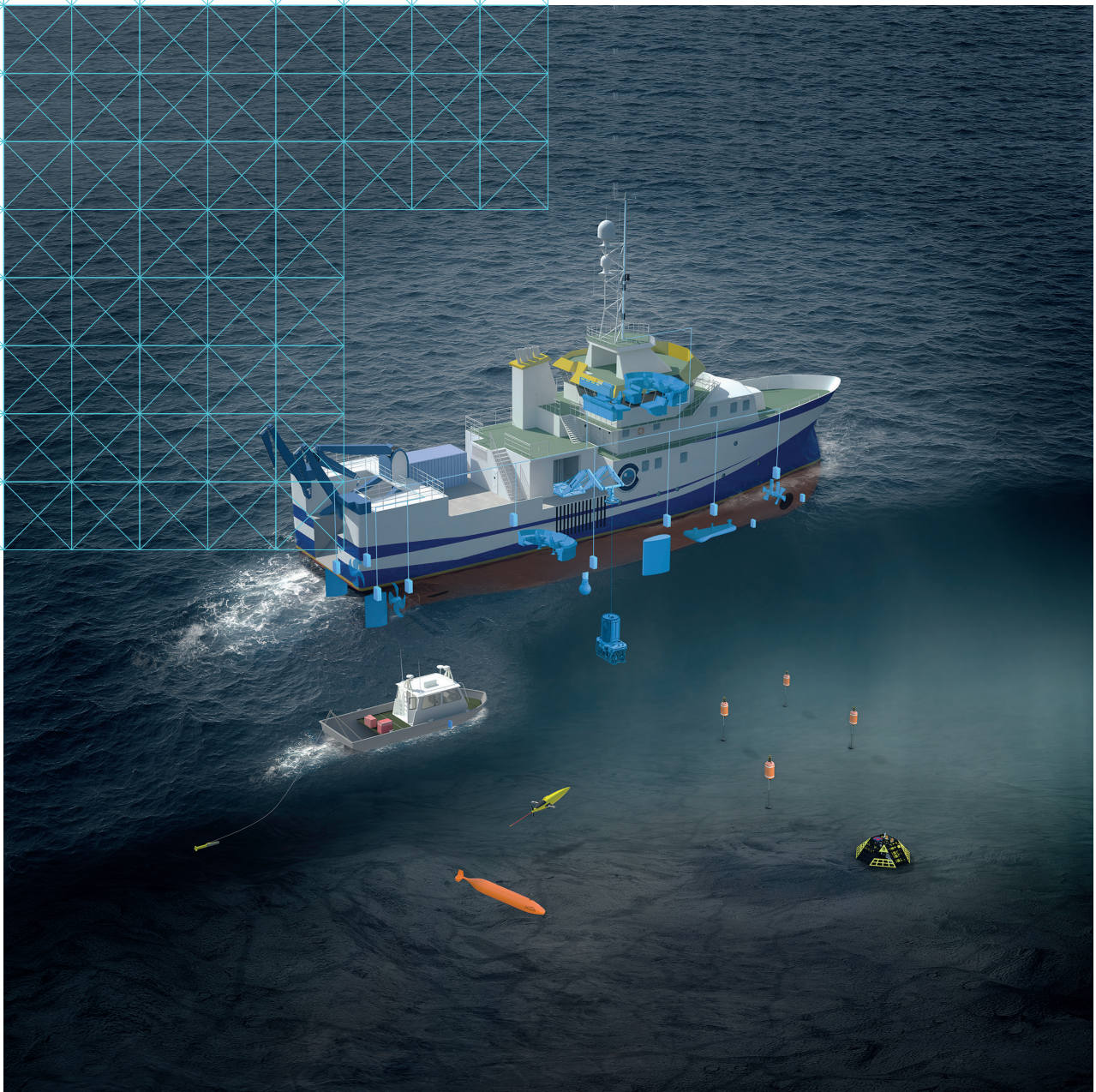




KONGSBERG

RENTAL BROCHURE

GLOBAL



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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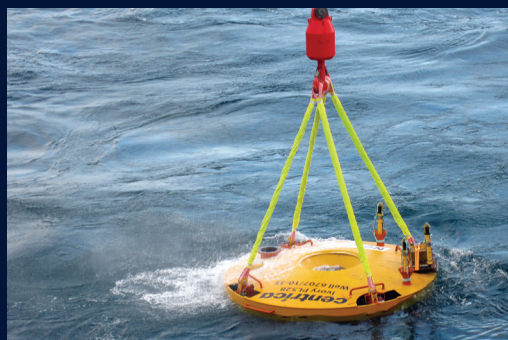
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UNDERWATER POSITIONING – POSITIONING SYSTEMS

HiPAP® 352P-MGC Portable System

Calibration Free Portable Hydroacoustic Positioning Reference

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

Fully compatible with Cymbal® and HPR400 acoustic protocols

Inbuilt motion and heading sensor: Seatex MGC® R3

Operating range: 1 - 5000 m

Main operational coverage area: $\pm 80^\circ$

Range detection accuracy (Cymbal): 2 cm

Angular accuracy (S/N [20 dB Rel. 1 μ Pa]): 0.10°

Heading accuracy (GNSS aided): 0.1° RMS (secant latitude)

Dynamic accuracy roll & pitch: 0.01° RMS

Depth rating: up to 50 m

Length, diameter; weight (air): 661, 338 mm; 51 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied with an APOS laptop or 19" rack mounted computer

Optional system item:

- Responder drive kit.



HiPAP® 352P Portable System

Portable Hydroacoustic Positioning Reference

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

Fully compatible with all Cymbal® "M" channels

Inbuilt motion sensor type / accuracy: Seatex MRU-H / 0.05°

Operating range: 1 - 5000 m

Main operational coverage area: $\pm 80^\circ$

Range detection accuracy (Cymbal): 2 cm

Angular accuracy (S/N [20 dB Rel. 1 μ Pa]): 0.10°

Depth rating: up to 50 m

Length, diameter; weight (air): 513, 341 mm; 42 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied with an APOS laptop or 19" rack mounted computer

Optional system item:

- Responder drive kit.



HiPAP® 351P-MGC Portable System

Calibration Free Portable Hydroacoustic Positioning Reference

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

Fully compatible with Cymbal® and HPR400 acoustic protocols

Inbuilt motion and heading sensor: Seatex MGC® R3

Operating range: 1 - 4000 m

Main operational coverage area: $\pm 80^\circ$

Range detection accuracy (Cymbal): 2 cm

Angular accuracy (S/N [20 dB Rel. 1 μ Pa]): 0.18°

Heading accuracy (GNSS aided): 0.1° RMS (secant latitude)

Dynamic accuracy roll & pitch: 0.01° RMS

Depth rating: up to 50 m

Length, diameter; weight (air): 663, 341 mm; 51 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied with an APOS laptop or 19" rack mounted computer

Optional system item:

- Responder drive kit.



HiPAP® 351P-5 Portable System

Portable Hydroacoustic Positioning Reference

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

Fully compatible with Cymbal® and HPR400 acoustic protocols

Inbuilt motion sensor type / accuracy: Seatex MRU-5 / 0.02°

Operating range: 1 - 4000 m

Main operational coverage area: $\pm 80^\circ$

Range detection accuracy (Cymbal): 2 cm

Angular accuracy (S/N [20 dB Rel. 1 μ Pa]): 0.18°

Depth rating: up to 50 m

Length, diameter; weight (air): 513, 341 mm; 42 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied with an APOS laptop or 19" rack mounted computer

Optional system item:

- Responder drive kit.



HiPAP® 351P Portable System**Portable Hydroacoustic Positioning Reference**

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

Fully compatible with Cymbal® and HPR400 acoustic protocols

Inbuilt motion sensor type / accuracy: Seatex MRU-H / 0.05°

Operating range: 1 - 4000 m

Main operational coverage area: ± 80°

Range detection accuracy (Cymbal): 2 cm

Angular accuracy (S/N [20 dB Rel. 1µPa]): 0.18°

Depth rating: up to 50 m

Length, diameter; weight (air): 513, 341 mm; 42 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied with an APOS laptop or 19" rack mounted computer

Optional system item:

- Responder drive kit.



