25 mm path length)
- Depth: +/- 0.01% FS (FS = 6000 psi / 4000 m).
- Inclinometers: 0.05° (range +/- 90 degrees).
**cNODE® Maxi 34-180-MEC/MGC**

Positioning Transponder with instrumented modular end cap

- **30 kHz band (MF) Transponder**
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Beamwidth: +/- 90 degrees
- Max source level: 190 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554))
- Length, diameter: 1213, 221 mm
- Weight in air / water: 40.5 / 20.2 kg
- Battery endurance with MGC: up to 72 hours
- Modular end cap incorporates a Motion Gyro Compass (MGC) sensor
- Sensor specifications:
  - Heading accuracy: 0.15° RMS (secant latitude)
  - Dynamic accuracy roll & pitch: 0.01° RMS.

**cNODE® Maxi 34-30V30H**

Positioning Transponder

- **30 kHz band (MF) Transponder**
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Dual transducer beam: 30° vertical and 30° horizontal
- Max vertical beam source level: 206 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554))
- Length, diameter: 1199, 184 mm
- Weight in air / water: 28 / 12.6 kg.

**cNODE® Maxi 34-30V30H-R**

Positioning Transponder

- **30 kHz band (MF) Transponder with release mechanism**
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Dual transducer beam: 30° vertical and 30° horizontal
- Max vertical beam source level: 206 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554))
- Length, diameter: 1366, 184 mm
- Weight in air / water: 30 / 14 kg.

**cNODE® Maxi 34-30V30H-R-St**

Positioning Transponder

- **30 kHz band (MF) Transponder with release mechanism**
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL and LBL positioning modes
- Dual transducer beam: 30° vertical and 30° horizontal
- Max vertical beam source level: 206 dB
- Polyurethane coated stainless steel housing, depth rating to 6000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554))
- Length, diameter: , , mm
- Weight in air / water: / kg.

**cNODE® Maxi 34-30V**

Positioning Transponder

- **30 kHz band (MF) Transponder**
- Fully compatible with Cymbal® and HPR 400 acoustic protocols
- SSBL / USBL positioning modes
- Beamwidth: +/- 15 degrees
- Max vertical beam source level: 206 dB
- Polyurethane coated aluminium housing, depth rating to 4000 m
- Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554))
- Length, diameter: 1034, 166 mm
- Weight in air / water: 28 / 12.6 kg.
cNODE™ Maxi 34-30V-R
Positioning Transponder*
30 kHz band (MF) Transponder with release mechanism
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL positioning modes
Beamwidth: +/- 15 degrees
Max vertical beam source level: 206 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D48-Li), Reg no. 319554)
Length, diameter: 1239, 166 mm
Weight in air / water: 30 / 14 kg.

*Note: Supplied with a lithium battery pack which is subject to the IATA Dangerous Goods Regulations UN3090/UN3091 for transportation by air.

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the “cNODE Maxi transponder”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER POSITIONING – cNODE MIDI/MAXI TRANSPOUNDER MODULES

cNODE® Maxi/Midi 34 Transducer TD180
Transducer for cNODE® Maxi 34 transponder
Part No. 319750
Beam width: 180°
Receiver sensitivity: 100 dB
Max source level: 190 dB
Anodised aluminium, depth rated to 4000 m
Length, diameter: 169.5, 166 mm.

cNODE® Maxi/Midi 34 Transducer TD30V30H
Transducer for cNODE® Maxi 34 transponder
Part No. 313455
Beam width: 30° vertical / 30° horizontal
Receiver sensitivity: 85 dB
Max source level: 206 dB / 190 dB
Anodised aluminium, depth rated to 4000 m
Length, diameter: 316, 184 mm.

cNODE® Maxi/Midi 34 Transducer TD30V
Transducer for cNODE® Maxi 34 transponder
Part No. 320662
Beam width: 30° vertical
Receiver sensitivity: 85 dB
Max source level: 206 dB
Anodised aluminium, depth rated to 4000 m

cNODE® Maxi/Midi 34 Top End Cap
Top end cap for remote transducer
Part No. 320949
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Bulkhead connector type: Subconn
Length, diameter: mm.

cNODE® Maxi/Midi 34 Serial Sensor Interface
Bottom end cap Si for cNODE® Maxi 34 transponder
Part No. 347652
Interface up to a maximum of three (3) external sensors
Serial input types: RS-232 or RS-485/422
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Bulkhead connector type: Subconn MCBH16M
Length, diameter: 72.8, 144 mm.

cNODE® Maxi/Midi 34 Modular Top Section
Modular Top Section (MTS/I)
Part No. 407000
Module incorporates inclinometers
Specifications:
• Inclinometer: 0.05°
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 184, 144 mm.

cNODE® Maxi/Midi 34 Modular Top Section
Modular Top Section (MTS/Sv)
Part No. TBC
Module incorporates a Valeport miniSVS sound velocity sensor
Specifications:
• Sound velocity: +/- 0.02 m/s
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 184, 144 mm.
cNODE® Maxi/Midi 34 Modular Top Section
Modular Top Section (MTS/PI)
Part No. 449270
Module incorporates a Paroscientific Digiquartz® pressure sensor and inclinometers
Specifications:
• Depth: +/- 0.01% FS (FS = 6000 psi)
• Inclinometer: 0.05°
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 184, 144 mm.

cNODE® Maxi/Midi 34 Modular Top Section
Modular Top Section (MTS/SvPI)
Part No. 388700
Module incorporates a Paroscientific Digiquartz® pressure sensor, inclinometers and sound velocity sensor
Specifications:
• Depth: +/- 0.01% FS (FS = 6000 psi)
• Inclinometer: 0.05°
• Sound velocity: +/- 0.02 m/s.
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 184, 144 mm.

cNODE® Maxi/Midi 34 Modular End Cap
Modular End Cap (MEC/SiPI)
Part No. 395555
Module incorporates an external serial sensor interface, Paroscientific Digiquartz® pressure sensor and inclinometers
Specifications:
• Depth: +/- 0.01% FS (FS = 2000 psi)
• Inclinometer: 0.05°
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 190.5, 191.2 mm.

cNODE® Maxi/Midi 34 Modular End Cap
Modular End Cap (Seatex MGC® R3)
Part No. 397960
Module incorporates a Motion Gyro Compass sensor
Specifications:
• Heading accuracy: 0.15° RMS (secant latitude)
• Dynamic accuracy roll & pitch: 0.01° RMS
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length (with blanking cap), diameter: 337, 281 mm
Weight in air / water (estimated): 18.2 / 7.5 kg.

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for cNODE® products. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
### UNDERWATER POSITIONING – TRANSPONDER FLOATATION COLLARS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Part No.</th>
<th>Depth Rating</th>
<th>Compatible With</th>
<th>Buoyancy</th>
<th>Width, Height, Depth</th>
<th>Weight Air/Water</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cNODE® Maxi Floatation Collar</strong></td>
<td>Flotation Collar for cNODE® Maxi 34 Transponder</td>
<td>320772</td>
<td>2000m</td>
<td>aluminium cNODE® Maxi 34 transponders</td>
<td>30 kg</td>
<td>358, 949, 300 mm</td>
<td>45 kg / kg</td>
<td></td>
</tr>
<tr>
<td><strong>cNODE® Maxi Floatation Collar</strong></td>
<td>Flotation Collar for cNODE® Maxi 34 Transponder</td>
<td>319301</td>
<td>4000m</td>
<td>aluminium cNODE® Maxi 34 transponders</td>
<td>30 kg</td>
<td>455, 948, 350 mm</td>
<td>70 kg / -30 kg</td>
<td></td>
</tr>
<tr>
<td><strong>cNODE® Maxi Floatation Collar</strong></td>
<td>Deepwater Flotation Collar for cNODE® Maxi 36 Transponder</td>
<td>331151</td>
<td>6000m</td>
<td>stainless steel cNODE® Maxi 36 transponders</td>
<td>kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cNODE® Mini Floatation Collar</strong></td>
<td>Floatation Collar for cNODE® MiniS transponder</td>
<td>442750</td>
<td>4000 m</td>
<td></td>
<td>6.3 kg</td>
<td>524, 350 mm; 16.66 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cNODE® Mini Floatation Collar</strong></td>
<td>Floatation Collar for cNODE® Mini transponder</td>
<td>366186</td>
<td>4000 m</td>
<td></td>
<td>3.5 kg</td>
<td>597, 290 mm, 9 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MST Floatation Collar</strong></td>
<td>Floatation Collar for Mini-transponder</td>
<td>119-099206</td>
<td>2000 m</td>
<td>MST 319, MST 324</td>
<td>4.5 kg, 4 kg</td>
<td>549, 275 mm, 9 kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the “transponder floatation collar.” In some instances, an end user statement will be required from the customer prior to despatch of the equipment.*
UNDERWATER POSITIONING – ANCILLARY EQUIPMENT

**TTC 30**
Transponder Test and Configuration Unit
- Fully compatible with all Kongsberg (MF) acoustic channels, including Cymbal® protocol
- Supplied with TT 30 test transducer (2.5 m cable length)
- Supplied with a 5 m serial cable which enables connection to cNODE transponder
- Operation temperature: -5 to +55°C
- Splash proof IP 54 case
- Internal rechargeable lead/acid battery pack (3 hours operation)
- Power supply: 100-240 Vac
- Diameter, weight: 488 x 185 mm, 16 kg.

