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.

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HiPAP® 352P-MGC Portable System

**Calibration Free Portable Hydroacoustic Positioning Reference**

Long Base Line (LBL) and Supershort Base Line (SSBL) compatibility

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.

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HiPAP® 352P Portable System

**Portable Hydroacoustic Positioning Reference**

Long Base Line (LBL) and Supershort Base Line (SSBL) compatibility

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.

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HiPAP® 351P-MGC Portable System

**Portable Hydroacoustic Positioning Reference**

Long Base Line (LBL) and Supershort Base Line (SSBL) compatibility

Fully compatible with Cymbal® and HPR400 acoustic protocols

Inbuilt motion and heading sensor: Seatex MGC® R3

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.

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HiPAP® 351P-5 Portable System

**Portable Hydroacoustic Positioning Reference**

Long Base Line (LBL) and Supershort Base Line (SSBL) compatibility

Fully compatible with Cymbal® and HPR400 acoustic protocols

Inbuilt motion sensor type / accuracy: 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) compatibility
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-MGC R3 System
Calibration Free Portable Hydroacoustic Positioning Reference
Operational modes: SSBL, LBL and data telemetry
Fully compatible with all Cymbal® “M” channels
Inbuilt motion and heading sensor: Seatex MGC® R3
Heading accuracy: 0.08° RMS (secant latitude)
Roll & pitch accuracy: 0.01° RMS
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-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: Seatex MRU-3 / 0.08°
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 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 - 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: 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.

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 items:
- 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 – SUBSEA HAIN SYSTEM

HAIN Subsea 7K MKII System
Hydroacoustic Aided Inertial Navigation Package

System benefits:
- precise, smooth and accurate positioning
- higher position update rate
- precise and accurate depth
- precise and accurate orientation (heading, roll and pitch)
- precise and accurate velocity estimate in 3D
- estimation and compensation of sensor errors
- much better QC and QA
- easily used with NavLab post-processing for even better accuracy, precision and integrity.

Package is supplied with a Subsea MGC®R3 IMU/Processing module, Nortek DVL1000 - 4000 m Doppler Velocity Log, Paroscientific Digiquartz® Depth sensor, and Survey APOS computer which enables independent HiPAP®, cPAP® and Subsea HAIN operations from the vessels ROV/Survey area.

The computer includes the following enabled APOS software functions:
- CYMBAL (requires HiPAP® X81/X82 transceiver unit)
- SSBL Fast Track
- LBL ROV, vessel and transponder positioning
- Interface to cPAP® ROV transceiver unit
- Subsea HAIN.

Survey APOS 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.

Subsea MGC® R3 IMU/Processing module specifications:
- Heading accuracy (GNSS aided): 0.04° 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
- Housing connector types: SubConn (1 x 16-pin and 3 x 8-pin):
  - Connection to topside: Ethernet 10 Mbit
  - Interface to DVL and Depth sensor
  - 1 PPS signal output.
- Power input: 24 Vdc
- Titanium housing, depth rated to 7000 m
- Length, diameter: 343, 191 mm
- Weight in air/water: 20 kg / 12.5 kg.

Note: Package can be supplied without DVL and/or Depth Sensor.
*Note: Seatex MGC-R3 is a Non-ITAR product.

Note: The Seatex MGC-R3 IMU is 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 customer prior to despatch of equipment.
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 analyse the on-line performance of the Subsea HAIN system and fine-tune its parameters, can also be used to assist in 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 – TRANSDUCERS & CABLES

<table>
<thead>
<tr>
<th>Transducer Type</th>
<th>Bandwidth</th>
<th>Housing Material</th>
<th>Depth Rating</th>
<th>Beam Pattern</th>
<th>Connector Type</th>
<th>Diameter/Lengt/Weight (Air/Water)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cPAP® 34-30H Transducer</strong></td>
<td>30 kHz (MF)</td>
<td>Aluminium</td>
<td>4000 m</td>
<td>30° horizontal</td>
<td>SubConn MCBH4MSS</td>
<td>77/213 mm, 1.54 kg/0.8 kg</td>
</tr>
<tr>
<td><strong>cPAP® 34-40V Transducer</strong></td>
<td>30 kHz (MF)</td>
<td>Aluminium</td>
<td>4000 m</td>
<td>40° vertical cone</td>
<td>SubConn MCBH4MSS</td>
<td>100/200 mm, 1.54 kg</td>
</tr>
<tr>
<td><strong>cPAP® 34-180 Transducer</strong></td>
<td>30 kHz (MF)</td>
<td>Aluminium</td>
<td>4000 m</td>
<td>180° (omni)</td>
<td>SubConn MCBH4MSS</td>
<td>86/200 mm, 1.0 kg</td>
</tr>
<tr>
<td><strong>Dunking Transducer TDD 180</strong></td>
<td>MF Transducer &amp; Cable</td>
<td>Aluminium</td>
<td>4000 m</td>
<td>180° beam pattern</td>
<td>SubConn MCBH4MSS</td>
<td>430/500/590 mm</td>
</tr>
<tr>
<td><strong>Dunking Transducer TDD 30V</strong></td>
<td>MF Transducer &amp; Cable</td>
<td>Aluminium</td>
<td>4000 m</td>
<td>30° vertical</td>
<td>SubConn MCBH4MSS</td>
<td>430/500/590 mm</td>
</tr>
<tr>
<td><strong>HiPAP®35xP / µPAP® 20x Transducer Cable</strong></td>
<td></td>
<td></td>
<td></td>
<td></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 “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 – OPTIONAL ITEMS & SOFTWARE

**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

Technical specifications:

- 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.