µPAP® 201-H System**Portable Hydroacoustic Positioning Reference**

Operational modes: SSBL, LBL and data telemetry

Fully compatible with all Cymbal® "M" channels

Inbuilt motion sensor type / accuracy: Seatex MRU-H / 0.05°

Operating range: 1 - 4000 m

Angular accuracy: 0.25°

Position accuracy: 0.45% (1 Sigma, SNR > 20dB rel. 1µPa in bandwidth)

Data telemetry: up to 2,5kBit/s (application dependent)

Transducer beam width: ± 80°

Material, depth rating: Bronze/Stainless steel, up to 50 m

Length, diameter; weight air/water: 400,190 mm; 17 kg/9 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied as standard with an APOS laptop computer

Optional system item:

- Responder drive kit.



µPAP® 201-3-NEL System**Portable Hydroacoustic Positioning Reference**

Operational modes: SSBL, LBL and data telemetry

Fully compatible with all Cymbal® "M" channels

Inbuilt motion sensor type / accuracy: 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-NEL System**Portable Hydroacoustic Positioning Reference**

Operational modes: SSBL, LBL and data telemetry

Fully compatible with all Cymbal® "M" channels

Inbuilt motion sensor type / accuracy: Xsens / <1.0°

Operating range: 1 - 995 m

Angular accuracy: 0.25°

Position accuracy: 0.45% (1 Sigma, SNR > 20dB rel. 1µPa in bandwidth)

Data telemetry: up to 2,5kBit/s (application dependent)

Transducer beam width: ± 80°

Material, depth rating: Bronze/Stainless steel, up to 50 m

Length, diameter; weight air/water: 250,190 mm; 13 kg/8 kg

Supplied with a 50 m or 70 m length transducer cable

Supplied as standard with an APOS laptop computer

Optional system item:

- Responder drive kit.



Note: No export licence required.

**cPAP® 34, Subsea LBL Positioning System
ROV Mount Transceiver**

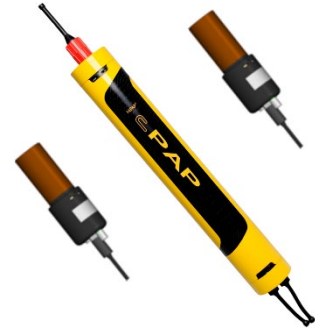
30 kHz band (MF)
FSK and PSK (Cymbal®) signalling modes
For use in support of Long Base Line (LBL) positioning operations
Polyurethane coated aluminium housing, depth rated to 4000 m
RS-232/422/485 isolated interfaces
110/220 Vac external power interfaces (100-300 W)

Transceiver supplied with the following items:

- 2 x Transducer 34-30H for cPAP (part no. 345773)
- 2 x Subsea Cable for cPAP to transducer, 6 m, (part no. 345772)
- 1 x Subsea Pigtail for cPAP (part no. 345771).

Optional system item:

- HiPAP® Survey APOS Operator Station.



**cPAP® 34 MKII, Subsea LBL Positioning System
ROV Mount Transceiver**

30 kHz band (MF)
FSK and PSK (Cymbal®) signalling modes
For use in support of Long Base Line (LBL) positioning operations
Polyurethane coated aluminium housing
Depth rated: up to 4000 m
APOS interface: RS-232
User interface: RS-232/422/485

Power supply: 20-28 Vdc, 1 Ampere (max)

Internal battery type: Lithium Iron Phosphate (Li-Fe - rechargeable)

Length, diameter; weight air/water: 278,105 mm; 4.2 kg/2.2 kg

Transceiver supplied with the following items:

- Transducer 34-30H for cPAP (part no. 345773)
- Subsea Cable for cPAP to transducer, 6 m, (part no. 345772)
- Subsea Pigtail for cPAP (part no. 408094).

Optional system item:

- cNODE® MiniS / Micro Battery Charger
- HiPAP® Survey APOS Operator Station.



**cPAP® 30, Portable Telemetry Unit
Portable Medium Frequency (MF) Transceiver Unit**

Fully compatible with all Kongsberg (MF) acoustic channels, including Cymbal® protocol

Supplied with a TDD 180 dunking transducer (70 m cable on reel)

Operation temperature: -5 to +55°C

Splash proof IP 54 case

Internal rechargeable lead/acid battery pack (3 hours operation)

Power supply: 100-240 Vac

Diameter, weight: 488 x 185 mm, 16 kg.



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

UNDERWATER POSITIONING – TRANSDUCERS

µPAP® 201-3-NEL Transducer

Part No. 334422
Operational modes: SSBL, LBL and data telemetry
Fully compatible with all Cymbal® M channels
Inbuilt motion sensor type / accuracy: Seatex MRU-3 / 0.08°
Operating range: 1 - 995 m
Transducer beam width: ± 80°
Material, depth rating: Bronze/Stainless steel, up to 50 m
Length, diameter; weight air/water: 400,190 mm; 17 kg/9 kg
Note: No Export Licence required.



cPAP® 34-30H Transducer

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



cPAP® 34-40V Transducer

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



cPAP® 34-180 Transducer

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



Dunking Transducer TDD 180

MF Transducer & Cable
Part No. 320822
180° beam pattern transducer
To be used for depths down to 500 m
Supplied with 70 m kevlar armoured cable on drum
Compatible with cPAP® 30 portable transceiver unit
Width, height, depth: 430, 500, 590 mm



Dunking Transducer TDD 30V

MF Transducer & Cable
Part No. 320680
30° vertical beam pattern transducer
To be used for depths down to 4000 m
Supplied with 70 m kevlar armoured cable on drum
Compatible with cPAP® 30 portable transceiver unit
Width, height, depth: 430, 500, 590 mm



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

UNDERWATER POSITIONING – CABLES

HiPAP[®]35xP / μ PAP[®] 20x Transducer Cable
Option of 50 m or 70 m length transducer cable
Cable diameter: 12 mm
Subsea plug diameter: Approx 44 mm
Length, weight: 50 m, 10 kg.



UNDERWATER POSITIONING – HAIN SYSTEM

Subsea Hydroacoustic Aided Inertial Navigation System HAIN System minus Inertial Measurement Unit

The Subsea HAIN solution offers:

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



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

Subsea HAIN computer type: MP8300/MP5810

Computer specifications:

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

Note: additional ROV sensors required: -

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

Inertial Measurement Unit for Subsea HAIN System

IMU type: Kongsberg Seatex MGC® R3

Product specification:

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



Note: Non ITAR product.

Inertial Measurement Unit for Subsea HAIN System

IMU type: Honeywell HG 9900

Product specification:

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



Note: Non ITAR product.

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

UNDERWATER POSITIONING – HAIN POST-PROCESSING SOFTWARE

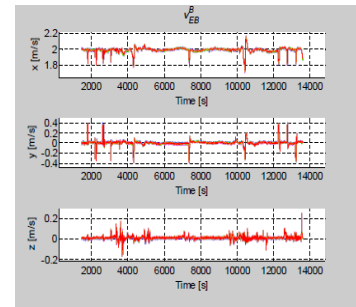
NavLab Post-Processing Computer

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

IMPORTANT NOTES:

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

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



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

UNDERWATER POSITIONING – DIVER TRANSPONDERS (cNODE MICRO)

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 342/N

ROV Positioning Transponder

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



MST Battery Charger

Battery Charger Kit

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



Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the "MST mini-transponder". In some instances, an end user statement will be required from the customer prior to despatch of the equipment.

UNDERWATER POSITIONING – ROV TRANSPONDERS (cNODE MINIS)

cNODE® MiniS 34-180

ROV Positioning Transponder

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



cNODE® MiniS 34-40V

ROV Positioning Transponder

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



cNODE® MiniS 37-40V-Ti

ROV Positioning Transponder

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



cNODE® MiniS Battery Charger

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



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

UNDERWATER POSITIONING – cNODE MINI TRANSPONDERS

cNODE® Mini 34-180

Positioning Transponder

30 kHz band (MF) Transponder / Responder
Fully compatible with Cymbal® and HPR400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: ± 90 degrees
Max source level: up to 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (NiMH)
Battery Lifetime (fully charged): Quiescent 60 days, 1 ping per sec / max source level 100,000 replies
External power: $15 \pm 10\%$ 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: $15 \pm 10\%$ 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.