**TTC Light**
Transponder Test and Configuration Tool
- TTC Light software installed on PC running Windows 7 or above
- The TTC Light software can be used to:
  - Test cNODE transponders from PC via interface cable to:
    - Read transponder configuration settings (serial number, acoustic channel and mode, battery capacity, transducer type)
    - Configure Cymbal or FSK Mode and channels
    - Upload new transponder firmware.
  - Perform acoustic tests (requires cNODE MiniS) to:
    - Read transponder configuration settings (serial number, acoustic channel and mode, channel number, battery capacity, read sensors)
    - Configure Cymbal or FSK Mode and channels
    - Execute acoustic release
    - In air acoustic range test.

**Note:** A cNODE MiniS transponder (not included) is required to be connected to the PC via the supplied serial cable and act as a transducer/transceiver to run acoustic tests to all cNODE transponder types.

**Responder Drive Kit for HiPAP®35xP/50x or μPAP® 20x**
Hardware for providing responder trigger signals from HiPAP or μPAP system to responder units
- Dust and water protected (IP 44 rated)
- Can be located near ROV control rooms
- Requires 230 Vac / 150 mA power supply
- Four + 24 V / 5 ms electrical trigger outputs
- Four optical pulse outputs
- Green LED’s for every 8 responder outputs
- Dimensions (L x W x H): 280 x 200 x 73 mm, Weight: 2.9 kg.

**HiPAP® Survey APOS Operator Station**
Acoustic Positioning System Computer: MP8300/MP5810
- Enables independent HiPAP, cPAP and Subsea HAIN system operations from the vessels ROV/Survey area.
- Supplied with the latest Survey APOS software and licence dongle key.
- Includes the following enabled software functions:
  - CYMBAL (requires HiPAP 351/451/501 transceiver)
  - SSBL Fast Track
  - LBL ROV, vessel and transponder positioning
  - Interface to cPAP ROV transceiver unit

Survey APOS computer specification:
- 8-port serial card: 4 x RS-232 and 4 x RS-422/485
- Ethernet ports: Net A, B and C
- Dimensions (L x W x H): 425 x 425 x 185 mm; Weight: 17 kg.
- Power: 90-132 / 180-264 V ac, 80 W.

**Note:** Additional APOS software function options maybe available on request.

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for this “ancillary equipment”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
Mesotech M3 Bathy System
Shallow Water High Resolution Bathymetric Sonar
Frequency: 500 kHz
Range: 1 to 50m
Maximum 120° view angle
Depth resolution: 3 mm
Vertical Beamwidth: 3°
Number of Beams: 256
Update Rate: up to 40 Hz

M3 Sonar Processor Laptop Computer
Supplied with a 15 m deck cable to laptop PC
Input Voltage/Power: 12 to 36 VDC / 22 W (typical)
Titanium sonar head, depth rated to 4000 m
Height, diameter, weight air/water: 159, 193 mm, 8.5/5.3 kg
Supplied with an over-the-side mounting pole assembly
Optional auxiliary sensors and hardware/software:
- Valeport miniSVS sound velocity sensor
- Seatex Seapath 130 system.
- QINSy Survey Lite data acquisition software.

EM 2040P Multibeam Echo Sounder System
Portable Transducer System with Single Swath
Frequency range: 200 to 400 kHz
Swath coverage sector: up to 140°
Beam width: 1° x 1° @ 400 kHz
Max ping rate: 50 Hz
Number of soundings per ping: 400
Range: 0.5 to 450 m (300 kHz, FM mode, cold ocean)
Depth accuracy: 2 cm
Roll, Pitch & Yaw stabilised beams
Supplied with a 15 m, 30 m or 50 m length transducer cable
HWS computer c/w Seafloor Information System (SIS) software
Sonar head depth rating: 30 m
Sonar head dimensions (L x W x H): 560 x 300 x 166 mm
Sonar Head weight air/water: 19.5/1.7 kg
Optional system item:
- Transducer mounting bracket.

EM 2040P Multibeam Echo Sounder System
Portable Transducer System with Dual Swath
Frequency range: 200 to 400 kHz
Swath coverage sector: up to 140°
Beam width: 1° x 1° @ 400 kHz
Max ping rate: 50 Hz
Number of soundings per ping: 800
Range: 0.5 to 450 m (300 kHz, FM mode, cold ocean)
Depth accuracy: 2 cm
Beam pattern: Equidistant, Equiangular & High Density
Roll, Pitch & Yaw stabilised beams
Supplied with a 15 m, 30 m or 50 m length transducer cable
HWS computer c/w Seafloor Information System (SIS) software
Sonar head depth rating: 30 m
Sonar head dimensions (L x W x H): 560 x 300 x 166 mm
Sonar Head weight air/water: 19.5/1.7 kg
Optional system item:
- Transducer mounting bracket.
**EM 2040C Multibeam Echo Sounder System**

**Single Compact Transducer System with Single Swath**

- Frequency range: 200 to 400 kHz in steps of 10 kHz
- Swath coverage sector: up to 130°
- Beam width: 1° x 1° (400 kHz)
- Max ping rate: 50 Hz
- Number of soundings per ping: 400 (single swath) / 800 (dual swath)
- Range: 0.5 to 450 m (300 kHz, FM mode, cold ocean)
- Depth accuracy: 2 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised beams
- Supplied with a 15 m, 30 m or 50 m length transducer cable
- HWS computer c/w Seaﬂoor Information System (SIS) software
- Sonar Head height, diameter, weight air/water: 119, 332 mm, 21/12.6 kg
- Optional system item:
  - Dual Swath mode
  - Transducer mounting bracket, Single RX.

**EM 2040C Multibeam Echo Sounder System**

**Dual Compact Transducer System with Single Swath**

- Frequency range: 200 to 400 kHz in steps of 10 kHz
- Swath coverage sector: up to 200°
- Beam width: 1° x 1° (400 kHz)
- Max ping rate: 50 Hz
- Number of soundings per ping: 800 (single swath) / 1600 (dual swath)
- Range: 0.5 to 450 m (300 kHz, FM mode, cold ocean)
- Depth accuracy: 2 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised beams
- Supplied with 15 m, 30 m or 50 m length transducer cables
- HWS computer c/w Seaﬂoor Information System (SIS) software
- Sonar Head height, diameter, weight air/water: 119, 332 mm, 21/12.6 kg
- Optional system item:
  - Dual Swath mode
  - Transducer mounting bracket, Dual RX.

**EM 2040 (0.7° x 0.7°) Multibeam Echo Sounder System**

**Single RX Transducer System with Single Swath**

- Frequency range: 200 to 400 kHz
- Swath coverage sector: up to 140°
- Max ping rate: 50 Hz
- Range: 0.5 to 470 m (300 kHz, cold ocean)
- Depth accuracy: 2 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised beams
- Transducers depth rated to 6000 m
- Supplied with a 15 m, 30 m or 50 m length transducer cables
- HWS computer c/w Seaﬂoor Information System (SIS) software
- TX transducer length, width, height (mm), weight air/water (kg):
  - 407 x 142 x 150 mm, 24/16 kg
- RX transducer length, width, height (mm), weight air/water (kg):
  - 407 x 142 x 136 mm, 23/16 kg
- Optional system item:
  - Dual Swath mode
  - Transducer mounting POD.

**EM 2040 (0.7° x 0.7°) Multibeam Echo Sounder System**

**Dual RX Transducer System with Single Swath**

- Supplied with two (2) RX transducers and processing unit(s)
- Frequency range: 200 to 400 kHz
- Swath coverage sector: up to 200°
- Max ping rate: 50 Hz
- Range: 0.5 to 470 m (300 kHz, cold ocean)
- Depth accuracy: 2 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised beams
- Transducers depth rated to 6000 m
- Supplied with 15 m, 30 m or 50 m length transducer cables
- HWS computer c/w Seaﬂoor Information System (SIS) software
- TX transducer length, width, height (mm), weight air/water (kg):
  - 407 x 142 x 150 mm, 24/16 kg
- RX transducer length, width, height (mm), weight air/water (kg):
  - 407 x 142 x 136 mm, 23/16 kg
- Optional system item:
  - Dual Swath mode
  - Transducer mounting bracket, Dual RX.
**EM 2040 (0.4° x 0.7°) Multibeam Echo Sounder System**

**Single RX Transducer System with Single Swath**

- Frequency range: 200 to 400 kHz
- Swath coverage sector: up to 140°
- Max ping rate: 50 Hz
- Range: 0.5 to 480 m (300 kHz, cold ocean)
- Depth accuracy: 2 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised beams
- Transducers depth rated to 6000 m
- Supplied with 15 m, 30 m or 50 m length transducer cables
- HWS computer c/w Seaﬂoor Information System (SIS) software
- TX transducer length, width, height (mm), weight air/water (kg): 727 x 142 x 150 mm, 45/30 kg
- RX transducer length, width, height (mm), weight air/water (kg): 407 x 142 x 136 mm, 23/16 kg
- Optional system item:
  - Dual Swath mode
  - Transducer mounting POD.

**EM 2040 (0.4° x 0.7°) Multibeam Echo Sounder System**

**Dual RX Transducer System with Single Swath**

- Supplied with two (2) RX transducers and processing unit(s)
- Frequency range: 200 to 400 kHz
- Swath coverage sector: up to 200°
- Max ping rate: 50 Hz
- Range: 0.5 to 480 m (300 kHz, cold ocean)
- Depth accuracy: 2 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised beams
- Transducers depth rated to 6000 m
- Supplied with 15 m, 30 m or 50 m length transducer cables
- HWS computer c/w Seaﬂoor Information System (SIS) software
- TX transducer length, width, height (mm), weight air/water (kg): 727 x 142 x 150 mm, 45/30 kg
- RX transducer length, width, height (mm), weight air/water (kg): 407 x 142 x 136 mm, 23/16 kg
- Optional system item:
  - Dual Swath mode
  - Transducer mounting bracket, Dual RX.

