Sonardyne

products + specifications guide

Edition

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Positioning
USBL, LBL, Releases

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Datasheet

6G Acoustic Comms Module (ACM) – External Clock

The 6G® ACM is based on field proven electronics from the Compatt 6 family and has been modified to reduce the overall size to allow it to be easily incorporated as OEM into third party pressure housings.

The 6G ACM can provide all of the capabilities of a 6G instrument and benefits of Wideband® V2 acoustic communications.

The Module is housed in a bespoke aluminium container which protects the sensitive electronics from external noise, electrostatic discharge and mechanical damage.

The module is supplied with an acoustic transducer that provides a complete acoustic communication system.

The 6G ACM benefits from being compatible with all 6G transceivers, thereby enabling data download or command and control from vessels of opportunity.

The 6G ACM is supplied as a fully tested instrument with a Sonardyne transducer (only this transducer can be used).

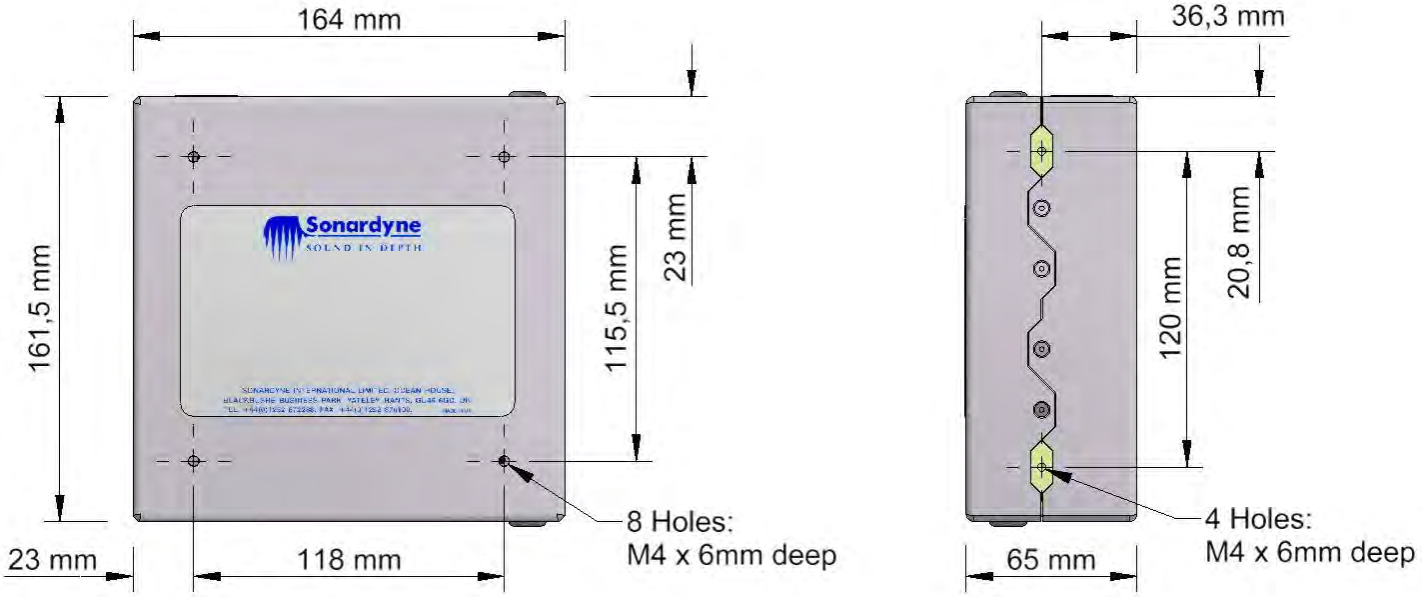
The lids are screwed to the chassis on each side with countersunk screws. Four M4 x6 mm holes are provided on both sides of the housing for mounting (shown on the technical drawing). The aluminium housing is approximately 165 x 164 x 65 mm and is soft anodised to provide basic protection.

Key Features

- Transmission and reception of user data at rates of up to 9 kbps
- Large input serial buffer 512 kB
- Flexible operation; scheduled, subsea master, trigger level, serial time-outs etc.
- Configurable behaviour; retries, missed sub-frames, buffer flushing
- Dual RS232 serial port
- Trigger input or Synch output
- General purpose I/O
- External power out; VBatt or 12 V regulated
- External power in; Quiescent, ping and charging (not telemetry)
- Dual Battery pack connection

Specifications

6G Acoustic Comms Module (ACM) – External Clock



Feature		8290 MF Omni-Directional	8290 MF Directional	8290 LMF Directional
Operating Range		3,000 m	>3,000 m	>5,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)	LMF (14–20 kHz)
Transducer Beam Shape		Omni-directional	Directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 Levels)	190–202 dB (4 Levels)	190–202 dB (4 Levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	196–208 dB	196–208 dB
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 Levels)	80–120 dB (7 Levels)	80–120 dB (7 Levels)
Number of Unique Addresses		>600	>450	>450
Ranging Precision		Better than 15 mm	Better than 15 mm	Better than 15 mm
External Power Supply		24 V (20–40 V)	24 V (20–40 V)	24 V (20–40 V)
Battery Supply	Input Voltage Range	11–16.8V	11–16.8V	11–16.8V
	Sleep/Active Power	45 mW/150 mW	45 mW/150 mW	45 mW/150 mW
	Transmitting Power	60 W typ. 120 W peak during high power telemetry		
Dimensions (Length x Width x Height)		165 x 164 x 65 mm	165 x 164 x 65 mm	165 x 164 x 65 mm
Serial Connections		2 x RS232	2 x RS232	2 x RS232
Battery		1 or 2 Sonardyne alkaline, lithium or Li-ion packs[2]		
Dimensions (Length x Width x Height)		164 x 162 x 65 mm	164 x 162 x 65 mm	164 x 162 x 65 mm
Operating Temperature		-5 to 40°C	-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C	-20 to 55°C

[1] Third party battery packs will allow any capacity or voltage monitoring.

[2] The system has a battery disconnect for improved transportation safety by means of a short circuit between two pins specific on the connector.

Datasheet
AvTrak 6 Transceiver

AvTrak 6 is an acoustic navigation and communications instrument designed to form part of an integrated AUV tracking and navigation system.

It combines the functions of transponder, transceiver and telemetry link in one low power unit that has been designed to meet the requirements of a wide variety of AUV mission scenarios and vehicle types.

The unit operates in Sonardyne Wideband®2. It is also fully compatible with our family of survey quality LBL and USBL navigation systems.

AvTrak 6 is available in 3,000 m, 5,000 and 7,000 m depth versions.

AvTrak 6 has a comprehensive yet easy to use command language that allows the AUV to undertake simultaneous LBL ranging, USBL tracking via a surface vessel and robust telemetry for AUV to vessel and AUV to AUV communications.

This capability can be used to provide absolute position reference data to periodically update the AUV's inertial navigation system.

The instrument is available in a variety of configurations with integral or remote transducer options. This flexible configuration is intended both to assist the AUV manufacturer with mounting of the instrument within the AUV and to ensure the highest levels of acoustic performance.

AvTrak 6 supports a Sonardyne Messaging Service (SMS) that allows custom payloads to be transferred to and from any 6G® transceiver. This allows for vehicle configuration or USBL position fixes to be acoustically sent to the vehicle or for status messages to be retrieved from the topside system.

There is an option to include a HPR 400 series tone for compatibility with a variety of other acoustic systems and transponders and another option to enable a RSPSK Modem upgrade for large volume data transfers.

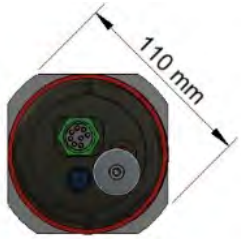
A number of acoustically controlled digital I/O lines are also provided for custom use, typical applications include mission abort and emergency ballast jettison control.

Key Features

- Incorporates Sonardyne Wideband 2 acoustic navigation and telemetry technologies
- Compatible with Ranger USBL for surface vessel combined positioning and telemetry
- Supports AUV to AUV ranging and telemetry (transceiver mode)
- Emergency relocation mode
- Custom I/O for mission abort and ballast jettison
- Pressure and temperature sensors
- Extremely low power consumption
- Internal back-up battery with external trickle charge
- Configurable as a surface vessel unit for AUV ranging and telemetry

Specifications

AvTrak 6 Transceiver

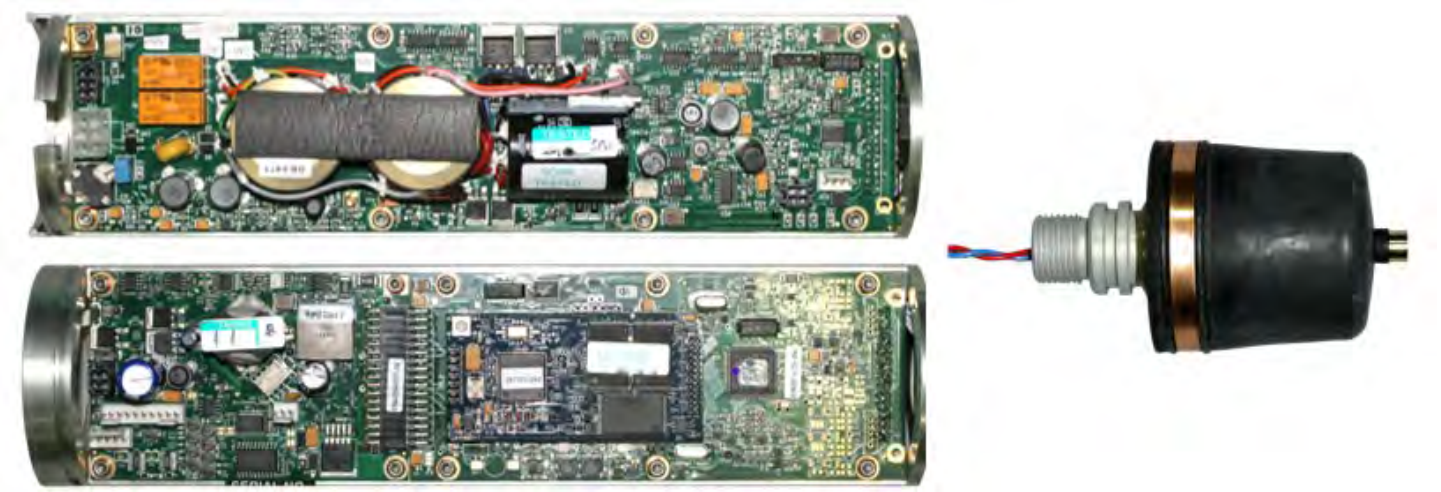


Features		Type 8220-3111	Type 8220-5212	Type 8220-7212
Depth Rating		3,000 m	5,000 m	7,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional	Directional	Directional
Transmit Source Level (re 1 µPa @ 1 m)	High Power	187 dB	193 dB	193 dB
	Low Power	181 dB	187 dB	187 dB
Tone Equivalent Energy (TEE)[1] WBv2+	High Power	193 dB	199 dB	199 dB
	Low Power	187 dB	193 dB	193 dB
Range Precision		Better than 15 mm	Better than 15 mm	Better than 15 mm
Depth Sensor		± 0.5% full scale	± 0.5% full scale	± 0.5% full scale
Communications Interface		RS232 (9,600–115,200 baud)		
External Supply Voltage		24 or 48 V dc (± 10%)	24 or 48 V dc (± 10%)	24 or 48 V dc (± 10%)
External Power	Sleep	~650 mW	~650 mW	~650 mW
	Wideband Listening	~1 W	~1 W	~1 W
	Battery Charging	6 W	6 W	6 W
	Peak (During Transmission)	<50 W	<50 W	<50 W
Battery Life (Li-ion 15 V)	Listening	30 days	30 days	30 days
	Continuous 5 Sec Interrogation	Approx. 6 days at low power		
Operating Temperature		-5 to 40°C	-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C	-20 to 55°C
Mechanical Construction		Anodised aluminium alloy and plastic		
Dimensions (Diameter x Length)		93 x 500 mm	97 x 513 mm	97 x 513 mm
Weights in Air/Water[2]		5.1/2.2 kg	7.0/3.5 kg	7.0/3.5 kg
Options		Remote, cable connected transducer Right-angle connector	Right-angle connector	Right-angle connector

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing Wideband and tone systems.

[2] Estimated weights.

Datasheet
AvTrak 6 OEM Transceiver



The AvTrak 6 OEM Transceiver is specially designed for underwater vehicles. The lightweight rechargeable transceiver design allows for easy integration into autonomous vehicles and provides all of the features supported by the standard AvTrak 6 transceiver.

The integrated Li-ion rechargeable battery provides up to 30 days emergency standby life, allowing sufficient time to relocate and recover a lost vehicle.

The AvTrak 6 transceiver operates in the Medium Frequency (MF) band so it is compatible with Sonardyne's Ranger 2 and Mini-Ranger 2 6G® Wideband® Ultra-Short Baseline (USBL) systems.

The AvTrak 6 supports the standard 6G command language (thereby simplifying development across the 6G instrument range) and Sonardyne's Messaging Service (SMS) telemetry, which provides an integrated navigation and data link vehicle solution in a single instrument.

As part of a 6G USBL system, the Avtrak 6 supports high update rate position information, where the prior position is communicated to the vehicle on each navigation cycle. This considerably reduces the position aiding latency.

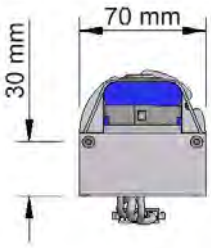
The OEM chassis can be customised to provide mounting points for specific vehicle internals and is supplied with a threaded boss mount MF omni-directional transducer for integration into a vehicle.

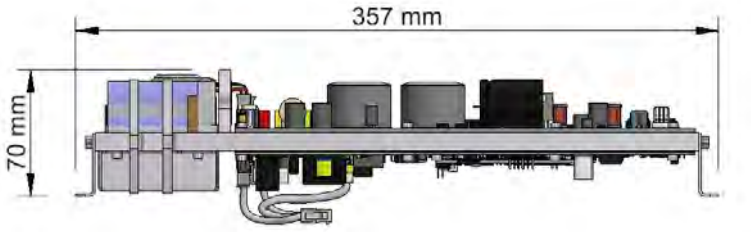
Key Features

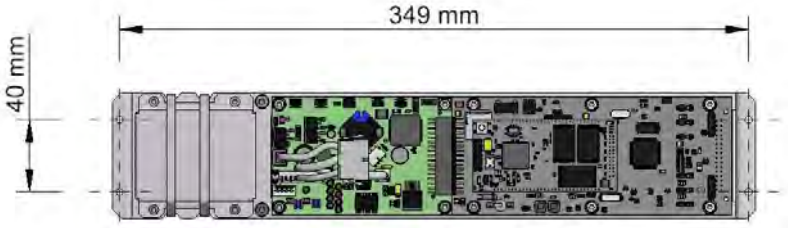
- Small size for fitting in small AUVs or ROVs
- Standard 6G Command Language to allow easy migration from other 6G transceivers or OEM solutions
- Operating range typically up to 3,000 m
- RS232 serial interface
- MF operation
- Standard, oil filled, omni-directional transducer
- Compatible with Sonardyne Ranger 2 and Mini-Ranger 2 USBL systems
- Integrated navigation and telemetry solution
- Optional pressure sensor input for depth aiding
- >300 independent acoustic addresses
- Emergency recovery transponder
- High update rate, low latency telemetry position aiding capability

Specifications

AvTrak 6 OEM Transceiver







Feature		Type 8220 OEM
Operating Range		3,000 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional ±130°
Source Level (re 1 µPa @ 1 m)		187 dB
Communication Interface		Serial RS232
Pressure Sensor (Optional)		100 or 400 bar (± 0.5% FS)
Power Supply[1]		24/48 V dc (± 10%) 650 mW to 6 W (depending on battery charge state) <50 W peak power when transmitting telemetry
Battery Life	Quiescent Listening	>30 days
	1 Second Ping Rate	>1 day
External Connections[2]	PL2-5 RS232 RX (PC TX) PL2-6 RS232 TX (PC RX)	PL2-1 Comms 0 V PL1-1 +V external dc voltage 24/48 V (±10%) PL1-3 Power 0 V (isolated from comms 0 V)
Transducer Wire Length[3]		150 mm (6”)
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 55°C
Chassis Dimensions (Length x Height x Depth)	With Mounting Bracket	357 x 70 x 70 mm
	Without Mounting Brackets	335 x 69 x 70 mm
Weight in Air	Chassis	750 g
	Transducer	300 g

[1] Any noise on the external dc supply will have an effect on the acoustic performance of the instrument.
[2] Extra care is required when connecting the OEM transceiver to external equipment as minimal protection is provided.
[3] It is possible to increase the transducer wire length if required; contact Sonardyne for more information.

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Datasheet

AvTrak 6 Nano Transceiver

The AvTrak 6 Nano Transceiver is a specially designed variant of the established AvTrak 6 for small underwater vehicles. It combines the functions of transponder, transceiver and telemetry link for intelligent subsea operations. It is available in OEM and Cabled form factors allowing for easy integration into many different platforms.

The integrated li-ion rechargeable battery has up to 3 months emergency standby life, allowing sufficient time to relocate and recover a lost vehicle or asset.

The AvTrak 6 Nano operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Ranger 2 family of 6G® Wideband® USBL system and beacons. It supports the standard 6G command language, thereby simplifying development across the 6G instrument range.

The AvTrak 6 Nano supports Sonardyne's Messaging Service (SMS) telemetry and MODEM functionality, allowing it to command and communicate with multiple subsea assets.

As part of a 6G USBL system, the AvTrak 6 Nano supports high update rate position information via robotics pack in Ranger 2 USBL, where the prior position is communicated to the vehicle on each navigation cycle. This considerably reduces the position aiding latency.

Common functionality with the established AvTrak 6 ensures that the AvTrak 6 family can be used across a range of vehicles and development programmes.

Key Features

- Incorporates Sonardyne Wideband 2 acoustic navigation and telemetry technologies
- Full transceiver functionality for remote command and control.
- Standard 6G command language to allow easy migration from AvTrak 6 to AvTrak 6 Nano and vice versa
- Compatible with Sonardyne Ranger 2 USBL systems
- Supports AUV to AUV ranging and telemetry (transceiver mode)
- Emergency relocation mode
- Miniature size for fitting in small AUVs or ROVs
- Operating range approximately 3000 m
- Solid omni-directional transducer
- High update rate, low latency telemetry position aiding capability
- Full Modem capability
- OEM version available

Specifications

AvTrak 6 Nano Transceiver

Feature		Type 8262 AvTrak 6 Nano
Operating Range		>3,000[1] m
Depth Rating		500 m
Operating Frequency		MF 19–34 kHz
Transducer Beam Shape		Omni-directional ±130°
Source Level (re 1 µPa @ 1 m)	Modem	175 dB
	Tracking & Telemetry[2]	184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs +/-0.7% FS
Power Supply[3]		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (Ext. Power)[4]	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Subconn MCIL8M
Mechanical Construction		Polymer
Operating Temperature[5]		-10 to 45°C
Storage Temperature[6]		-20 to 55°C
Dimensions (Length x Diameter)		192 x 55 mm
Weight in Air/Water		584/162 g

[1] UK export licensable, license free available with limited range. Range dependent on environment. 995m range when used with Micro-Ranger 2/range limited Ranger 2 systems.
[2] Configurable.
[3] Noise on the external dc supply may have an effect on the acoustic performance of the instrument.
[4] Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency.
[5] The battery will not charge above 45°C.
[6] To maximise battery life, the instrument should not be stored above 30°C.

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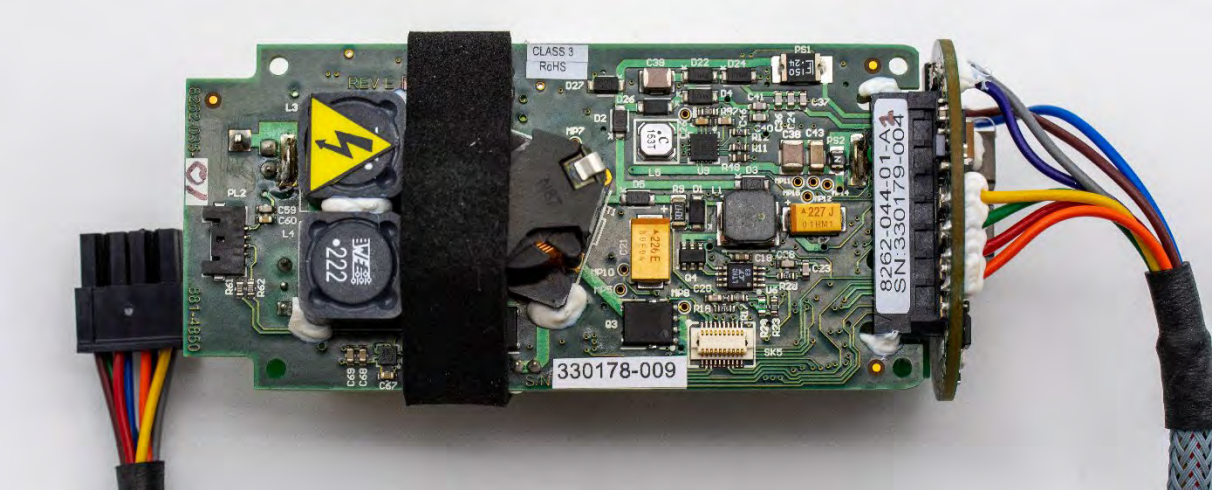
Datasheet

AvTrak 6 OEM Nano Transceiver



The AvTrak 6 OEM Nano Transceiver is a specially designed variant of the established AvTrak 6 for small underwater vehicles. It combines the functions of transponder, transceiver and telemetry link for intelligent subsea operations. It is available in OEM and Cabled form factors allowing for easy integration into many different platforms.

The integrated li-ion rechargeable battery has up to 3 months emergency standby life, allowing sufficient time to relocate and recover a lost vehicle or asset.

The AvTrak 6 OEM Nano operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Ranger 2 family of 6G® Wideband® USBL system and beacons. It supports the standard 6G command language, thereby simplifying development across the 6G instrument range.

The AvTrak 6 OEM Nano supports Sonardyne's Messaging Service (SMS) telemetry and MODEM functionality, allowing it to command and communicate with multiple subsea assets.

As part of a 6G USBL system, the AvTrak 6 Nano supports high update rate position information via robotics pack in Ranger 2 USBL, where the prior position is communicated to the vehicle on each navigation cycle. This considerably reduces the position aiding latency.

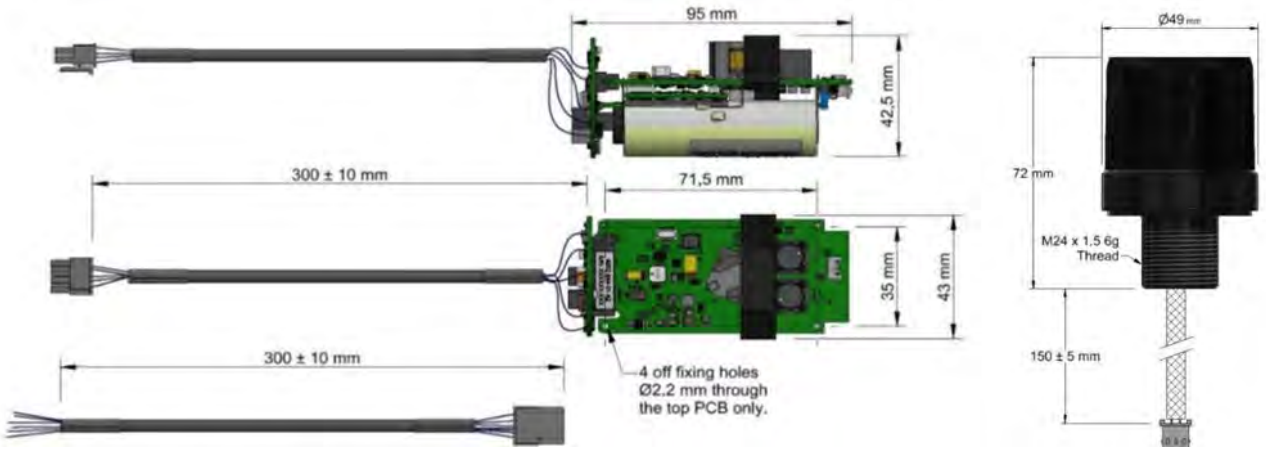
Common functionality with the established AvTrak 6 ensures that the AvTrak 6 family can be used across a range of vehicles and development programmes.

Key Features

- Incorporates Sonardyne Wideband 2 acoustic navigation and telemetry technologies
- Full transceiver functionality for remote command and control.
- Standard 6G command language to allow easy migration from AvTrak 6 to AvTrak 6 Nano and vice versa
- Compatible with Sonardyne Ranger 2 USBL systems
- Supports AUV to AUV ranging and telemetry (transceiver mode)
- Emergency relocation mode
- Miniature size for fitting in small AUVs or ROVs
- Operating range approximately 3,000 m
- Solid omni-directional transducer
- High update rate, low latency telemetry position aiding capability
- Full modem capability

Specifications

AvTrak 6 OEM Nano Transceiver



Feature		Type 8262 AvTrak 6 OEM Nano
Operating Range		>3,000[1] m
Transducer Depth Rating		500 m
Operating Frequency		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional ±130°
Source Level (re 1 µPa @ 1 m)	Modem	175 dB
	Tracking & Telemetry[2]	184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs +/-0.7% FS
Power Supply[3]		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (External Power)[4]	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Molex Microfit
Transducer Wire Length[5]		150 mm (6”)
Operating Temperature[6]		-10 to 45°C
Storage Temperature[7]		-20 to 55°C
Dimensions	Transducer (Length x Diameter)	72 x 49 mm
	PCB Board Assembly (Length x Width x Height)	95 x 43 x 42.5 mm
	Hole Centres (M2 clearance – Length x Diameter)	71.5 x 35 mm
Weights	PCB in Air	138g PCB + 12g cable
	Transducer in Air/Water (Estimated)	200/150 g

[1] UK export licensable, license free available with limited range. Range dependent on environment. 995 m range when used with Micro-Ranger 2/range limited Ranger 2 systems.
[2] Configurable.
[3] Noise on the external dc supply may have an effect on the acoustic performance of the instrument.
[4] Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency.
[5] It is possible to increase the transducer wire length if required; contact Sonardyne for more information.
[6] The battery will not charge above 45°C.
[7] To maximise battery life, the instrument should not be stored above 30°C.

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Datasheet

Compatt 6+ USBL/LBL Transponder and Modem

Compatt 6+ is the new industry standard, Wideband®2 and 3 enabled transponder, used for high-precision survey and construction operations in all water depths. Compatt 6+ is fully compatible with all 6G® equipment and Sonardyne's latest 6G LBL, INS and USBL systems, including Fusion 2.

Compatt 6+ offers significant time saving offering fast update rates (up to 1 Hz LBL tracking), all made possible using the Wideband 3 acoustic telemetry protocols. Compatt 6+ continues to use the fast and robust Sonardyne Wideband 2 acoustic ranging protocols proven to offer accurate ranging. Support of Wideband 2 ranges maintains backwards compatibility. This makes any system operating with Compatt 6+ significantly easier to operate therefore de-risking operations, reducing vessel time and reducing training requirements for offshore personnel.

Sonardyne Wideband advanced signal processing offers improved acoustic performance in challenging conditions, longer ranges, improved multipath rejection around structures and real-time range diagnostics for quality control. Sonardyne Wideband also reduces the interference to and from adjacent Sonardyne and other acoustic positioning systems.

The integrated communications and navigation technology allows the transponder to be used as a multi-purpose modem, autonomous data logger and navigation reference transponder.

The Type 8300 Compatt 6+ is the standard length version and is based on the field proven mechanics of Compatt 6. The design offers the perfect balance between size, acoustic output and battery life. Several depth ratings are available: 3,000, 5,000 and 7,000 m, all using a hard anodised aluminium alloy with protective polyurethane sleeves.

Typical Applications

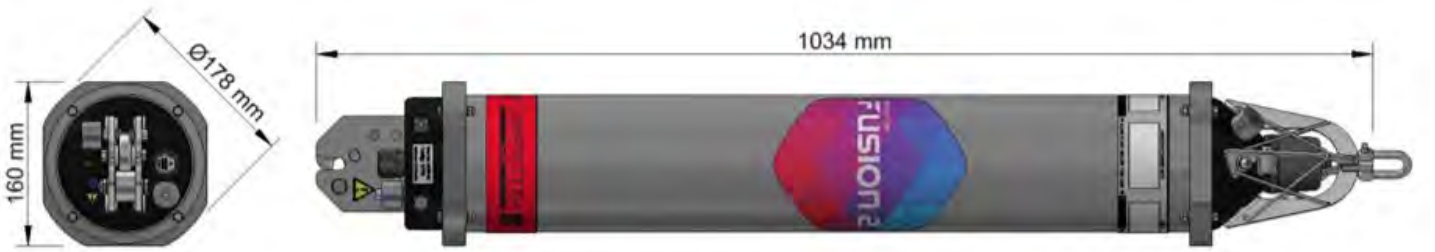
- LBL positioning
- Spool piece metrology
- Sparse LBL aided SPRINT INS

Key Features

- Medium Frequency (MF) band utilising Sonardyne Wideband 2 and 3 telemetry protocols
- Sonardyne Wideband 2 and HPR 400 navigation compatible
- Faster and easier to set-up, calibrate and operate
- Robust performance
- Real time diagnostics available on ranges to enable quality control
- Multiuser support included
- Automatic power-down if not used for a programmable period
- Integrated modem mode with data rates from 100 to 9,000 bps
- Highly reliable release mechanism
- Omni or directional transducer
- Standard sensors – Temperature, pressure and MEMS inclinometer
- Optional sensors – DigiQuartz, inclinometer and sound velocity
- Battery disconnect fob allows quick battery disconnection

Specifications

Compatt 6+ USBL/LBL Transponder and Modem



8300-3111 omni-directional shown above

Feature		Type 8300-3111	Type 8300-3113	Type 8300-5213
Depth Rating		3,000 m	3,000 m	5,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional	Directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)	190–202 dB (4 levels)	190–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	196–208 dB	196–208 dB
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)	80–120 dB (7 levels)	80–120 dB (7 levels)
Ranging Precision		Better than 15 mm	Better than 15 mm	Better than 15 mm
Number of Unique Wideband 2 Addresses		>300	>300	>300
Battery Life (Listening)	Alkaline	833 days	833 days	833 days
	Lithium	1,390 days	1,390 days	1,390 days
External Power Supply		24 V	24 V	24 V
Safe Working Load (4:1)		250 kg	250 kg	250 kg
Operating Temperature		-5 to 40°C	-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C	-20 to 55°C
Dimensions (Maximum) (Length x Diameter)	With Sensor Guard	1,034 x 200 mm	1,018 x 200 mm	1,018 x 200 mm
	Without Sensor Guard	1,034 x 178 mm	n/a	n/a
Weight in Air/Water[2]		23.8/11.8 kg	27.0/14.0 kg	29.0/15.0 kg
Endcap Sensors and Options				
Temperature (±0.1°C)		Standard	Standard	Standard
Tilt Switch (±30–45°)		Standard	Standard	Standard
Strain Gauge Pressure Sensor (±0.1%)		Standard	Standard	Standard
High Precision Strain Gauge (±0.01%) Presens or Keller		Optional	Optional	Optional
Paroscientific DigiQuartz Pressure Sensor 1,350 m, 2,000 m, 4,130 m, 6,800 m (±0.01%)		Optional	Optional	Optional
Inclinometer (Tilt Sensor) Range ±90°, Accuracy: ±1°		Standard	Standard	Standard
High Accuracy Inclinometer Range: ±90°, Accuracy: ±0.05° over 0 - ±15°; ±0.2° over 0 - ±45°		Optional	Optional	Optional
Sound Velocity Sensor ±0.02 m/s Accuracy Under Calibration Conditions		Optional	Optional	Optional
Release Mechanism		Standard	Standard	Standard
Power for External Sensors		Standard	Standard	Standard
Gyro Input		Standard	Standard	Standard

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated Weights.

Datasheet

Dynamic Positioning Transponder 6 (DPT 6)

DPT 6 is designed to be used as a seabed reference transponder by Ultra-Short BaseLine (USBL) and Long and Ultra-Short BaseLine (LUSBL) acoustic positioning systems, installed on many Dynamically Positioned (DP) vessels.

The DPT 6 supports Sonardyne Wideband®2 acoustic ranging and telemetry providing high accuracy positioning, robust performance in noisy and multipath conditions and easy set-up and use. With hundreds of channels, less interference to and from other acoustic systems and multi-user capability, Sonardyne Wideband 2 enables easier SIMOPS vessel capability. These features of the DPT 6 help de-risk subsea operations and save vessel time and cost.

The Type 8301 DPT 6 is the standard length version and is based on the field proven mechanics of the previous version but with improvements to the end cap closure mechanisms. The design offers the perfect balance between size, acoustic output and battery life. Several depth ratings are available: 3,000, 5,000 and 7,000 m, all hard anodised aluminium alloy with protective polyurethane sleeve. Midi (shorter) and Maxi (long endurance) options are also available. The DPT is fitted as standard with a highly reliable release mechanism to enable the unit to be deployed in a flotation collar and recovered to the surface without ROV intervention.

DPT 6 is fully compatible with all of Sonardyne's latest 6G® equipment including Sonardyne's Marksman LUSBL and Ranger 2 USBL systems.

Typical Applications

- DP vessel positioning
- Rig positioning
- Drill string monitoring

Key Features

- Medium Frequency (MF) band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- Dramatically faster and easier to set-up and operate
- Robust acoustic performance in noise and multipath conditions
- Real time diagnostics available on ranges to enable quality control
- Reduced mutual interference to further improve simultaneous ops
- Advanced multi-user/multi-vessel capability
- More than 500 unique Sonardyne Wideband 1 and 2 channels
- Sonardyne Wideband 1 and HPR400 USBL mode compatible
- Automatic power-down if not used for a programmable period
- Highly reliable release mechanism
- Omni or directional transducer
- Standard sensors: temperature, pressure and MEMS inclinometer
- Optional sensors: Paroscientific DigiQuartz pressure sensor, inclinometer and sound velocity
- Real time diagnostics available on ranges to enable quality control
- Field proven

Specifications

Dynamic Positioning Transponder 6 (DPT 6)

3 km Depth Rated MF Omni version shown (8301-3111)

Feature		Type 8301-3111	Type 8301-3113	Type 8301-5213	Type 8301-7213
Depth Rating		3,000 m	3,000 m	5,000 m	7,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)	MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional	Directional	Directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)	190–202 dB (4 levels)	190–202 dB (4 levels)	190–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	196–208 dB	196–208 dB	196–208 dB
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)	80–120 dB (7 levels)	80–120 dB (7 levels)	80–120 dB (7 levels)
Ranging Precision		Better than 15 mm	Better than 15 mm	Better than 15 mm	Better than 15 mm
Number of Unique Addresses Wideband 1 & 2		>500	>500	>500	>500
Battery Life (Listening)	Alkaline	833 days	833 days	833 days	833 days
	Lithium	1,390 days	1,390 days	1,390 days	1,390 days
Safe Working Load (4:1) (Release Mechanism)		250 kg	250 kg	250 kg	250 kg
Dimensions (Maximum) (Length x Diameter)	With Sensor Guard	1,034 x 200 mm	1,018 x 200 mm	1,018 x 200 mm	1,018 x 200 mm
	Without Sensor Guard	1,034 x 178 mm	n/a	n/a	n/a
Weight in Air/Water[2]		23.8/11.8 kg	27.0/14.0 kg	29.0/15.0 kg	33.3/18.8 kg
Endcap Sensors and Options					
Temperature (±0.1°C)		Standard	Standard	Standard	Standard
Tilt Switch (±30–45°)		Standard	Standard	Standard	Standard
Strain Gauge Pressure Sensor (±0.1%)		Standard	Standard	Standard	Standard
High Precision Strain Gauge (±0.01%) Presens or Keller		Optional	Optional	Optional	Optional
Paroscientific DigiQuartz Pressure Sensor 1,350 m, 2,000 m, 4,130 m, 6800 m (±0.01%)		Optional	Optional	Optional	Optional
Inclinometer (Tilt Sensor) Range ±90°, Accuracy: ±1°		Standard	Standard	Standard	Standard
High Accuracy Inclinometer Range: ±90°, Accuracy: ±0.05° over 0 - ±15°; ±0.2° over 0 - ±45°		Optional	Optional	Optional	Optional
Sound Velocity Sensor ±0.02 m/s Accuracy Under Calibration Conditions		Optional	Optional	Optional	Optional
Release Mechanism		Standard	Standard	Standard	Standard

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated Weights.

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Datasheet

Gyro Compatt 6+

Gyro Compatt 6+ is the new industry standard, Wideband®2 and Wideband 3 acoustic positioning and Lodestar AHRS technology in one small, highly versatile and robust instrument. This provides high update rate wireless attitude, heading, heave, surge, sway, temperature, pressure, SV and acoustic positioning of any subsea object.

Compatible with Ultra-Short BaseLine (USBL) and Long BaseLine (LBL) positioning systems, the Lodestar Gyro Compatt 6+ provides real time motion data for structure deployment during navigation (utilising Wideband 3 technology).

The internal high capacity rechargeable battery pack enables quick charge times and up to 28 hours of continuous operation with the ability to turn the gyro on and off to save battery life giving over two months of transponder life.

The instrument is small and light enough to be Remotely Operated Vehicle (ROV) installed and a mechanical stab enables precision alignment to any structure.

Structure position and orientation can be accurately determined during lowering, set-down and as-built surveys. Using the Lodestar Gyro Compatt 6+ for metrology delivers the measurements required for pipe-end coupling.

The stab, gyro and transducer are pre-aligned, this speeds up spot measurements as only single observations are required.

Autonomous logging negates the need for a vessel and ROV to be on standby taking measurement during long term settlement observations.

Modular construction allows for upgrade and service access to the transponder module.

Key Features

- Medium Frequency (MF) band utilising Sonardyne Wideband 2 and 3 telemetry protocols
- Rechargeable 28 hr internal battery pack; option for external power
- Acoustic, serial and manual ROV on/off switch for Lodestar AHRS
- Sonardyne Wideband and Kongsberg HPR 400 compatible
- Autonomous data logging mode (al sensor data and ranges)
- Faster command and configuration
- Simultaneous ranging and sensor data telemetry in one transmission
- Integrated sound speed & high accuracy pressure sensor with a port for additional auxiliary sensors
- Real time diagnostics on range measurements for quality control
- Optional calibrated stab pre-aligned to all instrument axes
- Compact size for ease of handling and ROV deployment/recovery
- INS data logged internally for post processing via 10/100 Ethernet
- High speed acoustic modem
- Data telegram output and 12 V available for ROV displays

Specifications
Gyro Compatt 6+

Feature			Type 8084
Depth Rating			3,000 m
Operating Temperature			-5 to +40°C
Storage Temperature			-20 to +55°C
Operational Shock Rating			22 g, 11 ms half sine
External Battery Pack / ROV Supply			24 V (20–50 V)
Battery Life	Acoustic Navigation Standby		3 months
	Lodestar Permanently Powered On		28 hours
Acoustic	Compatt 6+	Operating Frequency	MF (19–34 kHz) Sonardyne Wideband 3
		Transmit Source Level (dB re 1 µPa @ 1m)	185–192 dB (5 Levels)
		Ranging Precision	Better than 15 mm
		Telemetry Protocol	Sonardyne SMS and modem
		Ranges Tracked	14 simultaneous replies
Lodestar AHRS	Heading	Range	0–360°
		Accuracy	0.04 to 0.1° secant latitude
		Settle Time	<5 minutes
		Follow Up Speed	500° / second
		Resolution	0.01°
	Roll and Pitch	Range	±180° (no physical limit)
		Accuracy	0.01°
		Resolution	0.01°
	Heave	Range	±99 m
		Accuracy (Real Time)	5 cm or 5% (whichever is the greater)
		Bandwidth	User selectable
		Resolution	0.01 m
Digital Output - Output Telegram (e.g. for ROV LED display)			Yes
ROV Switch - Contact Closure			Yes
Data Back-up - Data Logger			8 GB (expandable to 32 GB) internal memory to allow post processing
Remote Transducer - For ROV Applications, a Remote Transducer is Available			
Sensors	Sound Speed Sensor		±0.03 m/s
	Pressure - Strain Gauge or Digiquartz		0.01% FS
Physical	Size (Diameter x Length)		248 x 918 mm
	Weight in Air/Water		45/17 kg

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Datasheet
Gyro iUSBL

Gyro iUSBL combines a Sonardyne 6th (6G®) generation high performance HPT Inverted Ultra-Short BaseLine (USBL) transceiver and a Lodestar Attitude and Heading Reference System (AHRS) / Inertial Navigation System (INS) in the same pressure rated mechanical assembly capable of operating at depths of 7,000 m.

With the AHRS / INS in fixed mechanical alignment to the iUSBL's pressure balanced acoustic array, the Lodestar Gyro iUSBL can be quickly deployed without need for a calibration to determine the alignment of the ship's motion sensors to the acoustic transceiver. For many applications, this can enable significant savings time and operational costs.