UNDERWATER POSITIONING – cNODE MIDI TRANSPONDERS

cNODE® Midi 34-180

Positioning Transponder*

30 kHz band (MF) Transponder with release mechanism
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D24-Li), Reg no. 322374))
Length, diameter: 704.5, 166 mm
Weight in air / water: 16.5 / 8.5 kg.



cNODE® Midi 34-180-Si

Positioning Transponder* with Sensor Interface Module

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



cNODE® Midi 34-180-MTS/I

Positioning Transponder*

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

- Inclinometers: 0.05° (range +/- 90 degrees).



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

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

UNDERWATER POSITIONING – cNODE MAXI TRANSPONDERS

cNODE® Maxi 34-180

Positioning Transponder*

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



cNODE® Maxi 34-180-Si

Positioning Transponder* with Sensor Interface Module

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



cNODE® Maxi 34-180-R

Positioning Transponder*

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



cNODE® Maxi 34-180-MTS/I

Positioning Transponder*

30 kHz band (MF) Transponder and Modular Top Section (MTS) fitted with inclinometers
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554)
Length, diameter: 1198, 166 mm
Weight in air / water: 32 / 15 kg
Modular top section incorporates inclinometers
Sensor specifications:

- Inclinometers: 0.05° (range +/- 90 degrees).



cNODE® Maxi 34-180-R-MTS/Sv**Positioning Transponder***

30 kHz band (MF) Transponder with release mechanism and Modular Top Section (MTS)
Fully compatible with Cymbal® and HPR 400 acoustic protocols
SSBL / USBL and LBL positioning modes
Beamwidth: +/- 90 degrees
Max source level: 190 dB
Polyurethane coated aluminium housing, depth rating to 4000 m
Supplied with a lithium battery pack (Type: D48-Li), Reg no. 319554)
Length, diameter: 1403, 166 mm
Weight in air / water: 34 / 15 kg
Modular top section incorporates a Valeport sound velocity sensor
Sensor specifications:

- Sound Velocity: +/- 0.02 m/s (25 mm path length).



cNODE® Maxi 34-180-R-MTS/PI**Positioning Transponder***

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

- Depth: +/- 0.01% FS (FS = 6000 psi)
- Inclometers: 0.05° (range +/- 90 degrees).



cNODE® Maxi 34-180-R-MTS/SvPI**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: 34.6 / 15 kg
Modular top section incorporates a Paroscientific Digiquartz® pressure sensor, Inclometers and a Valeport sound velocity sensor
Sensor specifications:

- Sound Velocity: +/- 0.02 m/s (25 mm path length)
- Depth: +/- 0.01% FS (FS = 6000 psi / 4000 m).
- Inclometers: 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 Inclometers
Sensor specifications:

- Depth: +/- 0.01% FS (FS = 2000 psi)
- Inclometers: 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))
Length, diameter: 1213, 221 mm
Weight in air / water: 40.5 / 20.2 kg
Battery endurance with MGC: up to 72 hours
Modular end cap incorporates a Motion Gyro Compass (MGC) sensor
Sensor specifications:

- Heading accuracy: 0.15° RMS (secant latitude)
- Dynamic accuracy roll & pitch: 0.01° RMS.



cNODE® Maxi 34-30V30H**Positioning Transponder***

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



cNODE Maxi®34-30V30H-R**Positioning Transponder***

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



cNODE Maxi®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.



cNODE® Maxi 34-30V**Positioning Transponder***

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



cNODE® Maxi 34-30V-R

Positioning Transponder*

30 kHz band (MF) Transponder with release mechanism

Fully compatible with Cymbal® and HPR 400 acoustic protocols

SSBL / USBL positioning modes

Beamwidth: +/- 15 degrees

Max vertical beam source level: 206 dB

Polyurethane coated aluminium housing, depth rating to 4000 m

Supplied with a lithium battery pack (Type: D48-Li, Reg no. 319554))

Length, diameter: 1239, 166 mm

Weight in air / water: 30 / 14 kg.



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

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

UNDERWATER POSITIONING – cNODE MIDI/MAXI TRANSPONDER MODULES

cNODE® Maxi/Midi 34 Transducer TD180 **Transducer for cNODE® Maxi 34 transponder**

Part No. 319750
Beam width: 180°
Receiver sensitivity: 100 dB
Max source level: 190 dB
Anodised aluminium, depth rated to 4000 m
Length, diameter: 169.5, 166 mm.



cNODE® Maxi/Midi 34 Transducer TD30V30H **Transducer for cNODE® Maxi 34 transponder**

Part No. 313455
Beam width: 30° vertical / 30° horizontal
Receiver sensitivity: 85 dB
Max source level: 206 dB / 190 dB
Anodised aluminium, depth rated to 4000 m
Length, diameter: 316, 184 mm.



cNODE® Maxi/Midi 34 Transducer TD30V **Transducer for cNODE® Maxi 34 transponder**

Part No. 320662
Beam width: 30° vertical
Receiver sensitivity: 85 dB
Max source level: 206 dB
Anodised aluminium, depth rated to 4000 m



cNODE® Maxi/Midi 34 Top End Cap **Top end cap for remote transducer**

Part No. 320949
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Bulkhead connector type: Subconn
Length, diameter: , mm.



cNODE® Maxi/Midi 34 Serial Sensor Interface **Bottom end cap Si for cNODE® Maxi 34 transponder**

Part No. 347652
Interface up to a maximum of three (3) external sensors
Serial input types: RS-232 or RS-485/422
Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Bulkhead connector type: Subconn MCBH16M
Length, diameter: 72.8, 144 mm.



cNODE® Maxi/Midi 34 Modular Top Section **Modular Top Section (MTS/I)**

Part No. 407000
Module incorporates inclinometers
Specifications:

- Inclinometer: 0.05°

Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 184, 144 mm.



cNODE® Maxi/Midi 34 Modular Top Section **Modular Top Section (MTS/Sv)**

Part No. TBC
Module incorporates a Valeport miniSVS sound velocity sensor
Specifications:

- Sound velocity: +/- 0.02 m/s

Polyurethane coated anodised aluminium unit
Depth rated to 4000 m
Length, diameter: 184, 144 mm.



**cNODE® Maxi/Midi 34 Modular Top Section
Modular Top Section (MTS/PI)**

Part No. 449270

Module incorporates a Paroscientific Digiquartz® pressure sensor and inclinometers

Specifications:

- Depth: +/- 0.01% FS (FS = 6000 psi)
- Inclinometer: 0.05°

Polyurethane coated anodised aluminium unit

Depth rated to 4000 m

Length, diameter: 184, 144 mm.



**cNODE® Maxi/Midi 34 Modular Top Section
Modular Top Section (MTS/SvPI)**

Part No. 388700

Module incorporates a Paroscientific Digiquartz® pressure sensor, inclinometers and sound velocity sensor

Specifications:

- Depth: +/- 0.01% FS (FS = 6000 psi)
- Inclinometer: 0.05°
- Sound velocity: +/- 0.02 m/s.

Polyurethane coated anodised aluminium unit

Depth rated to 4000 m

Length, diameter: 184, 144 mm.



**cNODE® Maxi/Midi 34 Modular End Cap
Modular End Cap (MEC/SiPI)**

Part No. 395555

Module incorporates an external serial sensor interface, Paroscientific Digiquartz® pressure sensor and inclinometers

Specifications:

- Depth: +/- 0.01% FS (FS = 2000 psi)
- Inclinometer: 0.05°

Polyurethane coated anodised aluminium unit

Depth rated to 4000 m

Length, diameter: 190.5, 191.2 mm.



**cNODE® Maxi/Midi 34 Modular End Cap
Modular End Cap (Seatex MGC® R3)**

Part No. 397960

Module incorporates a Motion Gyro Compass sensor

Specifications:

- Heading accuracy: 0.15° RMS (secant latitude)
- Dynamic accuracy roll & pitch: 0.01° RMS

Polyurethane coated anodised aluminium unit

Depth rated to 4000 m

Length (with blanking cap), diameter: 337, 281 mm

Weight in air / water (estimated): 18.2 / 7.5 kg.