**EM 710 MKII (2° x 2°) Multibeam Echo Sounder System**

**40-100kHz Multibeam Echo Sounder**

- 128 beams, Maximum angular coverage: 140°
- Range: 3 to 2000 m
- Depth resolution: 1 cm
- Beam pattern: Equidistant, Equiangular & High Density
- Roll, Pitch & Yaw stabilised
- 25 m length transducer cables
- HWS computer c/w Seaﬂoor Information System (SIS) software
- Supplied with a transducer array mounting pod
- Transducer length, width, height (mm) & weight (kg): 490 x 224 x 118 mm, 18 kg
- Transceiver Unit, width x height x depth (mm) & weight (kg): 540 x 573 x 750 mm, 83 kg
- Optional auxiliary sensors:
  - Valeport miniSVS sound velocity sensor
  - Seatex Seapath 330/380 system.

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the “EM 2040 and EM 710 Multibeam Echo Sounder Systems”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNDERWATER MAPPING – MBES SYSTEM PARTS

Mesotech M3 Sonar Head
High Resolution Imaging and Profiling Sonar
Part No. 922-20060000
Frequency: 500 kHz
Titanium sonar head, depth rated to 4000 m
Height, diameter, weight air/water: 159, 193 mm, 8.5/5.3 kg.

EM 2040 Compact Sonar Head
Frequency: 200 to 400 kHz
Maximum Angular Coverage: 130°
Titanium Housing, Depth rated to 50 m or 1500 m
Height, diameter, weight air/water (50 m): 119, 332 mm, 23/12.6 kg
Optional item: 15 m, 30 m or 50 m sonar head cable.

EM 2040 Portable Sonar Head
Frequency: 200 to 400 kHz
Maximum Angular Coverage: 140°
Anodised aluminium housing depth rated to 30 m
Dimensions (L x W x H): 560 x 300 x 166 mm
Weight air/water: 19.5/1.7 kg
Optional item: 15 m, 30 m or 50 m sonar head cable.

EM 2040-0.7° Receive Transducer
Single RX Transducer
Frequency range: 200 to 400 kHz
Swath coverage sector: up to 140°
RX transducer depth rated to 6000 m
RX transducer length, width, height (mm), weight air/water (kg):
407 x 142 x 136 mm, 23/16 kg
Optional items:
• Transducer RX-TX interlink cable.
• 15 m, 30 m or 50 m length RX transducer cable.

EM 2040-0.7° Transmit Transducer
Single TX Transducer
Frequency range: 200 to 400 kHz
Transducer depth rated to 6000 m
TX transducer length, width, height (mm), weight air/water (kg):
407 x 142 x 150 mm, 24/16 kg
Optional items:
• Transducer RX-TX interlink cable.
• 15 m, 30 m or 50 m length TX transducer cable.

EM 2040-0.4° Transmit Transducer
Single TX Transducer
Frequency range: 200 to 400 kHz
Transducer depth rated to 6000 m
TX transducer length, width, height (mm), weight air/water (kg):
727 x 142 x 150 mm, 45/30 kg
Optional items:
• Transducer RX-TX interlink cable.
• 15 m, 30 m or 50 m length TX transducer cable.
<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| **EM 2040 Single Processing Unit** | 19” rack mounted, 2U high            | Dimensions (width x height x depth): 482.5 x 88.6 x 424 mm  
Weight: 10.5 kg  
Power: 115 Vac (60Hz) or 230 Vac (50Hz), <280 W. |
| **EM 2040 Dual Processing Unit**   | 19” rack mounted, 2U high            | Dimensions (width x height x depth): 482.5 x 88.6 x 424 mm  
Weight: 10.5 kg  
Power: 115 Vac (60Hz) or 230 Vac (50Hz), <280 W. |
| **EM 2040 Compact/Portable Sonar Head Cable** | Available in 15 m, 30m, and 50 m cable lengths. | Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the “EM 2040 transducer and processing unit”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment. |
GeoSwath 4R Bathymetric Sonar System
Portable Wide Swath Bathymetry and Side Scan Sonar
IHO SP-44, special order
Frequency: 500 kHz
Range: 1 to 50 m
Maximum swath width: 190 m
Depth resolution: 1.5 mm
Seafloor coverage: up to 12 times water depth
Splash proof deck unit, IP66 rated
Power supply requirements: 24 Vdc, 40 W
Laptop PC running GS4 data acquisition and processing software
Supplied with assembly for mounting transducers and optional sensors
Transducer head dimensions: 330 x 109 x 75 mm
Supplied with 10 m or 20 m length transducer and sensor cables
Optional system items:
- Valeport miniSVS sound velocity sensor
- Seatex Seapath 130 or MRU-3/H/5/5+ (fitted in subsea housing)
- Over-the-side pole mount assembly.
UNDERWATER MAPPING – ECHO SOUNDERS

**EA 400SP Hydrographic Echo Sounder**

**Portable Dual Frequency Echo Sounder**
Frequency: 38 kHz and 200 kHz
Variable power output up to 1 kW
Max depth range at 38 kHz/1 kW: 2100 m
Transducer type: 38/200D Combi (13° x 21°7” x 7°)
Supplied as standard with 15 m transducer cable
Ruggedised case with operator laptop computer
Power requirements: 95-265 Vac, 11-15 Vdc, 30-50 W
Width, height, depth, weight: 488, 220, 390 mm, 18 kg

**EA 600 Hydrographic Single Beam Echo Sounder**

**15 kHz Precision Echo Sounder**
Frequency: 15 kHz
Circular beam width: 17°
Variable power output up to 2 kW
Max depth range at 15 kHz /2 kW: 7000 m
Transducer type: 15-17
Supplied as standard with 15 m transducer cable
Supplied with operator laptop computer
Power requirements: 95-265 Vac, 11-15 Vdc, 30-50 W
Width, height, depth, weight - 488, 220, 390 mm, 18 kg
Optional system item:
- Seatex MRU-5
UNDERWATER MAPPING – SCANNING SONARS

**MS1071 High Resolution Sonar Head**
Geared Fan/Cone Transducer Head
Part No. 974-23050000
MS1000 software switchable between imaging and profiling modes.
Specifications:
- Operating Frequency: 675 kHz
- Beamwidth: 0.9°x30° (Fan), 1.7° (Cone)
- Range: 0.5 - 100 m (typical), 150 m (obtainable)
- Range/Sampling Resolution: ≥ 19 mm / ≥ 2.5 mm
- Mechanical Step Size: ≥ 0.225°
- Power Input: 22-60 VDC, 33 W
- Telemetry: RS-232/RS-485
- Connector Type: Seacon RMG-4-BCL
- Depth rating: 3000 m
- Material Housing: Anodised Aluminium
- Dimensions Housing/Transducer: (L)569 mm x (D)89 mm / (W)140 mm
- Weight Air/Water: 6.1 kg / 2.9 kg

Optional sonar head items:
- MS1000 Sonar Processing Software with or without Laptop PC
- MS1000 Interface Unit
- Non-strain bearing umbilical cable
- Tripod for sonar head.

**MS1171 High Resolution Multi-Frequency Sonar Head**
Fan/Cone Transducer Head with Tilt Block & Internal Compass
Part No. 975-23800000
MS1000 software switchable between imaging and profiling modes.
Specifications:
- Operating Frequency: 600-1200 kHz
- Beamwidth: 0.6°x30° (Fan) @ 900 kHz, 1.0° (Cone) @ 1.5 MHz
- Range (max): up to 150+ m
- Power Input: 22-60 VDC, 28 W
- Telemetry: RS-232/RS-485
- Connector Type: Seacon RMG-4-BCL
- Depth Rating: 3000 m
- Material Housing: Anodised Aluminium
- Option: Tilt Block and Compass Module.
- Dimensions Housing/Transducer: (L)624 mm x (D)89 mm / (W)140 mm
- Weight Air/Water: 6.9 kg / 3.5 kg

Optional sonar head items:
- MS1000 Sonar Processing Software with or without Laptop PC
- MS1000 Interface Unit
- Non-strain bearing umbilical cable
- Tripod for sonar head.

**Clariscan 1171 Multi-Frequency Imaging Sonar Head**
Imaging Sonar Head with Composite Transducer & Acoustic Lens
Part No. 975-21190000
Specifications:
- Domed dual fan oil-filled transducer
- Operating Frequency: Tuneable in 5 kHz steps from 300 - 600 kHz and 605 - 1200 kHz in both CW and LFM modes
- Beamwidth: 2.7° x 26° @ 330 kHz, 1.4° x 36° @ 675 kHz, 0.9° x 22° @ 1000 kHz
- Range (max): 300 m @ 330 kHz, 100 m @ 675 kHz, 50 m @ 1000 kHz
- Power Input: 22 - 26 VDC @ ≤ 0.8A
- Telemetry: RS-232/RS-485
- Connector Type: Seacon RMG-4-BCL
- Depth Rating: 4000 m
- Material Housing: Anodised Aluminium
- Dimensions Housing/Transducer: (L)292 mm x (D)130 mm
- Weight Air/Water: 4.1 kg / 1.8 kg.
UNDERWATER MAPPING – SCANNING SONAR PARTS

**MS1000 Interface Unit**
Part No. 901-60240001
Telemetry: USB/RS-485
Output Power: 56 VDC (long line)
Enclosure Rating: IP66 (splashproof)

**MS1000 Interface Unit**
Part No. 901-60310001
Telemetry: USB/RS-485
Output Power: 28 VDC
Enclosure Rating: IP66 (splashproof)

**MS1000 Sonar Processing Software (standard version)**
Acquisition software for Mesotech scanning sonars and altimeters
Software and USB license dongle key for customer supplied PC.