**Remote HiPAP® 50x Operator Station**

**Acoustic Positioning System Computer**

Supplied with the latest APOS software to allow system master/slave operations from different locations onboard the vessel.

APOS computer specifications:

- Dimensions (L x W x H): 425 x 425 x 185 mm; Weight: 17 kg.
- Power: 90-132 / 180-264 Vac, 80 W.
HiPAP® Survey AOS Operator Station
Acoustic Positioning System Computer for Survey
Enables independent HiPAP, cPAP and Subsea HAIN system operations from the vessels ROV/Survey area.
Supplied with the latest Survey AOS software and licence.
Includes the following enabled AOS 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 AOS 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 AOS software functions available on request.

AOS LBL Function
AOS software option which enables Long Base Line operations when using HiPAP®, μPAP® and cPAP® systems.
Option includes:
- LBL Geographical Calibration
- Transponder LBL Positioning
- LBL and Sparse LBL Positioning for cPAP / ROV

Note: AOS software option available when supplied with acoustic positioning computer or with portable system.

AOS Transparent Modem Function
AOS software option which enables data communication with subsea modems.
Supports Hugin/Munin AUV positioning and data communication.

Note: AOS software option available when supplied with acoustic positioning computer or with portable system. Compatible with HiPAP®, μPAP® and cPAP® systems enabled with Cymbal acoustic protocol.

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for these "optional items". 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)

**cNODE® Micro 31-180**

**Shallow Water ROV / Diver Positioning Transponder**
- 30 kHz band (MF) Transponder / Responder
- Fully compatible with Cymbal® acoustic protocol
- SSBL and LBL positioning modes
- Beamwidth: ± 90 degrees
- Max source level: up to 170 dB
- Internal tilt sensor: ± 90 degrees
- Polyurethane coated aluminium housing, depth rated to 600 m
- Rechargeable battery pack (Li-Ion)
- Battery Lifetime (quiescent): < 10 days
- Battery Lifetime (operational): > 28 hours (Cymbal® (Low power, 1 sec update rate))
- External power: 24 Vdc, 1A
- Length, diameter (housing / transducer): 227 mm, 55 mm
- Weight in air / water: 1.0 / 0.4 kg.

**cNODE® Micro Battery Charger**

- Suitable for cNODE® Micro and MiniS 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 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: 192/188dB
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 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/Towfish 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.
Optional item:
  • Transducer guard.

**cNODE® MiniS 34-180 D**
Positioning Transponder with Pressure Sensor
30 kHz band (MF) Transponder / Responder
Integrated 100 bar or 400 bar pressure sensor, 0.05% FS
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.
Optional item:
  • Transducer guard.

**cNODE® MiniS 34-40V**
ROV/Towfish 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.
Optional item:
  • Transducer guard.
cNODE® MiniS 34-40V D
Positioning Transponder with Pressure Sensor
30 kHz band (MF) Transponder / Responder
Integrated 400 bar pressure sensor, 0.05% FS
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.
Optional item:
• Transducer guard.

cNODE® MiniS 37-40V-Ti
ROV/Towfish 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.
Optional item:
• Transducer guard.

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.

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.

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.

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.

Note: External power source required if transponder is to be interfaced to a Gyrocompass.

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

cNODE® Midi 34-180-MTS/l
Positioning 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).

cNODE® Midi 34-180-MTS/PI
Positioning Transponder*
30 kHz band (MF) Transponder and Modular Top Section (MTS) and a Paroscientific Digiquartz® pressure sensor
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 a Paroscientific Digiquartz® pressure sensor and Inclinometers
Sensor specifications:
- Depth: +/- 0.01% FS (FS = 6000 psi)
- 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.

Note: External power source required if transponder is to be interfaced to a Gyrocompass

Underwater Positioning – cNODE Maxi Transponders

Underwater Positioning – cNODE Maxi Transponders
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/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*
30 kHz band (MF) Transponder with instrumented modular end cap*
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: 34.6 / 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/SiPI
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: / kg
Modular end cap incorporates an external serial sensor interface, Paroscientific Digiquartz® pressure sensor and Inclinometers
Sensor specifications:
• Depth: +/- 0.01% FS (FS = 2000 psi)
• Inclinometers: 0.05° (range +/- 30 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))  
Battery endurance with MGC: up to 72 hours  
Length, diameter: 1213, 221 mm  
Weight in air / water: 40.5 / 20.2 kg  
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.  