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

UNDERWATER POSITIONING – TRANSPONDER FLOATATION COLLARS

cNODE® Maxi Floatation Collar
Flotation Collar for cNODE® Maxi 34 Transponder
Part No. 320772
Depth rating: 2000m
Compatible with aluminium cNODE® Maxi 34 transponders
Buoyancy: 30 kg
Width, height, depth: 358, 949, 300 mm
Weight air/water: 45 kg / kg.



cNODE® Maxi Floatation Collar
Flotation Collar for cNODE® Maxi 34 Transponder
Part No. 319301
Depth rating: 4000m
Compatible with aluminium cNODE® Maxi 34 transponders
Buoyancy: 30 kg
Width, height, depth: 455, 948, 350 mm
Weight air/water: 70 kg / -30 kg.



cNODE® Maxi Floatation Collar
Deepwater Flotation Collar for cNODE® Maxi 36 Transponder
Part No. 331151
Depth rating: 6000m
Compatible with stainless steel cNODE® Maxi 36 transponders
Buoyancy: kg
Width, height, depth: , , mm
Weight air/water: kg / kg.



cNODE® MiniS Floatation Collar
Flotation Collar for cNODE® MiniS transponder
Part No. 442750
Depth rating: 4000 m
Buoyancy (collar only): 6.3 kg
Height with cage, diameter, weight in air: 524, 350 mm; 16.66 kg.
Note: transponder not included.



cNODE® Mini Floatation Collar
Flotation Collar for cNODE® Mini transponder
Part No. 366186
Depth rating: 4000 m
Buoyancy: 3.5 kg
Height with cage, diameter, weight: 597, 290 mm, 9 kg.
Note: transponder not included.



MST Floatation Collar
Flotation Collar for Mini-transponder
Part No. 119-099206
Depth rating: 2000 m
Buoyancy MST 319, MST 324: 4.5 kg, 4 kg
Height with cage, diameter, weight: 549, 275 mm, 9 kg.



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

UNDERWATER POSITIONING – ANCILLARY EQUIPMENT

TTC 30

Transponder Test and Configuration Unit

Fully compatible with all Kongsberg (MF) acoustic channels, including Cymbal® protocol

Supplied with TT 30 test transducer (2.5 m cable length)

Supplied with a 5 m serial cable which enables connection to cNODE transponder

Operation temperature: -5 to +55°C

Splash proof IP 54 case

Internal rechargeable lead/acid battery pack (3 hours operation)

Power supply: 100-240 Vac

Diameter, weight: 488 x 185 mm, 16 kg.



TTC Light

Transponder Test and Configuration Tool

TTC Light software installed on PC running Windows 7 or above

The TTC Light software can be used to:

- Test cNODE transponders from PC via interface cable to:
 - Read transponder configuration settings (serial number, acoustic channel and mode, battery capacity, transducer type)
 - Configure Cymbal or FSK Mode and channels
 - Upload new transponder firmware.
- Perform acoustic tests (requires cNODE MiniS) to:
 - Read transponder configuration settings (serial number, acoustic channel and mode, channel number, battery capacity, read sensors)
 - Configure Cymbal or FSK Mode and channels
 - Execute acoustic release
 - In air acoustic range test.



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

Responder Drive Kit for HiPAP®35xP/50x or µPAP® 20x Hardware for providing responder trigger signals from HiPAP or µPAP system to responder units

Unit 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.



HiPAP® Survey APOS Operator Station

Acoustic Positioning System Computer: MP8300/MP5810

Enables independent HiPAP, cPAP and Subsea HAIN system operations from the vessels ROV/Survey area.

Supplied with the latest Survey APOS software and licence dongle key.

Includes the following enabled software functions:

- CYMBAL (requires HiPAP 351/451/501 transceiver)
- SSBL Fast Track
- LBL ROV, vessel and transponder positioning
- Interface to cPAP ROV transceiver unit

Survey APOS computer specification:

8-port serial card: 4 x RS-232 and 4 x RS-422/485

Ethernet ports: Net A, B and C

Dimensions (L x W x H): 425 x 425 x 185 mm; Weight: 17 kg.

Power: 90-132 / 180-264 V ac, 80 W.



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

Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for this “ancillary equipment”. In some instances, an end user statement will be required from the customer prior to despatch of the equipment.

UNDERWATER MAPPING – MULTIBEAM ECHO SOUNDER SYSTEMS

Mesotech M3 Bathy System

Shallow Water High Resolution Bathymetric Sonar

Frequency: 500 kHz

Range: 1 to 50m

Maximum 120° view angle

Depth resolution: 3 mm

Vertical Beamwidth: 3°

Number of Beams: 256

Update Rate: up to 40 Hz

M3 Sonar Processor Laptop Computer

Supplied with a 15 m deck cable to laptop PC

Input Voltage/Power: 12 to 36 VDC / 22 W (typical)

Titanium sonar head, depth rated to 4000 m

Height, diameter, weight air/water: 159, 193 mm, 8.5/5.3 kg

Supplied with an over-the-side mounting pole assembly

Optional auxiliary sensors and hardware/software:

- Valeport miniSVS sound velocity sensor
- Seatex Seapath 130 system.
- QINSy Survey Lite data acquisition software.



EM 2040P Multibeam Echo Sounder System

Portable Transducer System with Single Swath

Frequency range: 200 to 400 kHz

Swath coverage sector: up to 140°

Beam width: 1° x 1° @ 400 kHz

Max ping rate: 50 Hz

Number of soundings per ping: 400

Range: 0.5 to 450 m (300 kHz, FM mode, cold ocean)

Depth accuracy: 2 cm

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)

Depth accuracy: 2 cm

Beam pattern: Equidistant, Equiangular & High Density

Roll, Pitch & Yaw stabilised beams

Supplied with a 15 m, 30 m or 50 m length transducer cable

HWS computer c/w Seafloor Information System (SIS) software

Sonar head depth rating: 30 m

Sonar head dimensions (L x W x H): 560 x 300 x 166 mm

Sonar Head weight air/water: 19.5/1.7 kg

Optional system item:

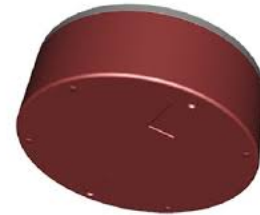
- Transducer mounting bracket.



**EM 2040C Multibeam Echo Sounder System
Single Compact Transducer System with Single Swath**

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

- Dual Swath mode
- Transducer mounting bracket, Single RX.



**EM 2040C Multibeam Echo Sounder System
Dual Compact Transducer System with Single Swath**

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

- Dual Swath mode
- Transducer mounting bracket, Dual RX.



**EM 2040 (0.7° x 0.7°) Multibeam Echo Sounder System
Single RX Transducer System with Single Swath**

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

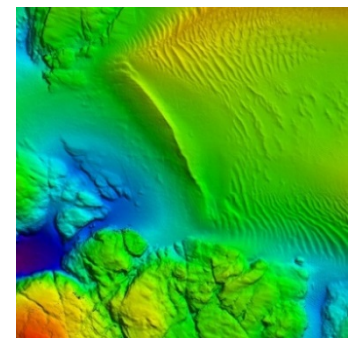
- Dual Swath mode
- Transducer mounting POD.



**EM 2040 (0.7° x 0.7°) Multibeam Echo Sounder System
Dual RX Transducer System with Single Swath**

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

- Dual Swath mode
- Transducer mounting bracket, Dual RX



**EM 2040 (0.4° x 0.7°) Multibeam Echo Sounder System
Single RX Transducer System with Single Swath**

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

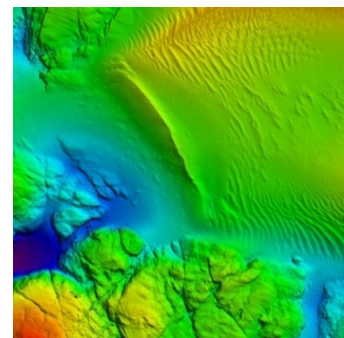
- Dual Swath mode
- Transducer mounting POD.



**EM 2040 (0.4° x 0.7°) Multibeam Echo Sounder System
Dual RX Transducer System with Single Swath**

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

- Dual Swath mode
- Transducer mounting bracket, Dual RX.



**EM 710 MKII (2° x 2°) Multibeam Echo Sounder System
40-100kHz Multibeam Echo Sounder**

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

- Valeport miniSVS sound velocity sensor
- Seatex Seapath 330/380 system.