The HPT transceiver component of the instrument utilises the latest Sonardyne Wideband®2 signal processing and is fully compatible with other products in the new Sonardyne 6G equipment range.

Lodestar is tightly integrated into the iUSBL system providing power and communications to the HPT transceiver and embedded highly accurate time-stamping of all motion and acoustic data.

This enables unparalleled precision and accuracy of position estimation by removing many of the sources of error associated with all USBLs such as lever arm offsets, pole bending, and vehicle flexing.

In addition, because many of the system parameters are now fixed, no USBL calibration is required during installation so the system is easier to install and set-up. Precision of better than 0.3% of slant range is achievable out of the box, or a one-off calibration can push this figure to less than 0.1% of slant range.

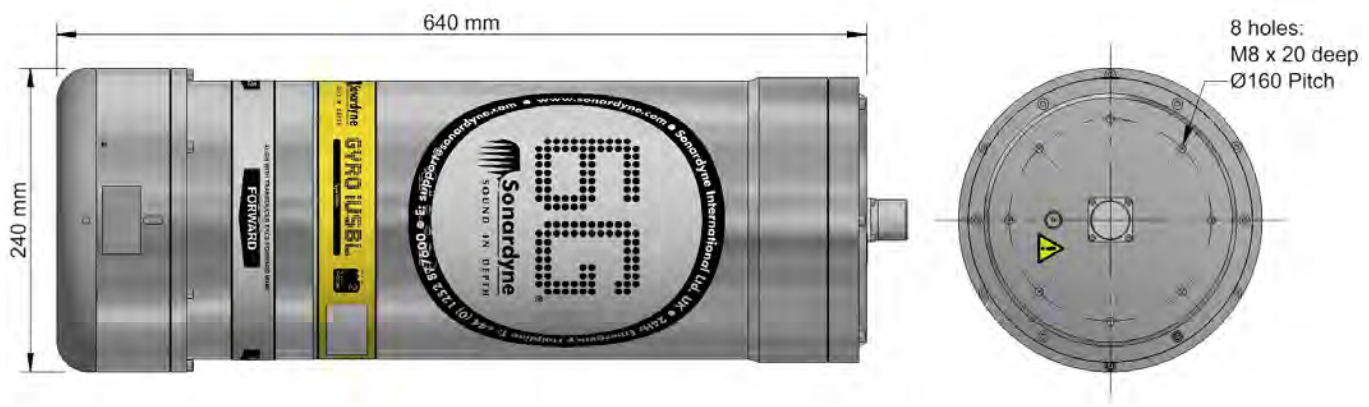
Manufactured in titanium, the Lodestar Gyro iUSBL is ideal for both short and long term installations.

In case of operational damage to the iUSBL transducer array, all electronics are robustly protected behind a double-sealed, pressure-resistant bulkhead. This ensures that if the transducer face is breached, the Lodestar and acoustic transceiver do not flood.

Key Features

- Integrated Sonardyne 6G Wideband 2 iUSBL transceiver and Lodestar AHRS / INS offering high performance
- Available in two versions; standard and deepwater optimised
- Calibration free offering rapid setup
- Class leading system precision and accuracy.
- Sonardyne Ranger 2 USBL and Fusion LBL compatible
- Water-blocked transducer array protects electronics in the event of damage
- Compatible with Sonardyne's through-hull, over-the-side and stem tube deployment systems
- Ethernet connectivity

Specifications
Gyro iUSBL



Features		Type 8084-000-7535
Operational Frequency		MF (19–34 kHz)
Transceiver Performance	Operating Range	Up to 7,000 m
	Pressure Rating	Up to 7,000 m
	Acoustic Coverage	Up to ± 90°
	Range Accuracy Positioning Repeatability	Better than 15 mm All transceivers tested to Better Than 0.1% of Slant Range 1 drms
Transmit Source Level (dB re 1 µPa @ 1 m)		200 dB
Tone Equivalent Energy (TEE)[1]		206 dB
Heading	Range	0–360°
	Accuracy	0.04 to 0.1° secant latitude
	Settle Time	<5 minutes
	Follow Up Speed	500° / second
	Resolution	0.01°
Pitch & Roll	Range	±180° (No physical limit)
	Accuracy	0.01°
	Resolution	0.01°
Heave	Range	±99 m
	Accuracy (Real Time)	5 cm or 5% (whichever the greater)
	Resolution	0.01 m
Electrical		+48 V dc maximum 160 W
Communication		RS485, baud rate switchable, Ethernet 100 Mbps
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 55°C
Dimensions (Length x Diameter)		640 mm x 240 mm (without end connector)
Weight in Air/Water[2]		56.4/32 kg

Note: The absolute accuracy of the system is dependent upon the beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment machine, SV knowledge and proper calibration of the total system using CASIUS.

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
[2] Estimated Weights.

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Datasheet

Gyro USBL 5000/7000

Gyro USBL combines a Sonardyne 6th (6G®) generation high performance HPT Ultra-Short BaseLine (USBL) transceiver and a Lodestar Attitude and Heading Reference System (AHRS) / Inertial Navigation System (INS) in the same mechanical assembly.

With the AHRS / INS in fixed mechanical alignment to the USBL's acoustic array, and 'in-water' pre calibrated at the factory, Gyro USBL can be quickly deployed without need for a USBL calibration. This enables significant savings in vessel time and operational costs. Depending on the array type, Gyro USBL can offer precision of better than 0.1% of slant range out of the box.

The HPT transceiver component of the instrument utilises the latest Sonardyne Wideband®2 signal processing and is fully compatible with other products in the Sonardyne 6G equipment range.

Lodestar is tightly integrated with the HPT transceiver, providing highly accurate time-stamped motion and acoustic data. This enables unparalleled precision and accuracy of position estimation by removing many of the sources of error associated with all USBLs such as lever arm offsets, pole bending, and ship flexing.

Two accuracy versions of Lodestar are available. A cost-effective version for standard USBL operations and a "plus" variant optimised for long layback tracking and touch-down monitoring.

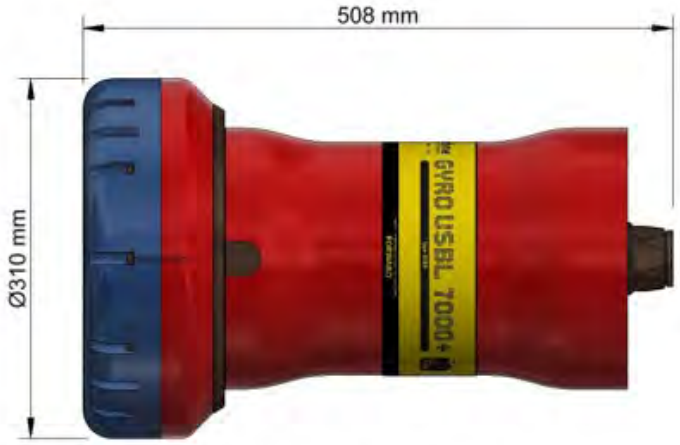
Manufactured in aluminium bronze the Gyro USBL is ideally suited for installations on vessels of opportunity using through-hull or over-the-side poles. It is also ideal for permanent installation on flexible stem tubes and on very small vessels such as USVs.

Key Features

- Integrated Sonardyne 6G Wideband 2 USBL transceiver and Lodestar AHRS / INS offering high performance
- Small form factor
- Available in two inertial performance versions; standard for typical top down operations and "plus" optimised for long layback tracking and touch-down monitoring.
- Available in two transducer array versions; standard and deepwater optimised
- LMF variant available on request
- Calibration free offering rapid deployment
- Class leading system precision and accuracy.
- Sonardyne Marksman LUSBL, DP-INS (plus variant) and Ranger 2 USBL compatible
- Compatible with Sonardyne's through-hull, over-the-side and stem tube deployment systems
- Ethernet and RS485 connectivity

Specifications
Gyro USBL 5000/7000

Gyro USBL 5000/5000+



Gyro USBL 7000/7000+

Feature			Gyro USBL 5000 Type 8084-0425 Gyro USBL 5000+ Type 8084-0455	Gyro USBL 7000 Type 8084-0427 Gyro USBL 7000+ Type 8084-0457
Operational Frequency			MF (19–34 kHz)	MF (19–34 kHz)
Transceiver Performance	Operating Range		Up to 7,000 m	Up to 7,000 m
	Acoustic Coverage		Up to ± 90°	Up to ±90° optimised for deepwater (dependant on frequency of operation)
	Range Accuracy		Better than 15 mm	Better than 15 mm
	Expected System Slant Range Accuracy 1 drms (20 dB)[1]		0.07%	0.04%
Transmit Source Level (dB re 1 µPa @ 1 m)			200 dB	200 dB
Tone Equivalent Energy (TEE)[2]			206 dB	206 dB
Heading	Accuracy	Plus Variant	0.1° secant latitude	0.1° secant latitude
		Standard Variant	0.2° secant latitude	0.2° secant latitude
	Settle Time		<5 minutes in dynamic conditions	<5 minutes in dynamic conditions
Pitch & Roll (Accuracy)			0.01°	0.01°
Heave	Range		±99 m	±99 m
	Accuracy (Real Time)		5 cm or 5% (whichever the greater)	5 cm or 5% (whichever the greater)
Electrical			+48 V dc maximum 160 W	+48 V dc maximum 160 W
Connector			AGP-2716	AGP-2716
Communication			RS485, baud rate switchable, Ethernet 100 Mbps	
Operating Temperature			-5 to 40°C	-5 to 40°C
Storage Temperature			-20 to 45°C	-20 to 45°C
Dimensions (Length x Diameter)			439 x 225 mm	508 x 310 mm
Weight in Air/Water			35.7/21.6 kg	55.9/35.3 kg

Note: The absolute accuracy of the system is dependent upon the beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment machine, SV knowledge and proper calibration of the total system using CASIUS

[1] System performance is directly affected by frequency of operation. These figures are taken at top end of the band of operation, i.e. 33.5 kHz for MF band

[2] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

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Datasheet

HPT 2000 Ultra-Short BaseLine HF Transceiver

The HPT 2000 Ultra-Short BaseLine (USBL) is a new smaller, lighter, high performance Ethernet interfaced transceiver supporting Sonardyne's Transition Zone – Ocean Bottom Cable (TZ/OBC) and Lightweight Release Transponders (LRT).

This smaller HPT offers significant improvements for seismic survey positioning in coastal and near shore operations where high elevation tracking is required in low noise environments.

Its multiple simultaneous channels enable robust tracking of up to 9 TZ/OBC transponder targets.

The advanced multi-element processing enables transponders to be positioned more precisely, more quickly and more robustly due to improvements in signal processing algorithms. When used as part of a complete Mini-Ranger 2 USBL system, heading and inertial navigation sensor, class leading performance is achieved.

The integral MTi-30 Xsens sensor provides pitch, roll and heading data that automatically compensates for the dynamic motion of the vessel, removing the need for an external sensor and pre-use calibration.

Manufactured in aluminium bronze, the HPT 2000 is intended to be fitted temporarily or permanently to a vessel's through-hull or over-the-side pole.

The full hemispherical coverage optimises performance in shallow water environments boosting transmissions and receive sensitivity in the horizontal axis.

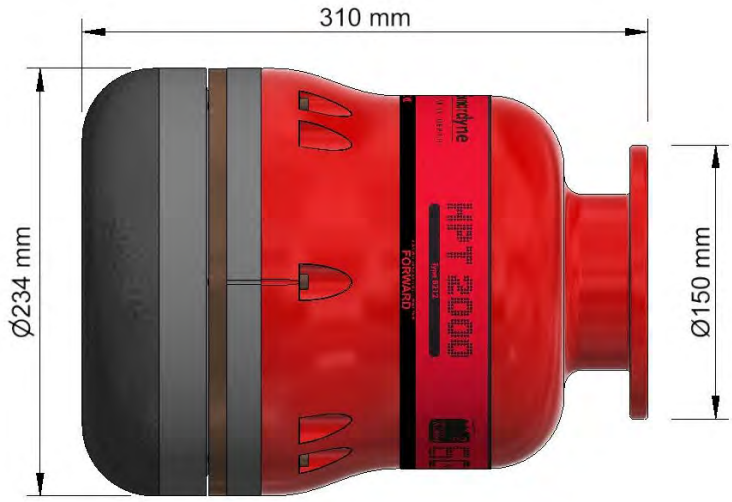
Ethernet connectivity enables the system to function over existing ship network wiring for rapid installation.

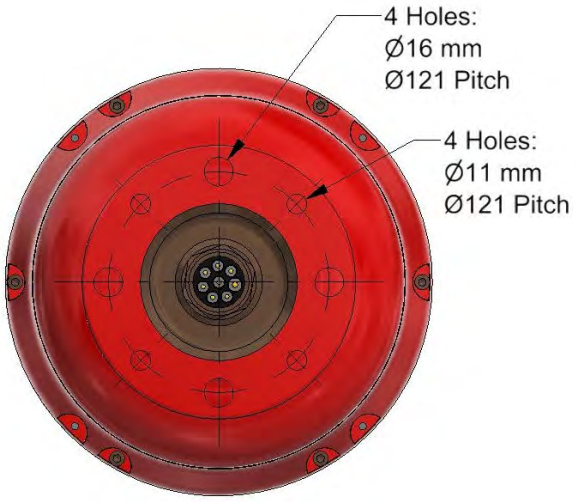
Key Features

- Easy to install and set up
- High performance USBL transceiver offers improved precision and robustness
- Tracking of up to 9 TZ/OBC transponder targets
- Enhanced USBL array design for shallow water high elevation tracking.
- Internal "Xsens" sensor magnetic compass for instantaneous and calibration free motion compensation.
- True simultaneous tracking of multiple transponders providing high position update rates
- Built in health checks including array and electronics diagnostics
- Waterfall plot for enhanced ambient noise monitoring.
- Audio codec for live streaming. Allows listening to in-water signals and ambient noise.
- Ethernet connectivity using an Ethernet Serial Hub (ESH)

Specifications

HPT 2000 Ultra-Short BaseLine HF Transceiver





Feature		Type 8221
Operational Frequency		HF (34–50 kHz)
Transceiver Performance	Operating Range	500 m
	Acoustic Coverage	Full 180°
	Range Precision	Better than 15 mm
	Positioning Repeatability External MRU	All transceivers tested to better than 0.2% of slant range 1 Drms / 0.14% 1 Sigma
	Positioning Repeatability Internal Xsens Pitch and Roll	All transceivers tested to better than 1.3% of slant range 1 Drms / 0.9% 1 Sigma
Source Level (dB re 1 µPa @ 1 m)		194 dB
Electrical		48 V dc (±10%), typical 15 W, maximum 120 W
Communication		Ethernet 100 Mbps
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 45°C
Mechanical Construction		Aluminium bronze
Dimensions (Height x Diameter)		310 x 234 mm
Weight in Air/Water		19.4/9.5 kg

Note: The absolute accuracy of the system is dependent upon the quality of external attitude and heading sensors, beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment machine, SV knowledge and proper calibration of the total system using CASIUS.

Datasheet

HPT 3000 Ultra-Short BaseLine Transceiver

The HPT 3000 Ultra-Short BaseLine (USBL) is a new smaller, lighter, high performance Ethernet interfaced transceiver supporting Sonardyne's Wideband®2 6G® instruments.

This smaller HPT offers significant improvements for survey positioning for coastal and near shore operations where high elevation tracking is required in low noise environments.

The advanced multi-element processing enables transponders to be positioned more precisely, more quickly and more robustly due to improvements in signal processing algorithms. When used as part of a complete Mini-Ranger 2 USBL system, heading and inertial navigation sensor, class leading performance is achieved.

The internal MTi-30 Xsens sensor provides pitch, roll and heading data for search and salvage applications which are time critical, requiring turn on and track functionality. Shallow water operations and pipelay from anchor barges also benefit from the internal sensor being calibration free.

'Discovery Mode' enables users to automatically detect previously deployed transponders including their configured address and channel, making the system easier to use.

The HPT 3000 is a highly capable acoustic transceiver. Its multiple simultaneous channels enable robust tracking of 10 targets.

Manufactured in aluminium bronze, the HPT 3000 is intended to be fitted temporarily or permanently to a vessel's through-hull or over-the-side pole.

The full hemispherical coverage optimises performance in shallow water environments boosting transmissions and receive sensitivity in the horizontal axis.

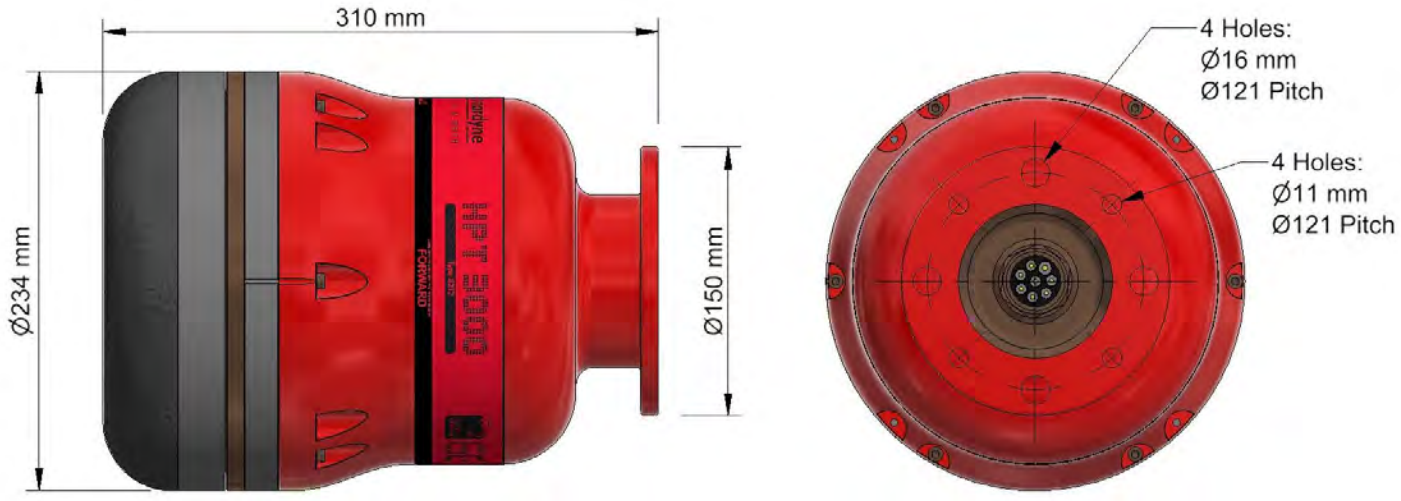
Ethernet connectivity enables the system to function over existing ship network wiring for rapid installation.

Key Features

- High performance USBL transceiver utilising Wideband 2 ranging and telemetry offer improved USBL precision and robustness
- Enhanced USBL array design for shallow water high elevation tracking.
- Internal "Xsens" sensor magnetic compass for quick operation.
- True simultaneous tracking of multiple transponders providing high update rates
- Built in health checks including array and electronics diagnostics
- Discovery mode allows users to automatically scan for transponders deployed within acoustic range
- Waterfall plot for enhanced ambient noise monitoring.
- Audio codec for live streaming. To allow noise and signals to be heard in the water.
- Compatible with the Sonardyne 6G suite of products.
- Ethernet connectivity using an Ethernet Serial Hub (ESH)
- Upgradable to Long BaseLine (LBL) and Modem

Specifications

HPT 3000 Ultra-Short BaseLine Transceiver



Feature		Type 8212
Operational Frequency		MF (19–34 kHz)
Transceiver Performance	Operating Range	Restricted to 995 m with Mini Ranger 2 system (4000 m with extended range version)
	Acoustic Cover	Full 180°
	Range Precision	Better than 15 mm
	Positioning Repeatability External MRU	All transceivers tested to better than 0.2% of slant range 1 Drms / 0.14% 1 Sigma
	Positioning Repeatability Internal Xsens Pitch and Roll	All transceivers tested to better than 1.3% of slant range 1 Drms / 0.9% 1 Sigma
Transmit Source Level (dB re 1 µPa @ 1 m)		194 dB
Tone Equivalent Energy (TEE)[1]		200 dB (3 JA)
Electrical		48 V dc (±10%), typical 15 W, maximum 120 W
Communication		Ethernet 100 Mbps
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 45°C
Mechanical Construction		Aluminium bronze
Dimensions (Height x Diameter)		310 x 234 mm
Weight in Air/Water		19.4/9.5 kg

Note: The absolute accuracy of the system is dependent upon the quality of external attitude and heading sensors, beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment machine, SV knowledge and proper calibration of the total system using CASIUS.

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
Detection performance is directly related to the signal energy (Joules (Watt seconds)) and not power. WBv2+ signals are longer in duration (greater energy) than WBv1 and Tone, therefore the detection performance is the same or improved for low transmit source levels.

Datasheet

HPT 5000/7000 Ultra-Short BaseLine and Telemetry Transceiver

The HPT 5000 and 7000 Ultra-Short BaseLine (USBL) and Telemetry Transceiver is a high performance platform which supports Sonardyne's Wideband®2 6G® instruments and offers significant improvements in acoustic positioning and telemetry performance.

The advanced multi-element processing enables transponders to be positioned more precisely, more quickly and more robustly due to improvements in signal processing algorithms and array design. When used as part of a complete USBL system such as Marksman or Ranger 2 and tightly integrated with Sonardyne's Lodestar attitude, heading and inertial navigation sensor, class leading performance in all water depths is achieved.

New functionality, such as 'Discovery Mode' which enables users to automatically detect previously deployed transponders including their configured address and channel, makes the system easier to use. The HPT also fully supports 6G LBL operations via Fusion LBL software.

The HPT transceiver is also a highly capable acoustic telemetry transceiver. Its multiple simultaneous channels enable robust high speed telemetry reception from Sonardyne's 6G subsea transponder modems and data loggers so reducing valuable vessel time.

Manufactured in aluminium bronze, the HPT is intended to be fitted temporarily or permanently to a vessel's through-hull or over-the-side pole.

A number of different array designs are available from full hemispherical coverage to specialist directional designs for ultra deepwater high noise environments.

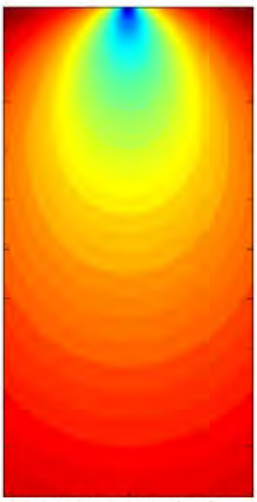
Key Features

- High performance USBL transceiver utilising Wideband 2 ranging and telemetry offer improved USBL precision and robustness
- Enhanced USBL array designs for improved noisy vessel and deepwater performance
- True simultaneous tracking of multiple transponders providing high update rates
- Seamless simultaneous positioning and telemetry of data whilst tracking
- Sonardyne Wideband 1, 2 and HRP400 ranging mode compatible
- Built in health checks including array and electronics diagnostics
- Discovery mode allows users to automatically scan for transponders deployed within acoustic range
- In water ambient noise monitoring
- Integral robust high data rate telemetry for fast acquisition of data from subsea instruments.
- Compatible with Marksman LUSBL, Ranger 2 USBL and Fusion 6G LBL systems
- Optional Ethernet connectivity

Specifications

HPT 5000/7000 Ultra-Short BaseLine and Telemetry Transceiver

HPT 5000 SNR Plot for a 27 kHz signal



HPT 7000 SNR Plot for a 27 kHz signal

Feature		Type 8142-001	Type 8142-002 (Deepwater optimised unit)
Operational Frequency		MF (19–34 kHz)	MF (19–34 kHz)
Transceiver Performance	Operating Range	Up to 7,000 m	Up to 7,000 m
	Acoustic Coverage	Up to ± 90°	Up to ± 90º Optimised for deep water (depending on frequency of operation)
	Range Precision	Better than 15 mm	Better than 15 mm
	Positioning Repeatability	All transceivers tested to better than 0.1% of slant range 1 Drms	All transceivers tested to better than 0.07% of slant range 1 Drms
Transmit Source Level (dB re 1 µPa @ 1 m)		200 dB	200 dB
Tone Equivalent Energy (TEE)[1]		206 dB (13 JA)	206 dB (13 JA)
Electrical		48 V dc (±10%), Typical 15 W, Max 120 W	48 V dc (±10%), Typical 15 W, Max 120 W
Communication		RS485, baud rate switchable, Ethernet 100 Mbps	RS485, baud rate switchable, Ethernet 100 Mbps
Operating Temperature		-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 45°C	-20 to 45°C
Mechanical Construction		Aluminium bronze	Aluminium bronze
Dimensions; Length x Diameter		322 x 225 mm	391 x 310 mm
Weight in Air/Water		26.7/15.3 kg	46.9/29.0 kg
Options		Tilted array adaptor	Tilted array adaptor

Note: The absolute accuracy of the system is dependent upon the quality of external attitude and heading sensors, beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment machine, SV knowledge and proper calibration of the total system using CASIUS.

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
Detection performance is directly related to the signal energy (Joules (Watt seconds)) and not power. WBv2+ signals are longer in duration (greater energy) than WBv1 and Tone, therefore the detection performance is the same or improved for low transmit source levels.

Datasheet

iHPT 5000 Inverted Ultra-Short BaseLine and Telemetry Transceiver

The iHPT 5000 Inverted Ultra-Short BaseLine (iUSBL) and Telemetry Transceiver is a new high performance platform which supports Sonardyne Wideband®2 6G® instruments and offers significant improvements in acoustic positioning and telemetry performance.

The advanced multi-element processing enables transponders to be positioned more precisely, more quickly and more robustly due to improvements in signal processing algorithms and array design. When used as part of a complete Ultra-Short BaseLine (USBL) system such as Marksman or Ranger 2 and tightly integrated with Sonardyne's Lodestar attitude, heading and inertial navigation sensor, class leading performance in all water depths is achieved.

New functionality, such as 'Discovery Mode' which enables user to automatically detect previously deployed transponders including their configured address and channel, makes the system easier to use. The iHPT 5000 also fully supports 6G LBL operations via Fusion LBL software.

The HPT transceiver is also a highly capable acoustic telemetry transceiver. Its multiple simultaneous channels enable robust high speed telemetry reception from Sonardyne's 6G subsea transponder modems and data loggers so reducing valuable vessel time.

Manufactured in titanium, the iHPT 5000 is intended to be fitted to deepwater subsea equipment such as a towfish.

The array has been adapted for deepwater operation from the tried and tested geometry of the HPT 5000.

Key Features

- High performance USBL transceiver utilising Wideband 2 ranging and telemetry offer improved USBL precision and robustness
- Enhanced USBL array designs for improved noisy vessel and deepwater performance
- True simultaneous tracking of multiple transponders providing high update rates
- Seamless simultaneous positioning and telemetry of data whilst tracking
- Sonardyne Wideband 1, 2 and HRP400 ranging mode compatible
- Built in health checks including array and electronics diagnostics
- Discovery mode allows users to automatically scan for transponders deployed within acoustic range
- In water ambient noise monitoring
- Integral robust High Data Rate telemetry for fast acquisition of data from subsea instruments – reduces costly vessel time
- Compatible with Marksman LUSBL, Ranger 2 USBL and Fusion 6G LBL systems

Specifications

iHPT 5000 Inverted Ultra-Short BaseLine and Telemetry Transceiver

Feature		Type 8191-000-01
Operational Frequency		MF (19-34 kHz)
Transceiver Performance	Operating Range	Up to 7,000 m
	Acoustic Cover	Up to ± 90°
	Range Precision	Better than 15 mm
	Positioning Repeatability	All transceivers tested to better than 0.1% of slant range 1 Drms
Transmit Source Level (dB re 1 uPa @ 1 m)		200 dB
Tone Equivalent Energy (TEE)[1]		206 dB (13 J_A)
Electrical		24 or 48 V dc (±10%), typical 15 W, maximum 120 W
Communication		RS485 or RS232, baud rate switchable. Optional Ethernet, 100Base-T
Mechanical Construction		Titanium
Depth Rating		7,000 m
Dimensions (Height x Diameter)		365 x 240 mm
Weight[2]		37 kg

Note: The absolute accuracy of the system is dependent upon the quality of external attitude and heading sensors, beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment machine, SV knowledge and proper calibration of the total system using CASIUS.

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
Detection performance is directly related to the signal energy (Joules (Watt seconds)) and not power. WBv2+ signals are longer in duration (greater energy) than WBv1 and Tone, therefore the detection performance is the same or improved for low transmit source levels.

[2] Estimated Weight.

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Datasheet

iRelease Transponder Release

The Type 8315 iRelease is a handheld unit designed to interact with a Lightweight Command Unit (LCU) acoustic transceiver to facilitate the acoustic release of Oceanographic Release Transponders (ORTs).

The rugged design coupled with simple interface and colour display makes the iRelease ideal for back-deck operations.

The iRelease is intended to replace the existing PSION MX Workabout (590-0042) and can be used to interact with the 7667-00-04, 7663-000-04 and 7574-000 LCU transceivers.

An internal rechargeable battery provides over 5 hours of active use with a life of 3 months in the lowest power standby mode.

The iRelease has a USB to recharge the internal battery and a serial connection for communication with the LCU.

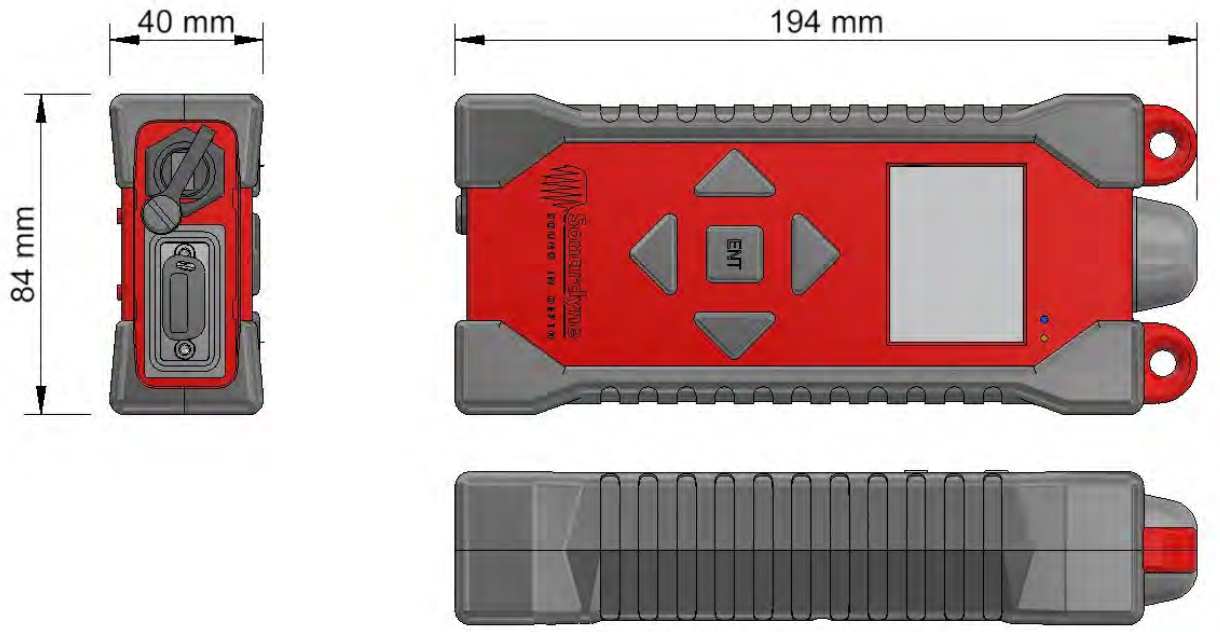
A rugged transmit case is provided and contains a wall mount USB ac charging adapter with a variety of international ac power adapters. A USB cable is also included in the case.

Key Features

- Handheld battery powered portable design
- Splash-proof and rugged
- Sunlight readable display
- Used in conjunction with a LCU to operate ORTs
- Easy-to-use five-button interface

Specifications

iRelease Transponder Release



Feature		Type 8315
Case		Rugged polypropylene copolymer case with styrenic over mould shock protection
Keypad		Sealed 5 key navigation pad
Display		320 x 240 sunlight readable LED display
Connections	USB	Splash-proof mini-USB Type B
	Serial	9-way D-type (male)
Charging		USB to PC or USB to wall adaptor
Internal Flash Memory		1 GB
Battery		Li-ion 3.7 V 1,300 mAh (typical)
Battery Life	Normal (Screen On)	>5 hours (screen automatically turns off after a selectable period)
	Idle (Screen Off)	>12 hours (press a key or 'shake to wake' to turn screen back on)
	Off	>3 months (press a key to wake)
	Off for Shipping	>1 year (requires USB connection to wake-up)
Operating Temperature		-10 to 55°C
Storage Temperature		-10 to 55°C
Dimensions (Length x Width x Depth)		194 x 84 x 40 mm
Weight		0.8 kg

Datasheet
iWAND 6G Test Equipment

The iWAND is a handheld acoustic transponder test and configuration device developed for use with Sonardyne's 6G® product range.

Being small, rugged and splash proof means the iWAND is ideal for setting up equipment in the workshop, on the back deck of a ship, or on ROVs and subsea structures before they are deployed. The simple to use interface and sunlight readable display makes it easy to test, gather and download configurations.

Communication to a transponder is via the acoustic 'Wand' which is held against the transponder's acoustic transducer. This tests the acoustic transmission and reception functions of the transponder ensuring they are operating correctly.

The iWAND is used in conjunction with the 6G configuration software running on a standard PC. It enables all 6G (excluding WSM6, which can only be acoustically tested) transponders to be easily configured. The configuration of the various transponders can then be exported to a document as an audit trail, or to a file that can be imported into Sonardyne positioning system navigation software.

The iWAND has various PC connection options: Bluetooth, USB or serial. The USB is used to recharge the internal battery.

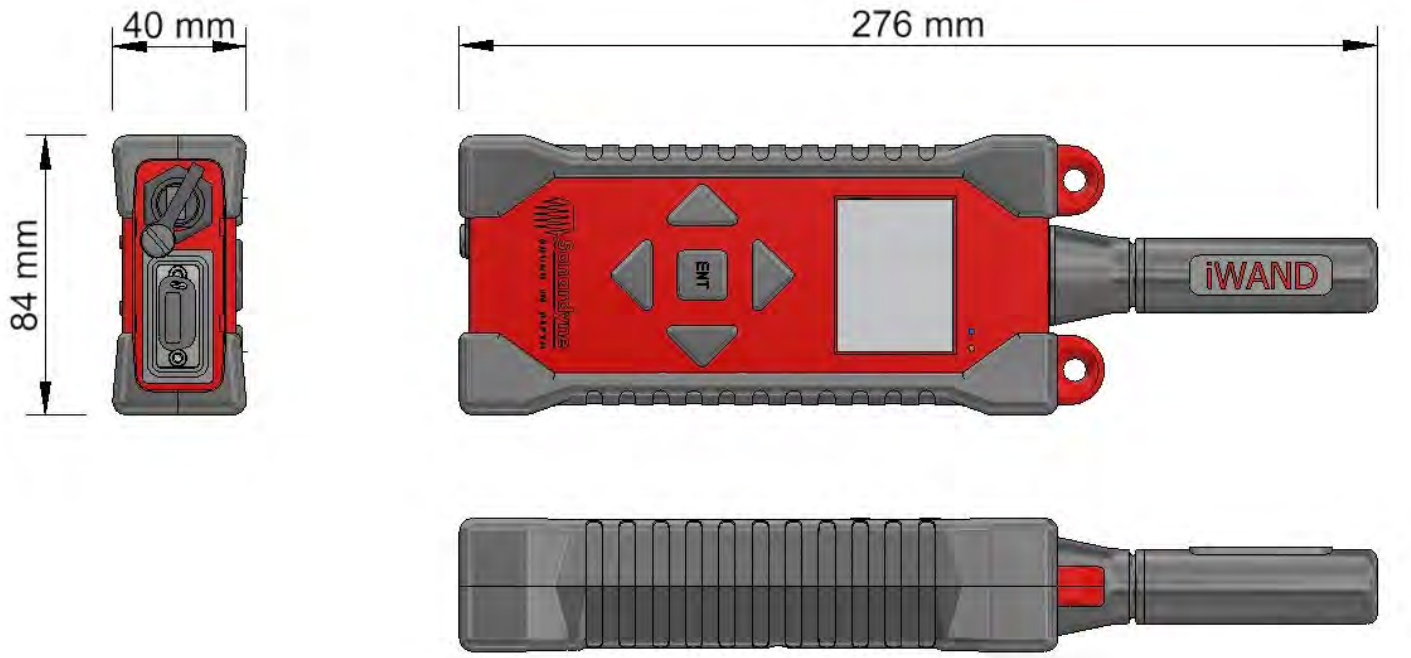
The internal GPS receiver provides UTC time tagging of communication to transponders and PC and can also be used to synchronise multiple transponders to UTC for logging applications.

Key Features

- Handheld battery powered highly portable design
- Splash-proof and rugged
- Sunlight readable display
- Multi-band operation: LMF, MF and HMF
- Automatically discovers the acoustic address of the instrument
- Back deck testing of sensors, acoustic levels, release mechanism, battery pack capacity etc.
- All communication via the easily accessible acoustic transducer and increase confidence in the instrument under test
- Simple to use software automatically synchronises when connected via Bluetooth, USB or serial
- Automatic instrument configuration based on the Unique ID of the transponder ensuring only the correct configuration is downloaded
- Simple transponder configuration based on the application, water depth and baseline range
- GPS time synchronisation
- Serial test capability via standard interface test leads
- Configuration export to other Sonardyne systems
- Test report generated for audit trail

Specifications

iWAND 6G Test Equipment



Feature		Type 8315
Operating Frequency		LMF (14–19 kHz), MF (19–34 kHz), HMF (34–40 kHz)
Transducer Beam Shape (Wand)		Directional
Case		Rugged polypropylene copolymer case with styrenic over mould shock protection
Keypad		Sealed 5 key navigation pad
Display		320 x 240 sunlight readable LED display
Connections	USB	Splash-proof mini-USB Type B IP67
	Serial	9-way D-Type (male) IP67
	Bluetooth	V2.1 + EDR Class 2 (+4 dBmi)
	BNC	Acoustic wand
Charging		USB to PC or USB to wall adaptor
Internal Flash Memory		1 GB
Battery		Li-ion 3.7 V 1,300 mAh (typical)
Battery Life	Normal (Screen On)	>5 hours (screen automatically turns off after a selectable period)
	Idle (Screen Off)	>12 hours (press a key or ‘shake to wake’ to turn screen back on)
	Off	>3 months (press a key to wake)
	Off for Shipping	>1 year (requires USB connection to wake)
Operating Temperature		-10 to 55°C
Storage Temperature		-10 to 55°C
Dimensions (Length x Width x Depth)		276 x 84 x 40 mm
Weight		0.8 kg

Datasheet

Marine Robotics Software Pack

Extends the functionality of Micro-Ranger 2, Mini-Ranger 2 and Ranger 2

The Robotics Pack adds value to operations of autonomous maritime vehicles by combining tracking with modem functionality. Used in conjunction with AvTrak 6 and Nano AvTrak 6 OEM transceivers, the Robotics Pack adds telemetry to the same acoustic signals that are used by Ranger 2 Ultra Short Baseline (USBL) to track. With it, the USBL systems transmit and receive data from Autonomous Underwater Vehicle (AUV) systems with AvTrak. It's the ideal aid for an AUV's Inertial Navigation System (INS) and a great compliment to our SPRINT INS.

The Robotics Pack provides vehicle developers with access to Sonardyne's powerful telemetry protocol. Built using simple ASCII commands and human readable, it is simple yet very flexible.

New features are also included and these unlock the following Sonardyne Messaging Services (SMS) Data Exchange features:

Single Interrogate SMS Data Exchange: This version of the SMS message can be used to share up to 4 seconds of data with every SMS.

Common Interrogate SMS Data Exchange: For a group interrogate, a Common Interrogate Signal (CIS) can be used to broadcast data simultaneously to up to 10 recipients.

Combined Position Updates: The vessel position and that of each vehicle in the group is sent out on each interrogation cycle, e.g. for AUV INS position aiding.

User-defined Data Bits: Additionally, a message flag consisting of a 10-bit integer can be sent to each individual transponder in the group, e.g. for AUV Command & Control.

ASCII Modem: This feature enables uninterrupted ASCII data exchanges for prolonged periods of time. The USBL system will not track during modem operation. The ASCII Modem feature is not compatible with Nano AvTrak 6 OEM.

Remote Control

The Robotics Pack also provides a Remote Control interface to the USBL systems via the Serial or UDP COM port. The remote interface accepts input commands to the USBL and outputs AUV positions and SMS messages. An Uncrewed Surface Vessel (USV) can use it to take control of the USBL and AUV.