**Note:** Day rate cost when an external power supply is used to power the MGC module.

---

**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.

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**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.

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**cNODE® Maxi 36-30V30H-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.

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**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 TRANSPONDER MODULES

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Description</th>
<th>Part No.</th>
<th>Beam Width</th>
<th>Receiver Sensitivity</th>
<th>Max Source Level</th>
<th>Material</th>
<th>Depth Rating</th>
<th>Length, Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>cNODE® Maxi/Midi 34 Transducer TD180</td>
<td>Transducer for cNODE® Maxi 34 transponder</td>
<td>319750</td>
<td>180°</td>
<td>100 dB</td>
<td>190 dB</td>
<td>Anodised aluminium, depth rated to 4000 m</td>
<td>169.5, 166 mm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cNODE® Maxi/Midi 34 Transducer TD30V30H</td>
<td>Transducer for cNODE® Maxi 34 transponder</td>
<td>313455</td>
<td>30° vertical / 30° horizontal</td>
<td>85 dB</td>
<td>206 dB / 190 dB</td>
<td>Anodised aluminium, depth rated to 4000 m</td>
<td>316, 184 mm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cNODE® Maxi/Midi 34 Transducer TD30V</td>
<td>Transducer for cNODE® Maxi 34 transponder</td>
<td>320662</td>
<td>30° vertical</td>
<td>85 dB</td>
<td>206 dB</td>
<td>Anodised aluminium, depth rated to 4000 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cNODE® Maxi/Midi 34 Top End Cap</td>
<td>Top end cap for remote transducer</td>
<td>320949</td>
<td></td>
<td></td>
<td></td>
<td>Polyurethane coated anodised aluminium unit</td>
<td>Depth rated to 4000 m</td>
<td>Length, diameter</td>
<td>Bulkhead connector type: Subconn</td>
</tr>
<tr>
<td>cNODE® Maxi/Midi 34 Serial Sensor Interface</td>
<td>Bottom end cap Si for cNODE® Maxi 34 transponder</td>
<td>347652</td>
<td></td>
<td></td>
<td></td>
<td>Polyurethane coated anodised aluminium unit</td>
<td>Depth rated to 4000 m</td>
<td>Length, diameter</td>
<td>Bulkhead connector type: Subconn MCBH16M</td>
</tr>
<tr>
<td>cNODE® Maxi/Midi 34 Modular Top Section (MTS/I)</td>
<td>Modular Top Section (MTS/I)</td>
<td>407000</td>
<td></td>
<td></td>
<td></td>
<td>Polyurethane coated anodised aluminium unit</td>
<td>Depth rated to 4000 m</td>
<td>Length, diameter</td>
<td></td>
</tr>
<tr>
<td>cNODE® Maxi/Midi 34 Modular Top Section (MTS/Sv)</td>
<td>Modular Top Section (MTS/Sv)</td>
<td>TBC</td>
<td></td>
<td></td>
<td></td>
<td>Polyurethane coated anodised aluminium unit</td>
<td>Depth rated to 4000 m</td>
<td>Length, diameter</td>
<td></td>
</tr>
</tbody>
</table>
**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 (unaided): 0.08° RMS (secant latitude)
- Dynamic accuracy roll & pitch: 0.01° RMS
Polyurethane coated anodised aluminium unit
Aluminium housing depth rated to 4000 m
Power requirements: 10-36 Vdc, 20 W (max)
Length (with blanking cap), diameter: 337, 281 mm
Weight in air / water (estimated): 18.2 / 7.5 kg.

**Note:** Non ITAR product.

**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>Dimensions</th>
<th>Weight Air/Water</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cNODE® Maxi</strong></td>
<td>Floatation Collar for cNODE® Maxi Transponder</td>
<td>320772</td>
<td>2000 m</td>
<td>Aluminium cNODE® Maxi 34 transponders</td>
<td>30 kg</td>
<td>Width, height, depth: 358, 949, 300 mm</td>
<td>45 kg / 45 kg</td>
</tr>
<tr>
<td><strong>cNODE® Maxi</strong></td>
<td>Floatation Collar for cNODE® Maxi Transponder</td>
<td>319301</td>
<td>4000 m</td>
<td>Aluminium cNODE® Maxi 34 transponders</td>
<td>30 kg</td>
<td>Width, height, depth: 455, 948, 350 mm</td>
<td>70 kg / -30 kg</td>
</tr>
<tr>
<td><strong>cNODE® Maxi</strong></td>
<td>Deepwater Floatation Collar for cNODE® Maxi Transponder</td>
<td>331151</td>
<td>6000 m</td>
<td>Stainless steel cNODE® Maxi 36 transponders</td>
<td>kg</td>
<td>Width, height, depth: kg</td>
<td>kg / kg</td>
</tr>
<tr>
<td><strong>cNODE® Maxi</strong></td>
<td>Floatation Collar for cNODE® Maxi Transponder</td>
<td>331150</td>
<td>7000 m</td>
<td>Stainless steel cNODE® Maxi X7 transponders</td>
<td>kg</td>
<td>Width, height, depth: 572, 945, 488 mm</td>
<td>98 kg / 98 kg</td>
</tr>
<tr>
<td><strong>cNODE® MiniS</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>Height with cage, diameter: 524, 350 mm</td>
<td>16.66 kg</td>
</tr>
<tr>
<td><strong>cNODE® Mini</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>Height with cage, diameter, weight: 597, 290 mm</td>
<td>9 kg</td>
</tr>
<tr>
<td><strong>MST</strong></td>
<td>Floatation Collar for Mini-Transponder</td>
<td>119-099206</td>
<td>2000 m</td>
<td></td>
<td>MST 319, MST 324</td>
<td>4.5 kg, 4 kg</td>
<td>Height with cage, diameter, weight: 549, 275 mm</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.
**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 (fitted in subsea housing).