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

UNDERWATER MAPPING – MBES SYSTEM PARTS

Mesotech M3 Sonar Head

High Resolution Imaging and Profiling Sonar

Part No. 922-20060000

Frequency: 500 kHz

Titanium sonar head, depth rated to 4000 m

Height, diameter, weight air/water: 159, 193 mm, 8.5/5.3 kg.



EM 2040 Compact Sonar Head

Frequency: 200 to 400 kHz

Maximum Angular Coverage: 130°

Power: 24 Vdc, 1 A

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°

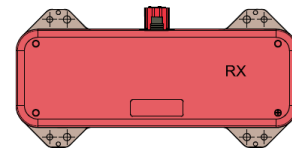
Transducer depth rated to 6000 m

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

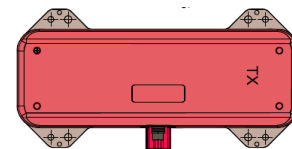
Transducer depth rated to 6000 m

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

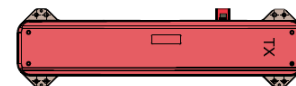
Transducer depth rated to 6000 m

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, 30m, and 50 m cable lengths.



Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the "EM 2040 transducer and processing unit". In some instances, an end user statement will be required from the customer prior to despatch of the equipment.

UNDERWATER MAPPING – WIDE SWATH BATHYMETRY SYSTEMS

GeoSwath 4R Bathymetric Sonar System

Portable Wide Swath Bathymetry and Side Scan Sonar

IHO SP-44, special order

Frequency: 500 kHz

Range: 1 to 50 m

Maximum swath width: 190 m

Depth resolution: 1.5 mm

Seafloor coverage: up to 12 times water depth

Splash proof deck unit, IP66 rated

Power supply requirements: 24 Vdc, 40 W

Laptop PC running GS4 data acquisition and processing software

Supplied with assembly for mounting transducers and optional sensors

Transducer head dimensions: 330 x 109 x 75 mm

Supplied with 10 m or 20 m length transducer and sensor cables

Optional system items:

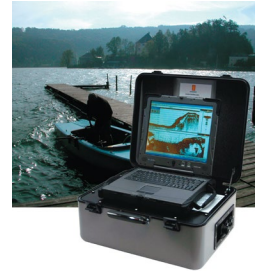
- Valeport miniSVS sound velocity sensor
- Seatex Seapath 130 or MRU-3/H/5/5+ (fitted in subsea housing)
- Over-the-side pole mount assembly.



UNDERWATER MAPPING – ECHO SOUNDERS

EA 400SP Hydrographic Echo Sounder Portable Dual Frequency Echo Sounder

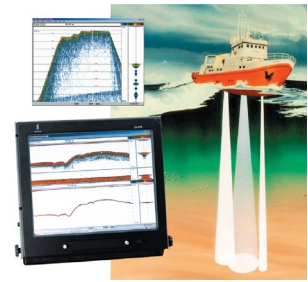
Frequency: 38 kHz and 200 kHz
Variable power output up to 1 kW
Max depth range at 38 kHz/1 kW: 2100 m
Transducer type: 38/200D Combi (13° x 21°/7° x 7°)
Supplied as standard with 15 m transducer cable
Ruggedised case with operator laptop computer
Power requirements: 95-265 Vac, 11-15 Vdc, 30-50 W
Width,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



EA 600 Hydrographic Single Beam Echo Sounder 15 kHz Precision Echo Sounder

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

- Seatex MRU-5



UNDERWATER MAPPING – SCANNING SONARS

MS1071 High Resolution Sonar Head Geared Fan/Cone Transducer Head

Part No. 974-23050000

MS1000 software switchable between imaging and profiling modes.

Specifications:

- Operating Frequency: 675 kHz
- Beamwidth: 0.9°x30° (Fan), 1.7° (Cone)
- Range: 0.5 - 100 m (typical), 150 m (obtainable)
- Range/Sampling Resolution: ≥ 19 mm / ≥ 2.5 mm
- Mechanical Step Size: $\geq 0.225^\circ$
- Power Input: 22-60 VDC, 33 W
- Telemetry: RS-232/RS-485
- Connector Type: Seacon RMG-4-BCL
- Depth rating: 3000 m
- Material Housing: Anodised Aluminium
- Dimensions Housing/Transducer: (L)569 mm x (D)89 mm / (W)140 mm
- Weight Air/Water: 6.1 kg / 2.9 kg

Optional sonar head items:

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



MS1171 High Resolution Multi-Frequency Sonar Head Fan/Cone Transducer Head with Tilt Block & Internal Compass

Part No. 975-23800000

MS1000 software switchable between imaging and profiling modes.

Specifications:

- Operating Frequency: 600-1200 kHz
- Beamwidth: 0.6°x30° (Fan) @ 900 kHz, 1.0° (Cone) @ 1.5 MHz
- Range (max): up to 150+ m
- Power Input: 22-60 VDC, 28 W
- Telemetry: RS-232/RS-485
- Connector Type: Seacon RMG-4-BCL
- Depth Rating: 3000 m
- Material Housing: Anodised Aluminium
- Option: Tilt Block and Compass Module.
- Dimensions Housing/Transducer: (L)624 mm x (D)89 mm / (W)140 mm
- Weight Air/Water: 6.9 kg / 3.5 kg

Optional sonar head items:

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



Clariscan 1171 Multi-Frequency Imaging Sonar Head Imaging Sonar Head with Composite Transducer & Acoustic Lens

Part No. 975-21190000

Specifications:

- Domed dual fan oil-filled transducer
- Operating Frequency: Tuneable in 5 kHz steps from 300 - 600 kHz and 605 - 1200 kHz in both CW and LFM modes
- Beamwidth: 2.7° x 26° @ 330 kHz, 1.4° x 36° @ 675 kHz, 0.9° x 22° @ 1000 kHz
- Range (max): 300 m @ 330 kHz, 100 m @ 675 kHz, 50 m @ 1000 kHz
- Power Input: 22 - 26 VDC @ ≤ 0.8 A
- 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)



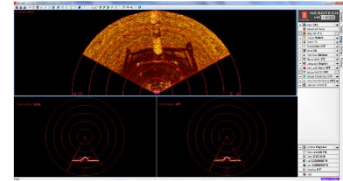
MS1000 Interface Unit

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



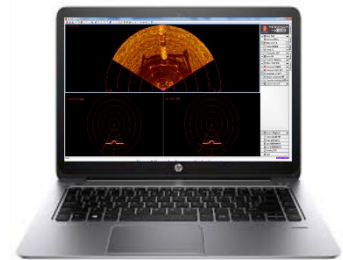
MS1000 Sonar Processing Software (standard version)

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.



MS1007D 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.



UNDERWATER MAPPING – SUB-BOTTOM PROFILERS & SIDE SCAN SONAR SYSTEMS

PuSAR Side Scan Sonar System High Resolution Side Scan Sonar

Frequency: 600 kHz - 1000 kHz

Wide bandwidth FM and CW pulses

Max range (m per side): 600 kHz - 100 m CW or 150 m FM

Max resolution (across track): 10 mm

Tow speed: 1 to 12 knots

IP-66 rated Control Unit containing acquisition/processing software

Integrated GPS module (SBAS corrections) in Control Unit

Tow fish: Stainless body steel with shear release carry handle/tow point, plastic nose cone

Depth rating: 1000 m

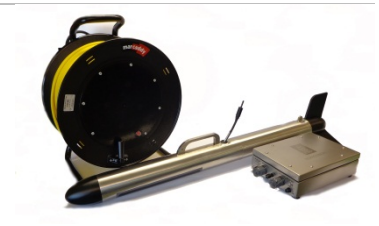
Dimensions: (L)110 cm x (D)9 cm, tail fins protrude by 7.5 cm

Weight: 16.5 kg

Power Requirements: 10-30 Vdc or 110/230 Vac (50 W max)

Supplied with a ruggedized laptop computer

Supplied with 300 m soft tow cable on hand reel and 10 m deck cable.