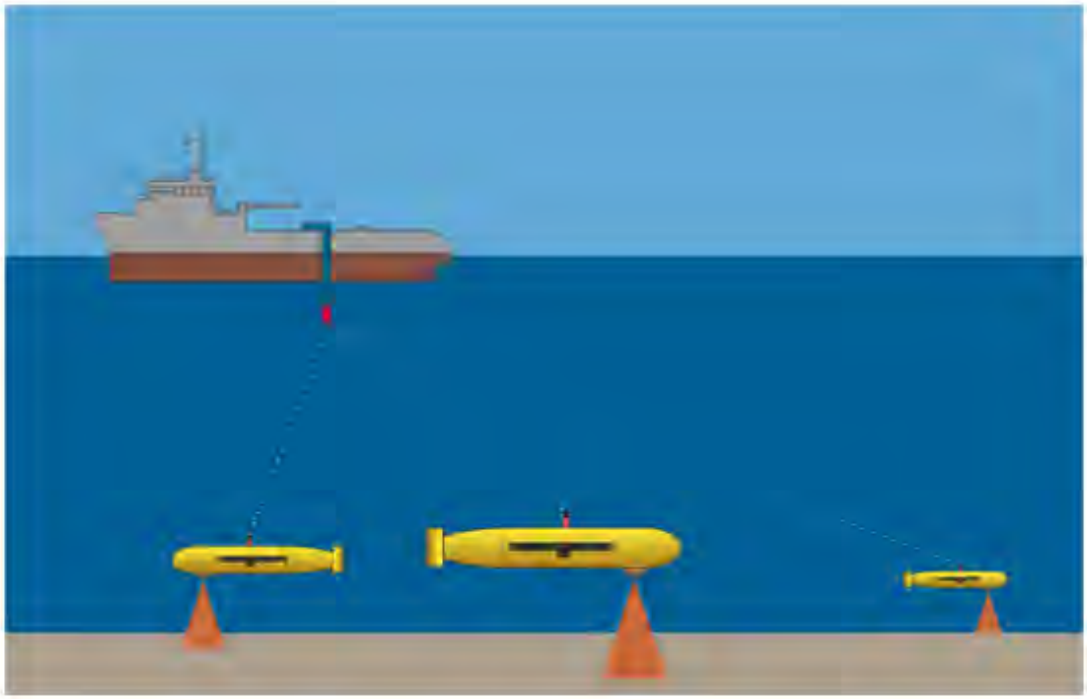
Key Features

- Combined telemetry and tracking means less instruments required
- Single Interrogate to optimise AUV operations
- Common Interrogate for improved multi-AUV operations
- Combined position updates for swarms
- ASCII Modem for large data exchanges
- Choose your telemetry scheme to adapt to the operating environment
- Update AUV mission and receive status messages
- Remote control enables integration of USBL into USVs

Specifications

Marine Robotics Software Pack

Extends the functionality of Micro-Ranger 2, Mini-Ranger 2 and Ranger 2



The Marine Robotics Software Pack is available with all Sonardyne Ranger 2 USBL systems.

Pack Features	Micro-Ranger 2	Mini-Ranger 2	Ranger 2
Single Interrogate	✓	✓	✓
Common Interrogate	X	✓	✓
Combined Position Updates	X	✓	✓
ASCII Modem[1]	✓	✓	✓
Remote Control	✓	✓	✓

Micro-Ranger 2, Mini-Ranger 2 and Ranger 2 have a 15,400 bps bandwidth and can support seven different telemetry schemes:

	TS1	TS2	TS3	TS4	TS5	TS6	TS7
Effective User Bandwidth (bps)	200	400	900	3,000[2]	6,000[2]	3,500	9,000

[1] ASCII Modem feature is not compatible with the Nano AvTrak 6 OEM.
[2] Robust schemes available only on multi-element transducers.

Datasheet
Marker 6

The Type 8326 Marker 6 is a low-cost acoustic positioning solution where compact design and deep water are important operational factors.

The Marker 6 enables critical targets such as underwater structures or instrumentation packages to be marked unambiguously and later relocated using a Sonardyne USBL system.

The Marker 6 incorporates Near Field Communications (NFC) allowing for fast setup. Its acoustic address can be selected from >200 unique acoustic identities and can be quickly programmed into each transponder using a suitable NFC enabled handset (including an NFC enabled Android™ handset with the Sonardyne NFC App) or a dedicated HF Radio Frequency Identification (RFID) reader.

The Marker 6 operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Ranger 2 6G® Wideband® USBL systems.

Sonardyne Wideband acoustic signal processing offers improved performance in challenging conditions such as at long range. The signal encoding also reduces the interference both on and by adjacent Sonardyne and other acoustic positioning systems.

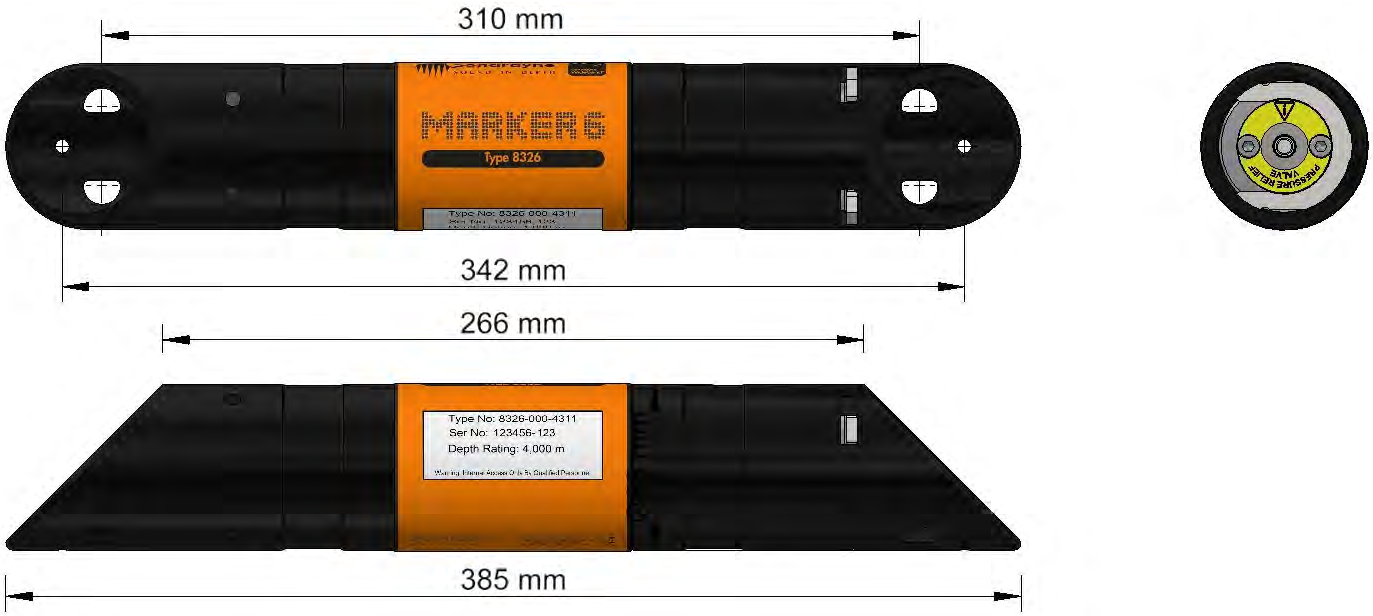
The NFC link also provides the ability to enter Marker 6 into a storage mode when not in use, thereby significantly increasing the overall battery endurance.

Key Features

- Compact and rugged design
- Depth rated to up to 7,000 m
- Powerful acoustic transmission level
- MF frequency band utilising Sonardyne Wideband 2 protocol
- Compatible with Sonardyne's MF frequency USBL systems
- >200 independent acoustic addresses
- NFC configuration and diagnostics using a suitable NFC enabled handset using Sonardyne NFC App
- Alkaline or lithium battery pack with >9.5 months/>30 months listening life
- Storage mode eliminates power consumption when not in use
- Integrated inclinometer

Specifications

Marker 6



Feature		Type 8326-4311	Type 8326-7511
Depth Rating		4,000 m	7,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional ±130°	Omni-directional ±130°
Transmit Source Level (re 1 µPa @1 m)		187 dB	187 dB
Inclinometer Sensor		±5°	±5°
Battery Life (Continuously Listening)	Alkaline	>9.5 months	>9.5 months
	Lithium	>30 months	>30 months
Storage Mode (Battery Disconnect via NFC)	Alkaline	5 years (battery self-discharge limited)	
	Lithium	>10 years (battery self-discharge limited)	
Operating Temperature Range		-5 to 40°C	-5 to 40°C
Storage Temperature Range[1]		-20 to 55°C	-20 to 55°C
Mechanical Construction	Outer Housing	Polypropylene	Polypropylene
	Inner Housing	Duplex stainless steel	Titanium grade 5
Dimensions (Length x Diameter)		383.0 x 63.0 mm (15.1 x 2.5")	383.0 x 63.0 mm (15.1 x 2.5")
Weight in Air/Water[2]		2.0/1.3 kg	1.5/0.7 kg

[1] To maximise battery life, the recommended storage temperature range when the instrument contains a battery pack is 10 to 25°C (50 to 77°F).

[2] Estimated weights.

Datasheet

Compatt 6 Micro LBL Transponder

Compatt 6 Micro is Sonardyne's smallest ever Long BaseLine (LBL) transponder. Designed for short duration missions such as spoolpiece metrology or dynamic mobile mapping, Compatt 6 Micro is perfect for installation on Inspection-class ROVs where payload is limited.

Its small size also means that a Work-class ROV can deploy multiple units in one trip to the seabed - contributing to those all-important project time savings.

Although not as capable as its bigger brothers, Compatt 6 Micro offers the same accurate and robust positioning that 6G is known for. Plus, its small form factor reduces offsetting errors when used with a stab and receptacle for improved metrology results. Also being a rechargeable unit, it saves time and money on replacing depleted primary batteries.

Compatt 6 Micro operates in Sonardyne Wideband®2 or HPR400 series tone modes with a variety of other acoustic systems and transponders. It is also fully compatible with Sonardyne's family of survey quality LBL and Ultra-Short BaseLine (USBL) navigation systems.

Compatt 6 Micro offers significant time saving using faster and more robust Sonardyne Wideband 2 acoustic ranging and telemetry protocols. This makes any system operating with Compatt 6 Micro significantly easier to operate therefore de-risking operations, reducing vessel time and reducing training requirements for offshore personnel.

Sonardyne Wideband 2 advanced signal processing offers improved acoustic performance in challenging conditions, longer range, improved multipath rejection around structures and real-time range diagnostics for quality control. Sonardyne Wideband 2 also reduces the interference to and from adjacent Sonardyne and other acoustic positioning systems.

Compatt 6 Micro is available as an omni-directional unit with a 3,000 m depth rating.

Typical Applications

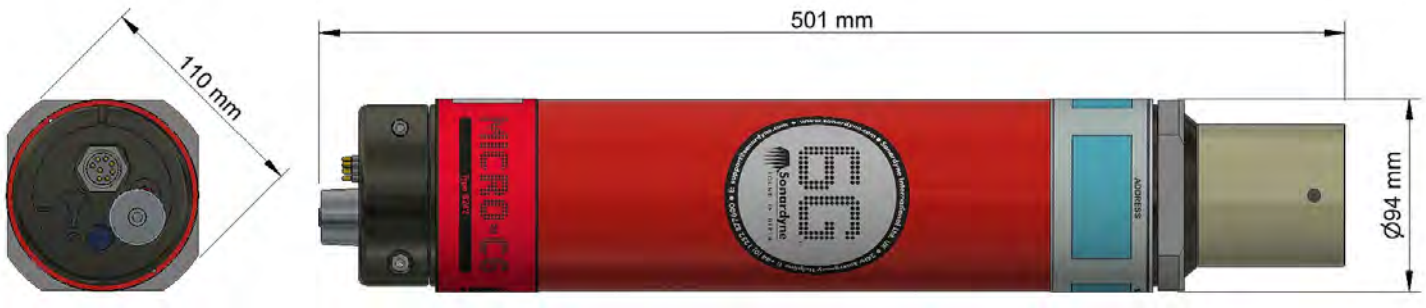
- Spoolpiece metrology
- Dynamic Mapping operations
- Use on inspection class vehicles

Key Features

- Incorporates Sonardyne Wideband 2 acoustic navigation and telemetry technologies
- Compatible with both Fusion LBL and Ranger 2 USBL positioning systems
- Robust performance in shallow water and reverberant environments around structures
- Real time diagnostics available on ranges to enable quality control
- More than 500 unique Sonardyne Wideband 1 and 2 addresses
- Sonardyne Wideband 1 and HPR400 navigation compatible
- Internal pressure sensor
- Internal rechargeable battery
- Field proven
- On/off switch

Specifications

Compatt 6 Micro LBL Transponder



Feature		Type 8242-3111
Depth Rating		3,000 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional
Source Level (re 1 µPa @ 1 m)	High Power	187 dB
	Low Power	181 dB
Tone Equivalent Energy (TEE)[1] WBv2+	High Power	193 dB
	Low Power	187 dB
Range Precision		Better than 15 mm
Depth Sensor		± 0.5% full scale
Communications Interface		RS232 (9,600–115,200 baud)
External Supply Voltage		24 or 48 V dc (± 10%)
External Power	Sleep	<300 mW
	Wideband Listening	<500 mW
	Battery Charging	6 W
	Peak (During Transmission)	<50 W
Battery Life (Li-ion 15 V)	Listening	30 days
	Continuous 5 Second Interrogation	Approx. 6 days at low power
Mechanical Construction		Anodised aluminium alloy and plastics
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 55°C
Dimensions (Diameter x Length)		110 x 501 mm
Weights in Air/Water[2]		5.1/2.2 kg

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated Weights.

Datasheet
Micro-Ranger 2 Integrator

Micro-Ranger 2 has been designed as a true one box battery powered USBL solution, small enough to be carried as hand luggage on commercial flights and mobilised at short notice.

The Micro-Ranger 2 integrator kit comes equipped with Robotics Pack and an AvTrak 6 Nano is provided. This provides an ideal low cost, portable system for Autonomous Underwater Vehicle (AUV) development programmes. This system is suitable for AUV integrators and manufacturers alike.

Micro-Ranger 2 uses a positioning technique known as Ultra-Short BaseLine (USBL) to calculate the position of underwater targets. A transceiver at the surface transmits an acoustic signal to transponders attached to each of the targets you wish to track. Using the return signal from each transponder, Micro-Ranger 2 determines its range (distance), bearing (heading) and depth, displaying the results on a radar-style software display, all whilst simultaneously exchanging telemetry for command and control (C2).

If you're a first-time user of USBL technology, you'll find Micro-Ranger 2 robotics incredibly easy to use. Connect your laptop to the inbuilt Wi-Fi, then attach an AvTrak 6 Nano to each target you want to monitor and control. With the transceiver lowered into the water, you're ready to start communicating with up to 10 AvTrak 6 Nanos.

To deliver the best possible positioning performance and operator experience, Micro-Ranger 2 uses the same market-leading 6G® hardware and Wideband®2 digital acoustic technology you'll find in Sonardyne's family of deepwater USBL systems, but with significantly less cost and complexity.

Built around Sonardyne's Micro-Ranger Transceiver, the USBL system can be deployed from the quayside or a vessel and is optimised for tracking and command at all elevation angles.

Note: The PC is not included.

Key Features

- One box tracking solution for AUVs, ROVs and instruments
- Wide input voltage range for powering + charging on the job
- Optimised for shallow water high elevation tracking
- Track and actuate Sonardyne releases
- Internal rechargeable battery with external on/off switch
- Industry standard IP68 external connectors
- Global database of sound velocity profiles for ease of use and accuracy
- Available as an integrator kit with Marine Robotics Pack for AUV communication
- Export license free

Specifications

Micro-Ranger 2 Integrator

Feature		Type 8241 - Micro-Ranger 2 Integrator
Dimensions		524 x 428 x 206 mm
Weight		13.5 kg
External Power + Charge		12/24 V dc, 115–230 V ac, 30 W maximum, 3.5 W typical
Internal Battery		Li-Ion 33 Wh[1]
Battery Life		>10 hours at 1 Hz ping rate
Connection Type		Ethernet or Wi-Fi (DHCP) to PC
User Connection Ports[2]		X1 RJ45 Ethernet port/X2 USB charging ports
Operating Temperature		-15 to 45°C
Storage Temperature		-20 to 45°C
IP rating		IP67[3]
Performance & Acoustics		
Accuracy[4]	Array	<3.5% of slant range 1DRMS
	System	<5% of slant range 1DRMS
Repeatability		0.3% of slant range 1DRMS
Range		<995 m
Update Rate		Up to 3 Hz
Beam Shape		Omni-directional
Frequency		19–34 kHz
Included in System Kit		
Software		Micro-Ranger 2 Marine Robotics Pack
Transponder		X1 AvTrak 6 Nano
Transceiver		Micro-Ranger USBL Transceiver (MRT) USBL
Internal GNSS		Single frequency GNSS
Cabling		10 m USBL cable/5 m GNSS cable
Charger		Portable topside charger/AvTrak 6 Nano charger
Documentation		Manual, quick start guide, integration videos

[1] UN 38.3 certified with electronic disconnect for transport.
[2] Additional user connections possible to Micro-Ranger 2 software via UDP.
[3] IP67 when operating with a closed box.
[4] System accuracy includes internal Heading, Pitch, Roll and GNSS. Array accuracy excludes GNSS error and incorrect Heading, Pitch and Roll.

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Datasheet
Micro-Ranger 2

Micro-Ranger 2 has been designed as a true one box battery powered USBL solution, small enough to be carried as hand luggage on commercial flights and mobilised at short notice.

Micro-Ranger 2 uses a positioning technique known as Ultra-Short BaseLine (USBL) to calculate the position of underwater targets. A transceiver at the surface transmits an acoustic signal to transponders attached to each of the targets you wish to track. Using the return signal from each transponder, Micro-Ranger 2 determines its range (distance), bearing (heading) and depth, displaying the results on a radar-style software display.

If you're a first-time user of USBL technology, you'll find Micro-Ranger 2 incredibly easy to use. Connect your laptop to the inbuilt Wi-Fi, then attach a transponder to each target you want to monitor the position of. With the transceiver lowered into the water, you're ready to start tracking up to 10 divers, underwater vehicles or any other underwater equipment.

To deliver the best possible positioning performance and operator experience, Micro-Ranger 2 uses the same market-leading 6G® hardware and Wideband®2 digital acoustic technology you'll find in Sonardyne's family of deepwater USBL systems, but with significantly less cost and complexity

Built around Sonardyne's Micro-Ranger Transceiver the USBL system can be deployed from the quayside or a vessel and is optimised for omni-directional tracking.

Each system is supplied with two of Sonardyne's Nano transponders, in either NFC or cabled configurations.

Note: The PC is not included.

Key Features

- One box tracking solution for AUVs, ROVs and instruments
- Wide input voltage range for powering + charging on the job
- Optimised for shallow water high elevation tracking
- Track and actuate Sonardyne releases
- Internal rechargeable battery with external on/off switch
- Industry standard IP68 external connectors
- Global database of sound velocity profiles for ease of use and accuracy
- Available as an integrator kit with Marine Robotics Pack for AUV communication
- Export license free

Specifications
Micro-Ranger 2

Feature		Type 8241 - Micro-Ranger 2
Dimensions		524 x 428 x 206 mm
Weight		13.5 kg
External Power + Charge		12/24 V dc, 115–230 V ac, 30 W maximum, 3.5 W typical
Internal Battery		Li-Ion 33 Wh[1]
Battery Life		>10 hours at 1 Hz ping rate
Connection Type		Ethernet or Wi-Fi (DHCP) to PC
User Connection Ports[2]		X1 RJ45 Ethernet port/X2 USB charging ports
Operating Temperature		-15 to 45°C
Storage Temperature		-20 to 45°C
IP rating		IP67[3]
Performance & Acoustics		
Accuracy[4]	Array	<3.5% of slant range 1DRMS
	System	<5% of slant range 1DRMS
Repeatability		0.3% of slant range 1DRMS
Range		<995 m
Update Rate		Up to 3 Hz
Beam Shape		Omni-directional
Frequency		19–34 kHz
Included in System Kit		
Software		Micro-Ranger 2
Transponder		X2 NFC Nano or x2 cabled Nano
Transceiver		Micro-Ranger USBL Transceiver (MRT) USBL
Internal GNSS		Single frequency GNSS
Cabling		10 m USBL cable/5 m GNSS cable
Charger		Portable topside charger/Nano charger
Documentation		Manual and quick start guide

[1] UN 38.3 certified with electronic disconnect for transport.
[2] Additional user connections possible to Micro-Ranger 2 software via UDP.
[3] IP67 when operating with a closed box.
[4] System accuracy includes internal Heading, Pitch, Roll and GNSS. Array accuracy excludes GNSS error and incorrect Heading, Pitch and Roll.

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Specifications subject to change without notice – 06/2021

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Datasheet
Micro-Ranger Transceiver (MRT)

The Micro-Ranger Transceiver (MRT) Ultra-Short BaseLine (USBL) is an extremely small and light, Ethernet interfaced transceiver supporting Sonardyne's 6G® capable beacons.

This smaller USBL offers significant operational benefits due to its small size. The MRT is designed to run from Power over Ethernet (PoE), however it is also compatible with Sonardyne's Ethernet Serial Hub (ESH) which allows it to be used with the Micro-Ranger 2 system.

The multi-element processing enables transponders to be positioned up to 995 m in either shallow or deep water.

When used as part of a complete Micro- Ranger 2 USBL system, all the benefits of the feature rich software are available, such as output telegrams, positioning displays and diagnostic tools.

The integral AHRS sensor provides pitch, roll and heading data that automatically compensates for the dynamic motion of the vessel, removing the need for an external sensor and pre-use calibration.

The MRT is a highly capable acoustic transceiver allowing tracking of up to 10 targets using the Micro-Ranger 2 software. It's compatible with both the Wideband® Sub-Mini 6+ (WSM 6+) and the Nano Transponder beacons. Options to track Autonomous Underwater Vehicles (AUVs) using the Nano AvTrak 6 OEM are also available.

The endcap is manufactured in stainless steel to allow it to be securely fitted and then removed from deployment poles over and over again, whilst the body is made from a lighter weight ABS material. The MRT lends itself to over-the-side deployments on small vessels or even ribs.

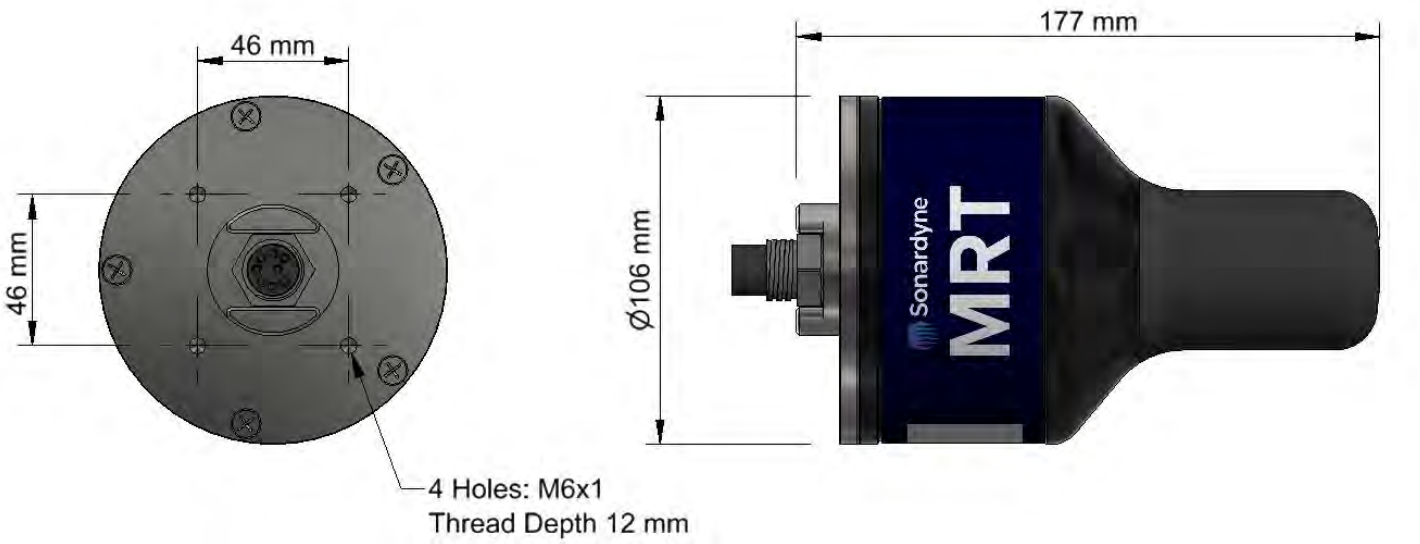
The MRT has a volumetric array to allow tracking both below and above the transceiver; useful when tracking divers close to the vessel of opportunity.

Key Features

- Easy to install and set up
- Supports WSM 6+ and Nano Transponder 6G beacons
- USBL design optimised for short range omni-directional performance
- The array design offers unrivalled range resolution and precision for a USBL system of this size
- Internal magnetic compass for instantaneous and calibration free motion compensation.
- Built in health checks including array and electronics diagnostics
- Ethernet connectivity using an ESH
- The Robotic Pack option enables Sonardyne's SMS acoustic messaging service and enables AUV tracking and control

Specifications

Micro-Ranger Transceiver (MRT)



Feature	Type 8243
Operational Frequency	MF (19–34 kHz)
Operating Range	Up to 995 m
Depth Rating	25 m
Acoustic Coverage	Greater than 200°
Range Accuracy[1]	Better than 15 mm
Angular Accuracy[1]	±3°
Transmit Source Level (dB re 1 µPa @ 1 m)	184 dB
Electrical	48 V dc (±10%) typical 1.5 W, maximum 25.5 W
Communication	Ethernet 100 Mbps
Operating Temperature	-5 to 40°C
Storage Temperature	-20 to 55°C
Mechanical Construction	Stainless steel 316, PVC and polyurethane
Dimensions (Height x Diameter)	177 x 106 mm (excluding connector)
Weight in Air/Water	1.84/0.99 kg

[1] The absolute accuracy of the system is dependent upon the quality of internal attitude and heading sensor which can be influenced by outside sources such as magnetic material, beacon source level, vessel noise, water depth, mechanical rigidity of the transceiver deployment, sound velocity knowledge and proper calibration of the system.

Datasheet
Mini-ROVNav 6+

Mini-ROVNav 6+ is a new 6G® Wideband®2 and Wideband 3 enabled ranging and telemetry Long BaseLine (LBL) transceiver specifically designed for installation on work class Remotely Operated Vehicles (ROVs).

Mini-ROVNav 6+ is fully compatible with all 6G equipment and Sonardyne's latest 6G LBL, INS and Ultra-Short BaseLine (USBL) systems, including Fusion 2.

Its support of Sonardyne Wideband 3 signal processing techniques offers improved range and acoustic performance in challenging conditions such as on noisy vehicles or in multipath environments.

Mini-ROVNav 6+ is also a fully compatible USBL responder or transponder compatible with Sonardyne Wideband 1 and 2 USBL systems and HPR400. The internal Li ion rechargeable battery pack also enables emergency transponder mode, so if the umbilical and therefore power is cut to the ROV it can still be located by USBL.

The nmni-directional Medium Frequency (MF) band transducer has a hemispherical beam pattern which is ideal for acoustics to an array and to a vessel alike.

Mini-ROVNav 6+ is designed to be significantly lighter and smaller than a standard ROVNav 6 whilst providing full 6G LBL capabilities.

Mini-ROVNav 6+ is fully compatible with Sonardyne's modem and logging equipment such as AMT and Fetch products, allowing it to be used to retrieve data or configure logging regimes. It supports all of Sonardyne's Wideband 2 and 3 spread spectrum acoustic communication; 100 to 9,000 bps user data rates can be selected depending on the environment.

Typical Applications

- ROV 6G LBL positioning and calibration
- ROV USBL positioning using 2-way Wideband or responder

Key Features

- Fully capable 6G LBL transceiver
- MF frequency band utilising Sonardyne Wideband 2 and 3 ranging and telemetry protocols
- More robust performance in shallow water and reverberant environments around structures etc
- Mini size – lightweight and small
- On/off switch to save battery during periods of down time
- Real time diagnostics available on ranges to enable quality control
- USBL compatible responder with emergency transponder mode (Li ion battery)
- Integrated modem capability for data download from Sonardyne AMT/Fetch products at data rates from 100 to 9,000 bits per second
- Pressure and temperature sensors
- Field proven design

Specifications
Mini-ROVNav 6+

Feature		Type 8240
Depth Rating		3,000 m
Operating Frequency		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional
Transmit Source Level (dB re 1 µPa @ 1 m)		181–187 dB (2 levels)
Tone Equivalent Energy (TEE)[1]		187–193 dB
Receiver Sensitivity (dB re 1 µPa)		90–120 dB
Range Precision		Better than 15 mm
Operating Voltage		24 or 48 V dc (±10%)
Serial Communications		Primary port: RS232 (9,600 – 115,200 baud)
Responder Input		4 V to 24 V, >0.5 ms duration
Release Output		12 V (250 mA rated)
Battery Life (Listening) Li-ion		>7 days
External Power	Active (Listening)	<2 W
	Battery Charging	<6 W
	Peak (During Transmission)	<50 W
Mechanical Construction		Hard anodised aluminium alloy and stainless steel connectors
Serial Communications Bulkhead Connector		MCBH8M
Dimensions (Length x Diameter)		501 x 93 mm
Weight in Air/Water[2]		5.1/ 2.2 kg
Operating Temperature Range		-5C to 40°C
Storage Temperature Range		-20 to 55°C
Sensors		**Type 8240**
Temperature (±0.25°C)		Standard
Strain Gauge Pressure Sensor (±0.25% FS)		Standard

[1] WBv2 & WBv1 signals are 2x the duration of Sonardyne tone signals, therefore the TEE figure is to give the user an idea of the operational performance when comparing Wideband and Tone systems.
[2] Estimated Weights.

For further information, contact us at **E** sales@sonardyne.com

Datasheet
Nano Transponder

The Wideband® Nano Transponder is specially designed for acoustic positioning of divers or small underwater vehicles. The small lightweight family of transponders allow for easy, unobtrusive attachment to a diver or vehicle.

Available in three variants: NFC, with connector (Cabled) and OEM; there is a Nano Transponder for every use case.

All variants are depth rated to 500 m and have an acoustic source level and beam shape that is designed to operate over a 995°m slant range under normal conditions. Three months battery life means they are suitable for long term deployments, marker beacons and for vehicle recovery.

A 500 m pressure sensor optimises acoustic performance at long horizontal ranges by constraining the depth measurement, making the nano perfect for Towed vehicle, AUV and Diver tracking.

The Nano Transponder family operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Mini-Ranger 2 6G® Wideband USBL system.

The NFC Nano Transponder features a unique connector-less design that is recharged and programmed via the Nano Docking Station. The NFC technology allows full configuration of the Nano whilst maintaining its rugged "strap on and go" form factor.

The Cabled Nano Transponder features an industry standard Subconn connector allowing the Nano to be permanently powered and can also be used in Responder mode.

For vehicle programs and integrators, the Nano OEM when paired with an OEM transducer provides all the functionality of the housed transponders, in a form factor that can be mounted in any system.

Key Features

- Miniature size for fitting on divers and small ROVs
- Variety of form factors
- Depth rated to 500 m
- Powerful acoustic transmission level
- Medium Frequency operation
- Compatible with Sonardyne Ranger 2 USBL systems
- Configuration using the Nano Docking Station wireless communications
- Battery disconnect storage mode
- Integrated pressure sensor for depth aiding
- >300 independent acoustic addresses
- Wide dc voltage input range
- Gainless for ease of use
- Common form factor with AvTrak 6 Nano so common transponders can be used across a fleet

Specifications
Nano Transponder

Nano NFC

Nano (Cabled)

Feature		Type 8262 NFC	Type 8262 Cabled
Operating Range		995 m[1]	995 m[1]
Depth Rating		500 m	500 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional ±130°	Omni-directional ±130°
Source Level (re 1 µPa @ 1 m)		184/175 dB	184/175 dB
Range Precision		Better than 15 mm	Better than 15 mm
Communication Interface		USB in dock	RS232, 3V3 TTL
Depth Sensor		50 bar abs +/-0.7% FS	50 bar abs +/-0.7% FS
Power Supply[2]		USB dock	12–28 V dc
Power Consumption	Wideband Listening (Battery)	n/a	5 mW
	Wideband Listening (Ext. Power)[3]	n/a	20 mW (including trickle charge)
	Battery Charging	n/a	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	n/a	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days	>90 days
	1 Sec Ping Rate	>12 hours	>12 hours
Battery Charge Time		12 Hours[4]	12 Hours
External Connections		n/a	Subconn MCIL8M
Mechanical Construction		Polymer	Polymer
Operating Temperature[5]		-10 to 45°C	-10 to 45°C
Storage Temperature[6]		-20 to 55°C	-20 to 55°C
Dimensions (Length x Diameter)		160 x 55 mm	192 x 55 mm
Weight in Air/Water		486/149 g	584/162 g

[1] When used with Micro-Ranger 2/range limited Ranger 2 systems.
[2] Noise on the external dc supply may have an effect on the acoustic performance of the instrument.
[3] Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency
[4] When using ac mains charger
[5] The battery will not charge above 45°C or below 0°C.
[6] To maximise battery life, the instrument should not be stored above 30°C.

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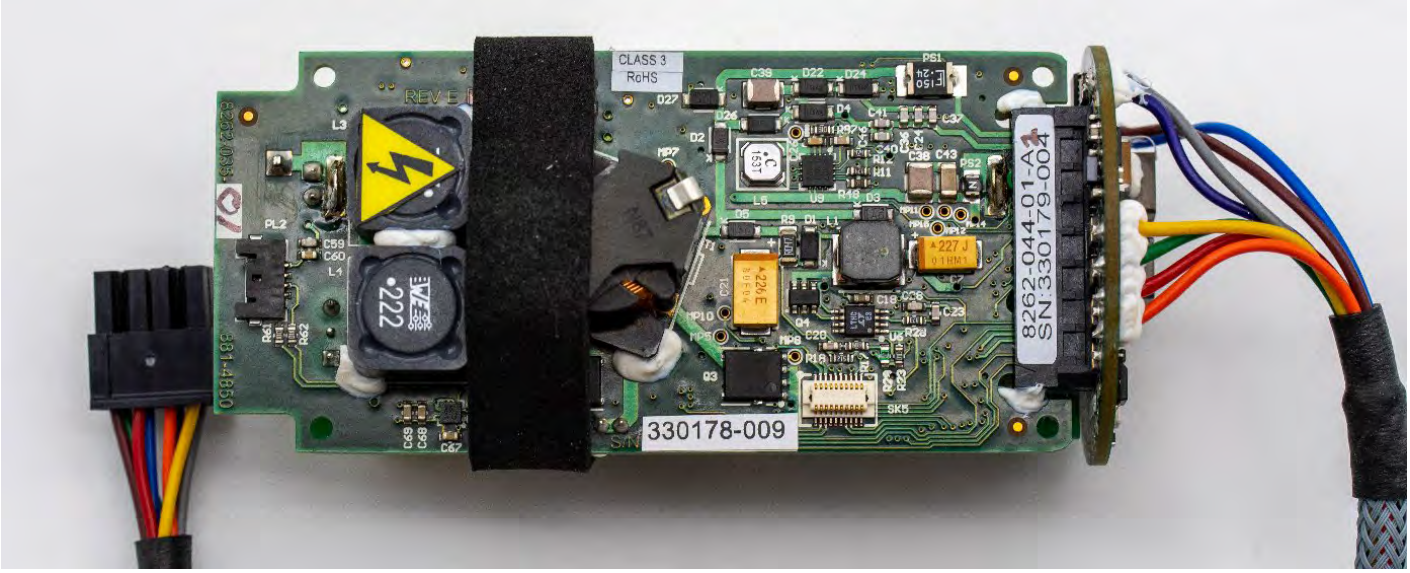
Datasheet
Nano OEM Transponder



The Wideband® Nano Transponder is specially designed for acoustic positioning of divers or small underwater vehicles. The small lightweight family of transponders allow for easy, unobtrusive attachment to a diver or vehicle.

Available in three variants: NFC, Cabled and OEM, there is a Nano Transponder for every use case.

All variants are depth rated to 500 m and have an acoustic source level and beam shape that is designed to operate over a 995˚m slant range under normal conditions. Three months battery life means they are suitable for long term deployments, marker beacons and for vehicle recovery.

A 500 m pressure sensor optimises acoustic performance at long horizontal ranges by constraining the depth measurement, making the nano perfect for Towed vehicle, AUV and Diver tracking.

The Nano Transponder family operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Mini-Ranger 2 6G® Wideband USBL system.

The NFC Nano Transponder features a unique connector-less design that is recharged and programmed via the Nano Docking Station. The NFC technology allows full configuration of the Nano whilst maintaining its rugged "strap on and go" form factor.

The Cabled Nano Transponder features an industry standard Subconn connector allowing the Nano to be permanently powered and can also be used in Responder mode.

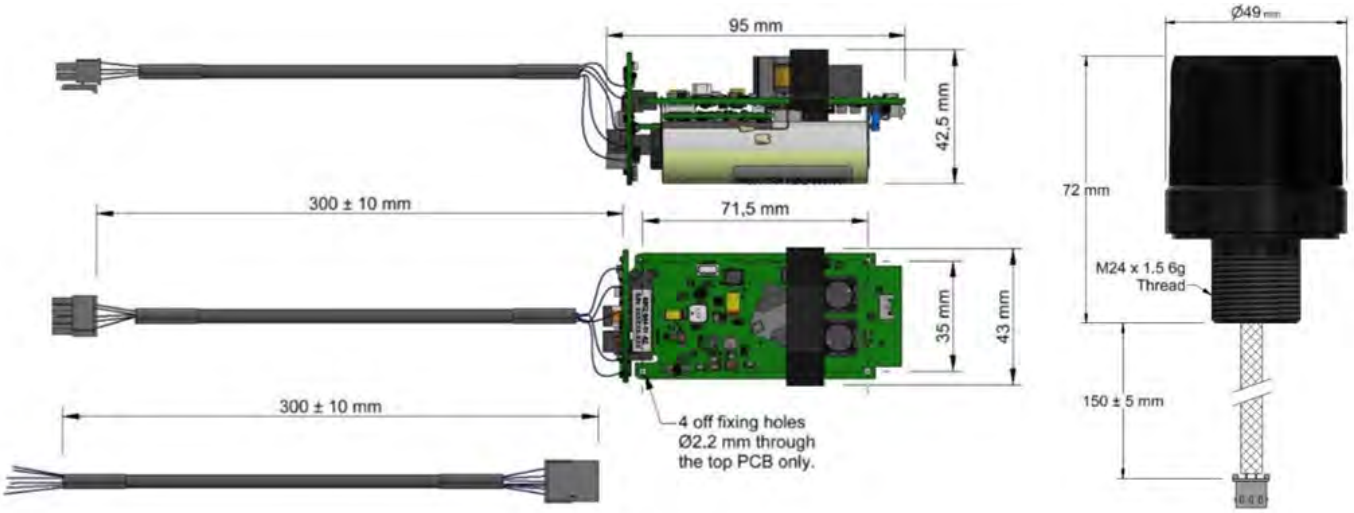
For vehicle programs and integrators, the Nano OEM when paired with an OEM transducer provides all of the functionality of the housed transponders, in a form factor that can be mounted in any system.

Key Features

- Miniature size for fitting on divers and small ROVs
- Configurable form factor
- Depth rated to 500 m
- Powerful acoustic transmission level
- Medium Frequency operation
- Compatible with Sonardyne Ranger 2 USBL systems
- Configuration using the Nano Docking Station wireless communications
- Battery disconnect storage mode
- Integrated pressure sensor for depth aiding
- >300 independent acoustic addresses
- Wide dc voltage input range
- Gainless for ease of use
- Common form factor with AvTrak 6 Nano so common transponders can be used across a fleet

Specifications

Nano OEM Transponder



Feature		Type 8262 Nano OEM
Operating Range		995 m[1]
Transducer Depth Rating		500 m
Operating Frequency		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional ±130°
Source Level (re 1 µPa @ 1 m)		184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs +/-0.7% FS
Power Supply[2]		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (External Power)[3]	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Molex Microfit
Transducer Wire Length[4]		150 mm (6”)
Operating Temperature[5]		-10 to 45°C
Storage Temperature[6]		-20 to 55°C
Dimensions	Transducer (Length x Diameter)	72 x 49 mm
	PCB Board Assembly (Length x Width x Height)	95 x 43 x 42.5 mm
	Hole Centres (M2 clearance – Length x Width)	71.5 x 35 mm
Weights	PCB in Air	138 g PCB + 12 g cable
	Transducer in Air/Water (Estimated)	200/150 g

[1] When used with Micro-Ranger/range limited Ranger 2 systems.
[2] Noise on the external dc supply may have an effect on the acoustic performance of the instrument.
[3] Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency.
[4] It is possible to increase the transducer wire length if required; contact Sonardyne for more information.
[5] The battery will not charge above 45°C or below 0°C.
[6] To maximise battery life, the instrument should not be stored above 30°C.