**Mesotech M3 Sonar - Bathy System**

**Shallow Water High Resolution Bathymetric Sonar**

*Sonar head part no. 922-20220000*
- Frequency: 500 kHz
- Range: 0.2 m to 50 m
- Maximum 120° view angle
- Range resolution: 1 cm
- Vertical beamwidth: 3°
- Number of beams: 256
- Update rate: up to 40 Hz
- Supplied with M3 Sonar processor computer and interface unit
- Supplied with 6 m or 15 m sonar head cable assembly
- Input voltage/power: 12 to 36 VDC / 22 W (typical)
- Anodised aluminium sonar head, depth rated to 500 m
- Height, width, weight air/water: 145, 213 mm, 4.6/1.7 kg
- Optional auxiliary sensors and hardware/software:
  - AML Micro X or Valeport miniSVS sound velocity sensor
  - Seatex Seapath 130 system
  - Over-the-side mounting pole assembly
  - QINSy Survey Lite data acquisition software.

**Mesotech M3 Sonar - Single Head ROV System**

**High Resolution Imaging and Profiling Sonar**

*Sonar head part no. 922-20060000*
- Frequency: 500 kHz
- Range: 0.2 m to 50 m
- Field of view: 120° / (EIQ 140°)
- Beamwidth (Imaging): 1.6° x (3° / 7° / 15° / 30°)
- Beamwidth (EIQ): 0.95° x 30°
- Beamwidth (Profiling / Bathymetry): 1.6° x 3°
- Telemetry: Ethernet (10/100/1000 Mbps)
- Input voltage/power: 12 to 36 VDC / 22 W (typical)
- Titanium sonar head, depth rated to 4000 m
- Height, width, weight air/water: 159, 217 mm, 8.5/5.3 kg
- Supplied with items:
  - M3 sonar head, 4000m depth rated
  - M3 Sonar Head Accessory Kit
  - M3 Sonar cable whip, 4.5m
  - M3 Sonar cable whip, 6.1m, Sync/1PPS
  - M3 Sonar mounting bracket
  - M3 Sonar software.
**Mesotech M3 Sonar - Dual Head ROV System**

**High Resolution Imaging and Profiling Sonar**

- **Sonar head part no.** 922-20060000
- **Frequency:** 500 kHz
- **Range:** 0.2 m to 50 m
- **Field of view:** 120° / (EQ 140°)
- **Beamwidth (Imaging):** 1.6° x (3° / 7° / 15° / 30°)
- **Beamwidth (EQ):** 0.9° x 30°
- **Beamwidth (Profiling / Bathymetry):** 1.6° x 3°
- **Telemetry:** Ethernet (10/100/1000 Mbps)
- **Input voltage/power:** 12 to 36 VDC / 22 W (typical)
- **Height, width, weight air/water:** 159, 217 mm, 8.5/5.3 kg

Package supplied with items:
- 2 x M3 sonar head, 4000m depth rated
- M3 Sonar Head Accessory Kit
- 2 x M3 Sonar cable whip, 4.5m
- M3 Sonar dual head sync cable, 6.1m
- M3 Sonar mounting bracket
- M3 Sonar software.

**EM 2040P MKII Multibeam Echo Sounder System**

**Portable Transducer System with Single Swath**

- **Frequency range:** 200 to 700 kHz
- **Swath coverage sector:** up to 170°
- **Beam width:** 1° x 1° @ 400 kHz
- **Max ping rate:** 50 Hz
- **Number of beams per ping:** 512
- **Range:** 0.5 to 270 m (400 kHz, FM mode, cold ocean water)
- **Depth accuracy:** 2 cm
- **Beam pattern:** Equidistant, Equiangular & High Density
- **Roll, Pitch & Yaw stabilised beams**
- **HWS or laptop computer c/w Seaﬂoor Information System 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
- **Supplied with:** a 15 m, 30 m or 50 m length transducer cable

Optional system items:
- Transducer mounting bracket
- Universal Sonar Mount (USM) expeditionary pole
- Seatex SeaPath 130
- AML Sound velocity sensor.