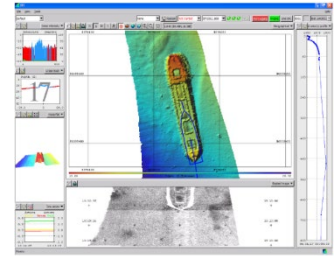


UNDERWATER MAPPING – ACQUISITION & PROCESSING SOFTWARE

Seafloor Information System (SIS) Software – version 4

Acquisition software for EM multibeam systems

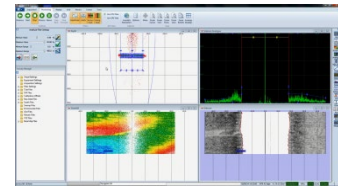
Supplied with a software license key and/or Hydrographic Workstation.



GeoSwath 4 (GS4) Software

Acquisition and post-processing software for the GeoSwath Plus shallow water wide swath bathymetry systems

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

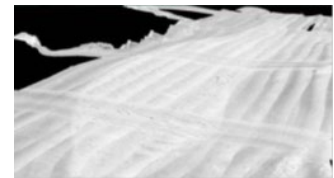


GeoTexture Software

Software and license dongle for analysis of GeoSwath side scan data

Features:

- Side Scan processing
- Side Scan mosaicing and normalisation
- Image classification
- Wide range of data input formats
- Close GeoSwath data support.

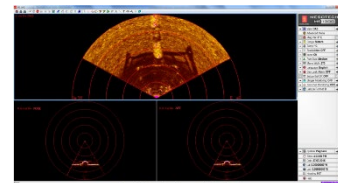


MS1000 Sonar Processing Software (standard version)

Acquisition software for Mesotech scanning sonars and altimeters

Features:

- Imaging, profiling and data storage to hard drive
- Data replay and image capture.
- Track Plotter module allows user to plot scanned area, geo-reference targets and create GeoTIFFs
- Simultaneous multi sonar head operation.



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

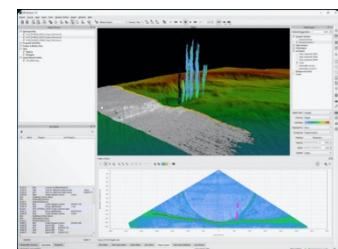
QPS Multibeam Processing Bundle

Sonar data processing software package

Features:

- Qimera Pro
- Fledermaus Geocoder Toolbox add-on
- Fledermaus GIS add-on
- Fledermaus Midwater add-on
- Fledermaus Viz4D.

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

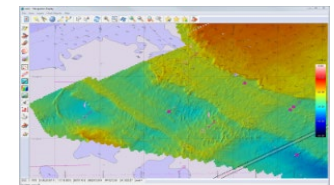


QPS QINSy Survey Lite

Real-time data acquisition, full survey planning, data cleaning/validation and map plotting functionality

Supports single multibeam echo sounder system and includes calibration/backscatter module

Supplied with a computer and/or software license key.



Note: For operations outside the UK/EU due to export restrictions, an export licence may be required for the "SIS Software". In some instances, an end user statement will be required from the customer prior to despatch of the equipment.

OCEANOGRAPHIC – SOUND VELOCITY SENSORS & PROFILERS

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. $\pm 0.1\%$ 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. $\pm 0.01\%$ 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. $\pm 0.05\%$ range, res. 0.001% range

External Power Supply: 9-28 Vdc, <250 mW

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. 0.001m/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. $\pm 0.05\%$ 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. $\pm 0.05\%$ 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: $\pm 0.1\%$ 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 kB/s
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (Li-Ion)
External power: 24 Vdc, 1A
Length, diameter housing / transducer: 305.5 mm, 106 mm
Weight in air / water: 4.0 / 2.1 kg.

Note: Operates in conjunction with compatible HiPAP and cPAP 30 systems enabled with APOS Cymbal and Transparent Modem functions.



cNODE® MiniS Modem 34-40V

Positioning and Transparent Modem Transponder

Frequency: 21 - 30 kHz band (MF)
Fully compatible with Cymbal® acoustic link protocol
SSBL / USBL and LBL positioning modes
Beamwidth: ± 20 degrees
Source level (high): 197 dB
Data Rate: up to 6 kB/s
Polyurethane coated aluminium housing, depth rating to 4000 m
Rechargeable battery pack (Li-Ion)
External power: 24 Vdc, 1A
Length, diameter housing / transducer: 321 mm, 105 mm
Weight in air / water: 4.6 / 2.1 kg.

Note: Operates in conjunction with compatible HiPAP and cPAP 30 systems enabled with APOS Cymbal and Transparent Modem functions.



cNODE® MiniS Modem Battery Charger

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



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

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

DATA TELEMETRY – RADIO MODEM

Maritime Broadband Radio System

MBR 179 Single System with Power Supply Unit~

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



Maritime Broadband Radio System

MBR 189 Single System with Power Supply Unit~

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



Maritime Broadband Radio System

MBR 144 System for Fixed Installation~

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



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

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

VESSEL REFERENCE – RELATIVE POSITIONING SYSTEMS

RADius 1000S System – Single Interrogator

Relative Positioning System

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



RADius 1000D System – Dual Interrogator

Relative Positioning System

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



RADius 1000T System – Triple Interrogator

Relative Positioning System

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



RADius 1000Q System – Quad Interrogator

Relative Positioning System

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



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

VESSEL REFERENCE – RELATIVE POSITIONING SYSTEM PARTS

RADius 1000 Interrogator Unit

Interrogator unit for RADius 1000 System*

Frequency band: 5.51 - 5.61 GHz
Interrogator opening angle: $\pm 45^\circ$ (vertical & horizontal)
Interrogator enclosure protection: IP 66 rated
Power requirements: 48 Vdc $\pm 10\%$, 70 W (max)
Width, height & depth, weight: 562 x 412 x 184 mm, 8 kg
***Note:** The power / connection shelf may have to be upgraded if the interrogator is added to an existing RADius 1000 system.



RADius 1000 Remote Interrogator Unit

Remotely located Interrogator unit for RADius 1000 System*

RADius remote power and modem cabinet
Modem mounted on rail in RADius controller unit cabinet
Frequency band: 5.51 - 5.61 GHz
Interrogator opening angle: $\pm 45^\circ$ (vertical & horizontal)
Interrogator and remote cabinet protection: IP 66 rated
Remote Cabinet power requirements: 110-240 Vac, 70 W (max)
Interrogator width, height & depth, weight: 562 x 412 x 184 mm, 8 kg
Remote Cabinet width, height, depth: 360, 360, 242 mm
***Note:** The cabling from the remote interrogator cabinet to controller unit is not supplied but maybe purchased on request.



RADius 1000 Processing Unit

Processing unit for RADius 1000 System

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



VESSEL REFERENCE – RELATIVE POSITIONING SYSTEM TRANSPONDERS

RADius 550X

Low Power, Long Range ATEX Rated Transponder*

Operational Range: 550 metres
DP Range: 350 metres
Operating Sector: $\pm 45^\circ$ (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: $\pm 45^\circ$ (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: $\pm 45^\circ$ (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: $\pm 45^\circ$ (vertical & horizontal)
Powered by lithium metal battery cells
Width, height & depth, weight: 562 x 412 x 184 mm, 6 kg
Note: Not ATEX Rated



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

VESSEL REFERENCE – LASER RANGING SYSTEMS

SpotTrack System

High Precision Positioning and Tracking System

Vertical angular coverage: 65° (min)
Horizontal angular coverage: 360°
DP range: 10 to 1000 m
Horizontal position accuracy: (2σ) 1 m @ 1000 m range
Bearing accuracy: (2σ) 1 mrad (0.06°)
Vertical stabilization: $< \pm 0.5^\circ$ for roll, pitch $< \pm 20^\circ$
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: $\pm 15^\circ$ range (5° increments)
Operating range: up to a maximum of 2000m (weather dependant)
Range accuracy: 20 cm
Angular accuracy: 0.1°
Single target, auto & fixed sector tracking
Scanning head operating conditions: IP 66 rated, -20°C to +55°C
Power requirements: 85-264 Vac, 61 W
Scanning head width, height, depth, weight: 300, 290, 200 mm, 12.9kg.