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Specifications subject to change without notice – 06/2021

Datasheet
Release Transponder 6 (RT 6-1000)

The Release Transponder 6 (RT 6-1000) has been designed for use in continental shelf waters to water depths of 1,000 m using Sonardyne's Wideband®2 acoustic ranging and telemetry protocol.

RT 6-1000 has both receive and transmit functions, enabling accurate slant ranges and position to be accurately determined, and release actuation confirmed with a Working Load Limit (WLL) of 150 kg.

RT 6-1000 can be used in both Transponder Mode (subsea) and Topside Control Mode (to release another subsea RT 6-1000) using the Sonardyne RT6 App on an NFC enabled Android™ device or tracked and released using a Ranger 2 6G® USBL system.

The Sonardyne RT6 App has been specially developed to configure, load the release nut prior to deployment and release the RT 6-1000. It can also run self-test functions, read battery status, add a GPS marker of your deployment position and locate a deployed RT 6-1000.

The NFC link also provides the ability to enter RT 6-1000 into a storage mode when not in use, thereby significantly increasing the overall battery endurance.

A 'screw-off' release mechanism ensures a positive release action that overcomes any biological growth and all external parts are made of high strength plastics that provide excellent environmental corrosion resistance.

An optional attachment for the RT 6-1000 is a rope canister that allows items left on the seabed, for example, tools, cables and salvage, to be quickly and easily hauled up.

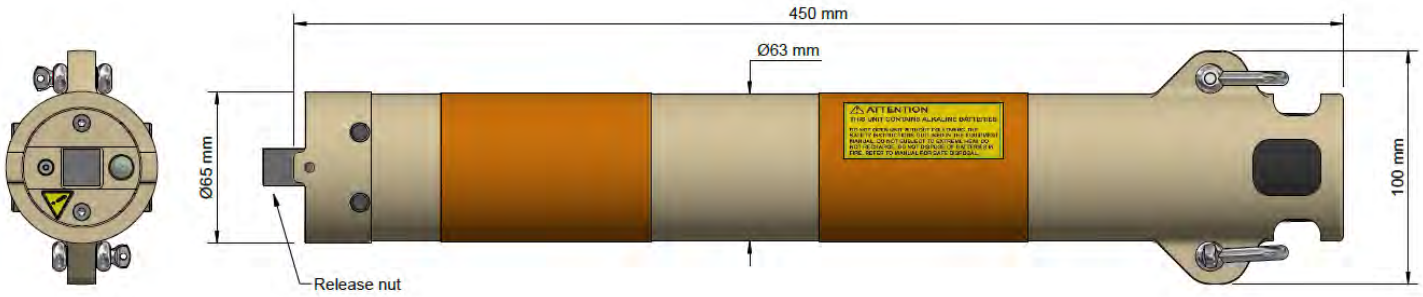
This works by mooring one end of the rope to the item on the seabed and the other end to the RT 6-1000 via the attached canister of rope. As the transponder ascends to the surface, high strength rope is deployed from the canister. This line can then be used to pull up the item directly or retrieve heavier tag lines.

Key Features

- MF frequency band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- Compatible with Sonardyne's 6G transceivers and USBL systems.
- Uses Sonardyne Wideband 2 acoustic addresses
- Working Load Limit of 150 kg
- Depth rated to 1,000 m
- >13 months deployment with alkaline battery pack
- Integrated inclinometer
- NFC configuration and diagnostics
- Storage mode eliminates power consumption when not in use
- Reliable, 'screw-off' release
- Rugged, compact design

Specifications

Release Transponder 6 (RT 6-1000)



Feature		Type 8327
Depth Rating		1,000 m
Operating Frequency		MF 19–34 kHz
Transducer Beam Shape		Hemispherical
Transmit Source Level (dB re 1 µPa @ 1 m)		187 dB
Tone Equivalent Energy (TEE)[1]		193 dB
Receive Threshold (dB re 1 µPa)		<100 dB
Working Load Limit (4:1)		150 kg
Proof Load[2]		300 kg
Breaking Load		600 kg
Maximum Safe Release Load		150 kg
Battery Life (Alkaline)		>13 months
Inclinometer Accuracy		±5°
Mechanical Construction		Anodised aluminium alloy, plastic and super duplex stainless steel
Operating Temperature		-5 to 40ºC
Storage Temperature		-20 to 55ºC
Maximum Dimensions (Length x Diameter)		450 x 65 mm
Weight in Air/Water[3]		2.0/0.5 kg
Options	Rope Canister (longer lengths available)	70 m (250 kg WLL) 120 m (250 kg WLL) 160 m (125 kg WLL)
	Release Nut	Part No. 830-0048 (note: 10 nuts supplied with each new RT 6-1000)
Standards		CE Marked to EN-60945, EN-61010

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
[2] Sonardyne does not perform proof load testing of this product.
[3] Estimated Weights.

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Specifications subject to change without notice – 06/2021

Datasheet

Release Transponder 6 (RT 6-3000)

The Release Transponder 6 (RT 6–3000) is a tough, reliable acoustic release designed for a wide variety of subsea applications and is fully compatible with Sonardyne's 6G® transceivers and USBL systems. RT 6-3000 is derived from mechanics of the highly reliable 7409 Oceanographic Release Transponders (ORT), which it supersedes.

RT 6-3000 integrates the functionality of a Sonardyne Wideband®2 compatible navigation transponder coupled with an integrated high load release mechanism.

RT 6-3000 can be tracked and released using all Medium Frequency (MF) band Ranger 2 6G USBL systems or a deck unit with remote dunking transducer. The maximum slant range for operation is dependent on the noise environment and topside used; however, ranges up to 4,500 m should normally be achievable.

Standard features include a Working Load Limit (WLL) of 1,275 kg (at 4:1) and a spring-assisted release mechanism.

A battery disconnect fob is located on the transducer and uses an internal magnetic switch to electronically disconnect the battery when not in use.

RT 6-3000 is compatible with Sonardyne's standard tandem and high load release frames.

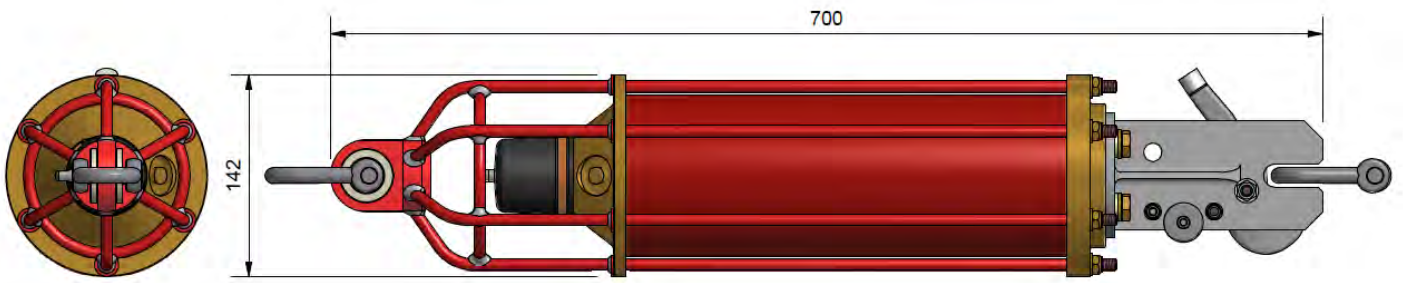
RT 6-3000 is configured with Sonardyne's iWAND 6G portable handheld acoustic transponder test and configuration device.

Key Features

- WLL 1,275 kg (4:1)
- Breaking Load 5,100 kg
- MF frequency band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- Quick and easy to set-up and operate
- Robust performance in shallow water and reverberant environments around structures etc.
- Real-time diagnostics available on ranges to enable quality control
- Reduced mutual interference to further improve simultaneous operations
- Uses Sonardyne Wideband 2 acoustic addresses
- Highly reliable release mechanism
- Omni-directional transducer
- Operation down to >3,000 m
- Compatible with Sonardyne 6G transceivers
- Battery disconnect fob to maximise battery life
- Integrated inclinometer (±5° accuracy)
- Battery status reporting

Specifications

Release Transponder 6 (RT 6-3000)



Feature	Type 8320-3411
Depth Rating	3,000 m[1]
Maximum Slant Range	4,500 m
Operating Frequency	MF (19–34 kHz)
Transducer Beam Shape	Hemispherical
Transmit Source Level (dB re 1 µPa @ 1 m)	186 dB
Tone Equivalent Energy (TEE)[2]	192 dB
Receive Threshold (dB re 1 µPa)	<90 dB
Working Load Limit (4:1)	1,275 kg[3]
Proof Load	2,550 kg
Breaking Load	5,100 kg
Maximum Safe Release Load	1,700 kg
Battery Life (Alkaline)	>32 months active
Inclinometer Accuracy	±5°
Surface Unit	Sonardyne 6G transceiver
Mechanical Construction	Aluminium bronze and duplex stainless steel
Operating Temperature	-5 to 40°C
Storage Temperature	-20 to 55°C
Dimensions (Length x Diameter)	700 x 142 mm (27.5 x 5.6”)
Weight in Air/Water[4]	20/15 kg
Options	Parallel Release Kit Heavy Duty Release Frame
Standards	CE Marked to EN-60945, EN-61010

[1] RT 6-3000 is pressure rated to 4,000 m; however, due to operating range constraints of MF, its use at depths greater than 3,000 m is not recommended.

[2] WBv2 signals are 2x the duration of Sonardyne tone signals, therefore the TEE figure is to give the user an idea of the operational performance when comparing Wideband and Tone systems.

[3] The standard supplied shackles have a WLL of 1,250 kg.

[4] Estimated Weights.

For further information, contact us at **E** sales@sonardyne.com

Datasheet

Release Transponder 6 (RT 6-6000)

The Release Transponder 6 (RT 6-6000) is a tough, reliable acoustic release designed for a wide variety of subsea applications and is fully compatible with Sonardyne's 6G® transceivers and USBL systems. RT 6-6000 is derived from mechanics of the, now superseded, but highly reliable 7710 Deep Oceanographic Release Transponders (DORT).

RT 6-6000 integrates the functionality of a Sonardyne Wideband®2 compatible navigation transponder coupled with an integrated high load release mechanism.

RT 6-6000 can be tracked and released using all LMF Ranger 2 6G USBL systems or a deck unit with remote dunking transducer.

Standard features include a Working Load Limit (WLL) of 1,275 kg (at 4:1) and a spring-assisted release mechanism.

A battery disconnect fob is located on the transducer and uses an internal magnetic switch to electronically disconnect the battery when not in use.

RT 6-6000 is compatible with Sonardyne's standard tandem and high load release frames.

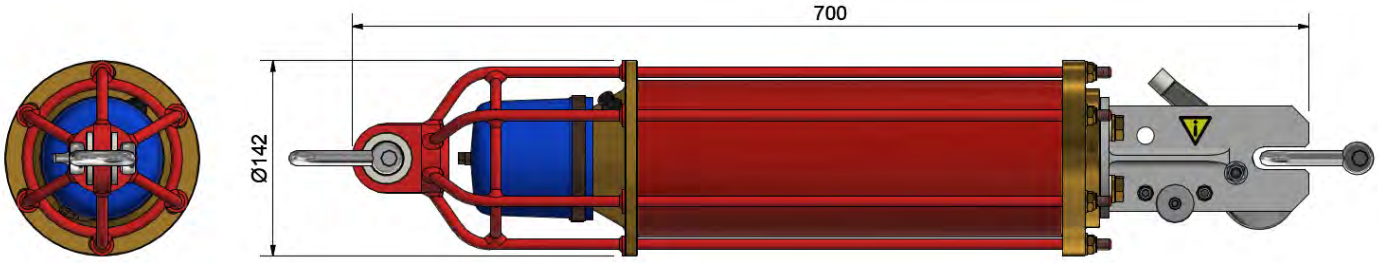
RT 6-6000 is configured with Sonardyne's iWAND 6G portable handheld acoustic transponder test and configuration device.

Key Features

- WLL 1,275 kg (4:1)
- Breaking Load 5,100 kg
- LMF frequency band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- Up to 3 years deployment
- Quick and easy to set-up and operate
- Robust performance in shallow water and reverberant environments around structures etc.
- Real time diagnostics available on ranges to enable quality control
- Reduced mutual interference to further improve simultaneous operations
- Uses Sonardyne Wideband 2 acoustic addresses
- Highly reliable release mechanism
- Omni-directional transducer
- Operation down to 6,000 m
- Compatible with Sonardyne 6G transceivers
- Battery disconnect fob to maximise battery life
- Integrated inclinometer (±5° accuracy)
- Battery status reporting

Specifications

Release Transponder 6 (RT 6-6000)



Feature	Type 8321-6415
Depth Rating	6,000 m
Operating Frequency	LMF (14–19 kHz)
Transducer Beam Shape	Hemispherical
Transmit Source Level (dB re 1 µPa @ 1 m)	188 dB
Tone Equivalent Energy (TEE)[1]	192 dB
Receive Threshold (dB re 1 µPa)	<90 dB
Working Load Limit (4:1)	1,275 kg[2]
Proof Load	2,550 kg
Breaking Load	5,100 kg
Maximum Safe Release Load	1,700 kg
Battery Life (Alkaline)	>32 months active
Inclinometer Accuracy	±5°
Surface Unit	Sonardyne 6G transceiver
Mechanical Construction	Aluminium bronze and duplex stainless steel
Operating Temperature	-5 to 40°C
Storage Temperature	-20 to 55°C
Dimensions (Length x Diameter)	700 x 142 mm (27.5 x 5.6”)
Weight in Air/Water[3]	20/15 kg
Options	Parallel Release Kit Heavy Duty Release Frame
Standards	CE Marked to EN-60945, EN-61010

[1] WBv2 signals are 2x the duration of Sonardyne tone signals, therefore the TEE figure is to give the user an idea of the operational performance when comparing Wideband and Tone systems.
[2] The standard supplied shackles have a WLL of 1,250 kg.
[3] Estimated Weights.

Datasheet

Release Transponder 6 Heavy Duty (RT 6-HD)

The Type 8322 Release Transponder 6 Heavy Duty (RT 6-HD) is a tough, reliable acoustic release with a Working Load Limit (WLL) of 2,500 kg, designed for deployment in up to 7,000 m of water and is fully compatible with Sonardyne's 6G® transceivers and USBL systems.

RT 6-HD integrates the functionality of a Sonardyne Wideband®2 compatible navigation transponder coupled with an integrated heavy duty release mechanism.

RT 6-HD can be tracked and released using all LMF Ranger 2 6G USBL systems or a deck unit with remote dunking transducer.

Excellent corrosion resistance is achieved by using super duplex stainless steel.

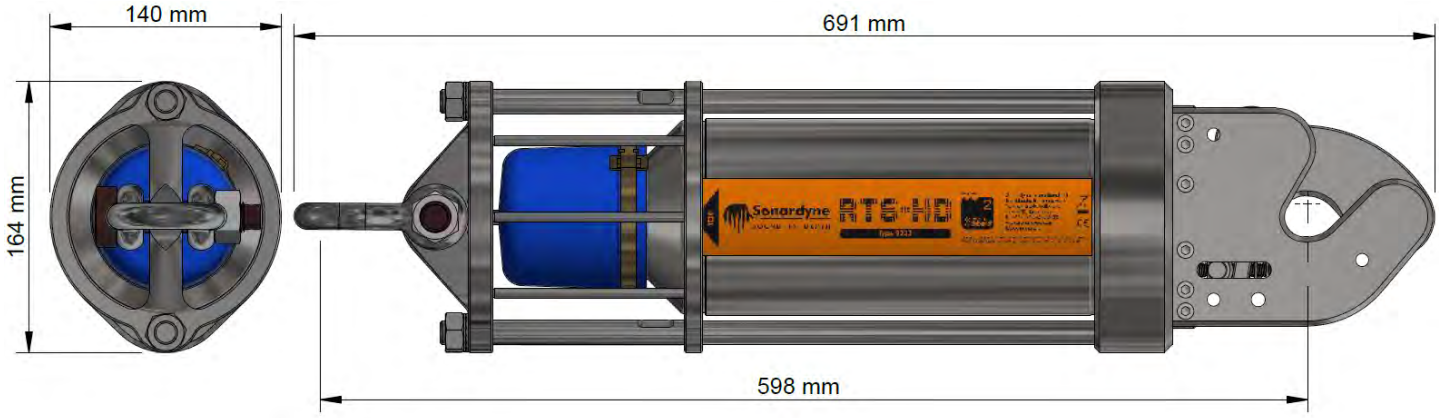
RT 6-HD can be configured with Sonardyne's iWAND 6G portable handheld acoustic transponder test and configuration device.

Key Features

- WLL 2,500 kg (4:1)
- Breaking Load >10,000 kg
- 7,000 m depth rated
- LMF frequency band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- Up to 3 years deployment
- Excellent corrosion resistance – Super duplex stainless steel
- Real time diagnostics available on ranges to enable quality control
- Reduced mutual interference to further improve simultaneous operations
- Uses Sonardyne Wideband 2 acoustic addresses
- Highly reliable release mechanism
- Omni-directional transducer
- Compatible with Sonardyne 6G transceivers
- Integrated inclinometer (±5° accuracy)
- Battery status reporting

Specifications

Release Transponder 6 Heavy Duty (RT 6-HD)

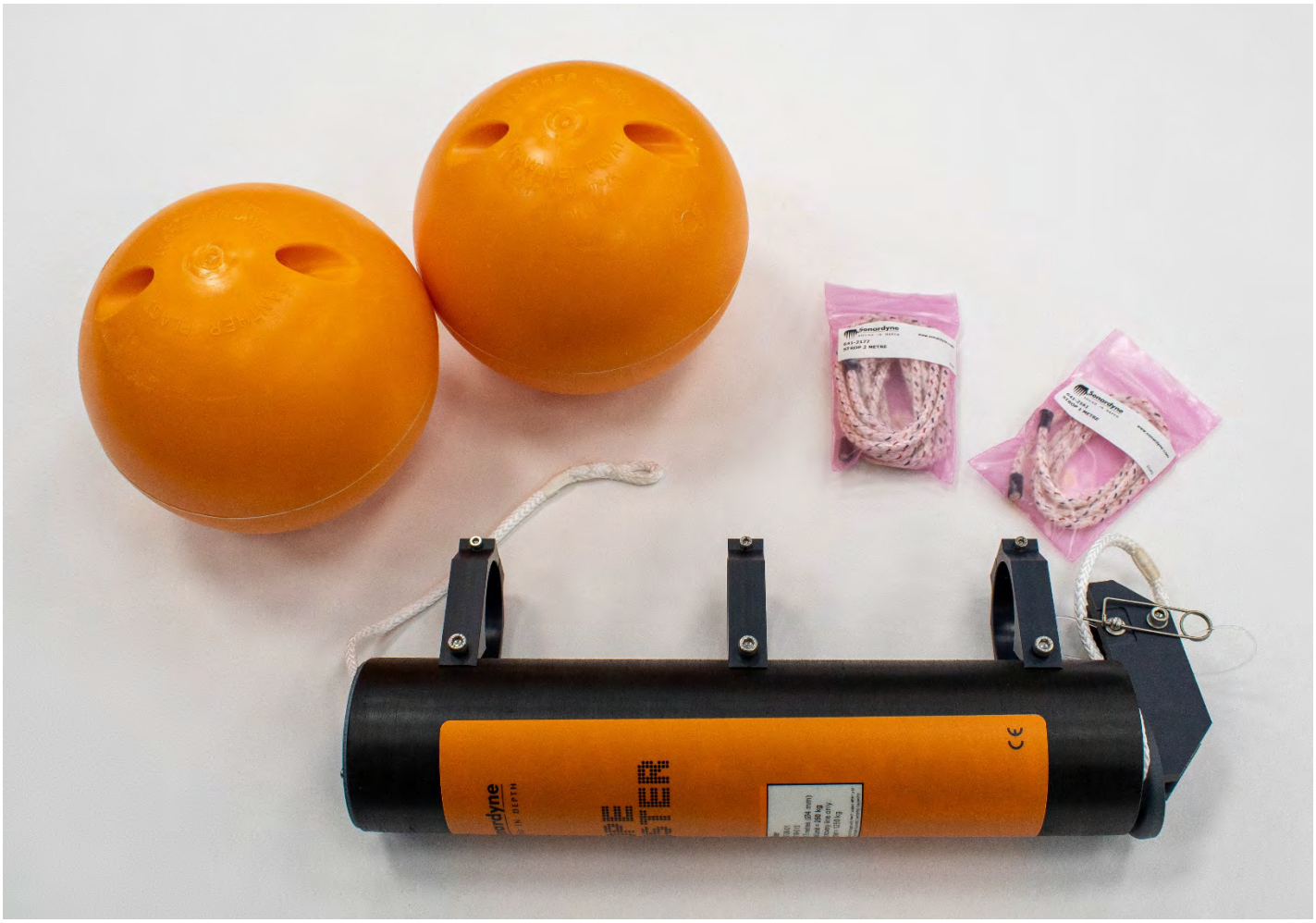


Feature	Type 8322
Depth Rating	7,000 m
Operating Frequency	LMF (14–19 kHz)
Transducer Beam Shape	Hemispherical
Transmit Source Level (dB re 1 µPa @ 1 m)	188 dB
Tone Equivalent Energy (TEE)[1]	192 dB
Receive Threshold (dB re 1 µPa)	<90 dB
Working Load Limit (4:1)	2,500 kg
Proof Load	5,000 kg
Breaking Load	10,000 kg
Battery Life (Alkaline)	>36 months active
Inclinometer Accuracy	±5°
Surface Unit	Sonardyne 6G transceiver
Mechanical Construction	Super duplex stainless steel
Operating Temperature	-5 to 40°C
Storage Temperature	-20 to 55°C
Dimensions (Maximum) (Length x Diameter)	691 x 164 mm
Weight in Air/Water[2]	24.5/20 kg

[1] WBv2 signals are 2x the duration of Sonardyne tone signals, therefore the TEE figure is to give the user an idea of the operational performance when comparing Wideband and Tone systems.

[2] Estimated Weights.

Datasheet
Rope Canister



The Rope Canister is an optional attachment for the RT 6-1000 release transponder that allows heavy items left on the seabed, for example: ADCPs, tools, cables, and subsea structures to be quickly and easily hauled up to the surface.

Sonardyne's Rope Canisters are designed to attach to the RT 6-1000 and come with configurable recovery line lengths and two 400 m depth rated 3.5kg upthrust buoys.

Rope Canister options are available including 70 m, 120 m and 160 m of high strength rope (Dyneema recovery line) with a working load limit (WLL) of up to 250 kg for the 70 m and 120 m.

The Rope Canister is small and portable in use and can be quickly attached to the RT 6-1000 using three clamps.

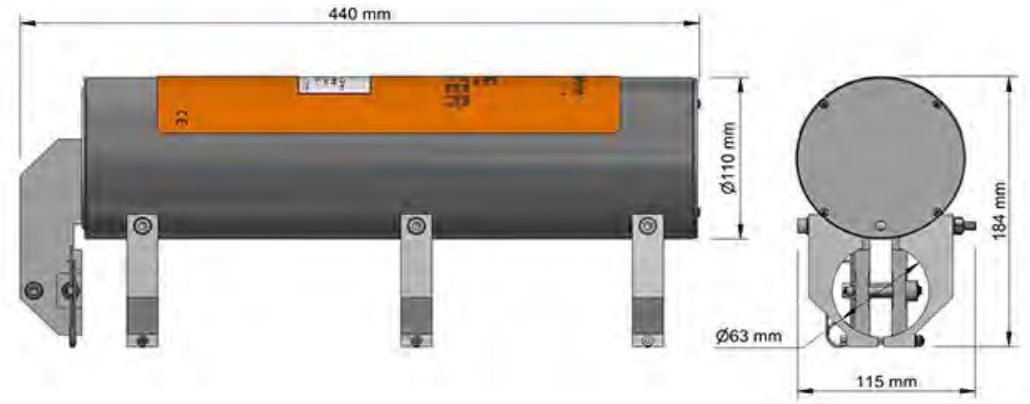
The Rope Canister kit is supplied with a Rope Canister, two 3.5 kg upthrust buoys, shackles and attachment lines.

Key Features

- Avoid leaving infrastructure on the seabed
- Avoid the use of costly ROVs or divers
- Options for different length recovery lines
- WLL up to 250 kg
- Compact and portable
- Supplied as a complete kit

Specifications
Rope Canister

70 m Rope Canister



120 m and 160 m Rope Canister

Feature		Specification
70 m Canister		Part number 641-0673
120 m Canister		Part number 641-3265
160 m Canister		Part number 641-0080
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 45°C
Dimensions (Length x Diameter)	70 m Canister	435 x 90 mm
	120/160 m Canister	440 x 110 mm
Weight in Air (Including Recovery Line)	70 m Canister	1.93 kg
	120 m Canister	2.42 kg
	160 m Canister	2.10 kg

Spares (Part Number)	Description
650-1602	Rope Canister Accessory Kit 70 m
650-2486	Rope Canister Accessory Kit 120 m
650-0038	Rope Canister Accessory Kit 160 m
231-0348	Replacement 70 m recovery line (250 kg WLL)
231-0350	Replacement 120 m recovery line (250 kg WLL)
641-0074	Replacement 160 m recovery line (125 kg WLL)

For further information, contact us at **E** sales@sonardyne.com

Datasheet

ROVNav 6+ LBL Transceiver and USBL Responder

ROVNav 6+ is a 6G® ranging and telemetry transceiver specifically designed for installation on work class ROVs for Long BaseLine (LBL) and Sparse LBL aided SPRINT INS operations.

Its compatibility with Sonardyne Wideband®2 and 3 telemetry commands, and support of high power Wideband 2 ranging protocols proven for their accuracy and robustness, means the ROVNav 6+ offers improved range and acoustic performance in challenging conditions such as on noisy vehicles or in multipath environments.

The support for Sonardyne Wideband 3 enables ROVNav 6+ to operate with Sonardyne's latest Compatt technology, Compatt 6+. In turn, it means ROVNav 6+ fully supports the latest Fusion 2 LBL and SPRINT INS software.

ROVNav 6+ is also a fully compatible USBL responder or transponder compatible with Sonardyne Wideband 2 USBL systems and HPR400. The internal Li-ion rechargeable battery pack also enables emergency transponder mode, so if the umbilical and therefore power is cut to the ROV it can still be located by USBL.

The rugged omni-directional remote Medium Frequency (MF) band transducer makes installation on a ROV easy.

ROVNav 6+ is designed to be rugged though relatively lightweight and utilises robust underwater connectors.

ROVNav 6+ supports a range of internal sensors including: strain gauge pressure, PRT temperature and MEMS based inclinometer.

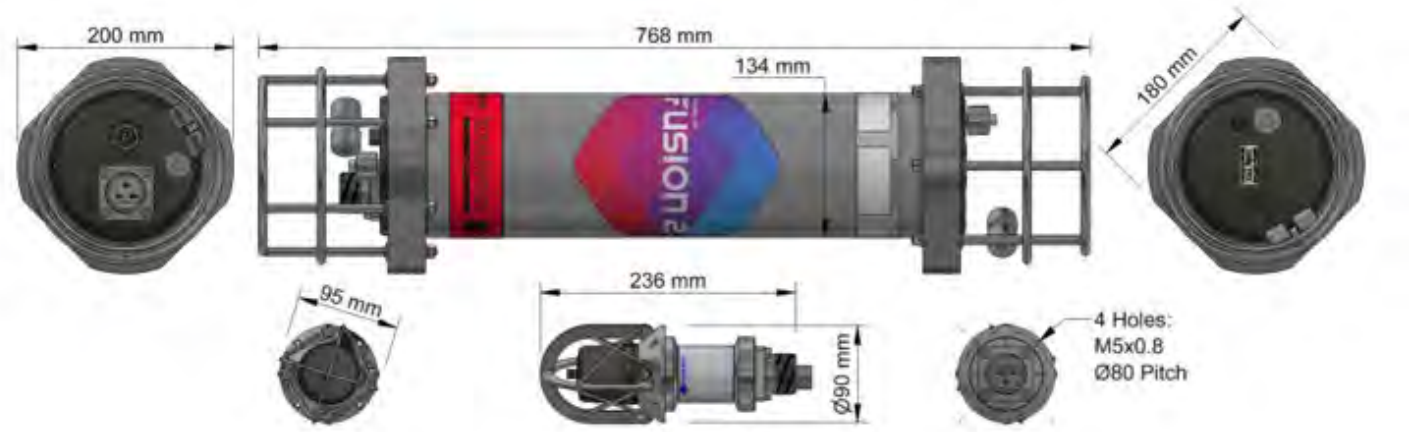
ROVNav 6+ is also fully compatible with Sonardyne's modem and logging equipment such as AMT and Fetch products, allowing it to be used to retrieve data or configure logging regimes. It supports all of Sonardyne's Wideband 2 and 3 spread spectrum acoustic communication; 100 to 9,000 bps user data rates can be selected depending on the environment.

Key Features

- High power, long range LBL transceiver
- MF frequency band utilising Sonardyne Wideband 2 and 3 telemetry protocols
- Sonardyne Wideband 2 and HPR400 navigation compatible
- Robust performance in shallow water and reverberant environments around structures etc.
- Real time diagnostics available on ranges to enable quality control
- USBL compatible responder with emergency transponder mode
- Li-ion battery
- Rugged mechanics and connectors
- Integrated modem capability for data download from Sonardyne AMT/Fetch products at data rates from 100 to 9,000 bits per second
- Standard sensors – Temperature, pressure and MEMS inclinometer
- 3,000, 5,000 or 7,000 depth rated

Specifications

ROVNav 6+ LBL Transceiver and USBL Responder



8340-3161 dimensions shown above

Feature		8340-3161	8340-5261	8340-7261
Depth Rating		3,000 m	5,000 m	7,000 m
Operating Frequency		MF (19–34 kHz)		
Transducer Beam Shape		Omni-directional		
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)		
Tone Equivalent Energy (TEE)[1]		193–202 dB		
Receiver Sensitivity (dB re 1 µPa)		90–120 dB		
Range Precision		Better than 15 mm		
Serial Communications[2]		RS232 or RS485 (half-duplex)		
Battery Life Li-ion (Listening)		3 days		
Operating Voltage		24 or 48 V dc (±10%)		
External Power	Active (Listening)	<3 W typical (maximum 10 W when charging)		
	Peak (During Transmission)	<80 W		
Serial Communications Connector		Subconn (8-way female)		
Remote Transducer Connector		Burton (3-way male)		
Housing Mechanical Construction		Hard anodised aluminium 6082	Hard anodised aluminium 7075	Hard anodised aluminium 7075
Remote Transducer Mechanical Construction		Stainless steel 316		
Dimensions (Maximum) (Length x Diameter)		768 x 200 mm	768 x 200 mm	768 x 200 mm
Housing Diameter		134 mm	134 mm	140 mm
Weight in Air/Water[3]	Housing Assembly	14.3/5.3 kg	14.7/5.7 kg	15.5/6.0 kg
	Transducer	3.2/2.7 kg	3.2/2.7 kg	3.3/2.8 kg
	Cable (5 m)	2.7/1.4 kg	2.7/1.4 kg	2.7/1.4 kg
Sensors				
Temperature (±0.1°C)		Standard		
Strain Gauge Pressure Sensor (±0.1%)		Standard		
High Precision Strain Gauge (±0.01%)		Optional		
Inclinometer (Tilt Sensor) Range ±90°, Accuracy: ±1° (Vertical Orientation)		Standard		

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Fusion 2 requires full duplex serial comms (RS232).

[3] Estimated Weights.

Datasheet
Small Seismic Transponder 6 (SST 6)

The Type 8325 Small Seismic Transponder 6 (SST 6) is a small rugged transponder designed for acoustic positioning of ocean bottom seismic cables and nodes, where high-performance, small-size, low-cost and ease of programming are all important operational factors.

The SST 6 incorporates Near Field Communications (NFC) allowing fast programming of 16 group interrogation addresses and 95 reply channels providing more than 1,520 unique acoustic identities. This allows the marking of seismic cables and other applications demanding dense transponder coverage.

The SST 6 is configured using NFC with a suitable NFC enabled handset (including an NFC enabled Android™ handset with the Sonardyne NFC App) or a dedicated HF Radio Frequency Identification (RFID) reader.

The SST 6 operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Ranger 2 Wideband®Nodal USBL systems that use HPT5000/7000 transceivers.

Ranger 2 USBL systems measure both range and bearing to SST 6 in the same operation so an accurate position of the node or cable can be determined very quickly and at a high update rate.

Combining the use of Ranger 2 USBL and SST 6 in this way results in considerable savings in vessel time and new standards of efficiency for seismic operations.

Sonardyne Wideband acoustic signal processing offers improved performance in challenging conditions such as at long range, high elevation and long layback tracking, with performance diagnostics provided for quality control.

Sonardyne Wideband signal encoding also reduces the interference both on and by adjacent Sonardyne and other acoustic positioning systems.

The NFC link provides the ability to enter SST 6 into a storage mode when not in use, thereby significantly increasing the overall battery endurance.

Key Features

- MF frequency band utilising Sonardyne Wideband Nodal protocol
- Compatible with Sonardyne's MF frequency USBL systems (HPT5000/7000 transceivers)
- Programmable to any one of 16 group interrogations and 95 reply channels, providing 1,520 unique acoustic identities
- NFC configuration and diagnostics using a suitable NFC enabled handset with Sonardyne NFC App
- Alkaline battery pack with 9.5 months listening life
- Storage mode eliminates power consumption when not in use
- Depth rated to 1,000 and 3,000 m
- Compact and rugged design

Specifications

Small Seismic Transponder 6 (SST 6)

Feature		Type 8325-1111	Type 8325-3311
Depth Rating		1,000 m	3,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)
Transmit Source Level (re 1 µPa @ 1 m)		187 dB	187 dB
Individual Address		1520	1520
Interrogation Groups		16	16
Replies		95	95
Battery Life (Continuously Listening)		9.5 months	9.5 months
Storage Mode (Battery Disconnect via NFC)		5 years (battery self-discharge limited)	5 years (battery self-discharge limited)
Operating Temperature		-5 to 40°C	-5 to 40°C
Storage Temperature [1]		-20 to 55°C	-20 to 55°C
Mechanical Construction	Outer Housing	Polypropylene	Polypropylene
	Inner Housing	Aluminium alloy	Duplex stainless steel
Dimensions (Length x Diameter)		385 x 63 mm	385 x 63 mm
Weight in Air/Water		1.0/0.3 kg	2.0/1.3 kg

[1] To maximise battery life, the recommended storage temperature range when the instrument contains a battery pack is 10 to 25°C (50 to 77°F).

Datasheet

Small Seismic Transponder 6 (SST 6) OEM

The Type 8325 Small Seismic Transponder 6 OEM (SST 6 OEM) has been specifically designed for acoustic positioning of ocean bottom seismic cables and nodes, where high-performance, small-size, low-cost, ease of programming and rugged design are all important operational factors.

SST 6 OEM comprises an electronics PCB and directional or omni-directional acoustic transducer options for integration and use within an Ocean Bottom Node.

The SST 6 OEM operates in the Medium Frequency (MF) band and is compatible with Sonardyne's Ranger 2 Wideband® Nodal USBL systems.

These USBL systems measure both range and bearing to SST 6 OEM in the same operation so an accurate position of the node or cable can be determined very quickly and at a high update rate.

Combining the use of Ranger 2 USBL and SST 6 OEM in this way results in considerable savings in vessel time and gives new standards of efficiency for seismic operations.

Sonardyne Wideband acoustic signal processing offers improved performance in challenging conditions such as at long range, high elevation and deep water tracking, with performance diagnostics provided for quality control.

Another benefit of the SST 6 OEM is its programming ease and flexibility. Any one of 16 group interrogation addresses and 95 reply channels provide more than 1,520 unique acoustic identities which can be quickly programmed into each transponder using the serial interface.

This lends itself to the marking of seismic cables/nodes and other applications demanding dense transponder coverage.

The serial command interface provides the ability to enter SST 6 OEM into a storage mode when not in use, meaning the unit draws no power from the external power supply.

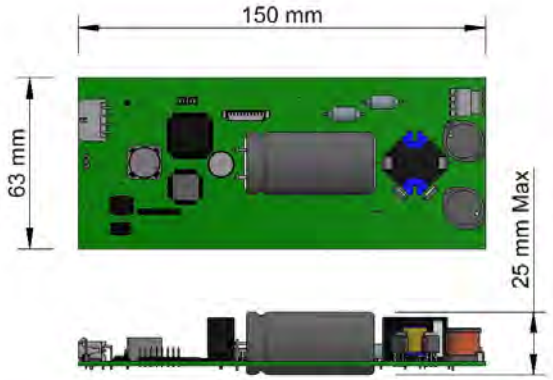
Battery status and other node parameter data can be acoustically uploaded to a surface vessel for quality control purposes.

Key Features

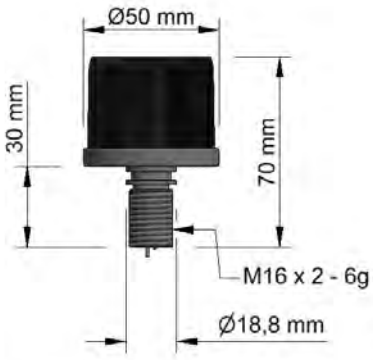
- MF frequency band utilising Sonardyne Wideband Nodal protocol
- Compatible with Sonardyne's MF frequency USBL systems
- Programmable to any one of 16 group interrogations and 95 reply channels, providing 1,520 unique acoustic identities
- Serial command interface
- Bi-directional acoustic telemetry capabilities for status upload
- Group interrogation of up to 95 transponders in one acoustic operation allows fast and efficient node position updates
- Storage mode eliminates power consumption when not in use
- Compact and rugged design

Specifications

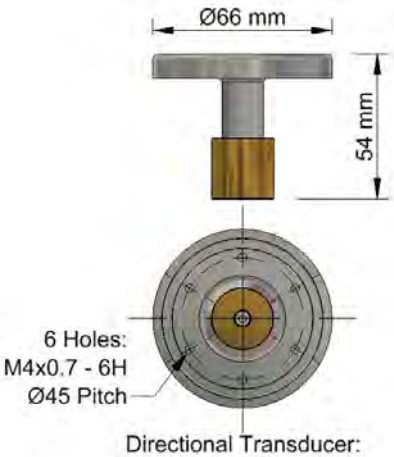
Small Seismic Transponder 6 (SST 6) OEM



Transceiver Electronics:
8325-038-01



Omni-Directional Transducer
8052-001-05



Directional Transducer:
8325-095

Feature		Type 8325 OEM
Operating Range		Up to 3,500 m
Operating Band		MF (19–34 kHz)
Transducer Beam Shape	Omni-directional	±130°
	Directional	±50° (at 28 kHz)
Source Level (re 1 µPa @ 1 m)	Omni-directional	187 dB
	Directional	193 dB
Communication Interface		UART (3.3 V CMOS) / Serial RS232 (optional)
MEMS Tilt Sensor (Optional)		±90°
Power Supply[1]		3.1–5.0 V dc 0 mW storage mode 4 mW quiescent current (listening) 3 W peak power following transmission
Transducer Wire Length[2]		150 mm
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 55°C
Board Dimensions (Length x Width x Height)		150 x 63 x 25 mm
PCB Weight in Air		125 g
Transducer Weight in Air	Omni-directional	200 g
	Directional	220 g

[1] Any noise on the external dc power supply will have an effect on the acoustic performance of the instrument.
[2] Alternative transducer wire lengths and connector arrangements can be specified; contact Sonardyne for more information.

Datasheet
Transition Zone Transponder (TZT)

The Type 8365 Transition Zone Transponder (TZT) is designed to work with Sonardyne's TZ/OBC acoustic positioning system and enables the positions of seismic hydrophone positions to be accurately and efficiently determined.

Prior to deployment from a cable lay boat, the transponders are attached to the seismic cable at each ground station, typically every 50 m. Once the bottom cable is laid, the acoustic system measures the ranges from the surface transceiver to the transponders to enable their exact positions to be established. This positioning process can either be conducted while laying the cable or later while shooting.

The transponders are small and lightweight and have been proven to be able to withstand the demanding and varied operational environment of OBC and TZ surveys.

Standard features include a depth rating of 500 m, a unique acoustic 'address' enabling thousands of units to be laid in a single deployment and automatic battery voltage monitoring to allow users to better plan their maintenance schedules.

The Type 8365-0002 TZT includes an RFID tag to enable asset tracking

In OBC operations using a 'squirter' cable deployment system, 'carapaces' are available that provide a fast and secure means of attaching transponders to the cable. The carapaces are manufactured from tough plastic that encapsulates the transponder and optional RFID asset tracking tag, clamping it securely to the cable whilst protecting it from the high cable deployment and recovery speeds.

The carapace design which is now in use with many operators around the world has been proven to be easy to fit and reduces long term maintenance when compared with traditional tie-wrap and tape methods. The low-profile shape of the carapace also reduces the risk of snagging and as it is acoustically 'quieter' in the water, creates less noise interference down the cable.