**EM 2040P MKII Multibeam Echo Sounder System**

**Portable Transducer System with Dual Swath**

- **Frequency range:** 200 to 700 kHz
- **Swath coverage sector:** up to 170°
- **Beam width:** 1° x 1° @ 400 kHz
- **Max ping rate:** 50 Hz
- **Number of beams per ping:** 1024
- **Range:** 0.5 to 270 m (400 kHz, FM mode, cold ocean water)
- **Depth accuracy:** 2 cm
- **Beam pattern:** Equidistant, Equiangular & High Density
- **Roll, Pitch & Yaw stabilised beams**
- **HWS or laptop computer c/w Seaﬂoor Information System 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
- **Supplied with:** a 15 m, 30 m or 50 m length transducer cable

Optional system items:
- Transducer mounting bracket
- Universal Sonar Mount (USM) expeditionary pole
- Seatex SeaPath 130
- AML Sound velocity sensor.
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 water)
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 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 water)
Depth accuracy: 2 cm
Beam pattern: Equidistant, Equiangular & High Density
Roll, Pitch & Yaw stabilised beams
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
Supplied with a 15 m, 30 m or 50 m length transducer cable
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
HWS computer c/w Seafloor Information System (SIS) software
Sonar Head height, diameter, weight air/water: 119, 332 mm, 21/12.6 kg
Supplied with a 15 m, 30 m or 50 m length transducer cable
Optional system items:
• 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
HWS computer c/w Seafloor Information System (SIS) software
Sonar Head height, diameter, weight air/water: 119, 332 mm, 21/12.6 kg
Supplied with a 15 m, 30 m or 50 m length transducer cable
Optional system items:
• 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 items:  
- 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):  
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 items:  
- 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.

**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 330/330+ 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.
### 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, weight:** air/water: 159, 217 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.

### 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, 30 m, and 50 m cable lengths.

EM 2040P Universal Sonar Mount (USM) Expeditionary Pole
Over the side pole vessel mount package
Supports fixture of EM 2040P transducer, AML sound velocity sensor,
Seapath 130 sensor unit, and Subsea Motion Reference Unit.

M3 Sonar Mounting Kit
Part No. 803-0162000
Over the side pole mount assembly
Supports fixture of M3 sonar head, Sound velocity sensor, Seapath 130
sensor unit, and Subsea Motion Reference Unit.

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.
**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
### TOPAS PS120 Sub-Bottom Profiler

**Portable Parametric Sub-Bottom Profiler**

- **Primary frequency:** 70 kHz - 100 kHz
- **Secondary frequency:** 2 kHz - 30 kHz
- **Pulse lengths:** 0.04 – 30 ms
- **Output power:** >8 kW
- **Beamwidth (primary):** ~3.5°
- **Beamwidth (secondary):** 4° x 6°
- **Source level (12 kHz):** >202 dB re μPa @ 1m
- **Dynamic range:** <110 dB
- **Range resolution:** <0.05 m
- **Penetration capability:** >50 m
- **Depth range:** 2 m - >400 m

Supplied with 15 m length transducer cable

Transducer dimensions, weight: 324 x 422 x 68 mm, 30 kg

Transceiver dimensions, weight: 520 x 700 x 400 mm, 45 kg.
UNDERWATER MAPPING – SIDE SCAN SONAR SYSTEMS

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 30 m soft tow cable
Optional system item(s):
  • 300 m soft tow cable on hand reel.

PulSAR Side Scan Sonar Cable
300 m length soft tow cable on hand reel.
UNDERWATER MAPPING – MULTIBEAM SONARS

**Flexview Sonar**
**Small Observation Class ROV Multibeam Sonar**
Part No. 922-20200000-7804
Operating frequency: 950 kHz - 1400 kHz
Field of view: Up to 140° (Imaging)
Range: 0.2 m to 100 m
Range resolution: 1 cm
Power (sonar head): 12-36 VDC, 22 W (avg.) <60 W (peak)
Telemetry: Ethernet (10/100 Mbps) / VDSL
Connector type: SubConn MCBHRA8MSS
Depth rating: 300 m
Material housing: Hard anodised aluminium
Dimensions: (W)169 mm x (H)86 mm x (D)249 mm
Weight air/water: 3.75 kg / 1.38 kg
Package includes:
- Accessory kit
- Cable whip, 4.5 m
- Datasheet and QuickStart guide
- Sonar software
- Equipment case.
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° x 30° (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° x 30° (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

### MS1007D Altimeter
**Compact Digital Altimeter**
Part No. 974-70130000

Specifications:
- Operating Frequency: 200 kHz
- Beamwidth: 10° (nominal)
- Range (max): 300 m usable (807 mode)
- Output Resolution: Adjustable, > 2.4mm (807 mode)
- Operating Mode: Configurable 807, 809 or MS1000
- Serial Interface: RS-232/RS-485
- Aux. Analog Output: Configurable, 0-5V or 0-10V
- Power Input: 22-26 VDC, 1.8 A (start-up) and 250 mA (continuous)
- Connector Type: Seacon XSG-6-BCL
- Depth rating: 3000 m
- Material Housing: Anodised Aluminium
- Dimensions Housing/Transducer: (L)197 mm x (D)88 mm
- Weight Air/Water: 2.4 kg / 1.1 kg.