Fanbeam and SpotTrack Reflector / Prism

Prism Single (1 prism) or Reflective Target tube (360 degree)



6-way prism cluster (6 prisms)

Max range: 1000 m / 1 km – 2000 m / 2 km
Angle coverage: 150°



Note: regarding reflectors:

4-way prism cluster covers 120 degrees, range out to around 800m

6-way prism cluster stacked by three, range out to around 2000m

*Note: Regarding DP Use:

Units supplied on rental for DP use, assume that the vessel has a correctly installed and operational interface.

The use of "Pseudo" DP interfaces is not recommended, and is in no way supported by Kongsberg Maritime.

IMCA guidelines should be adhered to at all times when systems are used as DP reference.

Please make contact with the DP system supplier if any doubt exists, in the case of any of the Kongsberg Maritime range of DP systems, assistance can be supplied at the time of rental enquiry.

VESSEL REFERENCE – (D)GNSS POSITIONING SYSTEMS

Kongsberg Seatex DPS 232 System

GNSS Based Position Reference Sensor

Combined GPS L1/L2, GLONASS L1/L2 and SBAS receiver
MULTIREF capability

Accepts DGPS / DGLONASS corrections: RTCM-SC104 ver. 2.2, 2.3, 3.0, 3.1, SeaSTAR HP, SeaSTAR XP, SeaSTAR G2

SBAS accuracy: < 1 m, 95 % CEP, 0.6 m, 1 σ

SeaSTAR XP/HP/G2 horizontal accuracy: 10 cm, 95 % CEP

SeaSTAR XP/HP/G2 vertical accuracy 15 cm, 95 % CEP

Interface Ports: 8 x isolated serial ports (6 configurable between RS-232 and RS-422), 4 x Ethernet / LAN

19" rack mount cabinet (6U) c/w integrated display/keyboard unit

Width, height, depth (6 U cabinet): 553, 660, 600 mm

Power: 100 - 240 Vac, 50/60 Hz, max 60 W

Supplied with a DGPS IALA radio beacon antenna

Optional system item:

- 3610/3710 DGNSS Receiver.



3610/3710 DGNSS Receiver

DGNSS Correction Services Receiver Unit

Fugro Seastar XP/HP/G2/DGNSS capability

Supplied with type AD430-3141 DGNSS (Spotbeam) antenna

External Interfaces: 1 x Serial port (RS-232 or RS-422)

Baud rate 115 200 bytes/sec, 1 x Ethernet / LAN, USB

Data Outputs:-

Message format: Multiplexed (MUX) correction format

Message type: Multiplexed correction data output with status

Power: 100 - 240 Vac, 50/60 Hz, max 75 W

Note: Subscription to Fugro correction services not included.



VESSEL REFERENCE – (D)GNSS POSITIONING SYSTEM PARTS

Kongsberg Seatex DPS 232 Processing Unit

GNSS Based Position Reference Sensor

Combined GPS L1/L2, GLONASS L1/L2 and SBAS receiver

19" rack mount, 2U height

Power: 100 - 240 Vac, 50/60 Hz, max 60 W.



Kongsberg Seatex DPS 200 Processing Unit

GNSS Based Position Reference Sensor

Combined GPS L1, GLONASS L1 and SBAS receiver

19" rack mount

Power: 100 - 240 Vac, 50/60 Hz, max 60 W.



VESSEL REFERENCE SYSTEMS – POSITION, HEADING & ATTITUDE SYSTEMS

Kongsberg Seapath 130-3 System

Compact GNSS Aided Heading, Attitude and Positioning Sensor

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



Note: No export licence required.

Kongsberg Seapath 130-H System

Compact GNSS Aided Heading, Attitude and Positioning Sensor

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



Kongsberg Seapath 130-5 System

Compact GNSS Aided Heading, Attitude and Positioning Sensor

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



Kongsberg Seapath 130-5+ System

Compact GNSS Aided Heading, Attitude and Positioning Sensor

Real-time, Position, Roll, Pitch, Heave & Heading
Supplied with a MRU-5+ Motion Sensor in Subsea Housing
Dual frequency GPS/GLONASS and SBAS receiver
Position accuracy: 0.5m RMS or 1m (95% CEP) with DGNSS/SBAS
Dynamic accuracy Roll/Pitch; Heading: 0.008°; 0.08° RMS
Heave accuracy (real-time): 5cm or 5% whichever is highest
Heave accuracy (delayed signal): 2cm or 2% whichever is highest
Data output rate: up to 100 Hz
Data outputs: 3 x Serial RS-232/422 lines, 8 x Ethernet UPD/IP ports
Power: Sensor Unit: 24 Vdc, 10W; MRU: 24 Vdc, 12W
Sensor Unit length, width, height; weight: 1210, 210, 94 mm; 6.8 kg
Supplied as standard with a 20 m sensor spider cable.



Kongsberg Seapath 330-5 System**GNSS Aided Heading, Attitude and Positioning Sensor**

Real-time, Position, Roll, Pitch, Heave & Heading

Supplied with MRU-5 Motion sensor

Dual frequency GPS/GLONASS and SBAS receiver

Position accuracy: 0.5 m RMS / 1 m (95% CEP) with DGNSS corrns

Heading accuracy: 0.065° RMS (2.5m baseline)

Dynamic accuracy Roll & Pitch: 0.02° RMS for +/- 5° amplitude

Heave accuracy (real-time): 5cm or 5% whichever is highest

Data output rate: up to 200 Hz

Power: 100-240 VAC, 138 W (max).

Antenna Beam width, depth, length; weight: 250, 40, 2560 mm; 7 kg

Supplied as standard with 2 x 25 m GNSS cables (RG-214)

Optional system item:

- Trimble SPS 852 Reference Station
- 3610/3710 DGNSS Corrections Receiver.



Kongsberg Seapath 330-5+ System**GNSS Aided Heading, Attitude and Positioning Sensor**

Real-time, Position, Roll, Pitch, Heave & Heading

Supplied with a MRU-5+ Motion sensor

Dual frequency GPS/GLONASS and SBAS receiver

Position accuracy (X and Y): 1 cm + 1.6 ppm RMS with RTK corrns

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

Heading accuracy: 0.065° RMS (2.5m baseline)

Dynamic accuracy Roll & Pitch: 0.008° RMS for +/- 5° amplitude

Heave accuracy (real-time): 5cm or 5% whichever is highest

Data output rate: up to 200 Hz

Power: 100-240 VAC, 138 W (max).

Antenna Beam width, depth, length; weight: 250, 40, 2560 mm; 7 kg

Supplied as standard with 2 x 25 m GNSS cables (RG-214)

Optional system item:

- Trimble SPS 852 Reference Station
- 3610/3710 DGNSS Corrections Receiver.



Kongsberg Seapath 380-3 System**GNSS Aided Heading, Attitude and Positioning Sensor**

Real-time, Position, Roll, Pitch, Heave & Heading

Supplied with a MRU-3 Motion sensor

Dual frequency GPS/GLONASS/Galileo/Beidou/QZSS and SBAS receiver

Position accuracy (DGNSS/GLONASS): 0.5 m RMS or 1 m 95% CEP

Position accuracy (Fugro XP2/G2/G4): 0.1 m RMS or 2 m 95% CEP

Heading accuracy: 0.07° RMS (2.5m baseline)

Dynamic accuracy Roll & Pitch: 0.08° RMS for +/- 5° amplitude

Heave accuracy (real-time): 5cm or 5% whichever is highest

Data outputs: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports, 3 x Analogue channels and 1 x 1PPS

Data output rate: up to 200 Hz

Power: 100-240 VAC, 138 W (max).

Antenna Beam width, depth, length; weight: 250, 40, 2560 mm; 7 kg

Supplied as standard with 2 x 25 m GNSS cables (RG-214)

Optional system item:

- Trimble SPS 852 Reference Station
- 3610/3710 DGNSS Corrections Receiver.



Kongsberg Seapath 380-H System**GNSS Aided Heading, Attitude and Positioning Sensor**

Real-time, Position, Roll, Pitch, Heave & Heading

Supplied with a MRU-H Motion sensor

Dual frequency GPS/GLONASS/Galileo/Beidou/QZSS and SBAS receiver

Position accuracy (DGNSS/GLONASS): 0.5 m RMS or 1 m 95% CEP

Position accuracy (Fugro XP2/G2/G4): 0.1 m RMS or 2 m 95% CEP

Heading accuracy: 0.07° RMS (2.5m baseline)

Dynamic accuracy Roll & Pitch: 0.03° RMS for +/- 5° amplitude

Heave accuracy (real-time): 5cm or 5% whichever is highest

Data outputs: 8 x serial RS-232/RS-422 lines, 4 x Ethernet/LAN ports, 3 x Analogue channels and 1 x 1PPS

Data output rate: up to 200 Hz

Power: 100-240 VAC, 138 W (max).