Key Features

- Versatile, low cost transponder
- Depth rated to 500 m
- Provides fast and efficient positioning of OBC cables
- Compact and rugged design
- HF frequency band 34–50 kHz
- Alkaline battery packs give up to 18 months listening life
- Optional RFID tags for asset tracking

Specifications

Transition Zone Transponder (TZT)

Type 8365-0002 Shown Above

Feature	Type 8365-0001	Type 8365-0002
RFID Tag	No	Yes
Depth Rating	500 m	500 m
Operating Frequency	HF (34–50 kHz)	HF (34–50 kHz)
Transmit Source Level (dB re 1 µPa @ 1 m)	184–187 dB	184–187 dB
Receive Sensitivity (dB re 1 µPa)	105–115 dB	105–115 dB
Number of Unique Addresses	3609 (field programmable)	3609 (field programmable)
Battery Life (Alkaline)	18 months	18 months
Mechanical Construction	Anodised aluminium alloy and plastic	Anodised aluminium alloy and plastic
Operating Temperature	-5 to +40°C	-5 to +40°C
Storage Temperature	-20 to +55°C	-20 to +55°C
Dimensions (Length x Diameter)	433 x 63 mm	433 x 63 mm
Weight in Air/Water	1.1/0.2 kg	1.1/0.2 kg
Deck Unit	Type 7967-000-02 (includes transducer and 10 m of cable)	

Datasheet

Transition Zone Transceiver

The Type 8263 Transition Zone Transceiver (TZ Transceiver) is designed for use with Sonardyne's Transition Zone Ocean Bottom Cable (TZ/OBC) and Small Seismic Transponder 6 (SST 6) transponders.

The remote transducer portion of the TZ Transceiver system is normally attached to a rigid pole and deployed over the side of a vessel. A GNSS receiver is typically attached to the top of this pole.

On command from a PC equipped with Sonardyne's HydroPos software, TZ Transceiver acoustically interrogates up to nine TZ/OBC or 95 SST 6 transponders at a time and the acoustic responses are used to generate range measurements to each of them.

By combining many acoustic range measurements made to each transponder with GNSS data input into HydroPos or Gator 2 it is possible to generate accurate positions of all transponders to better than 1 m absolute precision.

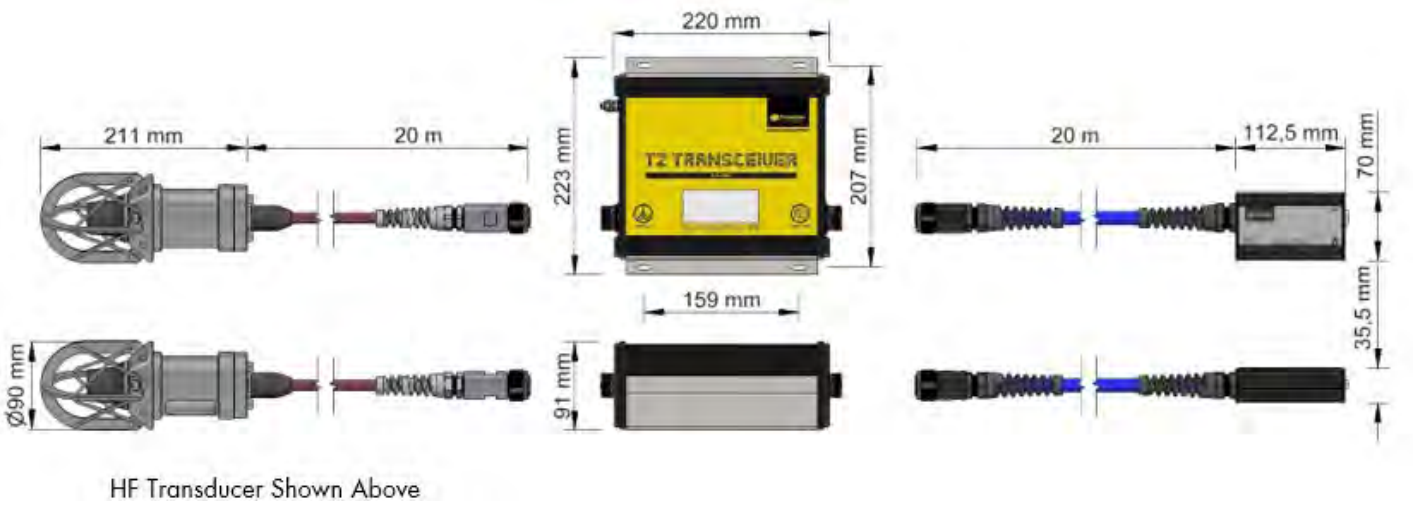
The trigger (output) is accessible on pin 9 of the D type connector.

High Frequency (HF) and Medium Frequency (MF) operating band options support TZ/OBC and SST 6 transponders respectively.

Key Features

- Interoperation with Sonardyne TZ/OBC and SST 6 transponders
- Simultaneous interrogation of up to 9 TZ/OBC transponders in each group
- Simultaneous interrogation of up to 95 SST6 transponders in each group
- Transmits release commands for LRT (HF) and RT 6-1000 (MF)
- Remote transducer with 20 m cable for pole attachment
- Splash-proof transceiver module rated to IP65 for on-deck mounting
- 20 m deck cable for RS232 Ethernet communications and 28 V dc power
- Configured for use with HydroPos and Gator 2 positioning software systems

Specifications
Transition Zone Transceiver



HF Transducer Shown Above

Feature	Type 8263-010-0021	Type 8263-010-0022
Operating Frequency	HF (35–55 kHz)	MF (19–34 kHz)
Transmit Source Level (dB re 1 µPa @ 1 m)	>184–186 dB	>184-187 dB
Receive Sensitivity (dB re 1 µPa)	<90 dB	<90 dB
Ranging Precision	Better than 0.5 m	Better than 15 mm
Addresses	401	1520
Power	28 V dc, maximum 2 A	28 V dc, maximum 2 A
Communications	RS232/RS485[1] @ 9,600 to 115,200 baud, Ethernet	
Connections	15-way Amphenol (power and communications) /5-way Amphenol (remote transducer)	
Mechanical Construction	Aluminium alloy	Aluminium alloy
Operating Temperature	-5 to +50°C	-5 to +50°C
Storage Temperature	-20 to +70°C	-20 to +70°C
Dimensions (Length x Width x Height)	223 x 220 x 91 mm	223 x 220 x 91 mm
Weight	3 kg	3 kg
Feature	**Remote Transducer HF**	**Remote Transducer MF**
Operating Frequency	HF (35–55 kHz)	MF (19–34 kHz)
Depth Rating (Acoustic Transducer)	100 m	100 m
Cable Length	20 m	20 m
Mechanical Construction	Stainless steel	Stainless steel
Dimensions (Diameter x Length)	90 x 211 mm (without cable)	90 x 211 mm (without cable)
Weight in Air	3.7 kg (without cable)	3.7 kg (without cable)

[1] The TZ Transceiver is configured for RS232 communications as standard.

Datasheet
Wideband Mini Transponder (WMT)

Sonardyne's existing Wideband®Sub-Mini transponder (WSM) is typically interrogated by a responder trigger sent down the ROVs' umbilical or a narrow band tone signal. In some situations, reverberation or multipath of the tone interrogation can cause interference problems.

The WMT is Sonardyne's first mini-sized transponder. It is slightly larger than the WSM and provides full two-way Wideband interrogation and reply which completely mitigates interference from and to other users.

For use on ROVs, the WMT includes responder trigger, an integrated rechargeable Li-ion battery pack that is charged from the ROV's power supply and full RS232 communications enabling channel set up, power and gain etc. to be changed from the surface.

The WMT is available in three depth versions: 3,000, 5,000 and 7,000 m. The 5,000 and 7,000 m versions have a higher acoustic output power level for improved long range operation.

An on/off switch (3,000 m only) helps to ensure that the internal battery is not discharged when not in use. If an umbilical trigger is not available, then the full Wideband transponder mode provides excellent Ultra-Short BaseLine (USBL) performance from a small, lightweight package.

Remote omni or directional transducers are available for both the WMT and existing WSM range. These make installation on an ROV easier as the remote transducer can be installed where there is good line-of-sight and is easily replaced if damaged.

The main body of the transponder can be installed within the ROV frame where it is well protected from damage.

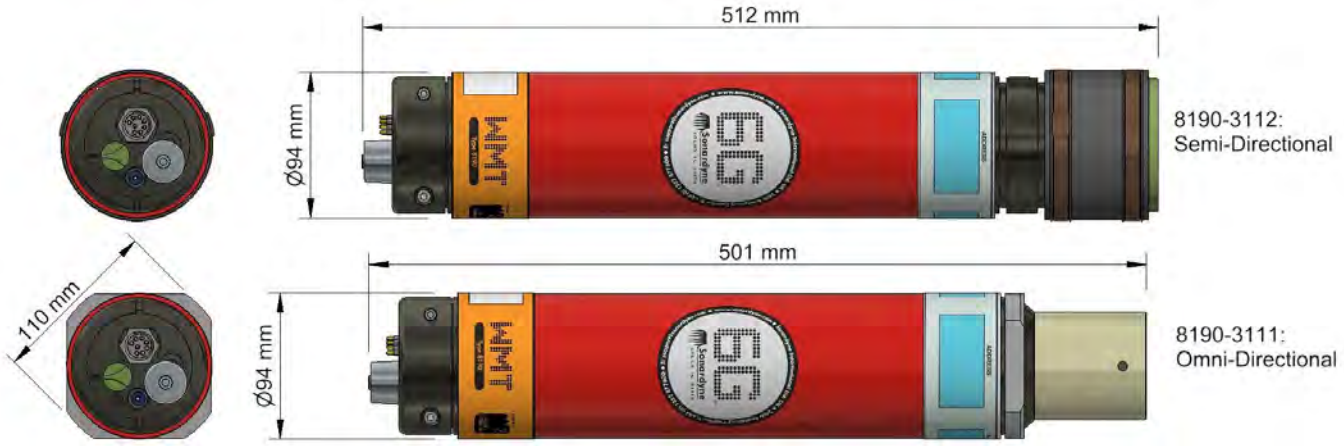
Note: The remote transducer option is not available for 5,000 and 7,000 m versions.

Key Features

- Full two-way Sonardyne Wideband 2 interrogation and reply – Mitigates any interference and multi-path issues
- Mini size – Lightweight and small
- Responder mode
- Li-ion rechargeable battery pack
- Optional remote transducer (3,000 m only)
- Pressure sensor fitted as standard.
- Full RS232 control from the surface
- External on/off switch (3,000 m only
- Field proven

Specifications

Wideband Mini Transponder (WMT)



Feature		Type 8190-3111	Type 8190-3112	Type 8190-5212 /7212
Depth Rating		3,000 m	3,000 m	5,000 and 7,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional	Directional	Directional
Source Level (re 1 µPa @ 1 m)	High Power	187 dB	193 dB	199 dB
	Low Power	181 dB	187 dB	193 dB
Tone Equivalent Energy (TEE)[1] WBv2+	High Power	193 dB	199 dB	205 dB
	Low Power	187 dB	193 dB	199 dB
Range Precision		Better than 15 mm	Better than 15 mm	Better than 15 mm
Depth Sensor		± 0.5% full scale	± 0.5% full scale	± 0.5% full scale
Communications Interface		RS232 (9,600–115,200 baud)		
External Supply Voltage		24 or 48 V dc (± 10%)	24 or 48 V dc (± 10%)	24 or 48 V dc (± 10%)
External Power	Sleep	~650 mW	~650 mW	~650 mW
	Wideband Listening	~1 W	~1 W	~1 W
	Battery Charging	6 W	6 W	6 W
	Peak (During Transmission)	<50 W	<50 W	<50 W
External Power Switch		Yes	Yes	No
Battery Life (Li-ion 15 V)	Listening	30 days	30 days	30 days
	Continuous 5 Seconds Interrogation	Approx. 6 days at low power		
Mechanical Construction		Anodised aluminium alloy and plastics		
Operating Temperature		-5 to 40°C	-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C	-20 to 55°C
Dimensions (Diameter x Length)		94 x 501 mm	94 x 512 mm	98 x 512 mm
Weights in Air/Water[2]		5.1/2.2 kg	7.0/3.5 kg	7.0/3.5 kg
Options		Remote, Cable Connected Transducer (see separate datasheet).		None

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing Wideband and tone systems.

[2] Estimated Weights.

Datasheet

Wideband Sub-Mini 6 Plus (WSM 6+) Transponder/Responder

The Wideband®Sub-Mini 6 Plus (WSM 6+) is Sonardyne's latest generation of versatile Ultra-Short BaseLine (USBL) transponders/responders that support Wideband 2 signals. The WSM 6+ is designed for positioning Remotely Operated Vehicles (ROVs), towfish and other mobile targets in water depths up to 4,000 m.

The compact and rugged design is based on the field proven WSM mechanics and is available in Medium Frequency (MF) directional and MF omni-directional versions. The latest Sonardyne Wideband 2 signal technology has been incorporated, which offers superior ranging accuracy and fast USBL position updates.

The WSM 6+ improves on its predecessors by offering full two-way Wideband support – Interrogation and reply signals. All Wideband 2 and Wideband 2+ signals are supported. Legacy support is also available for Wideband 1 and HPR 400. The configuration is programmable using supplied software and a serial link or it can be configured acoustically via iWAND.

This allows the WSM 6+ to be configured for use with all of the popular MF frequency acoustic navigation systems.

The Type 8370-1111 WSM 6+ is equipped with an omni-directional transducer and is depth rated to 1,000 m making it suitable for a wide range of general USBL tracking applications.

The Type 8370-4112 WSM 6+ is a 4,000 m rated unit and features a higher power directional transducer.

Both types of WSM 6+ have a depth sensor fitted as standard to aid USBL positioning accuracy and an external on/off switch to save the battery when not in use.

WSM 6+ variants are available with acoustically controlled output lines suitable for external motor drive, burnwire or contact closure releases.

Typical Applications

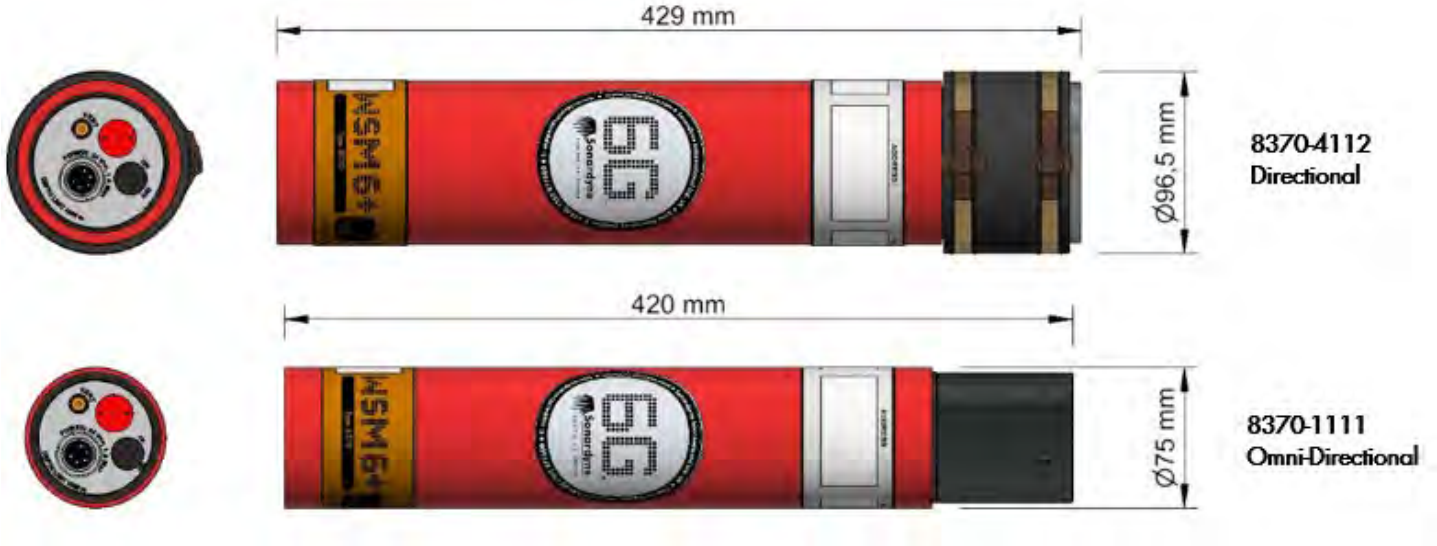
- Subsea vehicle tracking – ROV/towfish/crane wire
- Tether Management Systems (TMS)

Key Features

- Full two-way Sonardyne Wideband 2 interrogation and reply – Mitigates interference and multi-path issues
- More than 500 unique Sonardyne Wideband 1 and 2 addresses
- Sonardyne Wideband 1 and HPR 400 navigation compatible
- Choice of 1,000 or 4,000 m depth rating
- Choice of omni-directional or directional beam-shape
- Transponder or responder operating modes
- Depth sensor for improved USBL positioning performance
- Rechargeable NiMH battery
- External on/off switch for saving battery when not in use
- Compact and rugged design
- Release variants available

Specifications

Wideband Sub-Mini 6 Plus (WSM 6+) Transponder/Responder



Feature		Type 8370-1111	Type 8370-4112
Depth Rating		1,000 m	4,000 m
Operational Frequency		MF (19–34 kHz)	MF (19–34 kHz)
Transceiver Beam Shape		Omni-directional	Directional
Transmit Source Level (dB re. 1 µPa @ 1 m)	External Power	187 dB	196 dB
	Battery	184 dB	193 dB
Tone Equivalent Energy (TEE)[1] (External Power)		193 dB	202 dB
Receive Sensitivity (dB re 1 µPa)		<85 dB	<80 dB
Power Supply		Rechargeable NiMH battery or external. 24 V via ROV umbilical	
Operating Channels		All Sonardyne Wideband HPR 400 channels	
Depth Sensor		±0.5% full scale (100 bar)	±0.5% full scale (400 bar)
Operating Life (1 s update rate, max. power, Wideband 2)		>6 days	>3 days
Update Rate (Maximum)		>2 Hz	>2 Hz
Quiescent Life (Battery)		>35 days	>35 days
Connector	5-Way (Standard)	Subconn MCBH5M	Subconn MCBH5M
	8-Way (Burnwire/Motor Release)	Subconn MCBH8F	Subconn MCBH8F
Operating Temperature		-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C
Mechanical Construction		Anodised aluminium alloy	Anodised aluminium alloy
Dimensions (Length x Diameter)		420 x 75 mm	429 x 96.5 mm
Weight in Air/Water		3.2/1.3 kg	5.5/3.2 kg
Battery Charger		8370-011-01	8370-011-01

[1] WBv2 & WBv1 signals are 2x the duration of Sonardyne tone signals, therefore the TEE figure gives the user an idea of the operational performance when comparing Wideband and tone systems.

Navigation
INS & DVL

02.

Datasheet
Lodestar Subsea AHRS

Lodestar is a solid-state Attitude and Heading Reference System (AHRS) highly optimised for cost, size, weight, and power (C-SWaP).

The instrument is a turn-key solution comprised of carefully selected high-grade and highly reliable inertial sensors integrated into a Sonardyne in-house designed Inertial Measurement Unit (IMU).

The selected inertial sensors are the standard for commercial aviation with a proven 20+ year track record. These sensors have a highly desirable characteristic being insensitive to vibration, temperature changes and having very limited initial errors. The result is a system which is highly suitable for the marine environment where performance, robustness and data integrity need to be available from initialisation, even during the harshest conditions.

Lodestar requires no external aiding and settles robustly in dynamic conditions in less than 5 minutes.

On-board data storage and backup battery functionality ensures continued operation and eliminates the risk of data-loss even if communications or external power is lost.

Power-pass through to external aiding sensors is supported to ease integration requiring only a single cable for comms and power.

If a full INS solution is required, the Lodestar can easily be field upgraded to a SPRINT system.

This makes the Lodestar a flexible and future proof solution for both ROV guidance and survey applications.

Lodestar has a proven track record spanning more than 10 years in the field in diverse applications from ROV guidance and autopilot to demanding survey applications.

The instrument is available in 4,000 and 6,000 m depth ratings with a variety of connector options and configurations.

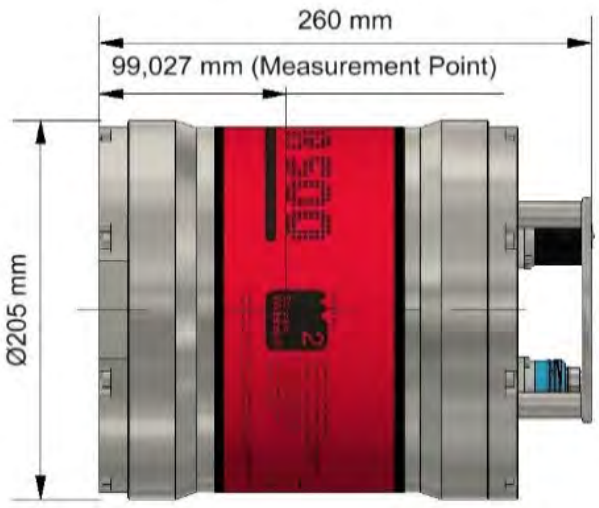
Applications Include

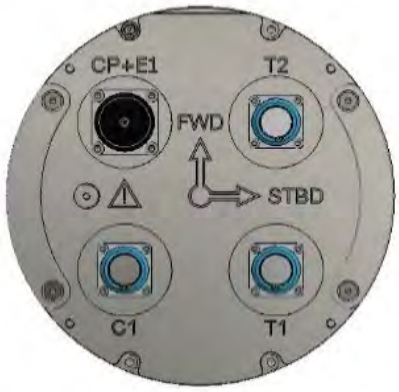
- ROV control & guidance
- Offshore construction

Key Features

- Turn-key solution for motion sensor and gyrocompass
- Up to 0.08° heading accuracy
- 0.01° roll and pitch accuracy
- 5 minute AHRS settling time
- Fast follow up speed of 900°/sec
- MTBF inertial sensors (gyros and accelerometers) > 400,000 hours
- Choice of depth ratings: 4,000 and 6,000 m
- Choice of connectors: Seacon (standard) or Seanet® (for use with FMC Schilling Robotics ROV)
- Transport approved rechargeable Li-ion battery back-up as standard
- 8 GB internal memory allows post processing and remote diagnostics
- Ethernet and serial interfaces
- Export is not ITAR controlled
- Lodestar AHRS can be remotely upgraded to SPRINT INS

Specifications
Lodestar Subsea AHRS





Feature		Lodestar 300	Lodestar 500	Lodestar 700
Depth Rating		4,000 / 6,000 m	4,000 / 6,000 m	4,000 / 6,000 m
Performance				
Heading		0.2°	0.1°	0.08°
AHRS Settle Time		<5 minutes in dynamic conditions		
Roll and Pitch		0.01°	0.01°	0.01°
Power				
Power Requirement		20–50 V dc, 15 W nominal, 35 W maximum		
Power Pass Through		3 x for external aiding sensors (up to 3A per sensor)		
Back Up Battery Type/Life		Li-ion/5 minutes	Li-ion/5 minutes	Li-ion/5 minutes
Data/Comms				
Data Storage		8 GB internal memory	8 GB internal memory	8 GB internal memory
Serial Ports/Protocol		4x RS232 or RS485	4x RS232 or RS485	4x RS232 or RS485
Other Ports		1× Ethernet, 4 triggers	1× Ethernet, 4 triggers	1× Ethernet, 4 triggers
Output Rate		Up to 100 Hz	Up to 100 Hz	Up to 100 Hz
Output Telegrams[1]		Industry standard AHRS/INS telegrams including acceleration and rotation rates		
Mechanical				
Connectors		4x Seacon / Seanet, 1x Seacon / Seanet		
Mechanical Construction		Titanium	Titanium	Titanium
Dimensions (Diameter x Height)	4,000 m (Seacon)	205 x 260 mm	205 x 260 mm	205 x 260 mm
	6,000 m (Seacon)	205 x 280 mm	205 x 280 mm	205 x 280 mm
	4,000 m (Seanet)	205 x 250 mm	205 x 250 mm	205 x 250 mm
Weight in Air/Water[2]	4,000 m	18.5/11.5 kg	18.5/11.5 kg	18.5/11.5 kg
	6,000 m	22/14 kg	22/14 kg	22/14 kg
Environmental				
Operating Temperature		-20 to +55°C	-20 to +55°C	-20 to +55°C
Storage Temperature		-20 to +60°C	-20 to +60°C	-20 to +60°C
Shock Rating		22 g, 11 ms half sine	22 g, 11 ms half sine	22 g, 11 ms half sine

[1] Specific outputs may be limited below quoted performance for reasons of export classification and control and should not be used as IMU data.
[2] Estimated Weights.

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Datasheet
SPRINT Subsea INS

SPRINT is an Aided Inertial Navigation System (AINS) highly optimised for cost, size, weight, and power (C-SWaP).

The instrument is a turn-key solution comprised of carefully selected high-grade and highly reliable inertial sensors integrated into a Sonardyne in-house designed Inertial Measurement Unit (IMU).

The selected inertial sensors are the standard for commercial aviation with a proven 20+ year track record. These sensors have a highly desirable characteristic being insensitive to vibration, temperature changes and having very limited initial errors. The result is a system which is highly suitable for the marine environment where performance, robustness and data integrity need to be available from initialisation, even during the harshest conditions.

SPRINT's dual AHRS & INS algorithm capability is unique in the market and allows for automatic on-board integrity checking between algorithms as well as having instantaneous INS start up with north alignment from the on-board AHRS. This capability allows for simultaneous use from one instrument, e.g. AHRS plus DVL for ROV piloting and INS plus DVL for survey operations.

Internal battery backup provides continuous on-board navigation and data storage supporting post-mission diagnostics and post-processing, even throughout brownout periods.

SPRINT INS interfaces to aiding sensors such as USBL, DVL, pressure sensor and sound speed.

Power-pass through to aiding sensors is supported to ease integration enabling the SPRINT to be interfaced using a single connection.

SPRINT has a proven track record spanning 10 years in the field in diverse applications from ROV guidance and autopilot to demanding survey applications such as multibeam Out-Of-Straightness surveys and sparse-LBL using tightly coupled 6G acoustics.

The instrument is available in 4,000 and 6,000 m depth ratings and as an OEM version and is one of the smallest form factor subsea inertial instruments available.

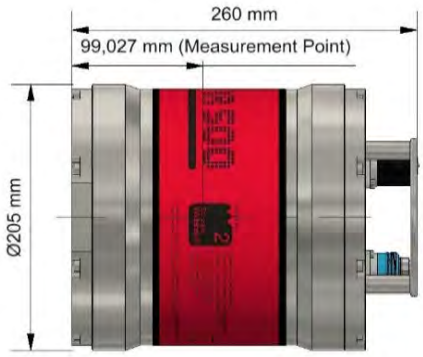
Typical Applications

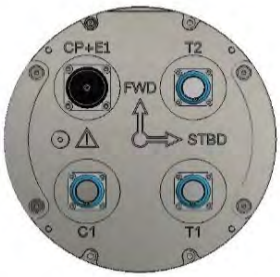
- Vehicle guidance & control
- Station keeping and autopilot including mid-water applications
- USBL aided INS survey
- DVL aided relative navigation
- AUV's
- ROV and tow fish positioning
- Hydrographic survey
- Offshore construction
- As laid and out of straightness
- Multibeam survey
- Touchdown monitoring
- Structure placement

Key Features

- Turn-key solution for motion sensor, gyrocompass and INS
- SPRINT provides concurrent AHRS and INS capability for dual use
- Fast follow up speed of 900˚/sec
- Choice of depth ratings: 4,000 and 6,000 m
- Choice of connecters: Seacon (standard) or Seanet® (for use with FMC Schilling Robotics ROV)
- Transport approved rechargeable Li-ion battery back-up as standard
- 8 GB internal memory allows post processing and remote diagnostics
- Export is not ITAR controlled
- Ethernet and serial interfaces

Specifications
SPRINT Subsea INS





Performance		SPRINT 300	SPRINT 500	SPRINT 700
Heading		0.05° secant latitude	0.04° secant latitude	0.02° secant latitude
INS Initialisation		Instantaneous		
Roll and Pitch		0.01°		
INS Aiding Supported		USBL, Depth, DVL, Zero Velocity, Manual Position, LBL, GNSS		
USBL/LBL Aided		3x precision improvement	3.5x precision improvement	4.5x precision improvement
USBL/LBL and DVL Aided		3 to 7 x precision improvement	4 to 10 x precision improvement	6 to 13 x precision improvement
LBL/DVL Aided		3 cm confined area, 20 cm wide area (dynamic)		
DVL Aided[1 2]	Typical Survey	0.05%	0.03%	0.02%
	Distance from Origin	0.15%	0.10%	0.08%
DVL Aiding Loss/Drift[1]		1.2 m over 1 minute, 5 m over 2 minutes	0.8 m over 1 minute, 3.2 m over 2 minutes	<0.5 m over 1 minute, 2 m over 2 minutes
Station Keeping		<1 m over 24 hours (Syrinx DVL)		
Power				
Power Requirement		20–50 V dc, 15 W nominal (35 W maximum)		
Power Pass Through		3x for external aiding sensors (up to 3 A per sensor)		
Back Up Battery Type/Life		Li-ion/5 minutes		
Data/Comms				
Data Storage		8 GB internal memory		
Serial Ports/Protocol		4x RS232 or RS485		
Other Ports		Ethernet, 4x Triggers		
Output Rate		Up to 100 Hz		
Mechanical				
Connectors Options		4x Seacon/Seanet 1x Seacon/Seanet		
Mechanical Construction		Titanium		
Dimensions (Diameter x Height)	4,000 m (Seacon)	205 x 260 mm		
	6,000 m (Seacon)	205 x 280 mm		
	4,000 m (Seanet)	205 x 250 mm		
Weight in Air/Water[3]	4,000 m	18.5/11.5 kg		
	6,000 m	22/14 kg		
Environmental				
Depth Rating		4,000/6,000 m		
Operating Temperature		-20 to +55°C		
Storage Temperature		-20 to +60°C		
Shock Rating		22 g, 11 ms half sine		

[1] CEP50 (assumes use of a high performance DVL such as the Sonardyne Syrinx 600).
[2] SPRINT-Nav performance achievable by co-locating with Syrinx DVL.
[3] Estimated Weights.

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Specifications subject to change without notice – 06/2021

Datasheet
SPRINT OEM INS

SPRINT OEM is an Aided Inertial Navigation System (AINS) highly optimised for cost, size, weight, and power (C-SWaP).

The selected inertial sensors are the standard for commercial aviation with a proven 20+ year track record. These sensors have a highly desirable characteristic being insensitive to vibration, temperature changes and having very limited initial errors. The result is a system which is highly suitable for the marine environment where performance, robustness and data integrity need to be available from initialisation, even during the harshest conditions.

SPRINT's dual AHRS & INS algorithm capability is unique in the market and allows for on-board integrity checking between both orientation solutions. Furthermore, the SPRINT INS algorithm can instantaneously start with north alignment from the on-board AHRS. This negates the need for specific dynamics to 'align' standalone INS products to north.

The AHRS requires no external aiding and can settle in 5 minutes or less in dynamic conditions. INS adds advanced aided inertial navigation that runs concurrently with the AHRS algorithm.

SPRINT INS supports a wide range of aiding including: USBL, Depth, DVL, Zero Velocity, Manual Position, LBL Position and GNSS to support most autonomous vehicle requirements. Optimal tight coupling is supported for Sonardyne's Syrinx and 6G+ LBL acoustics products, also available in OEM form.

On-board data storage allows for post-mission diagnostics checking with the supplied Janus QC software. An optional software upgrade allows for reprocessing and optimisation of the navigation solution.

The lightweight aluminium housing is one of the smallest form factor high performance OEM INS/AHRS units available.

Sonardyne provides a dedicated integration development kit and service for SPRINT OEM.

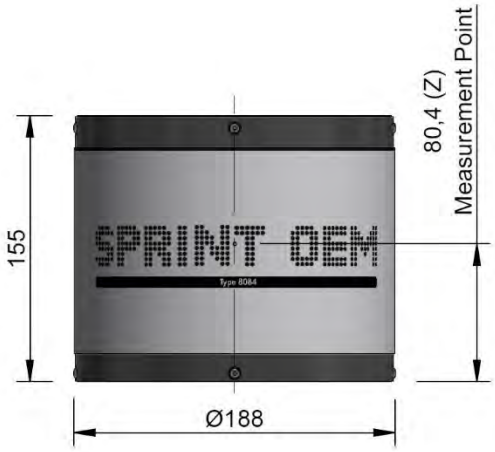
Typical Applications

- Any subsea autonomous platform including AUV, AIV, ROV, towfish and ROTV
- Manned submersibles
- Surface autonomous vehicles (ASV)

Key Features

- Turn-key OEM solution
- Development kit included
- Integration service with on-site or remote engineers
- SPRINT provides concurrent AHRS and INS capability for dual use
- Up to 0.02° (sec lat) heading accuracy
- 0.01° roll and pitch accuracy
- Fast follow up speed of 900°/sec
- MTBF inertial sensors (RLG and accelerometer) > 400,000 hours
- Lightweight aluminium housing
- Transport approved rechargeable Li-ion battery back-up option
- Dedicated connection for optional Sonardyne supplied pressure sensor
- 8 GB internal memory allows post processing and remote diagnostics
- Ethernet and serial interfaces

Specifications
SPRINT OEM INS



Performance		SPRINT 300 OEM	SPRINT 500 OEM	SPRINT 700 OEM
Heading		0.05° secant latitude	0.04° secant latitude	0.02° secant latitude
INS Initialisation		Instantaneous		
Roll and Pitch		0.01°		
INS Aiding Supported		USBL, Depth, DVL, Zero Velocity, Manual Position, LBL (position), GNSS		
USBL/LBL Aided		3x precision improvement	3.5x precision improvement	4.5x precision improvement
USBL/LBL and DVL Aided		3 to 7 x precision improvement	4 to 10 x precision improvement	6 to 13 x precision improvement
LBL/DVL Aided		3 cm confined area, 20 cm wide area (dynamic)		
DVL Aided[1]	Typical Survey	0.05%	0.03%	0.02%
	Distance from Origin	0.15%	0.10%	0.08%
DVL Aiding Loss/Drift[1]		1.2 m over 1 minute, 5 m over 2 minutes	0.8 m over 1 minute, 3.2 m over 2 minutes	<0.5 m over 1 minute, 2 m over 2 minutes
Station Keeping		<1 m over 24 hours (Syrinx DVL)		
Power				
Power Requirement		20–50 V dc, 15 W nominal (35 W maximum with optional external battery)		
Power Pass Through		3x for external aiding sensors (up to 3 A per sensor)		
Back Up Battery Type/Life		Li-ion/5 minutes (optional back-up battery available)		
Data/Comms				
Data Storage		8 GB internal memory		
Serial Ports/Protocol		4x RS232 or RS485		
Other Ports		Ethernet, 4x Triggers		
Output Rate		Up to 100 Hz		
Output Telegrams[2]		Industry standard AHRS/INS telegrams including acceleration and rotation rates		
Mechanical				
Connectors		4x Molex Microfit		
Mechanical Construction		Aluminium		
Dimensions (Diameter x Height)		188 x 155 mm		
Weight in Air[3]		7.0 kg		
Environmental				
Operating Temperature		-20 to +55°C		
Storage Temperature		-20 to +60°C		
Shock Rating		22 g, 11 ms half sine		

[1] CEP50 (assumes use of a high performance DVL such as the Sonardyne Syrinx 600).
[2] Specific outputs may be limited below quoted performance for reasons of export classification and control and should not be used as IMU data.
[3] Estimated Weights.

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Datasheet
SPRINT-Nav

SPRINT-Nav is the world's highest performing all-in-one hybrid navigator for all subsea vehicles and survey operations and is available in two frequencies: 600 kHz or 400 kHz for higher altitude tracking.

The SPRINT-Nav is a turn-key solution combining carefully selected inertial sensors, a Syrinx Doppler Velocity Log (DVL) and a high accuracy pressure sensor into a single housing.

The result is not only the highest performing hybrid navigator but also one of the smallest navigation instruments on the market.

All onboard sensors are optimally integrated to provide seamless operation and unprecedented levels of performance compared with standalone instruments from different vendors.

The unit comes pre-calibrated and requires no additional calibration to achieve unprecedented performance with minimal operational complexity.

SPRINT-Nav's inertial dual AHRS & INS algorithm capability is unique in the market and allows for automatic on-board integrity checking between algorithms as well as instantaneous INS start up with North alignment from the on-board AHRS. This capability allows for simultaneous use from one instrument, e.g. AHRS plus DVL for ROV piloting and INS plus DVL for survey operations.

Tight beam-level DVL aiding for the on-board INS with optimal timing and use of proprietary QC metrics provides higher performance and more reliable navigation in demanding bottom-lock environments. Furthermore, the tight integration also enables unconventional mounting arrangements, i.e. tilting the SPRINT-Nav, enabling vehicle integration previously not possible.

Each DVL transducer is fitted with a full depth-rated water block to ensure protection of the internal components. Combined with beam level aiding the SPRINT-Nav will continue to function even if one of the DVL transducers has been damaged.

SPRINT-Nav can be interfaced using a single connection and/or the internal sensors can be interfaced separately depending on requirements.

Internal battery backup provides continuous on-board navigation and data storage supporting post-mission diagnostics and post-processing, even throughout brownout periods.

Export of SPRINT-Nav is simplified as compared to other separate DVL and INS units. For example, shipping from outside the USA does not require a re-export licence.

Typical Applications

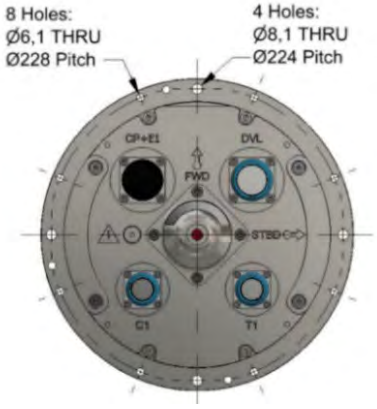
- Any subsea vehicle including AUV, AIV, ROV, Towfish & ROTV
- Ideally suited for autonomous and resident vehicles
- Survey and construction

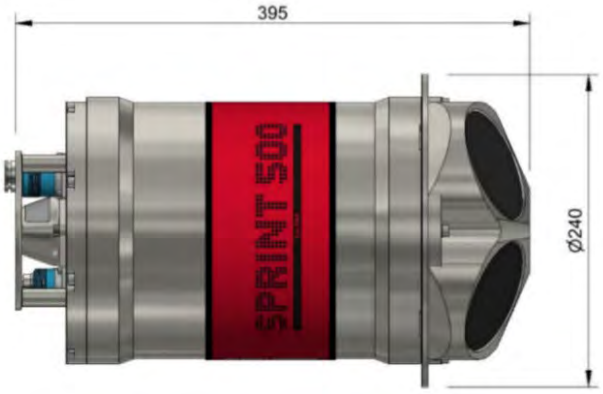
Key Features

- World's highest performing hybrid navigator
- All-in-one turn-key solution
- Dual concurrent AHRS, INS and DVL output capability for multi-use
- Instantaneous INS initialisation from AHRS with no alignment procedure required
- Dual AHRS & INS algorithms enabling internal health check of orientation
- Proven long life and high MTBF inertial sensors from trusted long-term US supplier
- Remote diagnostics and performance verification
- Fully water blocked DVL endcap protecting internal electronics
- Two DVL Frequencies available: 600 kHz or 400 kHz HA (High Altitude)
- Export is not ITAR controlled

Specifications

SPRINT-Nav





Performance			SPRINT-Nav 300	SPRINT-Nav 500	SPRINT-Nav 700	SPRINT-Nav X
DVL Aided[1]	Typical Survey		0.04%	0.02%	0.01%	0.01%
	Distance from Origin		0.12%	0.07%	0.05%	Get in touch
	High Altitude (HA) Option[2]		0.12%	0.08%	0.06%	Get in touch
Unaided			1.2 m in 60 s	0.8 m in 60 s	0.5 m in 60 s	Get in touch
Altitude Min/Max	Standard		0.4/175 m			
	High Altitude (HA) Option[2]		0.4/230 m			
USBL & DVL Aided	Precision Improvement		Up to 7x better	Up to 10x better	Up to 13x better	Up to 13x better
Station Keeping			<1 m over 24 hours			
LBL/DVL Aided			3 cm confined area, 20 cm wide area (dynamic)			
INS/AHRS Heading[1] (Secant Latitude)	INS		0.05º	0.04º	0.02º	0.01°
	AHRS		0.20º	0.10º	0.08º	0.08°
AHRS/INS Roll and Pitch[1]			0.01º	0.01º	0.01º	0.01º
Pressure Sensor			0.01% FS removable module			
ADCP	Profiling Range[3]	Standard	0.4–80 m			
		HA	0.4–120 m			
	Vel. Range & RMS (Along Beam)		Up to ±11.2 m/s ±0.4% of measured value			
	Maximum Number of Cells		255			
	Maximum Ping Rate		4 Hz (ADCP) or 2.5 Hz (DVL+ADCP)			
Power						
Power Requirements			20–50 V dc, 15 W nominal, 35 W maximum			
Internal Battery Backup			Li-ion/5 minutes			
Physical/Comms						
Data Storage			8 GB internal memory			
Serial Ports/Protocol			4x RS232 or RS485			
Other Ports			Ethernet, 4 triggers			
Mechanical Construction			Titanium			
Dimensions (Diameter x Height) (incl. connectors and mounting ring)		4,000 m	240 x 395 mm			
		6,000 m	240 x 405 mm			
Weight Air/Water[4]		4,000 m	23.9/13.1 kg			
		6,000 m	28.1/17.2 kg			
Environmental						
Depth Rating			4,000/6,000 m			
Operating Temperature			-5 to 50°C			
Storage Temperature			-25 to 55°C			

[1] CEP50.
[2] High Altitude DVL 400 kHz.
[3] Standard 600 kHz and High Altitude (HA) 400 kHz.
[4] Estimated Weights.