**MS1000 Sonar Processing Laptop PC**
Laptop PC supplied with MS1000 Software (standard version) and
USB license dongle key.

**Sonar Cable on Reel with Slip Ring**
Umbilical Cable Type/Function: Kevlar reinforced / Power & RS-485
Umbilical Cable Length/Diameter: 150 m / 12 mm
Deck Cable Length: 7.6 m
Connector Type: RMG-4-FS

**Tripod for High Resolution MS1071/1171 Sonar Head**
Part No. 975-80110000
## UNDERWATER MAPPING – ALTIMETERS

<table>
<thead>
<tr>
<th><strong>MS1007D Altimeter</strong></th>
<th><img src="image1.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compact Digital Altimeter</strong></td>
<td>Part No. 974-70130000</td>
</tr>
<tr>
<td>Specifications:</td>
<td></td>
</tr>
<tr>
<td>• Operating Frequency: 200 kHz</td>
<td></td>
</tr>
<tr>
<td>• Beamwidth: 10&quot; (nominal)</td>
<td></td>
</tr>
<tr>
<td>• Range (max): 300 m usable (807 mode)</td>
<td></td>
</tr>
<tr>
<td>• Output Resolution: Adjustable, &gt; 2.4mm (807 mode)</td>
<td></td>
</tr>
<tr>
<td>• Operating Mode: Configurable 807, 809 or MS1000</td>
<td></td>
</tr>
<tr>
<td>• Serial Interface: RS-232/RS-485</td>
<td></td>
</tr>
<tr>
<td>• Aux. Analog Output: Configurable, 0-5V or 0-10V</td>
<td></td>
</tr>
<tr>
<td>• Power Input: 22-26 VDC, 1.8 A (start-up) and 250 mA (continuous)</td>
<td></td>
</tr>
<tr>
<td>• Connector Type: Seacon XSG-6-BCL</td>
<td></td>
</tr>
<tr>
<td>• Depth rating: 3000 m</td>
<td></td>
</tr>
<tr>
<td>• Material Housing: Anodised Aluminium</td>
<td></td>
</tr>
<tr>
<td>• Dimensions Housing/Transducer: (L)197 mm x (D)88 mm</td>
<td></td>
</tr>
<tr>
<td>• Weight Air/Water: 2.4 kg / 1.1 kg.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MS1007D Altimeter</strong></th>
<th><img src="image2.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compact Digital Altimeter</strong></td>
<td>Part No. 975-71500000</td>
</tr>
<tr>
<td>Specifications:</td>
<td></td>
</tr>
<tr>
<td>• Operating Frequency: 675 kHz</td>
<td></td>
</tr>
<tr>
<td>• Beamwidth: 2.7° (nominal)</td>
<td></td>
</tr>
<tr>
<td>• Range (max): up to 110 m</td>
<td></td>
</tr>
<tr>
<td>• Output Resolution: Between 2.4 mm and 25 mm (affected by mode and range settings)</td>
<td></td>
</tr>
<tr>
<td>• Operating Mode: Configurable 807, 808, 809 or MS1000</td>
<td></td>
</tr>
<tr>
<td>• Serial Interface: RS-232/RS-485</td>
<td></td>
</tr>
<tr>
<td>• Aux. Analog Output: Configurable, 0-5V or 0-10V</td>
<td></td>
</tr>
<tr>
<td>• Power Input: 22-26 VDC, 1.0 A (start-up) and 250 mA (continuous)</td>
<td></td>
</tr>
<tr>
<td>• Connector Type: Burton 5507-1508</td>
<td></td>
</tr>
<tr>
<td>• Depth rating: 6000 m</td>
<td></td>
</tr>
<tr>
<td>• Material Housing: Anodised Aluminium</td>
<td></td>
</tr>
<tr>
<td>• Dimensions Housing/Transducer: (L)212mm x (D)114 mm</td>
<td></td>
</tr>
<tr>
<td>• Weight Air/Water: 5.0 kg / 2.7 kg.</td>
<td></td>
</tr>
</tbody>
</table>
PulSAR Side Scan Sonar System
High Resolution Side Scan Sonar
Frequency: 600 kHz - 1000 kHz
Wide bandwidth FM and CW pulses
Max range (m per side): 600 kHz - 100 m CW or 150 m FM
Max resolution (across track): 10 mm
Tow speed: 1 to 12 knots
IP-66 rated Control Unit containing acquisition/processing software
Integrated GPS module (SBAS corrections) in Control Unit
Tow fish: Stainless body steel with shear release carry handle/tow point, plastic nose cone
Depth rating: 1000 m
Dimensions: (L)110 cm x (D)9 cm, tail fins protrude by 7.5 cm
Weight: 16.5 kg
Power Requirements: 10-30 Vdc or 110/230 Vac (50 W max)
Supplied with a ruggedized laptop computer
Supplied with 300 m soft tow cable on hand reel and 10 m deck cable.
### Seafloor Information System (SIS) Software – version 4
Acquisition software for EM multibeam systems
Supplied with a software license key and/or Hydrographic Workstation.

### GeoSwath 4 (GS4) Software
Acquisition and post-processing software for the GeoSwath Plus shallow water wide swath bathymetry systems

**Note:** Software and USB license dongle key for customer supplied PC.

### GeoTexture Software
Software and license dongle for analysis of GeoSwath side scan data
**Features:**
- Side Scan processing
- Side Scan mosaicing and normalisation
- Image classification
- Wide range of data input formats
- Close GeoSwath data support.

### MS1000 Sonar Processing Software (standard version)
Acquisition software for Mesotech scanning sonars and altimeters
**Features:**
- Imaging, profiling and data storage to hard drive
- Data replay and image capture.
- Track Plotter module allows user to plot scanned area, geo-reference targets and create GeoTIFFs
- Simultaneous multi sonar head operation.

**Note:** Software and USB license dongle key for customer supplied PC.

### QPS Multibeam Processing Bundle
Sonar data processing software package
**Features:**
- Qimera Pro
- Fledermaus Geocoder Toolbox add-on
- Fledermaus GIS add-on
- Fledermaus Midwater add-on
- Fledermaus Viz4D.

**Note:** Software and USB license dongle key for customer supplied PC.

### QPS QINSy Survey Lite
Real-time data acquisition, full survey planning, data cleaning/validation and map plotting functionality
Supports single multibeam echo sounder system and includes calibration/backscatter module
Supplied with a computer and/or software license key.

**Note:** For operations outside the UK/EU due to export restrictions, an export licence may be required for the "SIS Software". In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Feature</th>
<th>Specification</th>
<th>Supplied with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valeport 650 Sound Velocity Profiler</td>
<td>True Velocity Sound Measurement</td>
<td>Self-Recording &amp; Direct Reading</td>
<td>Speed of Sound range: 1400 to 1600 m/s, acc. ±0.05, res. 0.001 m/s</td>
<td>Supplied fitted with a deployment cage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Temperature: -5 to +35°C, acc. ±0.01, res. 0.002°C</td>
<td>Diameter, length; weight air/water: 88, 337 mm; 12.5/9 kg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure: 5000 dBar, acc. ±0.1%, res. 0.005% FS dBar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Titanium Housing, depth rated to 5000 m</td>
<td></td>
</tr>
<tr>
<td>Valeport MIDAS Sound Velocity Profiler</td>
<td>Digital Time of Flight Sound Velocity Profiler</td>
<td>Self-Recording &amp; Direct Reading</td>
<td>Speed of Sound range: 1375 to 1900 m/s, acc. ±0.02, res. 0.001 m/s</td>
<td>Supplied fitted with a deployment cage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Temperature: -5 to +35°C , acc. ±0.01, res. 0.005°C</td>
<td>Diameter, length; weight air/water (in cage): 88, 665 mm; 11.5/8.5 kg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure: 6000 dBar, acc. ±0.01% FS, res. 0.001% range</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Titanium Housing, depth rated to 6000 m</td>
<td></td>
</tr>
<tr>
<td>Valeport miniSVP Sound Velocity Profiler</td>
<td>True Velocity Sound Measurement</td>
<td>Self-Recording &amp; Direct Reading</td>
<td>Part No.: 0660002</td>
<td>Supplied fitted with a deployment cage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Speed of Sound range: 1375 to 1900 m/s, acc. ±0.02, res. 0.001 m/s</td>
<td>Diameter, length; weight air/water: 110, 450 mm; 1.6/- kg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure: 300 or 600 Bar, acc. ±0.05% range, res. 0.001% range</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Titanium Housing, depth rated to 6000 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>External Power Supply: 9-28 Vdc, &lt;250 mW</td>
<td></td>
</tr>
<tr>
<td>Valeport miniSVS Sound Velocity Sensor</td>
<td>True Velocity Sound Measurement</td>
<td>Small Direct Reading Sensor: SV only</td>
<td>Part No.: 0652006 (25 mm path length)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Speed of Sound range: 1400 to 1600 m/s, acc. ±0.10m/s, res. 0.001m/s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>External Power Supply: 8-30 Vdc, 250 mW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Titanium Housing, depth rated to 6000 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supplied with a 20 m data / power cable</td>
<td></td>
</tr>
<tr>
<td>AML Minos X SVP/CTD Profiler</td>
<td>Real-time Vertical Profiler</td>
<td>Xchange™ field swappable sensors</td>
<td>Speed of Sound range: 1375 to 1625 m/s, acc. ±0.025, res. 0.001 m/s</td>
<td>Supplied with a 20 m or 50 m data / power cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure: 6000 dBar acc. ±0.05%FS, res. 0.01 dBar</td>
<td>Diameter, length; weight air/water: 76, 597 mm; 4.7/3.2 kg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conductivity, Temperature: 0-90 mS/cm, -5-45 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Titanium Housing, depth rated to 6000 m</td>
<td></td>
</tr>
<tr>
<td>AML Micro X SVP Sensor</td>
<td>True Velocity Sound Measurement</td>
<td>Small Direct Real-time Reading Sensor: SV only</td>
<td>Xchange™ field swappable sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Speed of Sound range: 1375 to 1625 m/s, acc. ±0.025, res. 0.001 m/s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure: 6000 dBar, acc. ±0.05%FS, res. 0.01 dBar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Power Supply: 8-26 Vdc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delrin or Titanium Housing: 500 m or 6000 m depth rating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supplied with a 20 m or 50 m data / power cable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diameter, length; weight air/water: 33 mm; 246 mm, 0.39/0.25 kg.</td>
<td></td>
</tr>
</tbody>
</table>
OCEANOGRAPHIC – TIDE MONITORING

