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.

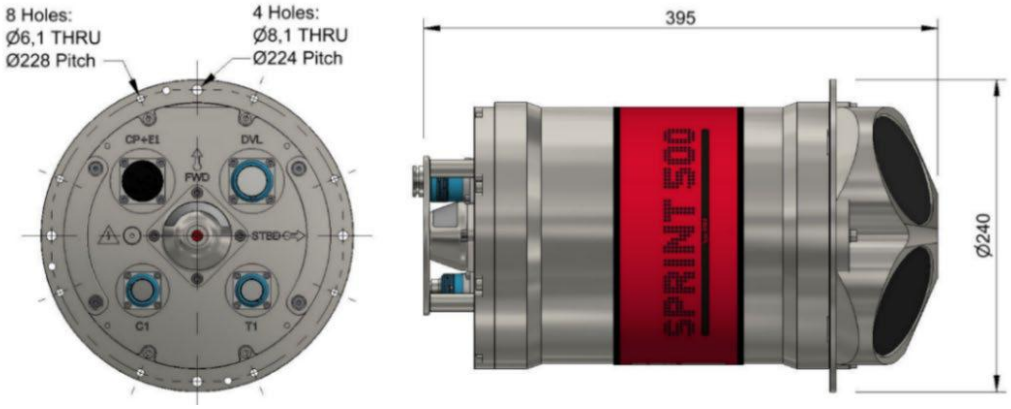
Typical applications

- 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
- Full ocean depth aiding from USBL
- 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	0.01º
	AHRS		0.20º	0.10º	0.08º	0.08º
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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Specifications subject to change without notice – 03/2023

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 current 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

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 ±5.6 m/s ±0.4% of measured value	Up to ±8.4 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)	4,000 m		189 x 225 mm	189 x 225 mm
	6,000 m		204 x 225 mm	n/a
Weight in air/water[3]	4,000 m		12.0/9.1 kg	11.3/8.5 kg
	6,000 m		14.4/10.9 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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Specifications subject to change without notice – 11/2023

Datasheet
SPRINT-Nav Mini

The 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+ADCP) 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.

The SPRINT-Nav mini outputs industry standard messages for command and control of AUVs, ROVs and USVs, removing complex integration.

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

The SPRINT-Nav Mini provides 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.

It 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. A clearly defined API allows for deep integration into vehicle control systems and remote operation of the system.

The SPRINT-Nav Mini is supplied with either top- or sidewall-mounted connectors for easy vehicle integration. For vehicles where height is critical, the sidewall variant measures only 187 mm in height.

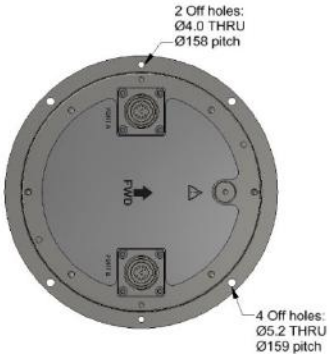
Typical applications

- Ideal for observation-class ROVs, light work-class ROVs, AUVs, 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
- 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, guidance and navigation outputs
- Low-height variant available measuring only 187 mm in height
- Factory calibrated
- 500 kHz DVL + ADCP
- 0.3–200 m bottom track operating altitude
- Intuitive Web UI
- Modern API
- Export is not ITAR controlled

Specifications
SPRINT-Nav Mini



SPRINT-Nav Mini 4,000 m

300 m Side Connector

Performance			SPRINT-Nav Mini
DVL aided[1]	Typical survey		0.05%
	Distance from origin		0.30%
Altitude min/max			0.3/200 m
USBL & DVL aided	Precision improvement		Up to 5x better
Heading[2] (secant latitude) with GNSS or USBL, and DVL[3]			0.10°
Heading[2] (secant latitude) with GNSS or USBL or DVL			0.15°
Roll and pitch[2]			0.02°
Angular rate range			±450°/s
Velocity precision (<2 m/s at 50 m altitude)			<0.4 cm/s
Depth accuracy[2]			0.01% FS
ADCP	Profiling Range		0.4–100 m
	Velocity Range & RMS (along beam)		Up to ±6.7 m/s ±0.4% of measured value
	Maximum number of Cells		255
	Max Ping rate		1 Hz
Power			
Power requirements[4]			24 V dc, 10 W nominal
Physical/Comms			
Data storage			32 GB internal memory
Serial ports/protocol			3x RS232
Interfaces			Ethernet, UDP/TCP, WebUI, 2 x trigger inputs (1PPS/DVL trigger), NTP, ZDA + 1PPS out
Mechanical construction		300 m	POM-C
		4,000 m	Titanium
Dimensions (diameter x height)	Standard	300 m	148 x 213 mm
		4,000 m	148 x 213 mm
	Side connector	300 m	148 x 187 mm (174 x 187 mm including connector)
Weight Air/Water[5]		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] RMS
[3] Heading accuracy is improved by availability of both absolute position (GNSS/USBL) and DVL.
[4] Contains backup battery to maintain system performance during power dropouts.
[5] Estimated weights.

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