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Datasheet
SPRINT-Nav Mini

SPRINT-Nav Mini 300 m

SPRINT-Nav Mini 4,000 m

SPRINT-Nav Mini is the world's smallest hybrid acoustic-inertial navigator. Built on years of experience gained with SPRINT-Nav, it is designed to provide accurate, precise and robust guidance or navigation information for subsea vehicles.

The SPRINT-Nav Mini combines carefully selected inertial sensors, a Syrinx Mini Doppler velocity log (DVL) and a high accuracy pressure sensor into a single housing and is optimised for size, weight and power consumption.

Like all SPRINT-Nav products, the SPRINT-Nav Mini uses information from all the sensors optimally to provide seamless operation and unprecedented levels of performance compared with standalone instruments.

There are two SPRINT-Nav Mini variants. The SPRINT-Nav Mini Guidance provides a single message containing all the information typically required for vehicle guidance and control reducing complexity of integration and operation. The SPRINT-Nav Navigator in addition provides latitude and longitude updates suitable for AUV control.

All SPRINT-Nav Mini come equipped with highly accurate gyroscopes and accelerometers which are not affected by magnetism and provide a true north seeking gyrocompass.

All SPRINT-Nav Mini provide velocity, depth and altitude which is free from noise and immune to short term DVL acoustic outages. Being able to provide these messages, including quality metrics, at a constant output rate of up to 200 Hz drastically improves vehicle control.

The compact form factor is significantly smaller and lighter than any other combination available in the market.

The unit comes pre-calibrated and requires no additional calibration offering minimal operational complexity.

It offers an easy-to-use Web UI which provides an intuitive dashboard viewer as well as configuration and detailed status pages for integration and troubleshooting.

SPRINT-Nav Mini is supplied with two connectors making retrofitting into existing control systems simple. For vehicles where height is critical, a sidewall connector variant is available measuring only 182 mm in height.

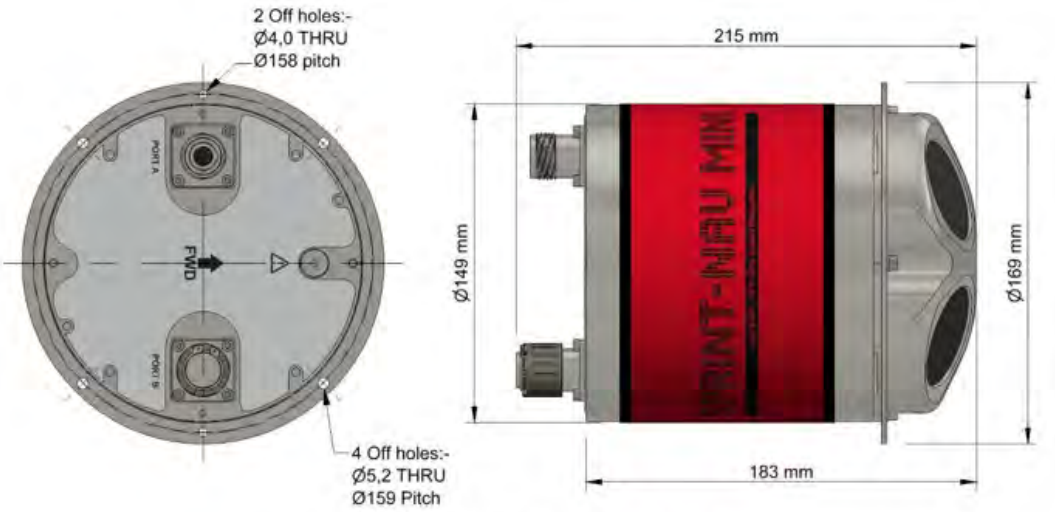
Typical Applications

- Ideal for observation-class ROVs, light work-class ROVs, USVs, manned submersibles and diver navigation boards
- Ideally suited for both remotely operated and autonomous vehicles
- True North seeking

Key Features

- World's smallest hybrid acoustic-inertial navigator
- Minimal sensitivity to vehicle dynamics or wave motion
- All-in-one turn-key solution
- Highly optimised size, weight and power
- 300 and 4,000 m variants
- Fixed frequency, continuous and robust vehicle control and guidance outputs
- Low-height variant available
- Factory calibrated
- 500 kHz DVL
- 0.3–200 m bottom track operating altitude
- Intuitive Web UI
- Export is not ITAR controlled

Specifications
SPRINT-Nav Mini



SPRINT-Nav Mini 4,000 Shown Above

Performance		SPRINT-Nav Mini – Guidance	SPRINT-Nav Mini – Navigator
DVL Aided[1]	Typical Survey	n/a	0.05%
	Distance from Origin	n/a	0.30%
Altitude Min/Max		0.3/200 m	0.3/200 m
USBL & DVL Aided	Precision Improvement	n/a	Up to 5x better
Heading[1] (Secant Latitude)		0.50°	0.15°
Roll and Pitch[1]		0.10°	0.10°
Angular Rate Range		±450°/s	±450°/s
Velocity Precision[1] (<2 m/s at 50 m Altitude)		<0.4 cm/s	<0.4 cm/s
Depth accuracy[1]		0.1% FS	0.1% FS
Power			
Power Requirements		24 V dc, 10 W nominal	
Physical/Comms			
Data Storage		32 GB internal memory	
Serial Ports/Protocol		3x RS232	
Other Ports		Ethernet, UDP/TCP, WebUI, 2 x trigger inputs (1PPS/DVL trigger)	
Mechanical Construction	300 m	POM-C	
	4,000 m	Titanium	
Dimensions (Diameter x Height) (incl. connectors and mounting ring)	300 m	149 x 215 mm	
	4,000 m	149 x 215 mm	
Weight Air/Water[2]	300 m	3.6/0.7 kg	
	4,000 m	7.1/4.2 kg	
Environmental			
Depth Rating		300/4,000 m	
Operating Temperature		-5 to 50°C	
Storage Temperature		-25 to 55°C	

[1] CEP50.
[2] Estimated Weights.

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Specifications subject to change without notice – 07/2021

Datasheet

Syrinx – Doppler Velocity Log

The Syrinx Doppler Velocity Log (DVL) is a class leading DVL that builds on Sonardyne's range of acoustic devices by bringing to market a high-integrity, high-performance instrument. Syrinx is a standalone navigation instrument or can be integrated into SPRINT Nav or third party navigation systems.

Syrinx DVL is available in two frequencies: 600 kHz or 400 kHz for higher altitude tracking.

Syrinx gains performance advantages by using both doppler and correlation technology in environments where each is best suited.

Advanced processing techniques avoid any loss in output measurements due to undulating and sharp roll off terrain, including near vertical gradients.

Adaptive signalling utilises the best signal type for the environment and terrain, giving class leading performance at low and high altitude.

Syrinx can output data of different formats simultaneously; this reduces the requirement of more than one DVL on the ROV, saving on weight and costs.

Optional ADCP and DVL+ADCP modes are available for standalone profiling, or concurrent DVL navigation and velocity profiling within the same instrument. This capability can be used without sacrificing navigation accuracy when combined with an INS.

When Syrinx is integrated with SPRINT INS, inertial velocities can be used to correct ADCP profiles for vessel speed in the absence of bottom lock or in moving bed conditions. This unique capability allows unbiased profile velocities and navigation through the entire water column.

The ADCP data uses an extended PD0 format containing acoustic, GPS and inertial data. Live or file data can be inspected and processed using the Echo Observer for Syrinx software package, which can be included with the ADCP upgrade.

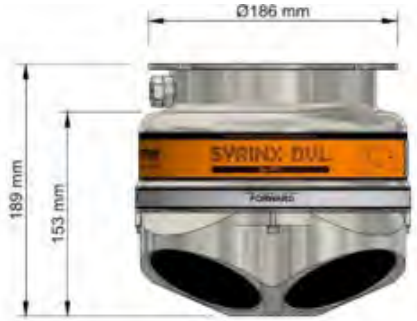
Sonardyne have developed the transducers to be singularly interchangeable, dramatically reducing maintenance costs and times. An internal bulkhead is fitted to prevent water ingress if a transducer is badly damaged. Both 4,000 and 6,000 m depth options are available.

Key Features

- Class-leading 400/600 kHz DVL
- Reliable adaptive bottom lock
- Capsule case design built around field proven USBL array capsules
- Concurrent Ethernet and serial comms
- Individually replaceable transducers
- On-board web interface for configuration and diagnostics
- Up to 25 Hz DVL ping rate
- 0.4 to 230 m DVL operation range
- Tight integration to Sonardyne SPRINT INS, providing unmatched DVL aided navigation even in challenging bottom lock conditions
- ADCP mode with up to 120 m range
- Up to 4 Hz ADCP ping rate
- Tight integration with SPRINT INS provides ADCP profiles independent of vessel motion, even without bottom lock or under moving bed conditions
- Internal bulkhead prevents water ingress if a transducer is damaged

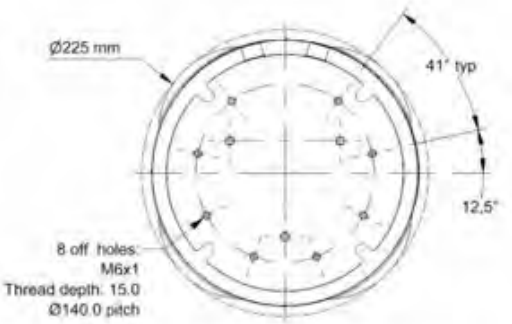
Specifications

Syrinx – Doppler Velocity Log



Type 4531/4561 – 4,000 m

Type 6531 – 6,000 m



Feature			8275-4531/6531 600 kHz	8275-4561 400 kHz
Operating Frequency			600 kHz	400 kHz
Bottom Velocity – Single Ping Precision (Standard Deviation @ 1 m/s[1])			±0.22 cm/s	±0.28 cm/s
Long Term Accuracy			±0.12% ±0.1 cm/s	±0.22% ±0.1 cm/s
Minimum/Maximum Altitude			0.4/175 m[2]	0.4/230 m
Velocity Range			>10 m/s	
Velocity Resolution			0.01 cm/s	
Data Output Rate			25 Hz maximum	
Water Reference Velocity	Accuracy		±0.2% ±0.1 cm/s	
	Layer Size		Selectable	
	Minimum/Maximum Range		0.4/80 m	0.4/120 m
ADCP	Profiling Range		0.4–80 m	0.4–120 m
	Velocity Range & RMS (Along Beam)		Up to ±11.2 m/s ±0.4% of measured value	
	Maximum Number of Cells		255	
	Maximum Ping Rate	ADCP	4 Hz	
		DVL+ADCP	2.5 Hz	
Beam Width			±1.0°	±1.3°
Beam Angle			30°	
Transmit Source Level (dB re 1 µPa @ 1 m)			217 dB (maximum)	
Sensors	Temperature		-5 to 40°C	
	Pitch/Roll (Optional)		±0.5°	
	Pressure (Optional)		±0.1% full scale	
Configuration (Array)			4-beam array @ 30° beam angles	
Communication and Logging	Communications		Dual RS232, multi-port Ethernet (TCP & UDP)	
	Trigger Inputs		3–12 V rising or falling edge configurable	
	Internal Logging		32 GB internal memory	
Output Telegrams			Sonardyne proprietary, PD0, PD3, PD4, PD6, PD13, SDDBT Simultaneous telegram output	
Voltage (dc Input)			24 V (±10%)	
Average Power (Typical)			10 W nominal	
Depth Rating			4,000 or 6,000 m array	
Operating Temperature			-5 to 55°C	
Storage Temperature			-20 to 55°C	
Mechanical Construction			Titanium	
Connector Type			Subconn	
Dimensions (Height x Diameter)	4000 m		189 x 225 mm	189 x 225 mm
	6000 m		204 x 225 mm	n/a
Weight in Air/Water[3]	4000 m		12.1/7.6 kg	11.5/6.7 kg
	6000 m		14.7/8.2 kg	n/a

[1] Standard deviation refers to proven single-ping true horizontal velocity precision, specified at 20–30 m altitude.
[2] 150 m bottom acquire range, up to 175 m once bottom locked in optimal seabed conditions.
[3] Estimated weights.

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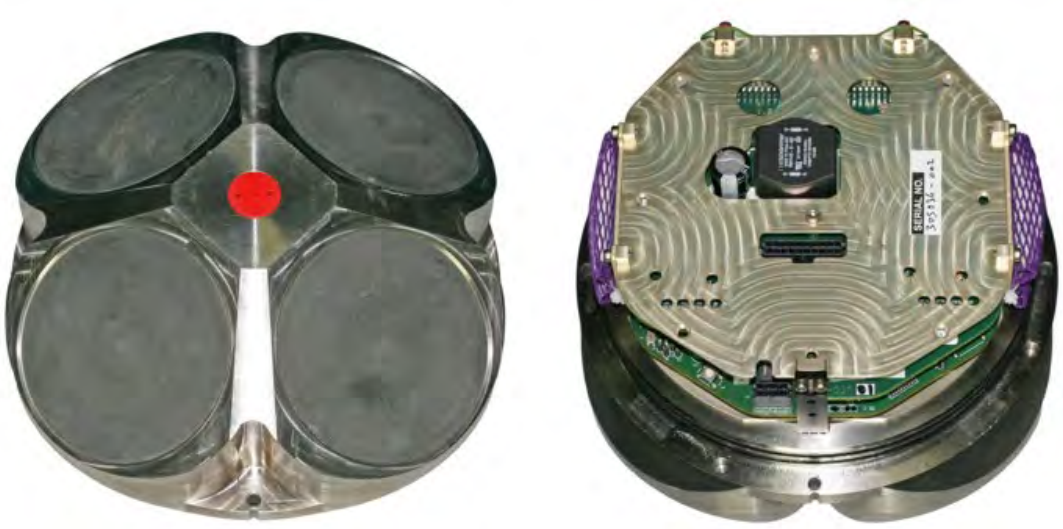
Datasheet

Syrinx – Doppler Velocity Log OEM



The Syrinx Doppler Velocity Log (DVL) OEM is a class leading DVL that builds on Sonardyne's range of acoustic devices by bringing to market a high-integrity, high-performance instrument. Syrinx is a standalone navigation instrument or can be integrated into SPRINT Nav or third party navigation systems.

Syrinx DVL is available in two frequencies: 600 kHz or 400 kHz for higher altitude tracking

Syrinx gains performance advantages by using both doppler and correlation technology in environments where each is best suited.

Advanced processing techniques avoid any loss in output measurements due to undulating and sharp roll off terrain, including near vertical gradients.

Adaptive signalling utilises the best signal type for the environment and terrain, giving class leading performance at low and high altitude.

Syrinx can output data of different formats simultaneously; this reduces the requirement of more than one DVL on the ROV, saving on weight and costs.

Optional ADCP and DVL+ADCP modes are available for standalone profiling, or concurrent DVL navigation and velocity profiling within the same instrument. This capability can be used without sacrificing navigation accuracy when combined with an INS.

When Syrinx is integrated with SPRINT INS, inertial velocities can be used to correct ADCP profiles for vessel speed in the absence of bottom lock or in moving bed conditions. This unique capability allows unbiased profile velocities and navigation through the entire water column.

The ADCP data uses an extended PD0 format containing acoustic, GPS and inertial data. Live or file data can be inspected and processed using the Echo Observer for Syrinx software package, which can be included with the ADCP upgrade.

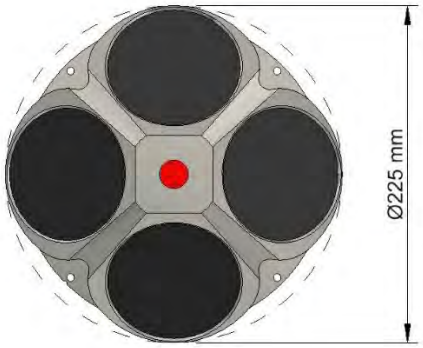
Sonardyne have developed the transducers to be singularly interchangeable, dramatically reducing maintenance costs and times. An internal bulkhead is fitted to prevent water ingress if a transducer is badly damaged. Both 4,000 and 6,000 m depth options are available.

Key Features

- Class-leading 400/600 kHz DVL
- Reliable adaptive bottom lock
- Capsule case design built around field proven USBL array capsules
- Concurrent Ethernet and serial comms
- Individually replaceable transducers
- On-board web interface for configuration and diagnostics
- Up to 25 Hz DVL ping rate
- 0.4 to 230 m DVL operation range
- Tight integration to Sonardyne SPRINT INS, providing unmatched DVL aided navigation even in challenging bottom lock conditions
- ADCP mode with up to 120 m range
- Up to 4 Hz ADCP ping rate
- Tight integration with SPRINT INS provides ADCP profiles independent of vessel motion, even without bottom lock or under moving bed conditions

Specifications

Syrinx – Doppler Velocity Log OEM



Feature			Type 8275 OEM 600 kHz	Type 8275 OEM 400 kHz
Operating Frequency			600 kHz	400 kHz
Bottom Velocity – Single Ping Precision (Standard Deviation @ 1 m/s[1])			±0.22 cm/s	±0.28 cm/s
Long Term Accuracy			±0.12% ±0.1 cm/s	±0.22% ±0.1 cm/s
Minimum/Maximum Altitude			0.4/175 m[2]	0.4/230 m
Velocity Range			>10 m/s	
Velocity Resolution			0.01 cm/s	
Data Output Rate			25 Hz maximum	
Water Reference Velocity	Accuracy		±0.2% ±0.1 cm/s	
	Layer Size		Selectable	
	Minimum/Maximum Range		0.4/80 m	0.4/120 m
ADCP	Profiling Range		0.4–80 m	0.4–120 m
	Velocity Range & RMS (Along Beam)		Up to ±11.2 m/s ±0.4% of measured value	
	Maximum Number of Cells		255	
	Maximum Ping Rate	ADCP	4 Hz	
		DVL+ADCP	2.5 Hz	
Beam Width			±1.0°	±1.3°
Beam Angle			30°	
Transmit Source Level (dB re 1 µPa @ 1 m)			217 dB (maximum)	
Sensors	Temperature		-5 to 40°C	
	Pitch/Roll (Optional)		±0.5°	
	Pressure (Optional)		±0.1% full scale	
Configuration (Array)			4-beam array @ 30° beam angles	
Communication and Logging	Communications		Dual RS232, multi-port Ethernet (TCP & UDP)	
	Trigger Inputs		3–12 V rising or falling edge configurable	
	Internal Logging		32 GB internal memory	
Output Telegrams			Sonardyne proprietary, PD0, PD3, PD4, PD6, PD13, SDDBT Simultaneous telegram output	
Voltage (dc Input)			24 V (±10%)	
Average Power (Typical)			10 W nominal	
Depth Rating			4,000 or 6,000 m array	
Operating Temperature			-5 to 55°C	
Storage Temperature			-20 to 55°C	
Mechanical Construction			Titanium	
Connector Type			Microfit	
Dimensions (Height x Diameter)			155 x 225 mm	
Weight in Air/Water[3]			7.7 kg	

[1] Standard deviation refers to proven single-ping true horizontal velocity precision, specified at 20–30 m altitude.
[2] 150 m bottom acquire range, up to 175 m once bottom locked in optimal seabed conditions.
[3] Estimated weights.

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Communication
Modems

03.

Sonardyne

Datasheet

BlueComm 100 – Optical Communications System

The BlueComm®100 optical communications system provides subsea wireless telemetry at broad band speeds and ranges up to 15 m.

BlueComm 100 can be used in all water conditions including shallow water daytime conditions where high ambient light is present. It is capable of data transmission rates from 1 to 5 Mbps.

The system uses an array of high-power light emitting diodes (LEDs) that are rapidly modulated to transmit data. Sensitive receivers are capable of detecting low energy light signals and decoding the communication data in the presence of significant ambient noise generated by daylight operation.

BlueComm 100 supports bi-directional optical communications and can be combined with an acoustic link for long range command and control.

The system is bi-directional using Time Division Multiple Access (TDMA) methods to provide a high-speed low latency link that supports TCP/IP based network protocols. Allocation of bandwidth ratios in each direction is user selectable and fully flexible.

The software supplied with BlueComm 100 enables system configuration and provides link diagnostics during operation.

Application examples include data recovery from seafloor instruments, wireless video transfer and also tether-free subsea vehicle control.

The optional acoustic link provides a method for locating and waking up a seafloor instrument prior to data recovery. The low latency feature of the system enables human-in-the-loop vehicle control.

Optical data transmission is highly efficient, enabling more than 1 GB of data to be transferred by BlueComm 100 using only the equivalent energy contained in a single lithium D sized battery cell.

BlueComm 100 has a titanium housing with a 4,000 m depth rating, matching the depth rating of most work-class ROVs.

Typical Applications

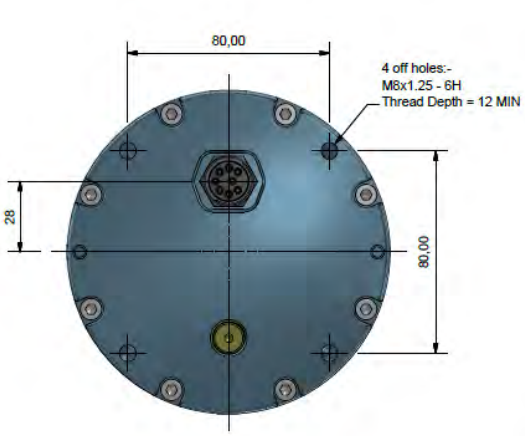
- Live video transmission
- Harvesting of large data sets from subsea instrumentation
- Tether-free subsea vehicle control

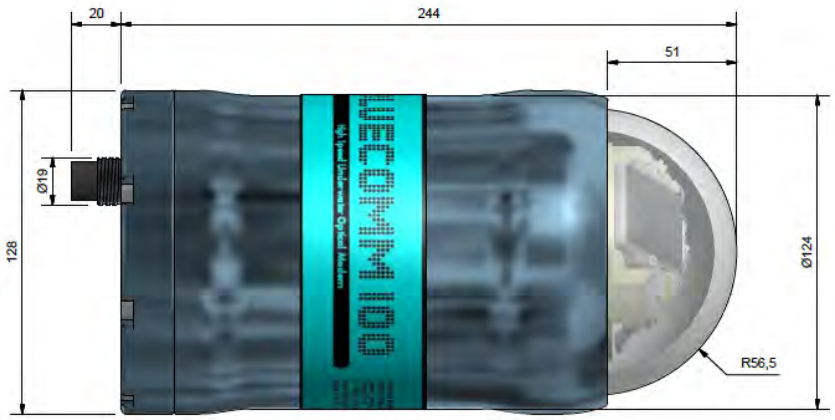
Key Features

- 1–5 Mbps at ranges of up to 15 m
- Suitable for shallow or deep water applications
- Highly energy efficient communications provide long battery life
- Optional integrated long-range acoustic communications and positioning for command and control
- Data recovery from seafloor instruments and tether-free subsea vehicle control
- 4,000 m depth operation

Specifications

BlueComm 100 – Optical Communications System





Feature	Type 8360-100 Specification
Depth Rating	4,000 m
Data Rate	1–5 Mbps
Optical Communication Range	1–15 m
Mechanical Construction	Titanium and glass dome
Supply Voltage	24–36 V dc
Communications Interface	10/100 Base-T Ethernet (static IP address)
Command Interface	Graphical User Interface / UDP Command Set
Rear Connector Type	Subconn MCBH8F Ti
Communications Type	Bidirectional, Time Division Multiplexing
Optical Transmit Power	6 W (radiometric)
Optical Wavelength	450 nm (royal blue)
Emitter Beam Shape	60° (half angle)
Receive Beam Shape	60° (half angle)
Power Consumption	10–30 W (dependent on transmit ratio)
Environmental and Dimensions	
Operating Temperature	-5 to 40°C
Storage Temperature	-20 to 55°C
Dimensions (Length x Diameter)	264 x 128 mm
Weight in Air/Water	5.2/2.4 kg

Datasheet

BlueComm 200 – Optical Communications System

BlueComm®200 provides subsea wireless optical communications up to 10 Mbps at ranges up to 150 m.

The system is most effective in low ambient light conditions such as deep water or shallow water night-time operations. It is capable of data transmission rates from 2.5–10 Mbps, enabling a range of application options including wireless telemetry from several concurrent video cameras and tether-free subsea vehicle control.

BlueComm 200 uses an array of high power light emitting diodes (LEDs) that are rapidly modulated to transmit data. Highly sensitive receivers detect the extremely small light signals in order to decode this data and to present it to the user via an Ethernet link.

BlueComm 200 uses Time Division Multiple Access (TDMA) methods to providing a bi-directional high speed low latency link that supports TCP/IP based network protocols. Allocation of bandwidth ratios in each direction is user selectable and fully flexible.

The allocation of bandwidths is ideal for applications where high-speed data transfer is mostly required in only one direction such as for extraction of large data volumes from seafloor instrumentation or sensors.

Optional integrated acoustic positioning and communications provide methods for locating the device, waking it up and managing the optical link. Once a connection is established, BlueComm 200 will immediately begin transferring buffered data.

Optical data transmission is highly efficient, enabling more than 9 GB of data to be transferred using only the energy contained in a single lithium D sized battery cell.

Key Features

- 2.5–10 Mbps at ranges up to 150 m
- Suitable for moderate to low turbidity dark water, (>200 m depth or night-time) applications
- Highly energy efficient communications provide long battery life
- Data recovery by AUV, ROV or surface deployed dunker system
- Up to 4,000 m depth operation
- Additional white light emitter available for video illumination
- ROV/AUV Remote Control

Specifications

BlueComm 200 – Optical Communications System

Feature		Type 8361
Depth Rating		Up to 4,000 m operation
Data Rate		2.5–10 Mbps
Optical Communication Range		Up to 150 m
Mechanical Construction		Anodized aluminium or titanium
Supply Voltage		24–36 V dc
Communications Interface		10/100 Base-T Ethernet (static IP address)
Command Interface		Graphical user interface or Ethernet UDP command set
Receiver Unit		
Receive Wavelength		Broadband visible light
Receive Angle		180° (omni-directional)
Receiver Weight in Air/Water*		7.3/3.1 kg
Power Consumption		10 W
Emitter Unit		
Optical Transmit Power		6 W (radiated light)
Optical Wavelength Options		450 nm (royal blue), 400–800 nm (white)
Emitter Beam Shape		180° (omni-directional)
Emitter Weight in Air/Water*		3.6/2.6 kg
Power Consumption		15 W (bandwidth allocation dependant)
Environmental and Dimensions		
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 55°C
Dimensions (Length x Diameter)	Receiver	384 x 136 mm
	Emitter	199 x 136 mm

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Specifications subject to change without notice – 06/2021

Datasheet

BlueComm 200 UV – Optical Communications System

BlueComm®200 UV provides subsea wireless optical communications up to 10 Mbps at ranges up to 75 m. Enabling a range of application options including wireless telemetry from several concurrent video cameras and tether-free subsea vehicle control.

The standard BlueComm 200 is optimized for maximum ranges up to 150 m, the range is however limited by ambient light which is seen as noise. The UV based system has a lower maximum range but a much higher tolerance to ambient light, designed for high ambient light operations closer to the surface or ROV operations.

The system uses a UV band pass optical filter to achieve better performance in high ambient light conditions.

BlueComm 200 UV uses an array of high power light emitting diodes (LEDs) that are rapidly modulated to transmit data. Highly sensitive receivers detect the extremely small light signals in order to decode this data and to present it to the user via an Ethernet link.

BlueComm 200 UV uses Time Division Multiple Access (TDMA) methods to providing a bi-directional high speed low latency link that supports TCP/IP based network protocols. Allocation of bandwidth ratios in each direction is user selectable and fully flexible.

The allocation of bandwidths is ideal for applications where high-speed data transfer is mostly required in only one direction such as for extraction of large data volumes from seafloor instrumentation or sensors.

Optional integrated acoustic positioning and communications provide methods for locating the device, waking it up and managing the optical link. Once a connection is established, BlueComm 200 UV will immediately begin transferring buffered data.

BlueComm 200 UV has a highly efficient optical data transmission, enabling more than 2 GB of data to be transferred using only the energy contained in a single lithium D sized battery cell.

Key Features

- 2.5–10 Mbps at ranges up to 75 m
- Suitable for moderate to low turbidity water and high ambient visible light conditions
- Data recovery by AUV, ROV or surface deployed dunker system
- Up to 4,000 m depth operation
- ROV/AUV Remote Control

Specifications

BlueComm 200 UV – Optical Communications System

Feature		Type 8361
Depth Rating		Up to 4,000 m operation
Data Rate		2.5–10 Mbps
Optical Communication Range		Up to 75 m
Mechanical Construction		Anodized aluminium or titanium
Supply Voltage		24–36 V dc
Communications Interface		10/100 Base-T Ethernet (static IP address)
Command Interface		Graphical user interface or Ethernet UDP command set
Receiver Unit		
Receive Wavelength		UV (band pass filter blocking visible light)
Receive Angle		180° (omni-directional)
Receiver Weight in Air/Water		7.3/3.1 kg
Power Consumption		10 W
Emitter Unit		
Optical Transmit Power		6 W (radiated light)
Optical Wavelength Options		405 nm (ultra violet)
Emitter Beam Shape		180°(omni-directional)
Emitter Weight in Air/Water		3.6/2.6 kg
Power Consumption		30 W (bandwidth allocation dependant)
Environmental and Dimensions		
Operating Temperature		-5 to 40°C
Storage Temperature		-20 to 55°C
Dimensions (Length x Diameter)	Receiver	384 x 136 mm
	Emitter	199 x 136 mm

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Datasheet

Dunker 6 LBL and Telemetry Transceiver System

Dunker 6 is a 6G® Sonardyne Wideband®2 Long BaseLine (LBL) and telemetry transceiver specifically designed for vessel deployment. The super duplex stainless steel housing with shock and vibration isolated electronics makes for an extremely rugged dunking system.

Its high power output and Sonardyne Wideband 2 signal processing offers improved operating range and acoustic performance in challenging conditions such as when deployed from noisy vessels or in multipath environments.

The internal Li-ion rechargeable battery pack minimises the supply current for long dunker cables. It also enables relocation of the dunker if the cable is cut.

The robust AGP connector on the Dunker 6 is identical to the ROVNav 6 and HPT USBL for compatibility and to reduce spares.

Dunker 6 is fully compatible with Sonardyne's modem and logging equipment such as AMT and Fetch products, allowing it to be used to retrieve data or configure logging regimes. It supports all Sonardyne Wideband 2 spread spectrum acoustic communication and can also be used to release the RT 6 range of acoustic releases.

The Dunker 6 system consists of 100 m of cable on a stainless steel cable drum with brake and locking mechanism. The 10 m deck cable between the 48 V Surface Interface Unit (SIU) and the cable drum allows the drum to be conveniently located. The connection to the cable drum is via an easily replaceable 8-way SubConn.

Optionally an RT 6 topside kit with 30 m of cable is available in a carrying case without a cable drum.

Key Features

- High power, long range LBL transceiver
- MF and LMF frequency band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- More robust performance in shallow water and reverberant environments around structures etc.
- Real-time diagnostics available on ranges to enable quality control
- Rugged mechanics and connectors
- Shock mounted internal electronics
- Internal Li-ion battery ensures that the transmit Source Level (SL) is maintained during telemetry
- Integrated modem capability for data download from Sonardyne AMT/Fetch products at data rates from 100 to 9,000 bps
- Capability to operate as topside for RT 6 acoustic releases
- Omni or directional transducers
- Multi-user ready
- Field proven

Specifications

Dunker 6 LBL and Telemetry Transceiver System

8309-1351 omni-directional shown above

Feature		Type 8309-1351	Type 8309-1353	Type 8309-1355	Type 8309-1356
Depth Rating		1,000 m	1,000 m	1,000 m	1,000 m
Operating Frequency		MF (21–32.5 kHz)	MF (21–32.5 kHz)	LMF (14–19 kHz)	LMF (14–19 kHz)
Transducer Beam Shape		Omni-directional	Directional	Omni-directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)	190–202 dB (4 levels)	187–196 dB (4 levels)	187–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	196–208 dB	193–202 dB	193–208 dB
Receiver Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)	80–120 dB (7 levels)	90–120 dB (7 levels)	80–120 dB (7 levels)
Range Precision		Better than 15 mm			
Serial Communications (Software Programmable)		Primary port: RS485 (half-duplex) or RS232 Secondary port: RS485 (half-duplex) or RS232 or SYNC IN			
Operating Voltage		24 or 48 V dc (±10%)			
External Power	Active (listening)	<3 W typical (maximum 6W when charging)			
	Peak (during transmission)	<80 W			
Battery Life (Li-ion) (Listening)		3 days			
Connector Type		AGP (8-way female)			
Mechanical Construction		Super duplex stainless steel			
Dimensions (Length x Diameter)		692 x 200 mm	660 x 200 mm	586 x 200 mm	641 x 230 mm
Weight in Air/Water[2]		24/16 kg	26/17 kg	20/14 kg	28/17 kg

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated Weights.

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Datasheet
Modem 6 Dunker (Surface)

The Modem 6 range, based on existing 6G® equipment, provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Modem 6 Dunker is a rugged and easy-to-mount instrument, suitable for transmission of data from a wide range of sensors including: current profilers, temperatures, depth and custom instrumentation.

The Modem 6 Dunker is depth rated to 1,000 m and available in MF and LMF, with omni-directional or directional transducer designed for excellent horizontal and shallow water communication.

The Modem Dunker 6 is powered using a Surface Interface Unit (SIU) and lowered over the side of a vessel.

Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, acknowledged and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G control language. They can be programmed using the supplied software and a serial link or any third-party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 down to 200 bps depending on the environment.

Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

Key Features

- MF/LMF, omni-directional/directional
- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – Mitigates interference and multi-path issues
- Incorporates field proven communication technology used within critical subsea applications
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Rugged, easy to mount housing
- Capable of achieving ranges in excess of 5 km

Specifications
Modem 6 Dunker (Surface)

8307-1351 omni-directional Modem 6 Dunker shown above

Cable drum, SIU and Dunker

100 mCable drum

Feature		Type 8307-1351	Type 8307-1353	Type 8307-1355	Type 8307-1356
Depth Rating		1,000 m	1,000 m	1,000 m	1,000 m
Operating Frequency		MF (21–32.5 kHz)	MF (21–32.5 kHz)	LMF (14–19 kHz)	LMF (14–19 kHz)
Transducer Beam Shape		Omni-directional	Directional	Omni-directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)	190–202 dB (4 levels)	187–196 dB (4 levels)	187–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	196–208 dB	193–202 dB	193–208 dB
Receiver Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)	80–120 dB (7 levels)	90–120 dB (7 levels)	80–120 dB (7 levels)
Serial Communications		Primary and secondary port: RS485 (half-duplex) SIU input: RS232			
Connector Type		AGP (8-way female)			
Mechanical Construction		Super duplex stainless steel			
Dunker 6 Operating Voltage		24 or 48 V dc (±10%) – Supplied by the SIU			
SIU Operating Voltage		90–260 V ac, 50/60 Hz, 200 VA maximum – Power out 48 V dc, 2.0 A maximum			
External Power Consumption	Active (Listening)	<3 W typical (maximum 6W when charging)			
	Peak (Transmission)	<80 W	<80 W	<80 W	<80 W
Battery Life (Li-ion) (Listening)		3 days	3 days	3 days	3 days
Dimensions (Length x Diameter)		692 x 200 mm	660 x 200 mm	586 x 200 mm	641 x 230 mm
Weight in Air/Water[2]		24/16 kg	26/17 kg	20/14 kg	28/17 kg

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
[2] Estimated weights.

Datasheet
Modem 6 Mini (Subsea)

The Modem 6 range, based on existing 6G® equipment provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Modem 6 Mini is compact, easy-to-mount and suitable for transmission of data from a wide range of sensors including: current profilers, temperatures, depth and custom instrumentation.

The Modem 6 Mini is available in Medium Frequency (MF) band with an omni-directional or directional transducer designed for excellent horizontal and shallow water communication.

Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, acknowledged and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G control language. They can be programmed using the supplied software and a serial link or any third party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 bps down to 200 bps depending on the environment.

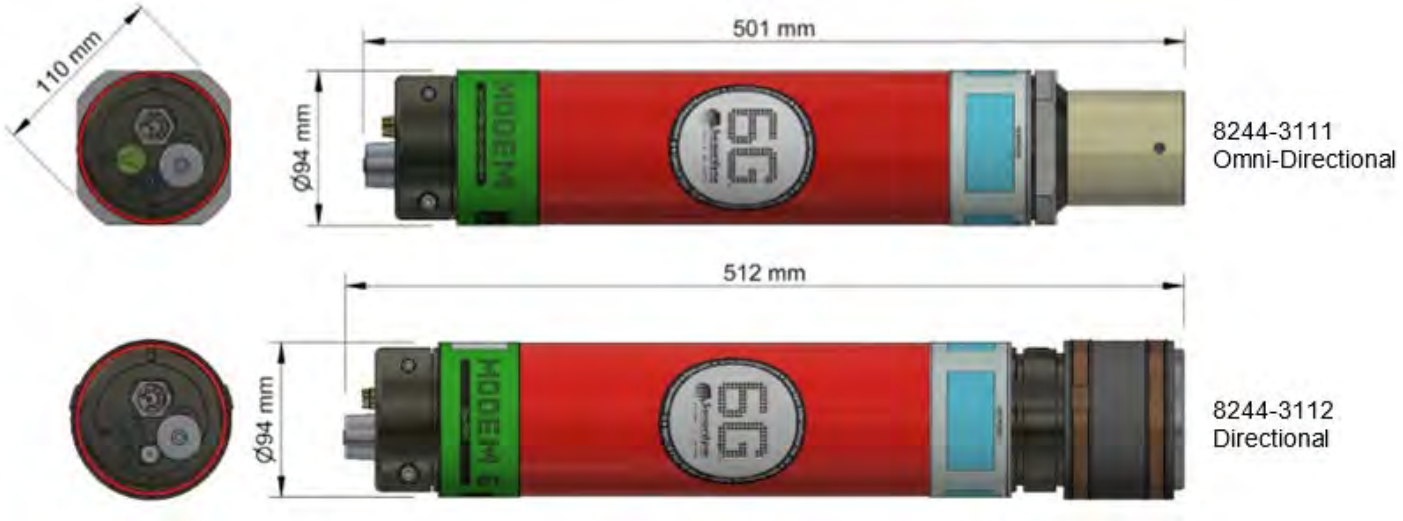
Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

For safety, a pressure relief valve is incorporated, and an external on/off switch saves the rechargeable battery when not in use.

Key Features

- Omni-directional and directional option
- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – Mitigates interference and multi-path issues
- Incorporates field proven communication technology used within critical subsea applications
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Internal back-up battery with external trickle charge
- Capable of achieving ranges in excess of 3 km

Specifications
Modem 6 Mini (Subsea)



Feature		Type 8244-3111	Type 8244-3112
Depth Rating		3,000 m	3,000 m
Operating Frequency		MF (21–32.5 kHz)	MF (21–32.5 kHz)
Transducer Beam Shape		Omni-directional	Directional
Source Level (re 1 µPa @ 1 m)	High Power	187 dB	193 dB
	Low Power	181 dB	187 dB
Tone Equivalent Energy (TEE)[1] WBv2+	High Power	193 dB	199 dB
	Low Power	187 dB	193 dB
Communications Interface		RS232 (2,400–115,200 baud)	
Operating Voltage		24 or 48 V dc (± 10%)	24 or 48 V dc (± 10%)
External Power Consumption	Sleep	~650 mW	~650 mW
	Wideband Listening	~1 W	~1 W
	Battery Charging	6 W	6 W
	Peak (Transmission)	<50 W	<50 W
External Power Switch		Yes	Yes
Battery Life (Li-ion 15 V) (Listening)		30 days	30 days
Operating Temperature		-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C
Mechanical Construction		Anodised aluminium alloy and plastics	
Dimensions (Length x Diameter)		501 x 94 mm	512 x 97 mm
Weights in Air/Water[2]		5.1/2.2 kg	7.0/3.5 kg

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing Wideband and tone systems.
[2] Estimated Weights.