Valeport TideMaster
Portable Water Level Recorder Set
Vented strain gauge, with stainless steel mounting bracket
1 bar transducer c/w 20 m cable and connector
Accuracy: ±0.1% Full Scale
GSM/GPRS transmitter in IP67 housing c/w integral antenna

Note: customer responsible to ensure the SIM card meets network coverage requirements.
cNODE® MiniS Modem 34-180
Positioning and Transparent Modem Transponder
Frequency: 21 - 30 kHz band (MF)
Fully compatible with Cymbal® acoustic link protocol
SSBL / USBL and LBL positioning modes
Beamwidth: ± 90 degrees
Source level (high): 182 dB
Data Rate: up to 6 kbps
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (Li-Ion)
External power: 24 Vdc, 1A
Length, diameter housing / transducer: 305.5 mm, 106 mm
Weight in air / water: 4.0 / 2.1 kg.
Note: Operates in conjunction with compatible HiPAP and cPAP 30 systems enabled with APOS Cymbal and Transparent Modem functions.

cNODE® MiniS Modem 34-40V
Positioning and Transparent Modem Transponder
Frequency: 21 - 30 kHz band (MF)
Fully compatible with Cymbal® acoustic link protocol
SSBL / USBL and LBL positioning modes
Beamwidth: ± 20 degrees
Source level (high): 197 dB
Data Rate: up to 6 kbps
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (Li-Ion)
External power: 24 Vdc, 1A
Length, diameter housing / transducer: 321 mm, 105 mm
Weight in air / water: 4.6 / 2.1 kg.
Note: Operates in conjunction with compatible HiPAP and cPAP 30 systems enabled with APOS Cymbal and Transparent Modem functions.

cNODE® MiniS Modem Battery Charger
Suitable for cNODE® MiniS Modem transponders
Automatic fast / trickle charge modes
Permit fast charge between 5° C and 40° C
Maximum transponder battery charge time: 165 min
Supply voltage: 110-230 Vac
Enclosure protection: IP 30 rated
Width x Height x Depth: 256 x 83 x 355 mm
Weight: 2.9 kg.

*Note: Supplied with a lithium battery pack which is subject to the IATA Dangerous Goods Regulations UN3090/UN3091 for transportation by air.

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the “cNODE MiniS Modem transponder”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
DATA TELEMETRY – RADIO MODEM

Maritime Broadband Radio System
MBR 179 Single System with Power Supply Unit
Operational range: 0 to 45 km (28 miles)
User data: 0.7 to 16.5 Mbps
Operational coverage area: 360° (omni-directional)
Frequency band: 4.9 GHz to 5.9 GHz
Channel bandwidth: 20 MHz
Transmission power: up to 4 W
Data Interface: 1 x Ethernet / LAN, RJ-45
MBR Unit power consumption (max): 210 W
MBR power supply unit: 110 to 240 V AC
Operational temperature range: -40 °C to +55 °C
MBR Unit enclosure protection: IP 66 rated
MBR Unit dimensions (L x W x H): 500 x 500 x 318 mm
MBR Unit weight: 16.5 kg.

Maritime Broadband Radio System
MBR 189 Single System with Power Supply Unit
Operational range: 0 to 50 km (>30 miles)
User data: 0.7 to 16.5 Mbps
Operational coverage area: 100° (azimuth)
Frequency band: 4.9 GHz to 5.9 GHz
Channel bandwidth: 20 MHz
Transmission power: up to 4 W
Data Interface: 1 x Ethernet / LAN, RJ-45
MBR Unit power consumption (max): 210 W
MBR power supply unit: 110 to 240 V AC
Operational temperature range: -40 °C to +55 °C
MBR Unit enclosure protection: IP 66 rated
MBR Unit dimensions (L x W x H): 500 x 500 x 318 mm
MBR Unit weight: 16.5 kg.

Maritime Broadband Radio System
MBR 144 System for Fixed Installation
Operational range: 0 to 20 km (>12 miles)
User data: 0.7 to 16.5 Mbps
Operational coverage area: 360° (omni-directional)
Frequency band: 4.9 GHz to 5.9 GHz
Channel bandwidth: 20 MHz
Transmission power: up to 2 W
Data Interface: 1 x Ethernet / LAN, RJ-45
Supplied with 10 m cable
MBR Unit power consumption (max): 25 W
MBR power supply voltage: 24V DC
Operational temperature range: -40 °C to +55 °C
MBR Unit enclosure protection: IP 66 rated
MBR Unit dimensions (L x W x H): 260 x 115 x 115 mm
MBR Unit weight: 2.5 kg.

Note: The operational range is dependent on antenna placement and height above sea level.

~Note: Radio frequency license for MBR system - the product contains a radio transmitting device and a national license for the use of frequencies is required for operation. Use in national waters will require a frequency license issued by the relevant national authorities. The owner and user of the equipment are responsible for obtaining such a license prior to switching the product ON. It may be required to switch the product OFF when the product is brought close to shore (closer than 12 NM).
VESSEL REFERENCE – RELATIVE POSITIONING SYSTEMS

**RADius 1000S System – Single Interrogator**

*Relative Positioning System*
Operational range: up to 1100 metres (dependant on transponder type)
DP range: up to 550 m (dependant on transponder type)
Coverage sector: up to 90° (Horizontal)
Distance accuracy (within 200 m): < 0.5 m
Angle accuracy (within 200 m): 0.5°
Frequency band: 5.51 - 5.61 GHz
Interrogator opening angle: ±45° (vertical/horizontal)
Interrogator enclosure protection: IP 66 rated
Interrogator height, width & depth, weight: 412 x 562 x 184 mm, 7 kg
19” rack mount cabinet (6U) c/w integrated keyboard/mouse
Width, height, depth (6 U cabinet): 553, 660, 600 mm
Power requirements: 110/220 Vac, 160 W
Standard LCD desktop monitor
Supplied with 60 m interrogator power & data cables
Supplied with a RADius 700 transponder for commissioning purposes.

**RADius 1000D System – Dual Interrogator**

*Relative Positioning System*
Operational range: up to 1100 metres (dependant on transponder type)
DP range: up to 550 m (dependant on transponder type)
Coverage sector: up to 180° (Horizontal)
Distance accuracy (within 200 m): < 0.5 m
Angle accuracy (within 200 m): 0.5°
Frequency band: 5.51 - 5.61 GHz
Interrogator opening angle: ±45° (vertical/horizontal)
Interrogator enclosure protection: IP 66 rated
Power requirements: 110-220 Vac, 160 W
Supplied with 60 m interrogator power & data cables
Supplied with a RADius 700 transponder for commissioning purposes
Interrogator height, width & depth, weight: 412 x 562 x 184 mm, 7 kg.

**RADius 1000T System – Triple Interrogator**

*Relative Positioning System*
Operational range: up to 1100 metres (dependant on transponder type)
DP range: up to 550 m (dependant on transponder type)
Coverage sector: up to 270° (Horizontal)
Distance accuracy (within 200 m): < 0.5 m
Angle accuracy (within 200 m): 0.5°
Frequency band: 5.51 - 5.61 GHz
Interrogator opening angle: ±45° (vertical/horizontal)
Interrogator enclosure protection: IP 66 rated
Power requirements: 110-220 Vac, 160 W
Supplied with 60 m interrogator power & data cables
Supplied with a RADius 700 transponder for commissioning purposes
Interrogator height, width & depth, weight: 412 x 562 x 184 mm, 7 kg.

**RADius 1000Q System – Quad Interrogator**

*Relative Positioning System*
Operational range: up to 1100 metres (dependant on transponder type)
DP range: up to 550 m (dependant on transponder type)
Coverage sector: up to 360° (Horizontal)
Distance accuracy (within 200 m): < 0.5 m
Angle accuracy (within 200 m): 0.5°
Frequency band: 5.51 - 5.61 GHz
Interrogator opening angle: ±45° (vertical/horizontal)
Interrogator enclosure protection: IP 66 rated
Power requirements: 110-220 Vac, 160 W
Supplied with 60 m interrogator power & data cables
Supplied with a RADius 700 transponder for commissioning purposes
Interrogator height, width & depth, weight: 412 x 562 x 184 mm, 7 kg.