### MS1107D Altimeter
**Compact Digital Altimeter**
Part No. 975-71500000

Specifications:
- Operating Frequency: 675 kHz
- Beamwidth: 2.7° (nominal)
- Range (max): up to 110 m
- Output Resolution: Between 2.4 mm and 25 mm (affected by mode and range settings)
- Operating Mode: Configurable 807, 808, 809 or MS1000
- Serial Interface: RS-232/RS-485
- Aux. Analog Output: Configurable, 0-5V or 0-10V
- Power Input: 22-26 VDC, 1.0 A (start-up) and 250 mA (continuous)
- Connector Type: Burton 5507-1508
- Depth rating: 6000 m
- Material Housing: Anodised Aluminium
- Dimensions Housing/Transducer: (L)212mm x (D)114 mm
- Weight Air/Water: 5.0 kg / 2.7 kg.
### Seafloor Information System (SIS) Software

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 GeoSwath shallow water wide swath bathymetry systems

**Note:** Software and USB license dongle key for customer supplied PC (offline processing).

### 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.
### Valeport 650 Sound Velocity Profiler

**True Velocity Sound Measurement**  
Self-Recording & Direct Reading  
- **Speed of Sound range:** 1400 to 1600 m/s, acc. ±0.05, res. 0.001 m/s  
- **Temperature:** -5 to +35°C, acc. ±0.01, res. 0.002°C  
- **Pressure:** 5000 dBar, acc. ±0.1% FS, res. 0.005% FS dBar  
- **Titanium Housing, depth rated to 5000 m**  
- Supplied fitted with a deployment cage  
- Diameter, length; weight air/water: 88, 337 mm; 12.5/9 kg.

### Valeport MIDAS Sound Velocity Profiler

**Digital Time of Flight Sound Velocity Profiler**  
Self-Recording & Direct Reading  
- **Speed of Sound range:** 1375 to 1900 m/s, acc. ±0.02, res. 0.001 m/s  
- **Temperature:** -5 to +35°C, acc. ±0.01, res. 0.005°C  
- **Pressure:** 6000 dBar, acc. ±0.01% FS, res. 0.001% range  
- **Titanium Housing, depth rated to 6000 m**  
- Supplied fitted with a deployment cage  
- Diameter, length; weight air/water (in cage): 88, 665 mm; 11.5/8.5 kg.

### Valeport miniSVP Sound Velocity Profiler

**True Velocity Sound Measurement**  
Self-Recording & Direct Reading  
- **Part No.:** 0660002  
- **Speed of Sound range:** 1375 to 1900 m/s, acc. ±0.02, res. 0.001 m/s  
- **Pressure:** 300 or 600 Bar, acc. ±0.05% range, res. 0.001% range  
- **Titanium Housing, depth rated to 6000 m**  
- Supplied fitted with a deployment cage  
- Diameter, length; weight air/water: 110, 450 mm; 1.6/- kg.

### Valeport miniSVS Sound Velocity Sensor

**True Velocity Sound Measurement**  
Small Direct Reading Sensor: SV only  
- **Part No.:** 0652006 (25 mm path length)  
- **Speed of Sound range:** 1400 to 1600 m/s, acc. ±0.10 m/s, res. 0.001 m/s  
- **External Power Supply:** 8-30 Vdc, 250 mW  
- **Titanium Housing, depth rated to 6000 m**  
- Supplied with a 20 m data / power cable  
- Diameter, length; weight air/water: 40, 217 mm; 0.53/- kg.

### AML Minos X SVP/CTD Profiler

**Real-time Vertical Profiler**  
Self-Recording & Direct Reading  
- **Xchange™ field swappable sensors**  
- **Speed of Sound range:** 1375 to 1625 m/s, acc. ±0.025, res. 0.001 m/s  
- **Pressure:** 6000 dBar acc. ±0.05% FS, res. 0.01 dBar  
- **Conductivity, Temperature:** 0-90 mS/cm, -5-45 °C  
- **Titanium Housing, depth rated to 6000 m**  
- Supplied fitted with a deployment cage  
- Diameter, length; weight air/water: 76, 597 mm; 4.7/3.2 kg.