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Datasheet
Modem 6 Mini-Dunker (Surface)

Modem 6 Mini-Dunker
8244-3151 MF

Modem 6 Mini-Dunker
8244-3155 LMF

The Modem 6 range, based on existing 6G® equipment provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Modem 6 Mini-Dunker is compact, easy-to-mount and suitable for transmission of data from a wide range of sensors including: current profilers, temperatures, depth and custom instrumentation.

The Modem 6 Mini-Dunker is available in Medium Frequency (MF) band with an omni-directional transducer designed for excellent horizontal and shallow water communication.

The surface system comprises of a Modem 6 Mini-Dunker, Surface Interface Unit (SIU) and 20 m deck cable.

Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, acknowledged and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G control language. They can be programmed using the supplied software and a serial link or any third party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 bps down to 200 bps depending on the environment.

Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

An external on/off switch saves the rechargeable battery when not in use.

Key Features

- MF and LMF option
- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – mitigates interference and multi-path issues
- Incorporates field proven communication technology used within critical subsea applications
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Internal back-up battery with external trickle charge
- Capable of achieving ranges in excess of 3 km

Specifications

Modem 6 Mini-Dunker (Surface)

8244-3151 MF Omni

8244-3155 LMF Omni

Feature		Type 8244-3151	Type 8244-3155
Depth Rating		3,000 m	3,000 m
Operating Frequency		MF (21–32.5 kHz)	LMF (14–19 kHz)
Transducer Beam Shape		Omni-directional	Omni-directional
Source Level (re 1 µPa @ 1 m)	High Power	187 dB	190 dB
	Low Power	181 dB	187 dB
Tone Equivalent Energy (TEE)[1] WBv2+	High Power	193 dB	196 dB
	Low Power	187 dB	193 dB
Serial Communications		Primary and secondary port: RS485 (half-duplex) SIU input: RS232	
Modem 6 Mini-Dunker Operating Voltage		24 or 48 V dc (± 10%) – supplied by the SIU	
SIU Operating Voltage		90–260 V ac, 50/60 Hz, 200 VA max – power out 48 V dc, 2.0 A maximum	
External Power Consumption	Sleep	~650 mW	~650 mW
	Wideband Listening	~1 W	~1 W
	Battery Charging	6 W	6 W
	Peak (Transmission)	<50 W	<50 W
External Power Switch		Yes	Yes
Battery Life (Li-ion 15 V) (Listening)		30 days	30 days
Operating Temperature		-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C
Mechanical Construction		Anodised aluminium alloy and plastics	
Dimensions (Length x Diameter)		518 x 94 mm	604 x 94 mm
Bump Guard Diameter		178 mm	200 mm
Weights in Air/Water[2]		5.1/2.2 kg	7.0/3.5 kg
Surface System Kit		**602-0123**	**602-0129**
Mini-Dunker		8244-3151	8244-3155
Surface Interface Unit (SIU)		620-7079	620-7079
Deck Cable (20 m)		820-0384	820-0384

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated Weights.

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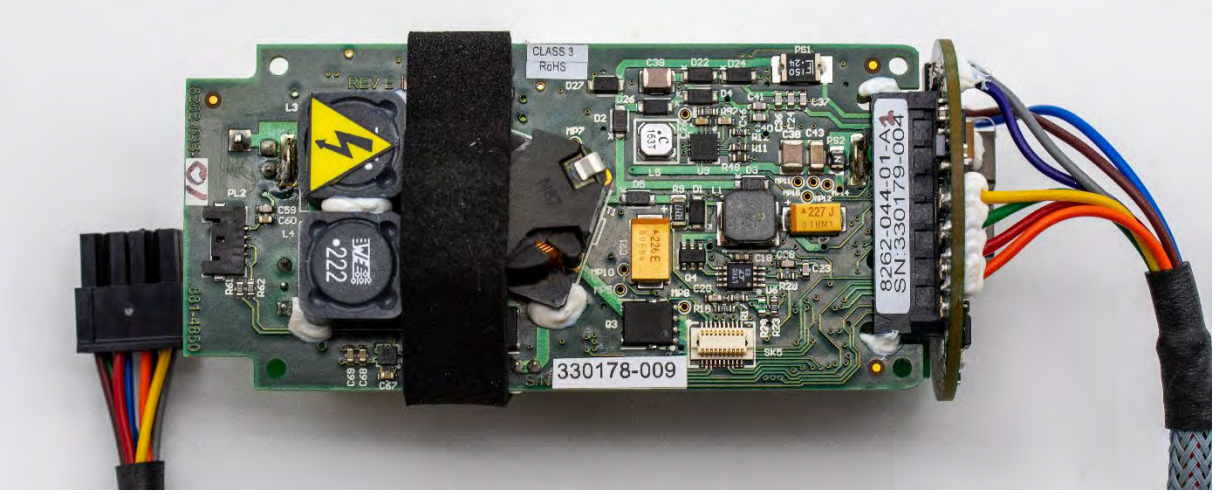
Datasheet
Modem 6 OEM Nano



The Modem 6 is based on existing 6G® equipment and provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Modem 6 OEM Nano is the smallest OEM Modem (with a battery pack) on the market. Easy-to-mount and suitable for transmission of data from a wide range of sensors including current and custom instrumentation.

The Modem 6 OEM Nano is available in Medium Frequency (MF) with an omni-directional 3000 m transducer for excellent horizontal and shallow water communication.

Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, acknowledged and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G control language. They can be programmed using the supplied software and a serial link or any third-party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 bps down to 200 bps depending on the environment.

Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

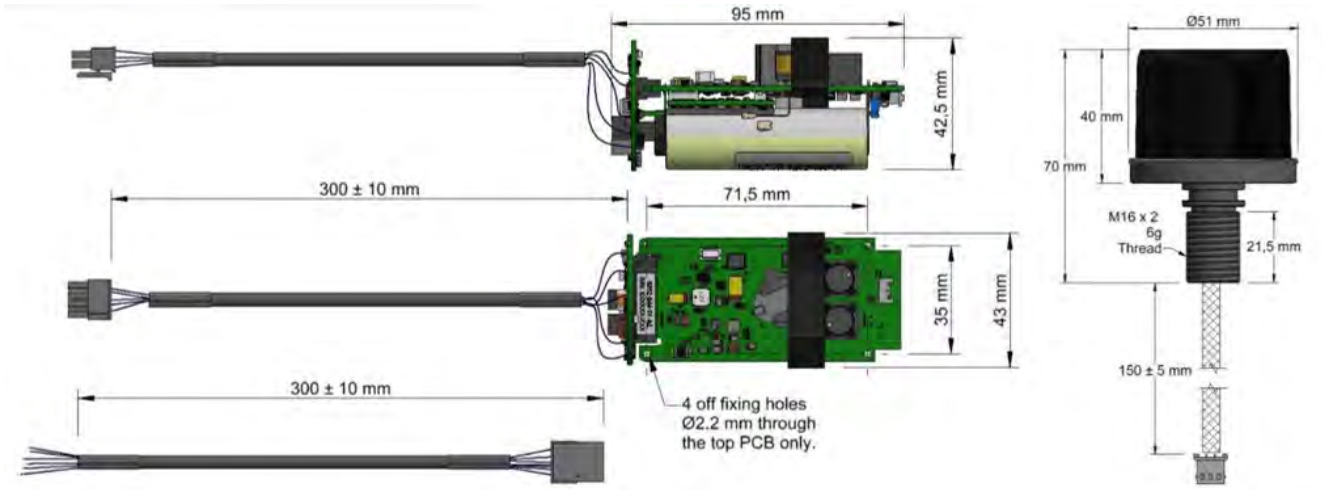
Designed to be integrated into persistent seabed sensors and subsea platforms Modem 6 OEM Nano brings the benefits of Sonardyne's established Modem range to a new integrator market.

Key Features

- Omni-directional
- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – mitigates interference and multi-path issues
- Acknowledged and fire and forget modes
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Internal back-up battery with external trickle charge
- Scalable solution with AvTrak 6 and Sonardyne Modem 6 range
- Simulation software available

Specifications

Modem 6 OEM Nano



Feature		Type 8262 Modem 6 OEM Nano
Operating Range		2,000 m
Transducer Depth Rating		3,000 m
Operating Frequency		MF (21–32.5 kHz)
Transducer Beam Shape		Omni-directional ±130°
Source Level (re 1 µPa @ 1 m)		175 dB
Communications Interface		RS232 (2,400–115,200 baud), 3V3 TTL
Power Supply		12–28 V dc
Bit Rate		200 – 9,000 bits/sec
Bit Error Rate		>10^{-10}
Buffer Size		512 kB
Power Supply[1]		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (External Power)[2]	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life (Listening)		>90 Days
Battery Charge Time		12 hours
Tilt Sensor		±90°
External Connections		Molex Microfit
Transducer Wire Length[3]		150 mm (6”)
Operating Temperature[4]		-10 to 45°C
Storage Temperature[5]		-20 to 55°C
Dimensions	Transducer (Length x Diameter)	72 x 49 mm
	PCB Board Assembly (Length x Width x Height)	95 x 43 x 42.5 mm
	Hole Centres (M2 clearance – Length x Width)	71.5 x 35 mm
Weights	PCB in Air	138g PCB + 12g cable
	Transducer in Air/Water (Estimated)	200/150 g

[1] Noise on the external dc supply may have an effect on the acoustic performance of the instrument.
[2] Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency.
[3] It is possible to increase the transducer wire length if required; contact Sonardyne for more information.
[4] The battery will not charge above 45°C or below 0°C.
[5] To maximise battery life, the instrument should not be stored above 30°C.

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Datasheet

Modem 6 Standard (Subsea)

The Modem 6 range is based on our proven 6G equipment range provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Type 8307 Modem 6 Standard is a subsurface deployed instrument suitable for transmitting data from a wide range of sensors including: current profilers, temperatures, depth and custom instrumentation.

The Type 8307 is based on the field proven mechanics of Compatt 6. The large capacity battery allows the modem to be deployed for long periods.

Battery power can be routed externally to power external devices.

Depth rating options are 3,000 and 5,000 m in hard anodised aluminium alloy with protective polyurethane sleeve.

The Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, question & answer and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G® control language. They can be programmed using the supplied software and a serial link or any third party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 down to 200 bps depending on the environment.

Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

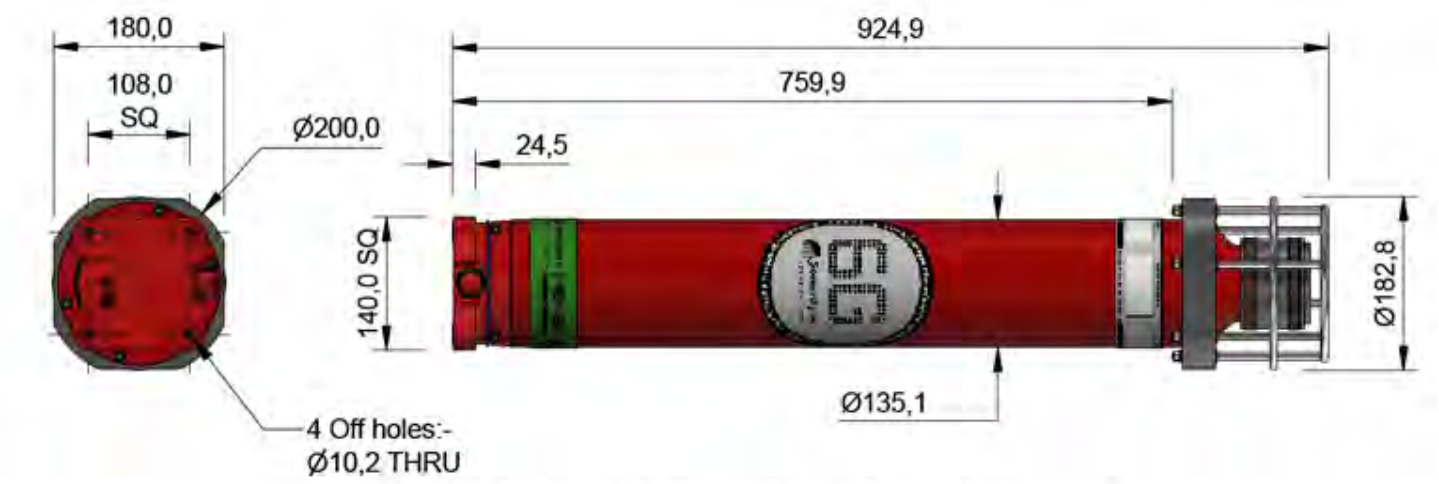
For safety, a pressure relief valve is incorporated, and a battery disconnect fob allows quick battery disconnection.

Key Features

- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – Mitigates interference and multi-path issues
- Incorporates field proven communication technology used within critical subsea applications
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Capable of achieving ranges in excess of 5 km
- Power output to external device controlled by acoustic command
- Optional RS485 connectivity
- Battery disconnect fob allows quick battery disconnection
- Upgradeable to full Compatt 6 functionality

Specifications

Modem 6 Standard (Subsea)



5,000 MF directional (without release) shown (8307-5213)

Feature		Type 8307-3111	Type 8307-3113	Type 8307-5213
Depth Rating		3,000 m	3,000 m	5,000 m
Operating Frequency		MF (21–32.5 kHz)	MF (21–32.5 kHz)	MF (21–32.5 kHz)
Transducer Beam Shape		Omni-directional	Directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)	190–202 dB (4 levels)	190–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	196–208 dB	80–120 dB (7 levels)
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)	80–120 dB (7 levels)	80–120 dB (7 levels)
Number of Unique Addresses Wideband 1 & 2		>500	>500	>500
Battery Life (Listening)	Alkaline	833 days	833 days	833 days
	Lithium	1,390 days	1,390 days	1,390 days
External Power Input		24 V	24 V	24 V
Power for External Sensors		12 V	12 V	12 V
Safe Working Load (4:1)		250 kg	250 kg	250 kg
Operating Temperature		-5 to 40°C	-5 to 40°C	-5 to 40°C
Storage Temperature		-20 to 55°C	-20 to 55°C	-20 to 55°C
Dimensions (Without Release) (Maximum) (LxDia)		955 x 200 mm	925 x 200 mm	925 x 200 mm
Weight in Air/Water[2] (Alkaline Battery)		23.8/11.8 kg	23.8/11.8 kg	23.8/11.8 kg

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated weights.

Datasheet

Modem 6 Sub-Mini (Subsea)

The Modem 6 range, based on existing 6G® equipment, provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Modem 6 Sub-Mini is a compact and easy-to-mount instrument, suitable for transmission of data from a wide range of sensors including: current profilers, temperatures, depth and custom instrumentation.

Type 8377-1111 is depth rated to 1,000 m and has an omni-directional transducer designed for excellent horizontal and shallow water communication.

Type 8377-4112 is depth rated to 4,000 m and has a directional transducer.

Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, acknowledged and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G control language. They can be programmed using the supplied software and a serial link or any third-party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 down to 200 bps depending on the environment.

Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

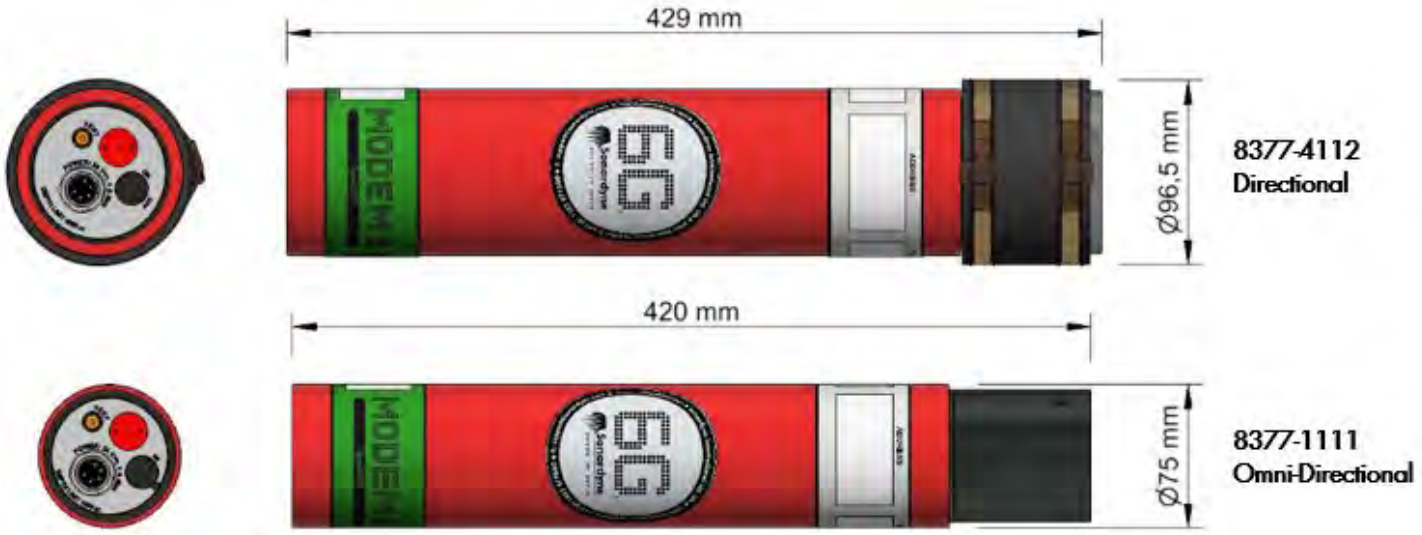
For safety, a pressure relief valve is incorporated, and an external on/off switch saves the rechargeable battery when not in use.

Key Features

- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – Mitigates interference and multi-path issues
- Incorporates field proven communication technology used within critical subsea applications
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Rechargeable NiMH battery
- External on/off switch for saving battery when not in use
- Rugged, easy to mount housing

Specifications

Modem 6 Sub-Mini (Subsea)



Feature	Type 8377-1111	Type 8377-4112
Depth Rating	1,000 m	4,000 m
Operating Frequency	MF (21–32.5 kHz)	MF (21–32.5 kHz)
Transceiver Beam Shape	Omni-directional	Directional
Data Rate (Maximum)	9,000 bps	9,000 bps
Serial Port (RS232)	2,400–115,200 baud	2,400–115,200 baud
Data Buffer/Storage	512 kB	512 kB
Range[1]	1–1.5 km	3–4 km
Transmit Source Level (dB re. 1 µPa @ 1 m)	181 dB	187 dB
Receive Sensitivity (dB re 1 µPa)	<85 dB	<80 dB
Power Supply	Rechargeable NiMH battery or external 24 V	Rechargeable NiMH battery or external 24 V
Battery Charge (0-100%)	5 hours	5 hours
Quiescent Life (Battery)	>35 days	>35 days
Connector 5-Way (Standard)	Subconn MCBH5M	Subconn MCBH5M
Mechanical Construction	Anodised aluminium alloy	Anodised aluminium alloy
Operating Temperature	-5 to 40°C	-5 to 40°C
Storage Temperature	-20 to 55°C	-20 to 55°C
Dimensions (Length x Diameter)	420 x 75 mm	429 x 97 mm
Weight in Air/Water2	3.2/1.3 kg	5.5/3.2 kg
Battery Charger	8370-011-01	8370-011-01

Pin	Description
1	RS232 comms in (RX)
2	0 V
3	RS232 comms out (TX)
4	External power 24 V
5	n/a

[1] Depends on ambient noise level and ray bending due to SVP.
[2] Estimated weights.

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Datasheet
Modem 6 Transceiver (Surface)

Modem 6 Transceiver 8182-0001

Modem 6 Transceiver 8193-0012

Surface System Kit

The Modem 6 range, based on our proven 6G® equipment range provides a reliable and cost-effective method of wirelessly transferring underwater sensor data in real-time.

The Modem 6 Transceiver is a surface deployed instrument, suitable for recovering data from a wide range of sensors including: current profilers, temperatures, depth and custom instrumentation.

The system kit comprises a surface Modem 6, Surface Interface Unit (SIU), deck cable, 100 m cable drum and a dunker cage, which allows deployment over the side in the absence of a deployment pole.

The advanced multi-element processing comprises improvements in signal processing algorithms and array design, enabling telemetry to be robustly decoded even in noisy and reverberant environments due to

Manufactured in aluminium bronze, it is intended to be fitted temporarily or permanently to a vessel's through-hull or over-the-side pole or mounted in a dunker cage assembly.

Modem 6 is a flexible range of instruments, supporting specific communication settings for a variety of link types such as low latency data, fire and forget, acknowledged and large data uploads. A 512 kB modem buffer stores data when a modem link is not active.

All Modem 6 products utilise Sonardyne Wideband® signal processing and standard 6G control language. They can be programmed using the supplied software and a serial link or any third party terminal software.

This technology is field proven and provides unprecedented levels of robustness and flexibility in challenging acoustic environments.

Data transfer rates range from 9,000 bps down to 200 bps depending on the environment.

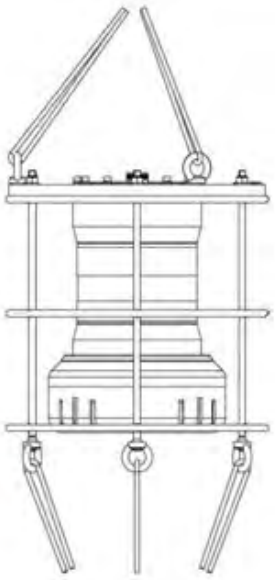
Advanced communication protocols and intelligent data packet stitching ensure latency is minimised and data is delivered error free.

Key Features

- MF and LMF option
- Sonardyne Wideband telemetry provides up to 9,000 bps actual acoustic data rate
- Compatible with all Modem 6 instruments
- Full two-way Sonardyne Wideband 2 interrogation and reply – mitigates interference and multi-path issues
- Incorporates field proven communication technology used within critical subsea applications
- More than 500 unique Sonardyne addresses
- Robust performance in noisy and reverberant environments
- Enhanced array designs for improved noisy vessel and deepwater performance
- Built in health checks including array and electronics diagnostics
- In water ambient noise monitoring
- Supports enhanced telemetry schemes TS4 and TS5.

Specifications

Modem 6 Transceiver (Surface)



Dunker Cage

Feature	Type 8182-0001	Type 8193-0012
Operating Frequency	MF (21–32.5 kHz)	LMF (14–19 kHz)
Operating Range	Up to 7,000 m	Up to 12,000 m
Acoustic Coverage	Up to ± 90°	Up to ± 90° optimised for deepwater (depending on frequency of operation)
Transmit Source Level (dB re 1 µPa @ 1 m)	200 dB	200 dB
Tone Equivalent Energy (TEE)[1]	206 dB (13 JA)	206 dB (13 JA)
Transceiver 6 Operating Voltage	48 V dc (±10%), typical 15 W, max 120 W – supplied by the SIU	
SIU Operating Voltage	90–260 V ac, 50/60 Hz, 200 VA max	
Serial Communication	Primary and secondary port: RS485 (half-duplex) SIU input: RS232	Primary and secondary port: RS485 (half-duplex) SIU input: RS232
Operating Temperature	-5 to 40°C	-5 to 40°C
Storage Temperature	-20 to 45°C	-20 to 45°C
Mechanical Construction	Aluminium bronze	Aluminium bronze
Dimensions (Height x Diameter)	370 x 225 mm	439 x 310 mm
Weight in Air /Water[2]	28/15 kg	41/20 kg
Surface System Kit	**Sonardyne Part Number**	
Surface Interface Unit (SIU)	620-7079	
Cable Drum (100 m)	641-3614	
Deck Cable (5 m)	820-0127	
Dunker Cage	641-3612	

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.
Detection performance is directly related to the signal energy (Joules (Watt seconds)) and not power. WBv2+ signals are longer in duration (greater energy) than WBv1 and Tone, therefore the detection performance is the same or improved for low transmit source levels.

[2] Estimated Weights.

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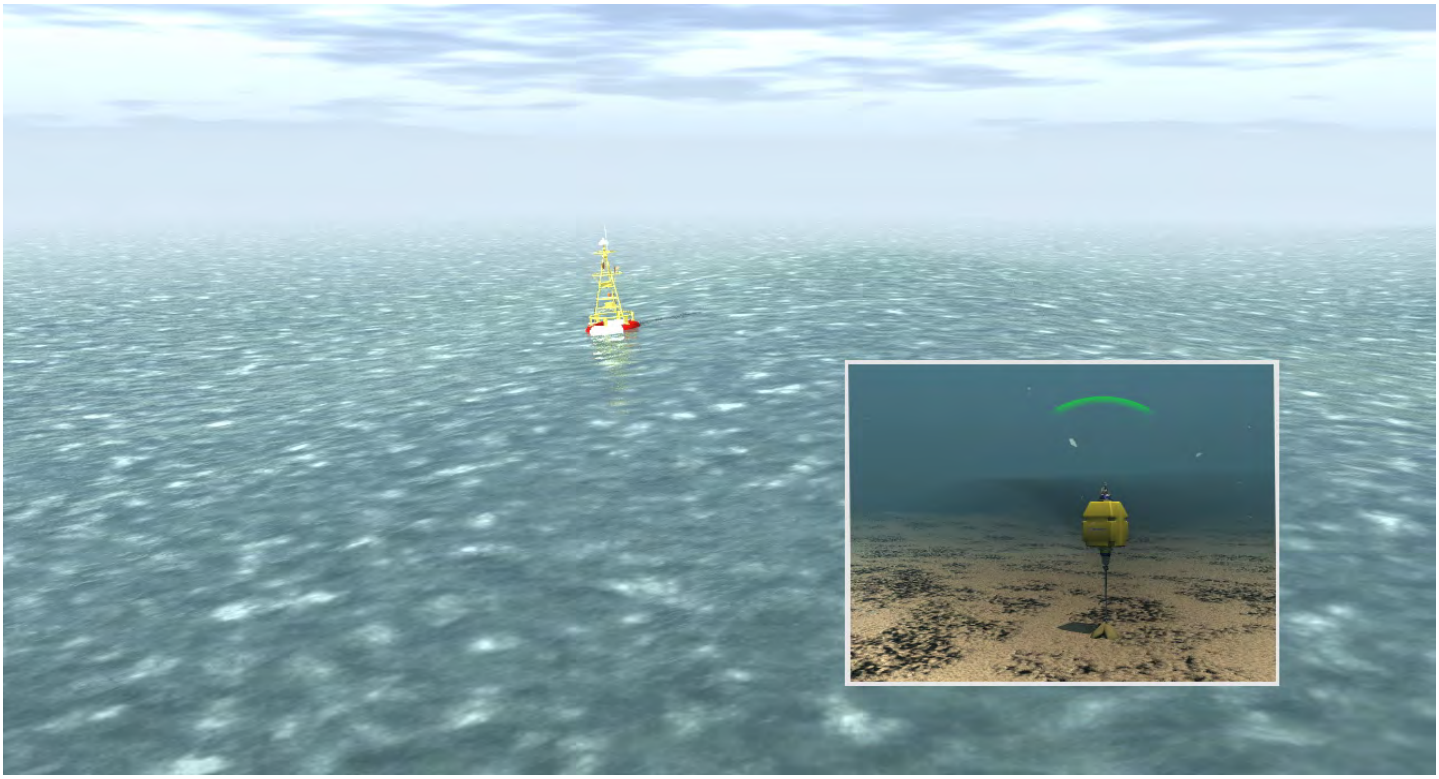
Monitoring
Data Loggers

04.

Datasheet

6G Tsunami Detection System



The Tsunami Detection System can be deployed on the seabed in the deep ocean from where it will monitor the pressure of the water above it. A tsunami wave in deep water creates a small but measurable change in pressure that will be maintained for as long as twenty minutes. By monitoring any such changes, the subsea detector will trigger an alarm that sends an acoustic warning message to a buoy-mounted transceiver on the surface. The transceiver, in turn, relays the message via a satellite data link to a control centre.

Sonardyne's tsunami system is based on the company's successful Compatt 6 seabed acoustic transponder. It uses the latest Wideband®2 digital acoustic technology to provide robust through-water communications in difficult acoustic conditions.

The Bottom Pressure Recorder 6 can be deployed in up to 7,000 m of water and it is fitted with a sensor that continuously monitors water pressure, saving data every fifteen seconds. Because a reliable early warning of a tsunami can only be obtained close to the sea floor, the BPR6 provides the essential means of sending these readings up to the surface.

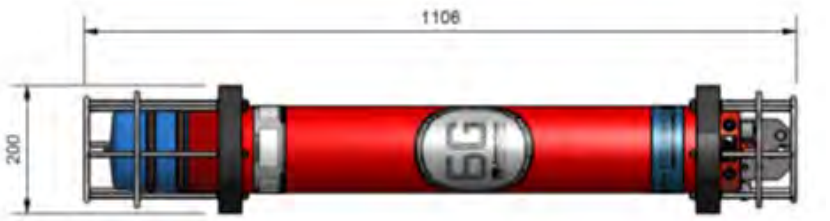
Every hour the BPR6 converts the pressure readings into signals which it transmits acoustically to the buoy on the surface. The satellite communications transceiver on the buoy then automatically forwards the pressure readings to the tsunami monitoring agency ashore. The system can also receive data from the central control so that revised monitoring parameters can be downloaded to the BPR6 if required.

The BPR6 is programmed to anticipate continual changes in the pressure of the water as these can be caused by influences such as tides, weather conditions and temperature. Because such changes can be predicted, a variation of as little as 3 cm from the expected pattern will switch the device into Tsunami Alert Mode. This will cause the BPR6 to transmit a sequence of messages containing hi-res pressure data to the surface over the next few hours. The transceiver on the buoy will immediately pass on the messages for transmission by satellite to the monitoring station.

This allows the first warning of a tsunami, caused by a small variation in water pressure on the seabed thousands of miles from shore, can be alert the office of the monitoring organisation within minutes.

Specifications

6G Tsunami Detection System



Feature	Type 8141 Buoy Mounted Transceiver
Frequency Band	LMF (14–19 kHz)
Transducer Beam Shape	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)	196–172 dB (3 levels)
Receive Sensitivity (dB re 1 µPa)	95–130 dB (6 levels)
Telemetry (Wideband 2)	100–900 baud, user payload, bi-directional
Sonardyne Messaging Service (SMS) data buffer	128 bytes
Command/Control	Accessed through communications interface
Error Detection and Correction	Advanced protocols to minimise data loss and re-sends
Communications Interface	RS232 (9,600–115,200 baud)
Dimensions (Length x Diameter)	608 x 260 mm
Weight in Air/Water	9.75/5.26 kg
External Power Requirement	24–50 V dc, 1 W quiescent, 100 W peak
Armoured Cable to buoy Payload	Included (10 m, 8-core, with strain relief)
Feature	**Type 8303 Bottom Pressure Recorder 6**
Depth Rating	5,000 m (4,100 and 7,000 m option)
Frequency Band	LMF (14–19 kHz)
Transducer Beam Shape	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)	202–169 dB (5 levels)
Receive Sensitivity (dB re 1 µPa)	80–120 dB (6 levels)
Telemetry (Wideband 2)	100–900 baud, user payload, bi-directional
Battery Life (Monitoring)	725 days standard (1,450 days maximum option)
Working Load Limit (4:1) (Release)	250 kg
Dimensions (Length x Diameter)	1,106 x 200 mm
Weight in Air/Water	28.2/14.2kg (standard 5,000 m option)
Pressure Sensor	4,100 m (7,000 m option)
BPR Floatation Collar	Included (nett buoyancy 300 N)

Datasheet

Autonomous Monitoring Transponder (AMT)

The Type 8305 AMT is a long-endurance Compatt 6 based transponder extensively used for subsea survey tasks and is capable of autonomously acquiring acoustic ranges and sensor data without surface control. The data is time-stamped and logged internally for recovery via the integrated high-speed acoustic telemetry modem. This autonomy allows measurements to be made over a long period of time without requiring a surface vessel or ROV to command the process. This enables new applications that save vessel and survey time so reducing cost and risk.

Precision pressure, temperature, sound velocity and dual-axis inclinometer sensors are integrated and are intelligently powered up at the requested time and sampling period, providing an ultra-low power platform for up to 5 years deployment. Sampling regimes can be re-programmed and recovery of all data can be achieved via the acoustic telemetry link.

The AMT has many of the same acoustic functions as Compatt 6. It operates in the Medium Frequency (MF) band and is fully Sonardyne Wideband®2 compatible.

The AMT is available with a range of omni and directional transducers, depth ratings and pressure housings dependent on deployment duration and application. Additional external sensors can be easily integrated via the power and communications port.

Typical Applications

- Metocean platform: Subsea acquisition of current profile, temperature, sound velocity and tidal height record
- AUV survey and metrology reference, acoustic position reference, SV and tidal height correction station
- PLET and pipeline buckle arrestor monitoring
- Structure settlement monitoring

Key Features

- Autonomous operation: acquires acoustic ranges & sensor data without surface command
- Integrated precision sensors: pressure, temperature, sound velocity and inclinometers
- Options for external sensors: current meters, turbidity etc.
- Easy to set-up with configuration and sampling period programmable via telemetry link
- Integrated modem with data rates ranging from 100 to 9,000 bps in multiple frequency bands
- 5 year deployment battery-life possible with Maxi version
- Alkaline and lithium battery options
- Sonardyne Wideband 1 and HPR 400 USBL mode compatible
- Corrosion resistant aluminium bronze or hard-anodised aluminium housing options
- Highly reliable release mechanism
- Real time diagnostics available on ranges to enable quality
- Field proven

Specifications

Autonomous Monitoring Transponder (AMT)

Type: 8305-3411 Omni-Directional

Feature		Type 8305-3411	Type 8305-3111	Type 8305-3113
Depth Rating		3,000 m	3,000 m	3,000 m
Operating Frequency		MF (19–34 kHz)	MF (19–34 kHz)	MF (19–34 kHz)
Transducer Beam Shape		Omni-directional	Omni-Directional	Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		187–196 dB (4 levels)	187–196 dB (4 levels)	190–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		193–202 dB	193–202 dB	196–208 dB
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)	90–120 dB (7 levels)	80–120 dB (7 levels)
Ranging Precision		Better than 15 mm	Better than 15 mm	Better than 15 mm
Number of Unique Addresses Wideband 1 & 2		>500	>500	>500
Battery Life (Listening, Disabled)	Alkaline	833 days	833 days	833 days
	Lithium	1,390 days	1,390 days	1,390 days
Safe Working Load (4:1)		n/a	250 kg	250 kg
Mechanical Construction		Aluminium bronze	Aluminium	Aluminium
Dimensions (Length x Diameter)		1,007 x 130 mm	1,034 x 134 mm	1,018 x 134 mm
Weight in Air/Water[2]		35/24 kg	24/12 kg	24/12 kg
Endcap Sensors and Options				
Temperature (±0.1°C)		Standard	Standard	Standard
Tilt Switch (±30-45°)		Standard	Standard	Standard
Strain Gauge Pressure Sensor (±0.1%)		Standard	Standard	Standard
High Precision Strain Gauge (±0.01%) Presens or Keller		Optional	Optional	Optional
Paroscientific DigiQuartz Pressure Sensor 1,350 m, 2,000 m, 4,130 m, 6,800 m (±0.01%)		Optional	Optional	Optional
High Accuracy Inclinometer Range: ±90°, Accuracy: ±0.05° over 0 - ±15°; ±0.2° over 0 - ±45°		Optional	Optional	Optional
Sound Velocity Sensor ±0.02 m/s Accuracy Under Calibration Conditions		Optional	Optional	Optional
Release Mechanism		Not Available	Standard	Standard

[1] WBv2+ signals are 4x the duration of Sonardyne tone signals (WBv1 & WBv2 are 2x). The TEE figure shows the operational performance when comparing wideband and tone systems.

[2] Estimated Weights.

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Datasheet

Fetch (Long-Life) – Wireless Autonomous Sensor Logging Node

Fetch is a long-life subsea sensor logging node that enables data to be wirelessly extracted via its integrated high-speed acoustic modem.

Fetch can be configured with an array of different sensors dependent on the monitoring application. Sensor options include low drift, high accuracy pressure, temperature and sound velocity as well as inclination. Other sensors can be integrated internally or externally as required. Fetch can also autonomously collect and log acoustic baseline ranges to other units.

Bluetooth and serial links are available for testing and configuration before deployment, as well as an acoustic modem, which is also used to recover the data to the surface.

The 9,000 bps modem transfer rate enables data to be extracted in minimal vessel time reducing operational costs.

The ultra-low power platform only powers up sensors when required and logs and timestamps the data to an internal SD memory card.

High capacity primary lithium battery packs enable deployments of many years, dependent on sensor selection and sampling rate. Fetch can therefore either be left on the seabed or configured with optional release and buoyancy for recovery. Several stand designs are available to suit specific applications

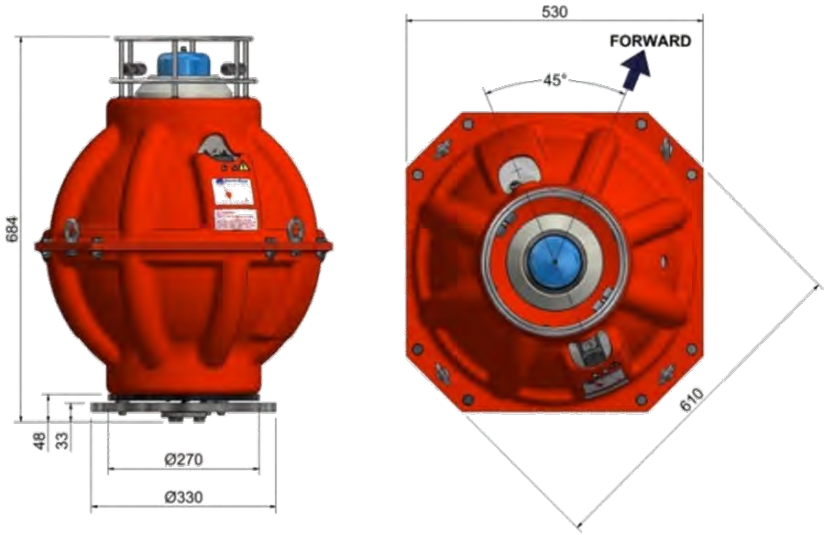
Fetch is compatible with Sonardyne's Ultra-Short BaseLine (USBL) positioning systems for positioning during deployment/recovery.

Key Features

- Autonomous sensor logging with acoustic telemetry of data
- Low data recovery costs
- Long-life – Typically 12 years battery life with corrosion resistant titanium components
- Integrated modem with data rates ranging from 100 to 9,000 bps in multiple frequency bands
- Easy to set-up with configuration and sampling period programmable via telemetry link
- Sonardyne Wideband®1, Wideband 2, Wideband 2+ and HPR 400 USBL mode compatible
- Low cost free-fall deployment option

Specifications

Fetch (Long-Life) – Wireless Autonomous Sensor Logging Node



Feature		Type 8306
Depth Rating		3,000 or 6,000 m
Operating Frequency		MF (19–34 kHz) or LMF (14–19 kHz)
Transducer Beam Shape		Omni-directional ±110° or directional ±40°
Transmit Source Level (dB re 1 µPa @ 1 m)		190–202 dB (4 levels)
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)
Communications		Acoustic modem, RS232 & Bluetooth wireless
Battery Life (Capacity)		Option: 504 Ah - up to 12 years typical Option: 180 Ah – up to 5 years typical (dependent on sensors and sampling interval)
Mechanical Construction		Glass sphere, titanium parts (except duplex stainless steel guard) and polypropylene shell
Operating Temperature		-5 to 35°C
Storage Temperature	With Batteries	0 to 30°C
	Without Batteries	-5 to 35°C
Weight in Air/Water[1]	3,000 m with 180 Ah Battery	50 kg/-100 N
	6,000 m with 504 Ah Battery	107 kg/-250 N
Sensors and Options		
Battery Temperature		Standard
Temperature (±0.015°C)		Optional (integrated with pressure sensor)
High Precision Pressure Sensor		Up to three sensors on single pressure port with diaphragm, including: Paroscientific DigiQuartz Sensor (±0.01%) Keller and/or Presens High Precision Strain Gauge (±0.01%)
Sound Velocity Sensor ±0.02 m/s Accuracy Under Calibration Conditions		Optional
MEMS Inclinometer (±0.5°)		Standard
High Accuracy Jewell Inclinometer (±0.05°)		Optional
Acoustic Baseline Ranging[2]		Optional
Release Mechanism (Screw-off)		Optional
Battery Disconnect Fob		Standard
Stand		Not included (several options available)

[1] Actual weight dependent on sensor and other options.
[2] Not available for directional transducer beam shape.

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Datasheet

Fetch AZA – Self-Calibrating Bottom Pressure Recorder

Fetch Ambient-Zero-Ambient (AZA) is a long-life subsea sensor logging node that enables data to be wirelessly extracted via its integrated high speed acoustic modem.

The high quality pressure sensor is automatically recalibrated in-situ, by periodically taking it to one atmosphere and measuring the sensor bias against a low pressure sensor of similar quality. In essence, the ±0.2 mbar accuracy of the low pressure sensor is transferred to the high pressure sensors. Potentially, barring any other errors, the post-processed data may be up to 150 times better accuracy, for the duration of the deployment.

Other supported sensors include high precision temperature and sound velocity as well as inclination.

The 9,000 bps modem transfer rate enables logged data to be extracted in minimal vessel time, reducing operational costs.