*Note:* RADius transponders must be rented individually as standalone units for an existing system.
Units supplied on rental for DP use, assume that the vessel has a correctly installed and operational interface.
The use of “Pseudo” DP interfaces is not recommended, and is in no way supported by Kongsberg Maritime.
IMCA guidelines should be adhered to at all times when systems are used as DP reference.
Please make contact with the DP system supplier if any doubt exists, in the case of any of the Kongsberg Maritime range of DP systems, assistance can be supplied at the time of rental enquiry.
### VESSEL REFERENCE – RELATIVE POSITIONING SYSTEM PARTS

#### RADius 1000 Interrogator Unit
Interrogator unit for RADius 1000 System*

- **Frequency band:** 5.51 - 5.61 GHz
- **Interrogator opening angle:** ±45° (vertical & horizontal)
- **Interrogator enclosure protection:** IP 66 rated
- **Power requirements:** 48 Vdc ±10%, 70 W (max)
- **Width, height & depth, weight:** 562 x 412 x 184 mm, 8 kg

*Note: The power / connection shelf may have to be upgraded if the interrogator is added to an existing RADius 1000 system.

#### RADius 1000 Remote Interrogator Unit
Remotely located Interrogator unit for RADius 1000 System*

- **RADius remote power and modem cabinet**
- **Frequency band:** 5.51 - 5.61 GHz
- **Interrogator opening angle:** ±45° (vertical & horizontal)
- **Interrogator and remote cabinet protection:** IP 66 rated
- **Remote Cabinet power requirements:** 110-240 Vac, 70 W (max)
- **Interrogator width, height & depth, weight:** 562 x 412 x 184 mm, 8 kg

*Note: The cabling from the remote interrogator cabinet to controller unit is not supplied but maybe purchased on request.

#### RADius 1000 Processing Unit
Processing unit for RADius 1000 System

- **19” rack mounted, 2U high**
- **Communication Ports:** 8 x isolated serial ports (6 configurable between RS-232 or RS-422), 4 x Ethernet ports, 3 x USB ports
- **Power:** 110 to 240 Vac (50/60Hz), 60 W (max)
- **Width, Height, Depth:** 485 x 88.1 x 412 mm
- **Weight:** 5.4 kg
## VESSEL REFERENCE – RELATIVE POSITIONING SYSTEM

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| **RADius 550X** | Low Power, Long Range ATEX Rated Transponder*  | Operational Range: 550 metres  
DP Range: 350 metres  
Operating Sector: ±45° (vertical & horizontal)  
Intrinsically Safe (category 2) Zone 1 & 2 Rated  
Powered from an encapsulated lithium battery  
Width, height & depth, weight: 220 x 400 x 147 mm, 3.6 kg  
ATEX Certificate: DNV-2005-ATEX-0040 |
| **RADius 600X** | High Gain ATEX Rated Transponder         | Operational Range: up to 1100 metres  
Operating Sector: ±45° (vertical & horizontal)  
Intrinsically Safe (category 2) Zone 1 & 2 Rated  
Powered from power supply located in safe area  
Width, height & depth, weight: 220 x 400 x 147 mm, 3.3 kg  
ATEX Certificate: DNV-2005-ATEX-0040 |
| **RADius 700X** | Low Power, Long Range ATEX Rated Transponder*  | Operational range: up to 1000 metres  
DP range: >550 metres  
Operating Sector: ±45° (vertical & horizontal)  
Intrinsically safe (category 2) hazardous zone 1 and 2 rated  
Powered from an encapsulated lithium battery pack  
Width, height & depth, weight: 560 x 564 x 214 mm, 7.4 kg  
ATEX Certificate: DNV-2005-ATEX-0040 |
| **RADius 700** | Low Power, Long Range Transponder*            | Operational range: up to 1000 metres  
DP range: >550 metres  
Operating Sector: ±45° (vertical & horizontal)  
Powered by lithium metal battery cells  
Width, height & depth, weight: 562 x 412 x 184 mm, 6 kg  
*Note: Not ATEX Rated |

*Note: All supplied with Lithium battery packs which are subject to the IATA Dangerous Goods Regulations UN3090/UN3091 for transportation by air
VESSEL REFERENCE – LASER RANGING SYSTEMS

SpotTrack System
High Precision Positioning and Tracking System
Vertical angular coverage: 65° (min)
Horizontal angular coverage: 360°
DP range: 10 to 1000 m
Horizontal position accuracy: (2o) 1 m @ 1000 m range
Bearing accuracy: (2o) 1 mrad (0.06°)
Vertical stabilization: < ± 0.5° for roll, pitch < ± 20°
Multi-target: up to 10 targets simultaneously
SpotTrack sensor operating conditions: IP 66 rated, -25°C to +55°C
SpotTrack sensor (diameter, height; weight): 173, 455 mm; 6 kg.

Fanbeam Mk5 System
Precision Positioning and Tracking System
AutoTilt laser tracking system
AutoTilt mechanism: ±15° range (5° increments)
Operating range: up to a maximum of 2000m (weather dependant)
Range accuracy: 20 cm
Angular accuracy: 0.1°
Single target, auto & fixed sector tracking
Scanning head operating conditions: IP 66 rated, -20°C to +55°C
Power requirements: 85-264 Vac, 61 W
Scanning head width, height, depth, weight: 300, 290, 200 mm, 12.9kg.

Fanbeam and SpotTrack Reflector / Prism
Prism Single (1 prism) or Reflective Target tube (360 degree)

6-way prism cluster (6 prisms)
Max range: 1000 m / 1 km – 2000 m / 2 km
Angle coverage: 150°

Note: regarding reflectors:
4-way prism cluster covers 120 degrees, range out to around 800m
6-way prism cluster stacked by three, range out to around 2000m
*Note: Regarding DP Use:
Units supplied on rental for DP use, assume that the vessel has a correctly installed and operational interface.
The use of “Pseudo” DP interfaces is not recommended, and is in no way supported by Kongsberg Maritime.
IMCA guidelines should be adhered to at all times when systems are used as DP reference.
Please make contact with the DP system supplier if any doubt exists, in the case of any of the Kongsberg Maritime range of DP systems, assistance can be supplied at the time of rental enquiry.
VESSEL REFERENCE – (D)GNSS POSITIONING SYSTEMS

Kongsberg Seatex DPS 232 System
GNSS Based Position Reference Sensor
Combined GPS L1/L2, GLONASS L1/L2 and SBAS receiver
MULTIREF capability
Accepts DGPS / DGLONASS corrections: RTCM-SC104 ver. 2.2, 2.3, 3.0, 3.1, SeaSTAR HP, SeaSTAR XP, SeaSTAR G2
SBAS accuracy: < 1 m, 95 % CEP, 0.6 m, 1σ
SeaSTAR XP/HP/G2 horizontal accuracy: 10 cm, 95 % CEP
SeaSTAR XP/HP/G2 vertical accuracy 15 cm, 95 % CEP
Interface Ports: 8 x isolated serial ports (6 configurable between RS-232 and RS-422), 4 x Ethernet / LAN
19” rack mount cabinet (6U) c/w integrated display/keyboard unit
Width, height, depth (6 U cabinet): 553, 660, 600 mm
Power: 100 - 240 Vac, 50/60 Hz, max 60 W
Supplied with a DGPS IALA radio beacon antenna
Optional system item:
• 3610/3710 DGNSS Receiver.

3610/3710 DGNSS Receiver
DGNSS Correction Services Receiver Unit
Fugro Seastar XP/HP/G2/DGNSS capability
Supplied with type AD430-3141 DGNSS (Spotbeam) antenna
External Interfaces: 1 x Serial port (RS-232 or RS-422)
Baud rate 115 200 bytes/sec, 1 x Ethernet / LAN, USB
Data Outputs:-
Message format: Multiplexed (MUX) correction format
Message type: Multiplexed correction data output with status
Power: 100 - 240 Vac, 50/60 Hz, max 75 W
Note: Subscription to Fugro correction services not included.
### VESSEL REFERENCE – (D)GNSS POSITIONING SYSTEM PARTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| **Kongsberg Seatex DPS 232 Processing Unit** | GNSS Based Position Reference Sensor  
Combined GPS L1/L2, GLONASS L1/L2 and SBAS receiver  
19” rack mount, 2U height  
Power: 100 - 240 Vac, 50/60 Hz, max 60 W. |                                                                                                                                 |
| **Kongsberg Seatex DPS 200 Processing Unit** | GNSS Based Position Reference Sensor  
Combined GPS L1, GLONASS L1 and SBAS receiver  
19” rack mount  
Power: 100 - 240 Vac, 50/60 Hz, max 60 W. |                                                                                                                                 |
# Vessel Reference Systems – Position, Heading & Attitude Systems

## Kongsberg Seapath 130-3 System
**Compact GNSS Aided Heading, Attitude and Positioning Sensor**
- Real-time, Position, Roll, Pitch, Heave & Heading
- Supplied with a MRU-3 Motion Sensor in Subsea Housing
- Dual frequency GPS/GLONASS and SBAS receiver
- Position accuracy: 0.5m RMS or 1m (95% CEP) with DGNSS/SBAS
- Dynamic accuracy Roll/Pitch; Heading: 0.08°, 0.10° RMS
- Heave accuracy (real-time): 5cm or 5% whichever is highest
- Heave accuracy (delayed signal): 4cm or 5% whichever is highest
- Data output rate: up to 100 Hz
- Data I/O Ports: 3 x Serial RS-232/422 lines, 8 x Ethernet UPD/IP ports
- Power: Sensor Unit: 24 Vdc, 10W; MRU: 24 Vdc, max. 5.5W
- Sensor Unit length, width, height; weight: 1210, 210, 94 mm; 6.8 kg
- Supplied as standard with a 20 m sensor spider cable.