Antenna Beam width, depth, length; weight: 250, 40, 2560 mm; 7 kg

Supplied as standard with 2 x 25 m GNSS cables (RG-214)

Optional system item:

- Trimble SPS 852 Reference Station
- 3610/3710 DGNSS Corrections Receiver.



Kongsberg Seapath 380-5 System
GNSS Aided Heading, Attitude and Positioning Sensor

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

Optional system item:

- Trimble SPS 852 Reference Station
- 3610/3710 DGNSS Corrections Receiver.



Kongsberg Seapath 380-5+ System
GNSS Aided Heading, Attitude and Positioning Sensor

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

Optional system item:

- Trimble SPS 852 Reference Station
- 3610/3710 DGNSS Corrections Receiver.



SeaNav 300
GNSS Heading and Positioning Sensor

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



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



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

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

VESSEL REFERENCE SENSORS – MOTION REFERENCE UNITS

Kongsberg Seatex MRU-6

Motion Sensor

Real-time, Roll, Pitch, Heave & Heading
Static Accuracy Roll & Pitch: 0.025° RMS
Dynamic Accuracy Roll & Pitch; Hdg: 0.03°; 1° RMS
Dynamic Accuracy Heave: 5 cm or 5 % whichever highest
Power Supply 12-30 V dc, 14.5 W
Diameter, height, weight: 105, 205 mm, 2.5 kg
Optional items:

- 10 m or 1000 m MRU subsea housing
- MRU wall mounting bracket
- MRU junction box.



Kongsberg Seatex MRU-5+

Motion Sensor

Real-time Roll, Pitch and Heave Measurements
Dynamic Accuracy Roll & Pitch: 0.008° RMS
Dynamic Accuracy Heave (real-time): 5 cm or 5 % whichever highest
Data Outputs: RS-232, RS-422 and Ethernet
Data Output Rate (max): 200 Hz
Power Supply: 10-36 V dc, max 12 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:

- 10 m or 500 m MRU subsea housing
- MRU wall or floor mounting bracket
- MRU junction box (required for analogue channels).



Kongsberg Seatex MRU-5

Motion Sensor

Real-time, Roll, Pitch, Heave
Static Accuracy Roll & Pitch: 0.025° RMS
Dynamic Accuracy Roll & Pitch: 0.02° RMS (for a ±5° amplitude)
Dynamic Accuracy Heave: 5 cm or 5 % whichever highest
Power Supply 12-30 V dc, max 8 W
Diameter, height, weight: 105, 205 mm, 2.5 kg
Optional items:

- 10 m or 1000 m MRU subsea housing
- MRU wall mounting bracket
- MRU junction box.

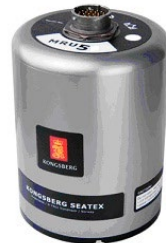


Kongsberg Seatex MRU-5 (5th Generation)

Motion Sensor

Real-time Roll, Pitch and Heave Measurements
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).



Kongsberg Seatex MRU-H

Motion Sensor

Real-time, Roll, Pitch, Heave
Static Accuracy Roll & Pitch: 0.04°/s RMS
Dynamic Accuracy Roll & Pitch: 0.05° RMS (for a ±5° amplitude)
Dynamic Accuracy Heave: 5 cm or 5 % whichever highest
Power Supply 12-30 V dc, 6 W
Diameter, height, weight: 105, 205 mm, 2.5 kg
Optional items:

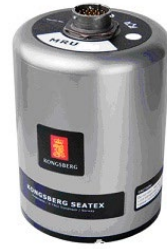
- 10 m or 1000 m MRU subsea housing
- MRU wall mounting bracket
- MRU junction box.



**Kongsberg Seatex MRU-H (5th Generation)
Motion Sensor**

Real-time Roll, Pitch and Heave Measurements
Angular Orientation Range: $\pm 180^\circ$
Dynamic Accuracy Roll & Pitch: 0.05° RMS
Dynamic Accuracy Heave (real-time): 5 cm or 5 % whichever highest
Data Outputs: RS-232, RS-422 and Ethernet
Data Output Rate (max): 200 Hz
Power Supply: 10-36 V dc, max 12 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:

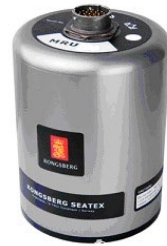
- 10 m or 500 m MRU subsea housing
- MRU wall or floor mounting bracket
- MRU junction box (required for analogue channels).



**Kongsberg Seatex MRU-3 (5th Generation)
Motion Sensor**

Real-time Roll, Pitch and Heave Measurements
Angular Orientation Range: $\pm 45^\circ$
Dynamic Accuracy Roll & Pitch: 0.08° RMS
Dynamic Accuracy Heave (real-time): 5 cm or 5 % whichever highest
Data Outputs: RS-232, RS-422 and Ethernet
Data Output Rate (max): 200 Hz
Power Supply: 10-36 V dc, max 12 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:

- 10 m or 500 m MRU subsea housing
- MRU wall or floor mounting bracket
- MRU junction box (required for analogue channels).



Note: No export licence required.

**Kongsberg Seatex MRU-2
Roll & Pitch Sensor**

Real-time, Roll, Pitch
Static Accuracy Roll & Pitch: 0.08° RMS
Dynamic Accuracy Roll & Pitch: 0.1° RMS (for a $\pm 5^\circ$ amplitude)
Power Supply 12-30 V dc, 6 W
Diameter, height, weight: 105, 205 mm, 2.5 kg
Optional items:

- MRU wall mounting bracket
- MRU junction box.



**Kongsberg Seatex MRU-D
Roll & Pitch Sensor**

Real-time, Roll, Pitch
Static Accuracy Roll & Pitch: 0.3° RMS
Dynamic Accuracy Roll & Pitch: 0.35° RMS (for a $\pm 5^\circ$ amplitude)
Power Supply 12-30 V dc, 3 W
Diameter, height, weight: 105, 129 mm, 1.5 kg
Note: No export licence required.
Optional items:

- MRU wall mounting bracket
- MRU junction box.

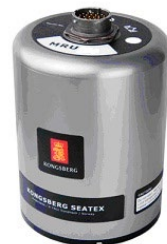


Note: No export licence required.

**Kongsberg Seatex MRU-D (5th Generation)
Roll & Pitch Sensor**

Real-time, Roll, Pitch
Static Accuracy Roll & Pitch: 0.3° RMS
Dynamic Accuracy Roll & Pitch: 0.35° RMS (for a $\pm 5^\circ$ amplitude)
Power Supply 10-36 V dc, max 3 W
Diameter, height, weight: 105, 140 mm, 2.4 kg
Optional items:

- MRU wall mounting bracket
- MRU junction box.



Note: No export licence required.

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

UNMANNED SURFACE VEHICLES

GeoSwath 4R USV System Unmanned Surface Vessel (USV)

Vehicle specifications:

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

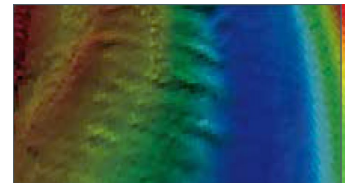
Optional System Item:

- Trimble SPS 852 Reference Station

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

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

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



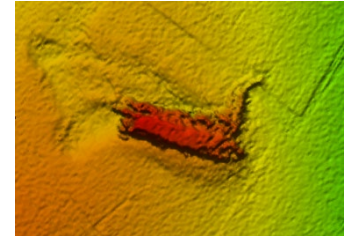
AUTONOMOUS UNDERWATER VEHICLES

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



Sensor Payload:

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



Technical Specification:

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

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

Optional System Items:

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

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

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

***Note:** The MUNIN system is supplied with lithium battery cells which are subject to the IATA Dangerous Goods Regulations UN3480/UN3481 for transportation by air.



KONGSBERG

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.

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