The ultra-low power platform powers up sensors only when required and logs and timestamps the data to an internal SD memory card.

High capacity primary lithium battery packs enable deployments of many years, dependent on sensor selection and sampling rate.

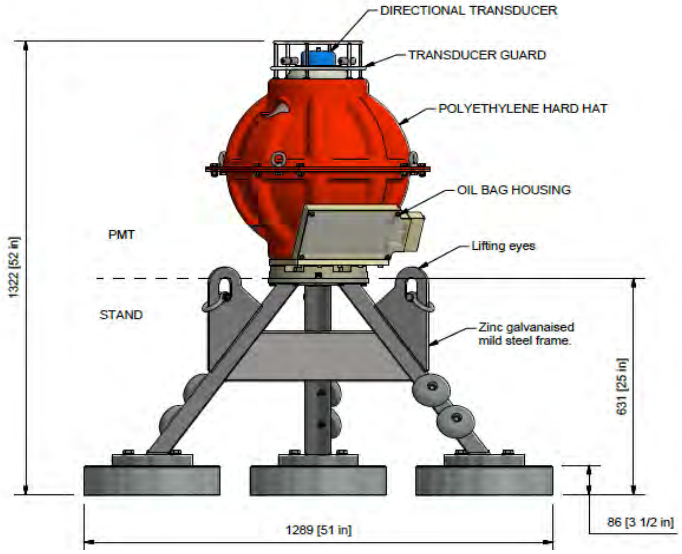
Fetch is compatible with Sonardyne's Ultra-Short BaseLine (USBL) positioning systems for positioning during deployment/recovery.

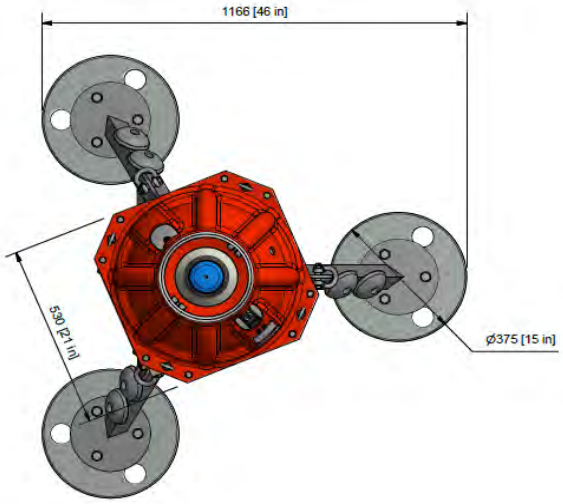
Key Features

- Pressure data with drift-elimination
- Autonomous sensor logging with acoustic telemetry of data
- Low data recovery costs
- 3,000/6,000 m depth options
- Ultra long-life – 10+ years with excellent corrosion resistance
- Integrated modem with data rates ranging from 100 to 9,000 bps in multiple frequency bands
- Easy to set-up with configuration and sampling period programmable via telemetry link
- Sonardyne Wideband®1, Wideband 2, Wideband 2+ and HPR 400 USBL mode compatible
- Battery disconnect fob to disconnect battery for transport and storage

Specifications

Fetch AZA – Self-Calibrating Bottom Pressure Recorder





Feature		Type 8306
Depth Rating		3,000 m
Operating Frequency		MF
Transducer Beam Shape		Directional/omni-directional
Transmit Source Level (dB re 1 µPa @ 1 m)		190–202/187–196 dB
Receive Sensitivity (dB re 1 µPa)		<85 dB
Communications		Acoustic modem & Bluetooth wireless
Battery Life (Lithium)		10 years typical, (504 Ah) (dependent on sensors and sampling interval)
Mechanical Construction		Glass sphere, duplex s/steel guard, PVC shell and titanium ports
Operating Temperature		-5 to +35°C
Storage Temperature	With Batteries	0 to +30°C
	Without Batteries	-5 to +35°C
Mass	With Stand	145 kg
	Without Stand	62 kg
Weight in Water	With Stand	830 N
	Without Stand	25 N (negative buoyancy)
Sensors and Options		
AZA In-situ Self-Calibration Mechanism		Standard
High Precision Temperature Sensor (±0.015°C)		Standard
Transfer Pressure Sensor	Quartz, (±0.01%)	Standard
	2nd Quartz	Option
Ambient Pressure Sensor	Strain Gauge, (±0.01%)	Standard
	Strain Gauge, (±0.19%)	Option
Low-Range Pressure Sensor (Strain Gauge, 2 bar (±0.01%))		Standard
Sound Velocity Sensor ±0.02 m/s Accuracy Under Calibration Conditions		Option
MEMS Inclinometer (±1°)		Standard
High Precision Inclinometer (±0.05°)		Option
Acoustic Baseline Ranging[1]		Option
Release Mechanism (Screw-off)		Option
Battery Disconnect Fob		Standard
Stand/Mud Feet		Option

[1] Available for omni-directional transducer beam shapes only.

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Datasheet

GPS-Acoustic Module (GPS-A Module)

The Type 8297 GPS-Acoustic Module (GPS-A Module) is an acoustic transceiver integrated into the dry box of a Liquid Robotics 'Wave Glider' wave powered autonomous surface vehicle and supplied in an OEM drop in form factor.

The system manages the collection and storage of high accuracy acoustic box in data (ranges) with tightly coupled high accuracy GNSS and heading, pitch, roll data.

In addition, the system also enables wireless data harvesting operations to be conducted.

The system is compatible with a wide range of Sonardyne 6th generation (6G®) instruments, including Compatt 6, Autonomous Monitoring Transponder (AMT), FETCH and Pressure Inverted Echo Sounder (PIES).

The data harvesting functionality enables the autonomous platform to acoustically collect data from seabed instruments in a highly cost-effective manner without the need to deploy an expensive surface ship. The autonomous vessel is controlled remotely from a shore station via Iridium satellite communications.

The unit is available with remote directional transducer options for operating in both Medium Frequency (MF) (19–34 kHz) and Lower Medium Frequency (LMF) (14–19 kHz) bands to suit different seabed instruments and is fully compatible with Sonardyne Wideband®2.

The system is tightly integrated into the vehicle communications and power systems thereby providing many of the standard acoustic commands and features associated with Sonardyne 6G products.

For data harvesting applications near real-time data is provided by the Iridium satellite communications.

The drop in OEM form factor is designed to drop into the latest Wave Gliders for a plug and play experience.

Typical Applications

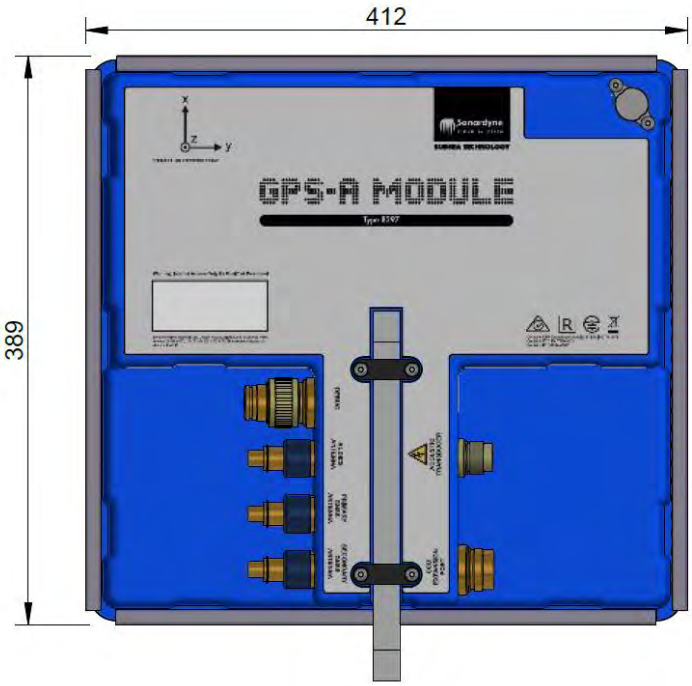
- Precise GNSS/acoustic positioning of seafloor references for determination of tectonic plate movement
- Remote/wireless data harvesting from large arrays of AMT, FETCH and PIES instruments
- Surface gateway for deep ocean tsunami warning systems
- Collection of pressure and temperature gauge data from Sonardyne acoustic data loggers

Key Features

- Provides an intelligent managed acoustic link to Sonardyne subsea instruments
- Enables direct remote data collection, monitoring and control from a shore-based operations centre
- Fully compatible with Sonardyne Wideband 2 and 6G
- Tightly integrated with WG management system
- Integrated acoustic modem with data rates from 100 to 9,000 bps
- Integrated single or dual antenna GNSS receivers. Integrated compass and attitude sensors
- Internal rechargeable battery to reduce electrical noise and simplify power supply issues
- MF and LMF directional transducer options
- Integrated Wi-Fi link for local test, configuration & data offload

Specifications

GPS-Acoustic Module (GPS-A Module)



Feature		Type 8297-000-06
Operating Frequency		MF (19–34 kHz) LMF (14–19 kHz)
Transducer Beam Shape		Directional
Transmit Source Level (dB re 1 µPa @ 1 m)		190–202 dB (4 levels)
Tone Equivalent Energy (TEE)[1]		196–208 dB
Receive Sensitivity (dB re 1 µPa)		90–120 dB (7 levels)
Acoustic Modem Data Rates		100–9,000 bps (6 levels)
Dimensions (Length x Width x Height)		412 x 389 x 205 mm (standard Liquid Robotics 3 MPU)
Weight in Air/Water[2]		10.4/-15 kg
Operating Temperature		-10 to 45°C
Storage Temperature		-20 to 55°C
Internal Backup Battery for Acoustic Modem		Rechargeable Li-ion (2.2 Ah)
Satellite Communications		Iridium RUDICS (2,400 bps)
GNSS Receiver		Survey grade L1 & L2 receiver: Novatel OEM7720 series (GNSS Derived Heading)
AHRS Device		XSENS MTi-300 and/or EPSON G320 SPAN INS
Ranging Clock		GPS derived 4 MHz pulse conditioned to 8 MHz
Communication and Logging	Communications	Wi-Fi, RS232 transceiver, RJ45 Ethernet, dedicated power and comms for GNSS and HRP, single RS232 expansion port with 5 V power pass through
	Internal Logging	128 GB dual redundant internal memory RINEX GNSS logging SPAN INS logging

[1] WBv2+ signals are 4x the duration (WBv1 & WBv2 are twice) of Sonardyne tone signals, therefore the TEE figure is to give the user an idea of the operational performance when comparing Wideband and Tone systems.

[2] Estimated Weights.

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Datasheet

Pressure Inverted Echo Sounder (PIES)

The Pressure Inverted Echo Sounder (PIES) is a long-life sensor logging node that accurately measures the average sound velocity through a column of water from the seabed to the sea surface.

It works by transmitting a Wideband® acoustic pulse from its stable location on the seabed. This pulse is reflected off the sea surface and returns to the seabed where it is detected by PIES. The resulting data enables two-way travel-time to be calculated.

At the same time, an accurate measurement of depth (distance to the surface) is made using a highly accurate internal pressure sensor.

Average water column velocity can then be calculated directly from the depth and travel time data, noting that speed = distance / time.

The sampling interval of PIES can be configured serially before deployment and also via its internal acoustic telemetry link. This telemetry link also allows recorded data to be transmitted to surface at data rates ranging from 100 to 9,000 bits per second.

A high capacity primary lithium or alkaline battery pack enables deployment for months or even years depending on the transmission sampling interval configured.

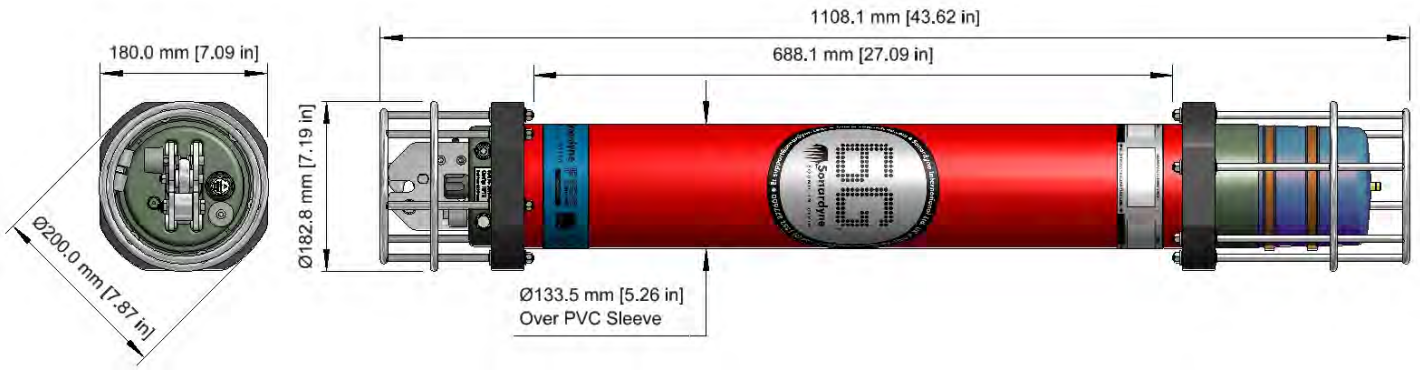
PIES is compatible with Sonardyne's LMF Ultra-Short-Baseline (USBL) systems for positioning during deployment and recovery.

Key Features

- Autonomous sensor logging combined with high speed acoustic telemetry of recorded data
- LMF frequency band utilising Sonardyne Wideband 2 ranging and telemetry protocols
- Freefall deployment possible from surface vessel
- Integrated acoustic release for buoyant ascent to the surface with float
- Long life – with excellent corrosion resistance
- Primary lithium/alkaline battery pack option
- Integrated modem mode with data rates ranging from 100 to 9000 bits per second in multiple frequency bands
- Wireless configuration using surface software and acoustic dunker

Specifications

Pressure Inverted Echo Sounder (PIES)



Feature	Type 8302-3116
Depth Rating[1]	3,000 or 6,000 m
Operating Frequency	LMF (14–19 kHz)
Transmit Source Level (dB re 1 µPa @ 1 m)	190-202 dB (4 levels)
Receive Sensitivity (dB re 1 µPa)	80–120 dB (7 levels)
Battery Life (Capacity)	Multi-years life, dependent on sensors and sampling interval (100 Ahr)
Mechanical Construction	Hard anodised aluminium housing, duplex stainless steel guards
Weight in Air/Water[2]	30.6/16.1 kg
End Cap Sensors and Options	**Type 8302-3116**
Temperature (±0.1°C)	Standard
Tilt Switch (±30–45°)	Standard
High Precision Strain Gauge (±0.01%) Keller or Presens	Optional
Paroscientific DigiQuartz Pressure Sensor (±0.01%) 1,350 m, 2,000 m, 4,130 m, 6,800 m	Standard
High Accuracy Inclinometer Range: ±90° Accuracy: ±0.05° over 0–±15°; ±0.2° over 0–±45°	Optional
Sound Velocity Sensor ±0.02 m/s Accuracy Under Calibration Conditions	Optional
Release Mechanism (Screw-off)	Standard
Connector Type	Subconn MCIL8M

See Compatt 6 and AMT datasheets for more information.

[1] PIES functionality is maximum 5,000 m.
[2] Estimated Weights.

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Datasheet

Subsea Monitoring, Analysis and Reporting Technology (SMART)

Sonardyne has developed the Subsea Monitoring, Analysis and Reporting Technology (SMART) to cover a range of advanced subsea asset monitoring applications.

SMART can be built and configured into a variety of housing configurations and material types to suit the application.

SMART provides low power electronics, long duration data logging, subsea data processing and acoustic telemetry in a single, easily deployed instrument.

SMART has the flexibility to interface with a wide range of internal and external sensors and other data sources, utilising standard or bespoke data analysis algorithms to provide the key data.

For structural monitoring applications SMART is outfitted as standard with a high performance Six Degrees of Freedom (6DOF) sensor package. This provides motion monitoring data which can be utilised for fatigue analysis and vibration monitoring including Vortex and Flow Induced Vibration (VIV and FIV).

By incorporating robust acoustic communications from Sonardyne's award winning 6G technology[1] SMART provides real-time monitoring functions. The on-board data processing converts time series data into a compact packet based on spectral and statistical analysis, enabling long duration monitoring campaigns.

In addition to the acoustic link SMART also has Ethernet and serial connections which can be used for data upload through cabled connections or for high speed data offload on retrieval.

Additional sensors including external strain gauges can be connected to SMART if required.

Standard topside software provides for data collection and system management. Data analysis functions can be added if required or data exported to third party applications.

Typical Applications

- Drilling and production riser fatigue monitoring
- Wellhead and conductor monitoring
- FIV and VIV monitoring
- SMART variants can be optimised to a wide range of applications

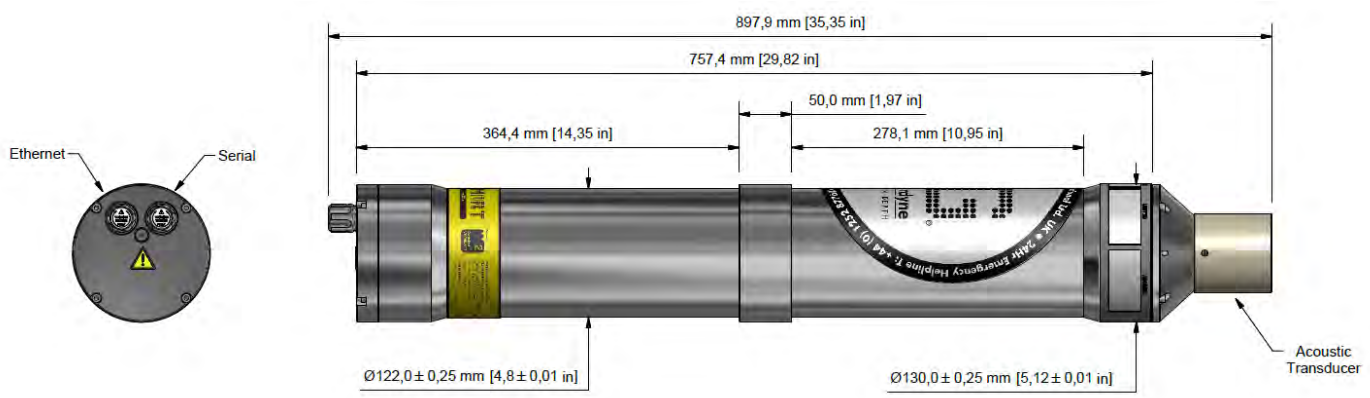
Key Features

- High quality 6DOF motion monitoring
- Configurable data logging with redundant storage
- On-board processing for real-time updates based on standard or bespoke algorithms
- Advanced acoustic telemetry using Sonardyne Wideband® protocols at up to 9,000 bps
- Ethernet connection for high speed download; on deck or via BlueComm® optical modem to Remotely Operated Vehicle (ROV)
- Standard and bespoke topside software applications
- Highly configurable for all environmental conditions and operating water depths
- Expansion capability for additional internal sensors and analogue and digital interfaces to external sensors

[1] For full details of acoustic link parameters please refer to Sonardyne Compatt 6 (Type 8300) and compatible topside transceivers, which include Dunker 6 (Type 8309) and the High-Performance Transceiver (HPT) range (Type 8142) at www.sonardyne.com.

Specifications

Subsea Monitoring, Analysis and Reporting Technology (SMART)



Instrument Feature		Type 8316
Depth Rating		3,000 m (up to 7,000 m on request)
Acoustic Operating Frequency		MF (19–34 kHz)
Acoustic Data Rate		100–9,000 bps
Standard Battery Specifications		100 Ah @ 15 V (high capacity options available)
Power Consumption	Listening	50 mW
	Logging	200 mW
Battery Life (Typical) (Lithium)		>500 days @ 25% logging duty, hourly reporting
Mechanical Construction		Super duplex stainless steel
Weight in Air/Water		32/22 kg
Operating Temperature		-5 to 30°C
Storage Temperature		-25 to 70°C
SMART Feature		**Type 8316**
6 Degrees of Freedom High Performance Motion Sensor		Standard
Triaxial Acceleration Measurement	Range	±30 ms^{-2}
	RMS Noise	$6x10^{-4}$ $ms^{-2}/\sqrt{Hz}$
	Instability	$5x10^{-4}$ ms^{-2}
Triaxial Angular Rate Measurement	Range	±150 deg s^{-1}
	RMS Noise	0.002 deg $s^{-1}/\sqrt{Hz}$
	Instability	2.2 deg/hr
Sensor Axial Misalignment		0.02°
Sampling Rate		5 Hz, 10 Hz and 25 Hz
Anti-aliasing Filter (Standard)		-3 dB cut-off @ 4 Hz
Data Storage		32 GB dual redundant, FAT32
Processing Capability		Fully programmable including FFT spectral analysis, statistical functions and bespoke options
Logging and Reporting Scheme		Fully configurable
Connectivity		Acoustic Link (for real-time reporting), Ethernet Port (high speed data upload), serial Port
Additional Sensors		Optional internal and external sensors

The table above shows typical values for a SMART transponder configured for drilling riser fatigue monitoring. As a flexible instrumentation platform, alternative configurations are available including alternative motion sensors if higher sensitivity is required. SMART can be offered with a standard data processing algorithm for fatigue monitoring or can incorporate customer specific requirements on request.

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Datasheet
Sentinel Sonar Head

The Sentinel Sonar Head comprises a combined transmit and receive transducer array along with the required electronics to transfer raw data to the Sentinel Sonar Processor (Type 8161-002-001).

The Sonar Head has a wide bandwidth transmission capability, centred by default on 70 kHz with a bandwidth in excess of 20 kHz. Source level for the default transmission is 206 dB re 1 µPa @ 1 m with FM pulse lengths up to 40 ms. Eight separate 45° transmit sectors are used, which are individually addressable, allowing any segment to be disabled to reduced nuisance acoustic returns from close in objects such as harbour walls or jetties.

The transmitters themselves are fully programmable and supplied with a number of frequency modulated Doppler tolerant pulses that can be selected via the Sentinel system configuration file.

The compact high-bandwidth transducer array has 128 separately wired elements, which are used to form 256 receive beams equispaced at 1.4°. Tracking software further interpolates these beams to provide highly accurate bearing estimation for the target.

The sonar head also contains the electronics to digitise, baseband, and multiplex the signals received by the transducer, along with control and monitoring software that performs periodic built-in-testing to verify the health of the transducer elements and front-end electronics.

Efficient electronics and transducer arrays result in a total power budget of less than 70 W.

Data is transferred to the surface via 65 m copper. For greater distances a hybrid power/fibre cable is used.

An attitude and heading reference sensor is included in the sonar to enable compensation for orientation and motion.

This allows the sonar to be mounted either way up or cable suspended.

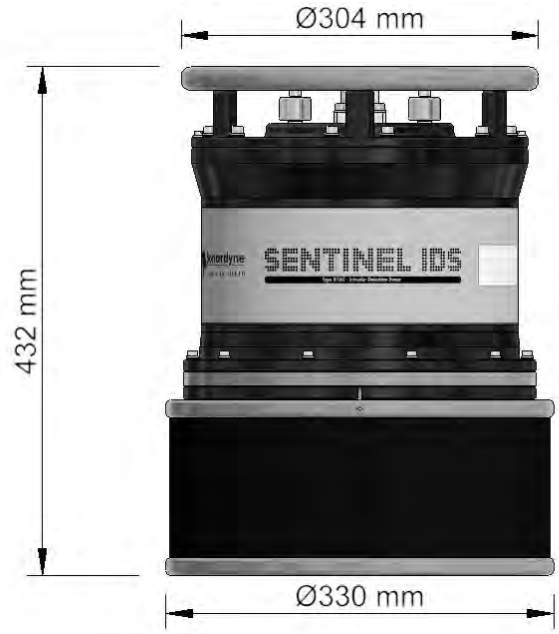
The Sentinel Sonar Head is available in both a lightweight aluminium housing (suitable for expeditionary use) and in a super-duplex housing for permanent installations.

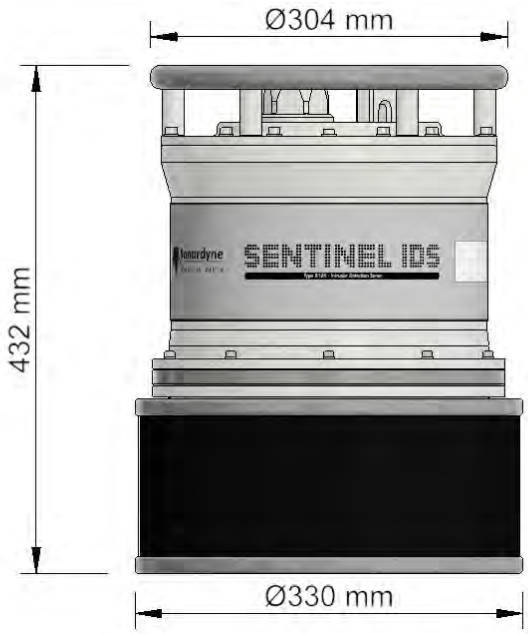
Key Features

- Environmentally friendly low 206 dB re 1 µPa @ 1 m source level
- Operating power of <70 W
- Available in aluminium or super-duplex housings
- High bandwidth arrays
- Separately addressable 45° transmit sectors
- Integrated attitude and heading reference sensor

Specifications

Sentinel Sonar Head





Feature		Type 8160-000-01 Expeditionary Model	Type 8160-000-02 Long Immersion Model
Acoustic	Operational Frequency	70 kHz	70 kHz
	Bandwidth	20 kHz	20 kHz
	Source Level (dB re 1 µPa @ 1 m)	206 dB	206 dB
	Pulse Length	40 ms	40 ms
	Receive Beams	256	256
Performance	Detection Range (Scuba Diver)	Radius 1000 m[1]	Radius 1000 m
	Acoustic Cover	360°	360°
	Target Bearing Accuracy	Down to 0.35°	Down to 0.35°
	Target Position Accuracy	<1 m at 150 m range	<1 m at 150 m range
Electrical	Voltage	55–0–55 V ac	55–0–55 V ac
	Power	Maximum 70 W	Maximum 70 W
Communication		Cat6 Ethernet	Cat6 Ethernet
Environmental (Depth Rating)		50 m	50 m
Mechanical Construction		Aluminium alloy, PVC and PU	Super duplex, PVC and PU
Dimensions (Length x Diameter)		432 x 330 mm (17 x 12”)	432 x 330 mm (17 x 12”)
Weight in Air/Water		35/6 kg (77/13.5 lb)	45.5/18 kg (100/40 lb)

[1] Represents maximum proven detection range.

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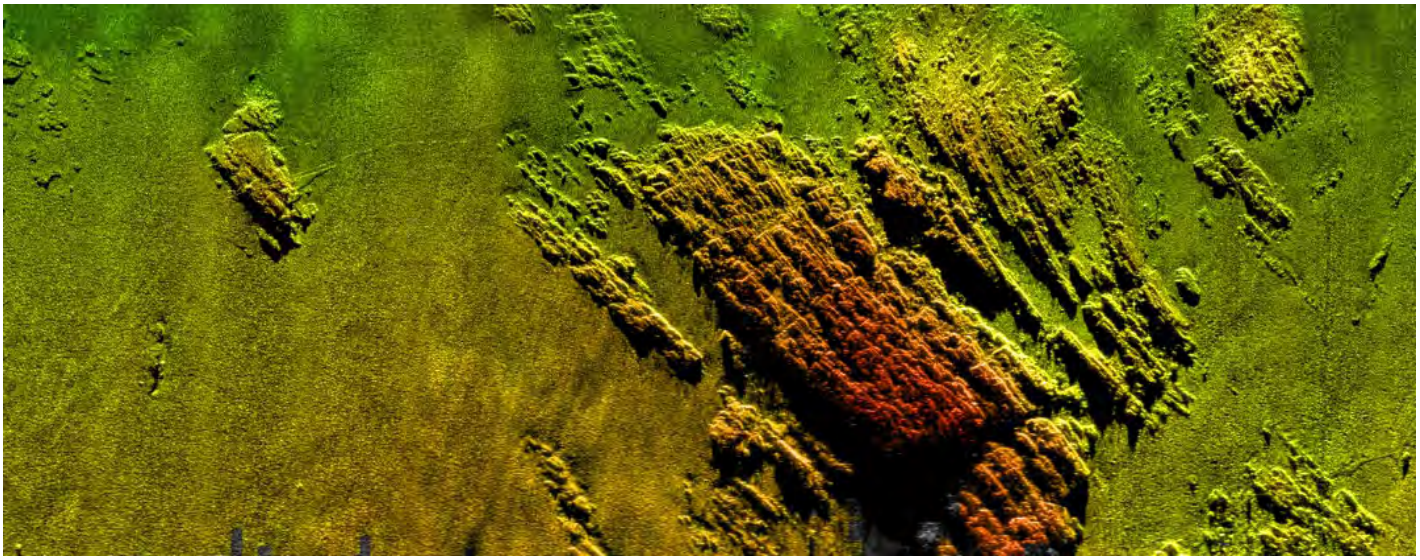
Specifications subject to change without notice – 06/2021

Datasheet

Solstice Multi Aperture Side-scan Sonar



Solstice is a Multi Aperture Sonar (MAS) designed for Search, Classify and Map (SCM) and Hydrographic AUV operations with integrated swath bathymetry. It has been tailored for Autonomous Underwater Vehicle (AUV) operations providing high resolution imagery and full dynamic focus for improved mine recognition, hydrography and post-mission analysis. The imagery produced by Solstice is designed to be of the highest quality possible from side-scan sonar. The along-track resolution of 0.15° is unrivalled for this application.

The sonar has been carefully designed so that it will give excellent results even in very shallow water, where other side scans suffer degradation due to multi-path effects. All of which is achieved whilst consuming only 18 W of power. The low power and wide swath results in long vehicle endurance and high area coverage rates.

Solstice's onboard processing produces geo-coded side-scan imagery which is available for onboard automatic target recognition and post-mission analysis.

Solstice provides a high-fidelity image by using a back-projection beamforming technique to focus at every single pixel in the image. Solstice uses knowledge of the platform motion and eliminates unwanted effects, producing undistorted imagery with 100% ground coverage. Real-time array calibration is used to dynamically re-calibrate each individual hydrophone element several times a second to compensate for any dynamical strains causing array non-linearity.

The result is a wide swath (200 m) of high-resolution imagery suitable for simultaneous search and classification. Solstice is ideal for Computer Aided Detection and Classification (CAD/CAC).

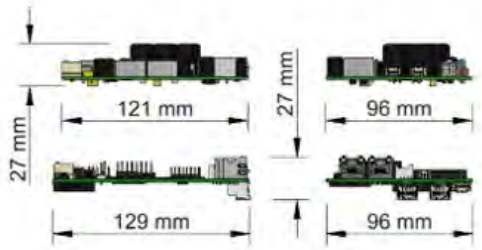
Solstice produces high quality bathymetry data from a vertical hydrophone array on each flank. The bathymetry data is co-registered onto the same pixel grid as the side-scan imagery, and therefore can produce stunning digital terrain maps, with the side-scan imagery accurately wrapped over the bottom topography.

Key Features

- Multi Aperture Sonar improves Signal to Noise Ratio
- Low power suitable for AUV operations, 18 W
- Full Dynamic Focus and ultra-high along-track resolution 0.15°, over the full 200 m swath
- Enables on-board CAD and CAC
- Co-registered side-scan imagery and bathymetry

Specifications

Solstice Multi Aperture Side-scan Sonar



OEM electronics boards

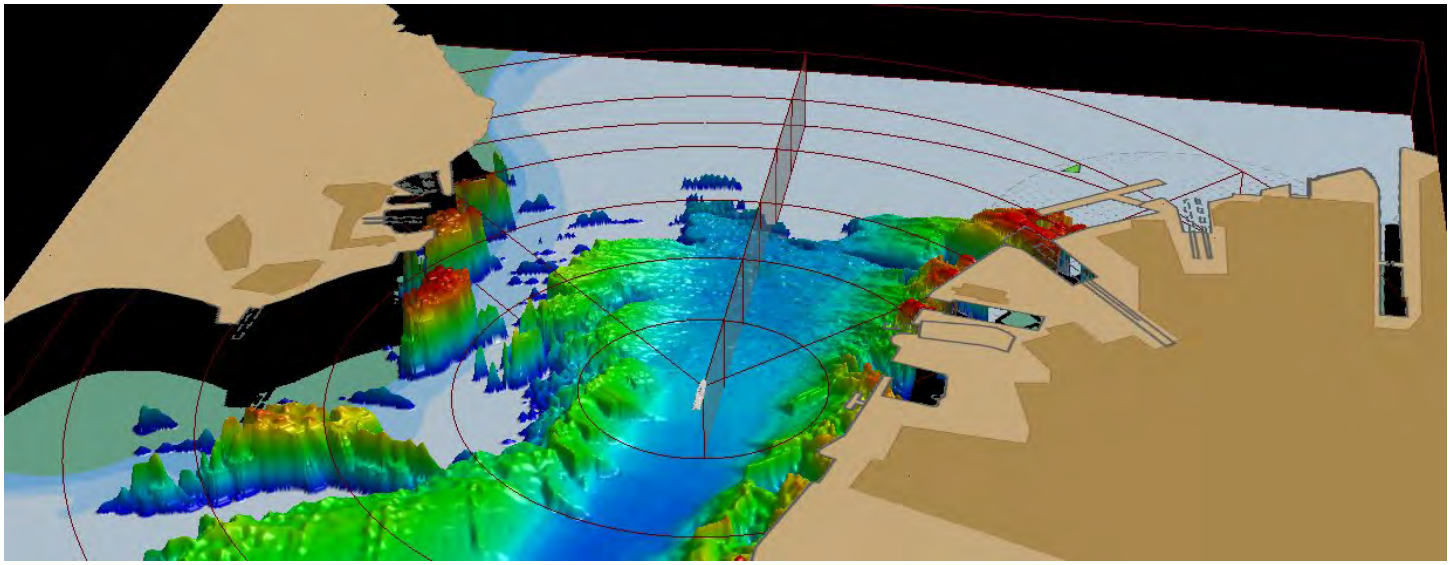
Payload Pressure Vessel (PPV)

Solistice Array shown. Electronics can be supplied as OEM or in a Payload Pressure Vessel (PPV) both shown.

Feature	Type 8200-500-35
Depth Rating	300 m
Frequency Band	725–775 kHz
Source Level (dB re 1 µPa @ 1 m)	220 dB
Number of Receiver Channels	2 x (32 +4)
Number of Transmitter Channels	2 x 32
Azimuth Beam Width	0.15°
Swath	200 m
Bathymetry	Yes
Power (Array & PPV)	18 W
Operating Temperature	-2 to 40°C
Hydrophone Array Length	682 mm
Projector Array Length	416 mm
Output Formats	.SWF8 and .XTF
Weight in Air/Water	2.11/0.76 kg
Payload Pressure Valve	**Type 8200-500-35**
Depth Rating	300 m
Dimensions (Diameter x Length)	133 x 289 mm
Weight in Air/Water	2.88/0.25 kg

Datasheet

Vigilant Forward Look Sonar (Vigilant FLS)



Vigilant FLS is a low power, forward-looking sonar that can be operated as a standalone unit or be integrated into a vessel's navigation and integrated bridge systems. It has been tailored to provide high resolution imagery to help detect obstacles as far away as possible, to provide enough time for crews to manoeuvre safely. The detection range of 1,500 m and angular accuracy of 0.3° is unrivalled for this application.

The sonar scans the water column and builds a 3D model of the seabed and submerged objects ahead of the vessel. The intuitive display informs the crew of the seabed terrain and any potential underwater hazards to a range of up to 600 m over a 120º field of view in 2D and 3D depth modes and out to 1,500 m in sonar mode. Vigilant FLS also has an optional operating mode for underwater intruder detection and can be used with Sonardyne's leading diver detection sonar system, Sentinel.

Vigilant FLS can operate as an independent system or feed fully processed sonar images into, and be controlled by, the vessel's integrated navigation system. This allows the crew to customise the operator display to meet the specific needs of the vessel and its mode of operation.

When installed on autonomous vessels or unmanned surface vessels (USV), data on detected objects and potential collision hazards can be output to an auto-pilot or autonomous control system.

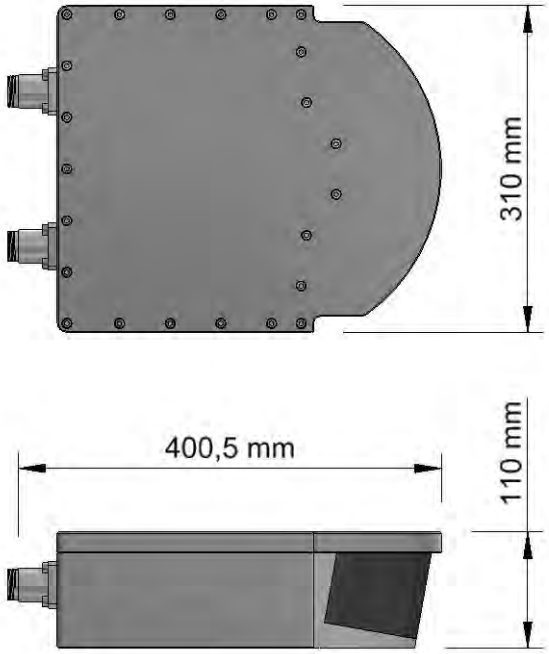
The Vigilant FLS hardware consists of Projector and Receiver arrays which can be mounted together or separately. Sonardyne's highly experienced engineering team can work with owners to design bespoke mounting arrangements. Consisting of two sonar arrays that are mounted in the bow of the vessel, Vigilant FLS is designed to be retrofitted to existing vessels as well as new builds. Comprehensive engineering support and advice is available from Sonardyne to support installation and commissioning.

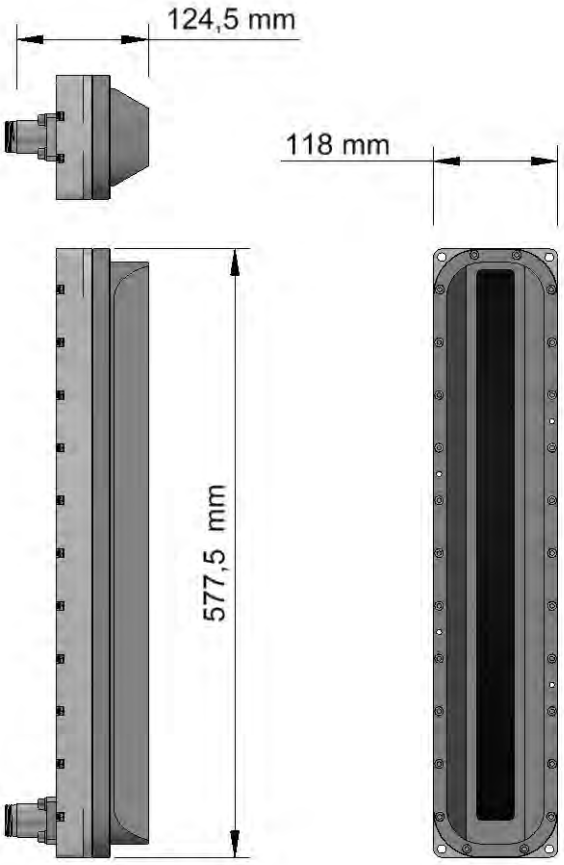
Key Features

- 3D Depth Mode builds 3D model of the seabed around the vessel
- Sonar Mode detects obstacles up to 1500 m range
- 3D obstacle and ground avoidance in dynamically changing conditions
- Overlay charts to improve situational awareness
- Full bridge integration
- Includes interface to autonomous and smart ships
- User defined alarms conforms to your requirements
- Intruder detection mode optional

Specifications

Vigilant Forward Look Sonar (Vigilant FLS)





Feature	Vigilant FLS
Range/Field of View	75 m, 150 m, 300 m, 600 m x 120º 2D/3D Depth Mode 75 m, 150 m, 300 m, 600 m, 900 m, 1500 m x 120º Sonar Mode
Operational Speed	Up to 25 knots
Operating Frequency	70 kHz
Bottom Mapping Ratio	Up to 20 x water depth
Maximum Depth Detection	100 m
Roll/Pitch Stabilisation	+/- 20º
Angular Accuracy	~0.3º
Operating Power	<150 W
Operating Temperature	-2 to 40ºC
Storage Temperature Range	-20 to 55ºC
Receiver (Height x Width x Length)	110 x 310 x 400.5 mm
Receiver Weight in Air/Water	12.0/6.0 kg
Transmitter (Height x Width x Length)	577.5 x 118 x 124.5 mm
Transmitter Weight in Air/Water	11.5/6.0 kg

For further information, contact us at **E** sales@sonardyne.com

Global Headquarters
T +44 1252 872288
sales@sonardyne.com

Aberdeen, UK
T +44 1224 707875
sales@sonardyne.com

Houston, USA
T +1 281 890 2120
usa.sales@sonardyne.com

Singapore
T +65 6542 1911
asia.sales@sonardyne.com

Rio das Ostras, Brasil
T +55 22 2123 4950
brasil.sales@sonardyne.com

24 Hour Emergency
Telephone Helpline
support@sonardyne.com

sonardyne.com