### Note: No export licence required.

## Kongsberg Seapath 130-H System
**Compact GNSS Aided Heading, Attitude and Positioning Sensor**
- Real-time, Position, Roll, Pitch, Heave & Heading
- Supplied with a MRU-H Motion Sensor in Subsea Housing
- Dual frequency GPS/GLONASS and SBAS receiver
- Position accuracy: 0.5m RMS or 1m (95% CEP) with DGNSS/SBAS
- Dynamic accuracy Roll/Pitch; Heading: 0.03°, 0.10° RMS
- Heave accuracy (real-time): 5cm or 5% whichever is highest
- Heave accuracy (delayed signal): 2cm or 2% whichever is highest
- Data output rate: up to 100 Hz
- Data outputs: 3 x Serial RS-232/422 lines, 8 x Ethernet UPD/IP ports
- Power: Sensor Unit: 24 Vdc, 10W; MRU: 24 Vdc, 12W
- Sensor Unit length, width, height; weight: 1210, 210, 94 mm; 6.8 kg
- Supplied as standard with a 20 m sensor spider cable.

## Kongsberg Seapath 130-5 System
**Compact GNSS Aided Heading, Attitude and Positioning Sensor**
- Real-time, Position, Roll, Pitch, Heave & Heading
- Supplied with a MRU-5 Motion Sensor in Subsea Housing
- Dual frequency GPS/GLONASS and SBAS receiver
- Position accuracy: 0.5m RMS or 1m (95% CEP) with DGNSS/SBAS
- Dynamic accuracy Roll/Pitch; Heading: 0.02°, 0.08° RMS
- Heave accuracy (real-time): 5cm or 5% whichever is highest
- Heave accuracy (delayed signal): 2cm or 2% whichever is highest
- Data output rate: up to 100 Hz
- Data outputs: 3 x Serial RS-232/422 lines, 8 x Ethernet UPD/IP ports
- Power: Sensor Unit: 24 Vdc, 10W; MRU: 24 Vdc, 12W
- Sensor Unit length, width, height; weight: 1210, 210, 94 mm; 6.8 kg
- Supplied as standard with a 20 m sensor spider cable.

## Kongsberg Seapath 130-5+ System
**Compact GNSS Aided Heading, Attitude and Positioning Sensor**
- Real-time, Position, Roll, Pitch, Heave & Heading
- Supplied with a MRU-5+ Motion Sensor in Subsea Housing
- Dual frequency GPS/GLONASS and SBAS receiver
- Position accuracy: 0.5m RMS or 1m (95% CEP) with DGNSS/SBAS
- Dynamic accuracy Roll/Pitch; Heading: 0.008°, 0.08° RMS
- Heave accuracy (real-time): 5cm or 5% whichever is highest
- Heave accuracy (delayed signal): 2cm or 2% whichever is highest
- Data output rate: up to 100 Hz
- Data outputs: 3 x Serial RS-232/422 lines, 8 x Ethernet UPD/IP ports
- Power: Sensor Unit: 24 Vdc, 10W; MRU: 24 Vdc, 12W
- Sensor Unit length, width, height; weight: 1210, 210, 94 mm; 6.8 kg
- Supplied as standard with a 20 m sensor spider cable.
Kongsberg Seapath 330-5 System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with MRU-5 Motion sensor
Dual frequency GPS/GLONASS and SBAS receiver
Position accuracy: 0.5 m RMS /1 m (95% CEP) with DGNSS corrs
Heading accuracy: 0.065° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.02° RMS for +/- 5° amplitude
Heave accuracy (real-time): 5cm or 5% whichever is highest
Data output rate: up to 200 Hz
Power: 100-240 VAC, 138 W (max).
Antenna Beam width, depth, length: weight: 250, 40, 2560 mm; 7 kg
Supplied as standard with 2 x 25 m GNSS cables (RG-214)
Optional system item:
• Trimble SPS 852 Reference Station
• 3610/3710 DGNSS Corrections Receiver.

Kongsberg Seapath 330-5+ System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MRU-5+ Motion sensor
Dual frequency GPS/GLONASS and SBAS receiver
Position accuracy (X and Y): 1 cm + 1.6 ppm RMS with RTK corrs
Position accuracy (Z): 2 cm + 3.2 ppm RMS with RTK corrs
Heading accuracy: 0.065° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.008° RMS for +/- 5° amplitude
Heave accuracy (real-time): 5cm or 5% whichever is highest
Data output rate: up to 200 Hz
Power: 100-240 VAC, 138 W (max).
Antenna Beam width, depth, length: weight: 250, 40, 2560 mm; 7 kg
Supplied as standard with 2 x 25 m GNSS cables (RG-214)
Optional system item:
• Trimble SPS 852 Reference Station
• 3610/3710 DGNSS Corrections Receiver.

Kongsberg Seapath 380-3 System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MRU-3 Motion sensor
Dual frequency GPS/GLONASS/Galileo/Beidou/QZSS and SBAS receiver
Position accuracy (DGNSS/GLONASS): 0.5 m RMS or 1 m 95% CEP
Position accuracy (Fugro XP2/G2/G4): 0.1 m RMS or 2 m 95% CEP
Heading accuracy: 0.07° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.08° RMS for +/- 5° amplitude
Heave accuracy (real-time): 5cm or 5% whichever is highest
Data outputs: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports,
3 x Analogue channels and 1 x 1PPS
Data output rate: up to 200 Hz
Power: 100-240 VAC, 138 W (max).
Antenna Beam width, depth, length: weight: 250, 40, 2560 mm; 7 kg
Supplied as standard with 2 x 25 m GNSS cables (RG-214)
Optional system item:
• Trimble SPS 852 Reference Station
• 3610/3710 DGNSS Corrections Receiver.

Kongsberg Seapath 380-H System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MRU-H Motion sensor
Dual frequency GPS/GLONASS/Galileo/Beidou/QZSS and SBAS receiver
Position accuracy (DGNSS/GLONASS): 0.5 m RMS or 1 m 95% CEP
Position accuracy (Fugro XP2/G2/G4): 0.1 m RMS or 2 m 95% CEP
Heading accuracy: 0.07° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.03° RMS for +/- 5° amplitude
Heave accuracy (real-time): 5cm or 5% whichever is highest
Data outputs: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports,
3 x Analogue channels and 1 x 1PPS
Data output rate: up to 200 Hz
Power: 100-240 VAC, 138 W (max).
Antenna Beam width, depth, length: weight: 250, 40, 2560 mm; 7 kg
Supplied as standard with 2 x 25 m GNSS cables (RG-214)
Optional system item:
• Trimble SPS 852 Reference Station
• 3610/3710 DGNSS Corrections Receiver.
Kongsberg Seapath 380-5 System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MRU-5 Motion sensor
Dual frequency GPS/GLONASS/Galileo/Beidou/QZSS and SBAS receiver
Position accuracy (DGNSS/GLONASS): 0.5 m RMS or 1 m 95% CEP
Position accuracy (Fugro XP2/G2/G4): 0.1 m RMS or 2 m 95% CEP
Heading accuracy: 0.04° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.02° RMS for +/- 5° amplitude
Heave accuracy (real-time): 5cm or 5% whichever is highest
Data outputs: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports,
3 x Analogue channels and 1 x 1PPS
Data output rate: up to 200 Hz
Power: 100-240 VAC, 138 W (max).
Antenna Beam width, depth, length; weight: 250, 40, 2560 mm; 7 kg
Supplied as standard with 2 x 25 m GNSS cables (RG-214)
Optional system item:
• Trimble SPS 852 Reference Station
• 3610/3710 DGNSS Corrections Receiver.

Kongsberg Seapath 380-5+ System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MRU-5+ Motion sensor
Dual frequency GPS/GLONASS/Galileo/Beidou/QZSS and SBAS receiver
Position accuracy (DGNSS/GLONASS): 0.5 m RMS or 1 m 95% CEP
Position accuracy (Fugro XP2/G2/G4): 0.1 m RMS or 2 m 95% CEP
Heading accuracy: 0.04° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.008° RMS for +/- 5° amplitude
Heave accuracy (real-time): 5cm or 5% whichever is highest
Data outputs: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports,
3 x Analogue channels and 1 x 1PPS
Data output rate: up to 200 Hz
Power: 100-240 VAC, 138 W (max).
Antenna Beam width, depth, length; weight: 250, 40, 2560 mm; 7 kg
Supplied as standard with 2 x 25 m GNSS cables (RG-214)
Optional system item:
• Trimble SPS 852 Reference Station
• 3610/3710 DGNSS Corrections Receiver.

SeaNav 300
GNSS Heading and Positioning Sensor
Heading Accuracy (dynamic): 0.5° RMS
Position Accuracy: 1.2 m RMS / 2.5 m (95% CEP) with corrections
Power: 12 to 24 Vdc, <5 W
Data Outputs: Serial RS-232/422, Ethernet and 1PPS
Sensor Unit Dimensions / Weight: 780 x 180 x 100 mm / 2.5 kg.

Trimble SPS852 Reference Station
RTK Base Station for Seapath 330/380
GNSS antenna type: Zephyr Geodetic™ 2
Signal tracking: GPS L1/L2, GLONASS, SBAS, OmniSTAR
Correction message types: RTCM 18 & 19, ver 3 or Trimble CMR™
Power: 12 VDC (external lead acid battery pack)
UHF radio receiver type: DGPS 464 (19” rack mounted)
Frequency band: 430 - 470 MHz
Power: 100 - 230 VAC / 50 - 60 Hz, 5 W (typical)

Note: A communications radio license maybe required to operate the unit in the location or country of use, subject to local regulations. It is the responsibility of the end user to obtain an operator’s permit or license for the receiver for the location or country of use.