### AML Micro X SVP Sensor

**True Velocity Sound Measurement**  
Small Direct Real-time Reading Sensor: SV only  
- **Xchange™ field swappable sensor**  
- **Speed of Sound range:** 1375 to 1625 m/s, acc. ±0.025, res. 0.001 m/s  
- **Pressure:** 6000 dBar, acc. ±0.05% FS, res. 0.01 dBar  
- **Power Supply:** 8-26 Vdc  
- **Delrin or Titanium Housing:** 500 m or 6000 m depth rating  
- Supplied with a 20 m or 50 m data / power cable  
- Diameter, length; weight air/water: 33 mm; 246 mm, 0.39/0.25 kg.
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.
DATA TELEMETRY – ACOUSTIC MODEM

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.

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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.

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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.

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~**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).~
### RADius 1000 Single Interrogator System

**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
- **Height, width & depth,** weight: 412 x 562 x 184 mm, 7 kg
- **Power requirements:** 110-220 Vac, 160 W
- **Supplied with:** 60 m interrogator power & data cables
- **Supplied with:** A RADius 700 transponder for commissioning purposes.

### RADius 1000 Dual Interrogator System

**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 1000 Triple Interrogator System

**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 1000 Quad Interrogator System

**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

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RADius 1000 Interrogator Unit</strong></td>
<td>Interrogator unit for RAĐius 1000 System&lt;br&gt;Frequency band: 5.51 - 5.61 GHz&lt;br&gt;Interrogator opening angle: ±45° (vertical &amp; horizontal)&lt;br&gt;Interrogator enclosure protection: IP 66 rated&lt;br&gt;Power requirements: 48 Vdc ±10%, 70 W (max)&lt;br&gt;Width, height &amp; depth, weight: 562 x 412 x 184 mm, 8 kg</td>
</tr>
<tr>
<td><strong>RAĐius 1000 Remote Interrogator Unit</strong></td>
<td>Remotely located Interrogator unit for RAĐius 1000 System&lt;br&gt;RAĐius remote power and modem cabinet&lt;br&gt;Modem mounted on rail in RAĐius controller unit cabinet&lt;br&gt;Frequency band: 5.51 - 5.61 GHz&lt;br&gt;Interrogator opening angle: ±45° (vertical &amp; horizontal)&lt;br&gt;Interrogator and remote cabinet protection: IP 66 rated&lt;br&gt;Remote Cabinet power requirements: 110-240 Vac, 70 W (max)&lt;br&gt;Interrogator width, height &amp; depth, weight: 562 x 412 x 184 mm, 8 kg&lt;br&gt;Remote Cabinet width, height, depth: 360, 360, 242 mm</td>
</tr>
<tr>
<td><strong>RAĐius 1000 Processing Unit</strong></td>
<td>Processing unit for RAĐius 1000 System&lt;br&gt;19” rack mounted, 2U high&lt;br&gt;Communication Ports: 8 x isolated serial ports (6 configurable between RS-232 or RS-422), 4 x Ethernet ports, 3 x USB ports&lt;br&gt;Power: 110 to 240 Vac (50/60Hz), 60 W (max)&lt;br&gt;Width, Height, Depth: 485 x 88.1 x 412 mm&lt;br&gt;Weight: 5.4 kg</td>
</tr>
</tbody>
</table>
VESSEL REFERENCE – RELATIVE POSITIONING SYSTEM

TRANSPONDERS

**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**

**Seatex 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: (2σ) 1 m @ 1000 m range  
Bearing accuracy: (2σ) 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

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/XP/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 keyboard & mouse
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
Supplied as standard with 30 m length RG-214 antenna cables
Optional system item:
• 3610 or 3710 DGNSS receiver.

Seatex DPS 432 System
GNSS Based Position Reference Sensor
Combined GPS L1/L2/L5, GLONASS L1/L2, Galileo E1/E5, Beidou B1/B2, QZSS and SBAS receiver
MULTIREF capability
Dual frequency ionospheric compensation
Accepts DGNSS corrections: RTCM-SC104 ver. 2.2, 2.3, 3.0, 3.1, 3.2;
SeaSTAR XP/XP2/G2/G2+/G4/G4+
High precision accuracy*: < 10 cm, 95 % CEP
DGNSS/DGLONASS accuracy: < 1 m, 95 % CEP
SBAS accuracy: < 1 m, 95 % CEP
Velocity accuracy: < 0.05 m/s, 95 % CEP
Output rate: 1 Hz
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 keyboard & mouse
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
Supplied as standard with 30 m length RG-214 antenna cables
Optional system item:
• 3610 or 3710 DGNSS receiver.

Seatex 3710 DGNSS Receiver
DGNSS Correction Services Receiver Unit
Fugro Seastar XP2/G2/G2+/G4/Std L1 capability
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
Supplied with type AD430-3141 DGNSS (Spotbeam) antenna
Note: Subscription to Fugro correction services not included.