Note: For operations outside the UK/EU due to export restrictions, an export licence will be required for the Seatex MRU-5+/5/H. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
### Kongsberg Seatex MRU-6
**Motion Sensor**
- Real-time, Roll, Pitch, Heave & Heading
- Static Accuracy Roll & Pitch: 0.025° RMS
- Dynamic Accuracy Roll & Pitch; Hdg: 0.03°; 1° RMS
- Dynamic Accuracy Heave: 5 cm or 5 % whichever highest
- Power Supply 12-30 V dc, 14.5 W
- Diameter, height, weight: 105, 205 mm, 2.5 kg
**Optional items:**
- 10 m or 1000 m MRU subsea housing
- MRU wall mounting bracket
- MRU junction box.

### Kongsberg Seatex MRU-5+
**Motion Sensor**
- Real-time Roll, Pitch and Heave Measurements
- Dynamic Accuracy Roll & Pitch: 0.008° RMS
- Dynamic Accuracy Heave (real-time): 5 cm or 5 % whichever highest
- Data Outputs: RS-232, RS-422 and Ethernet
- Data Output Rate (max): 200 Hz
- Power Supply: 10-36 V dc, max 12 W
- Diameter, height, weight: 105, 140 mm, 2.4 kg
**Optional items:**
- 10 m or 500 m MRU subsea housing
- MRU wall or floor mounting bracket
- MRU junction box (required for analogue channels).

### Kongsberg Seatex MRU-5 (5th Generation)
**Motion Sensor**
- Real-time Roll, Pitch, Heave
- Static Accuracy Roll & Pitch: 0.025° RMS
- Dynamic Accuracy Roll & Pitch: 0.02° RMS (for a ±5° amplitude)
- Dynamic Accuracy Heave: 5 cm or 5 % whichever highest
- Power Supply 12-30 V dc, max 8 W
- Diameter, height, weight: 105, 205 mm, 2.5 kg
**Optional items:**
- 10 m or 1000 m MRU subsea housing
- MRU wall mounting bracket
- MRU junction box.

### Kongsberg Seatex MRU-H
**Motion Sensor**
- Real-time, Roll, Pitch, Heave
- Static Accuracy Roll & Pitch: 0.04°/s RMS
- Dynamic Accuracy Roll & Pitch: 0.05° RMS (for a ±5° amplitude)
- Dynamic Accuracy Heave: 5 cm or 5 % whichever highest
- Power Supply 12-30 V dc, 6 W
- Diameter, height, weight: 105, 205 mm, 2.5 kg
**Optional items:**
- 10 m or 1000 m MRU subsea housing
- MRU wall mounting bracket
- MRU junction box.
Kongsberg Seatex MRU-H (5th Generation) Motion Sensor
Real-time Roll, Pitch and Heave Measurements
Angular Orientation Range: ±180°
Dynamic Accuracy Roll & Pitch: 0.05° RMS
Dynamic Accuracy Heave (real-time): 5 cm or 5 % whichever highest
Data Outputs: RS-232, RS-422 and Ethernet
Data Output Rate (max): 200 Hz
Power Supply: 10-36 V dc, max 12 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:
- 10 m or 500 m MRU subsea housing
- MRU wall or floor mounting bracket
- MRU junction box (required for analogue channels).

Kongsberg Seatex MRU-3 (5th Generation) Motion Sensor
Real-time Roll, Pitch and Heave Measurements
Angular Orientation Range: ±45°
Dynamic Accuracy Roll & Pitch: 0.08° RMS
Dynamic Accuracy Heave (real-time): 5 cm or 5 % whichever highest
Data Outputs: RS-232, RS-422 and Ethernet
Data Output Rate (max): 200 Hz
Power Supply: 10-36 V dc, max 12 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:
- 10 m or 500 m MRU subsea housing
- MRU wall or floor mounting bracket
- MRU junction box (required for analogue channels).

Note: No export licence required.

Kongsberg Seatex MRU-2 Roll & Pitch Sensor
Real-time, Roll, Pitch
Static Accuracy Roll & Pitch: 0.08° RMS
Dynamic Accuracy Roll & Pitch: 0.1° RMS (for a ±5° amplitude)
Power Supply 12-30 V dc, 6 W
Diameter, height, weight: 105, 205 mm, 2.5 kg
Optional items:
- MRU wall mounting bracket
- MRU junction box.

Kongsberg Seatex MRU-D Roll & Pitch Sensor
Real-time, Roll, Pitch
Static Accuracy Roll & Pitch: 0.3° RMS
Dynamic Accuracy Roll & Pitch: 0.35° RMS (for a ±5° amplitude)
Power Supply 12-30 V dc, 3 W
Diameter, height, weight: 105, 129 mm, 1.5 kg
Note: No export licence required.
Optional items:
- MRU wall mounting bracket
- MRU junction box.

Note: No export licence required.

Kongsberg Seatex MRU-D (5th Generation) Roll & Pitch Sensor
Real-time, Roll, Pitch
Static Accuracy Roll & Pitch: 0.3° RMS
Dynamic Accuracy Roll & Pitch: 0.35° RMS (for a ±5° amplitude)
Power Supply 10-36 V dc, max 3 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:
- MRU wall mounting bracket
- MRU junction box.

Note: No export licence required.

Note: For operations outside the UK/EU due to export restrictions, an export licence will be required for the Seatex MRU-6/5+/5/H/2. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.
UNMANNED SURFACE VEHICLES

GeoSwath 4R USV System
Unmanned Surface Vessel (USV)
Vehicle specifications:
Platform type: EchoBoat-ASV™ portable survey boat.
Remote control frequency / range: 2.4 GHz / up to 1.5 km (line of sight).
Hull length / width: 168 cm / 81 cm.
Weight: Approx. 55 kg (payload dependent).
Max speed: up to 4 knots (2 m/s).
Endurance: up to 2.5 hours (exchangeable battery pack).
Operational limits: Sea State 1-2 (max).
Bathymetric sonar type / frequency: GeoSwath / 500 kHz.
Sonar Range: 1 to 50 m.
Max seafloor coverage: up to 12 times water depth.
Position, attitude and heading sensor type: Seapath 130-5+.

Optional System Item:
• Trimble SPS 852 Reference Station

Note: Equipment Support Engineer(s) to assist in vehicle mobilisation/demobilisation and during missions available on request.

Note: For operations outside of the UK/EU, due to export restrictions, a licence will be required for the MRU-5+ which is contained within the GeoSwath USV system. In most instances an end user statement will be required from the customer prior to despatch of equipment.

*Note: The GeoSwath USV system is supplied with lithium-ion polymer batteries which are subject to the IATA Dangerous Goods Regulations UN3480/UN3481 for transportation by air.
AUTONOMOUS UNDERWATER VEHICLES

MUNIN Autonomous Underwater Vehicle
Modular, Low-logistics AUV System*

Sensor Payload:
Kongsberg NavP Aided Inertial Navigation System (AINS) with
Honeywell HG9900 Inertial Measurement Unit (IMU)
Teledyne RD1 300 kHz Broadband Doppler Velocity Log (DVL)
Imaginex Forward Looking Sonar/Anti-Collision System
EM 2040M (1° x 1°) MBES - 200/300/400 kHz
EdgeTech 2205 Dual Frequency Side Scan Sonar (230/540 kHz)
NBOS Conductivity and Temperature Sensor
Paroscientific Digiquartz® Depth Sensor

Technical Specification:
Navigation: Novatel L1/L2 GPS, USBL (Cymbal®), DVL and INS
Communication: Hydroacoustic (HiPAP®351/501), WiFi and Iridium
Integrated pipeline inspection with pipeline detection and tracking
Energy: 10 kWh (5 kWh plus 5 kWh with swappable battery module)
Endurance: up to 9 hours per battery module
Min to Max Speed: 2 to 4.5 knots (payload sensor dependant)
Operating Depth: 5 - 600 m
Vehicle Diameter, Length: 340, 4000 mm (payload sensor defendant)
Weight in air: <300 kg (payload sensor defendant)

Note: System supplied with Mini Stinger Launch & Recovery System
(Freeboards up to 2 m), HUGIN and Payload Operator Station, MUNIN
Battery Charger, NavLab and Reflection PMA Software and Spares Kit.

Optional System Items:
• EdgeTech Sub-Bottom Profiler - 4-24 kHz
• HiPAP®502-MGC or HiPAP®35x-P/5/MGC Portable System
• GNSS Positioning and/or Heading Sensor

Note: Equipment Support Engineer(s) to assist in vehicle
mobilisation/demobilisation and during missions available on request

Note: The MUNIN system is subject to export control restrictions. The MUNIN system can only be operated in approved territories and will not be shipped or used in any country listed in the Norwegian, UK or US embargoed country list. In most instances an end user statement will be required from the customer prior to despatch of equipment.

*Note: The MUNIN system is supplied with lithium battery cells which are subject to the IATA Dangerous Goods Regulations UN3480/UN3481 for transportation by air.
Global and local support
We provide global support from local service and support facilities at strategic locations world wide. Service and support work is carried out under the supervision of your personal account manager, who will ensure that you receive high-quality service and support where and when you need it. Your account manager will ensure continuity and work closely with your personnel to improve and optimise system availability and performance. Under the direction of your account manager, and with a local inventory of spare parts, our well-qualified field service engineers will be able to help you quickly and effectively.

GLOBAL SUPPORT 24/7
Call +47 33 03 24 07
E-mail: km.support@kongsberg.com