Fugro 3610 DGNSS Receiver
DGNSS Correction Services Receiver Unit
Fugro Seastar XP/HP/G2/DGNSS capability
Power: 9-24 Vdc, 50/60 Hz, < 16 W
Dimensions (W x H x D): 109.5 x 65 x 235 mm
Supplied with type AD430-3141 DGNSS (Spotbeam) antenna
Note: Subscription to Fugro correction services not included.
<table>
<thead>
<tr>
<th>Model</th>
<th>GNSS Based Position Reference Sensor</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seatex DPS 232</td>
<td>Combined GPS L1/L2, GLONASS L1/L2 and SBAS receiver</td>
<td>100 - 240 Vac, 50/60 Hz, max 60 W.</td>
</tr>
<tr>
<td>Seatex DPS 432</td>
<td>Combined GPS L1/L2/L5, GLONASS L1/L2, Galileo E1/E5, Beidou B1/B2, QZSS and SBAS receiver</td>
<td>100 - 240 Vac, 50/60 Hz, max 60 W.</td>
</tr>
</tbody>
</table>
VESSEL REFERENCE SYSTEMS – POSITION, HEADING & ATTITUDE SYSTEMS

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.

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.

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.

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.
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 corrections
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.

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 corrections
Position accuracy (Z): 2 cm + 3.2 ppm RMS with RTK corrections
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.

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
Combined 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 output rates: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports,
3 x Analogue channels and 1 x 1PPS
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.

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
Combined 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 output rates: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports,
3 x Analogue channels and 1 x 1PPS
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.
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
Combined 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
Head 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.

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
Combined 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
Head 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.

Seapath 380-R3 System
GNSS Aided Heading, Attitude and Positioning Sensor
Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MGC R3 Motion and Gyrocompass
Combined 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
Head accuracy: 0.04° RMS (2.5m baseline)
Dynamic accuracy Roll & Pitch: 0.01° 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 may be 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.
# VESSEL REFERENCE SENSORS – MOTION REFERENCE UNITS

## Seatex MGC® R3
### Motion Sensor & Gyro Compass
- Real-time, Roll, Pitch, Heave & Heading
- Roll & Pitch accuracy: 0.01° RMS
- Heave accuracy (real-time): 5 cm or 5 %, whichever is highest
- Heading accuracy: 0.08° RMS (secant latitude)
- Heading accuracy (GNSS aided): 0.04° RMS (secant latitude)
- Heading settling time to full accuracy (typical): 17 min from start-up
- Position output (free inertial): 5 nm/h
- Data outputs: RS-232, RS-422 and Ethernet
- Data output rate (max): 200 Hz
- Power supply: 18-32 V dc, max 12 W
- Height, length, width; weight: 188.9, 189.5, 189.5 mm; 8.0 kg
- Supplied with items:
  - MGC angle bracket
  - Junction box c/w 3 m cable
  - Transit case.

## Seatex MRU-5+
### Motion Sensor
- Real-time Roll, Pitch and Heave
- 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).

## Seatex MRU-5
### 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.

## Seatex MRU-5 (5th Generation)
### Motion Sensor
- Real-time Roll, Pitch and Heave
- Dynamic Accuracy Roll & Pitch: 0.02° 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).
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.

Seatex MRU-H (5th Generation)
Motion Sensor
Real-time Roll, Pitch and Heave
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).

Seatex MRU-3 (5th Generation)
Motion Sensor
Real-time Roll, Pitch and Heave
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.

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.

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.
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 & MANNED SURFACE VESSELS

GeoSwath 4R USV
Unmanned Surface Vessel (USV)
Technical 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)
Position, attitude and heading sensor type: Seapath 130-5+
Fitted with Valeport MiniSVS
Bathymetric sonar type, frequency: GeoSwath, 500 kHz
Sonar Range: 1 to 50 m
Max seafloor coverage: up to 12 times water depth.

Optional item:
- Trimble SPS 852 Reference Station.

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

GeoSwath CSV
Compact Surface Vessel (CSV)
Technical specifications:
Platform type: Road transportable two-person catamaran
Construction: Polythene catamaran with stainless steel fittings
Length, width, draft: 3 m, 1.62 m, 0.35 m
Dry weight (hull, base boat): 120 kg
Motor: 30 HP, remote throttle
Max speed: up to 27 knots
Fuel capacity: 31 litres (8 gallons)
Equipped with VHF radio
Position, attitude and heading sensor type: Seapath 130-5+
Fitted with Valeport MiniSVS
Standard bathymetric sonar type, frequency: GeoSwath, 500 kHz
Sonar Range: 1 to 50 m
Max seafloor coverage: up to 12 times water depth.

Optional Item(s):
- Trimble SPS 852 Reference Station
- EM 2040P multibeam echosounder (instead of GeoSwath).

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 and CSV systems. 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.
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 RDI 300 kHz Broadband Doppler Velocity Log (DVL)
Imagenex Forward Looking Sonar/Anti-Collision System
EM 2040M (1º x 1º) 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 Payload Sensor - 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 wellqualified field service engineers will be able to help you quickly and effectively.

GLOBAL SUPPORT 24/7
Call +47 33 03 24 07
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