Gaps M7 (G5)

High performance USBL positioning & communication system

Gaps M7 is a high-performance Ultra Short Baseline (USBL) positioning and communication system for locating and communicating with subsea assets. It integrates a USBL antenna and a fiber-optic Inertial Navigation System (INS) within a single housing. USBL calibration on the field is not required anymore. Advanced acoustic techniques, including wideband signals, enable maximum performance even in the most challenging conditions. With its unique 3D acoustic array, the Gaps M7 allows for efficient tracking and communication from the deep sea to extremely shallow water, including at angles above horizontal.

The latest generation of the Gaps M7 comes with additional features, including enhanced acoustic communication capability for commanding and controlling multiple subsea assets, a new web MMI with real-time 2D mapping, and additional compatibility with third-party transponders.

FEATURES

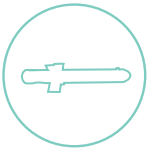
- Compact, all-in-one USBL and INS solution
- Absolute georeferenced of subsea asset
- Compatible with dynamic positioning systems
- Simultaneous beacons tracking and communication
- 3D acoustic array geometry
- Third-party transponder compatibility
- Acoustic communication

BENEFITS

- Rapid deployment
- Operational cost savings
- Calibration-free
- Horizontal tracking
- Highly accurate positioning
- Robust and stable positioning
- Multiple tracking capabilities
- Plug & play deployment & operation
- Tracking & communication

APPLICATIONS


ROV tracking


AUV tracking


Marine work


DP

2022-12 | V001 DRAFT

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TECHNICAL SPECIFICATIONS

Positioning absolute accuracy

CEP50	MF BAND	LF BAND[5]
SNR = 0 dB	0.53 % x Slant range	1.06 % x Slant range
SNR = 10 dB	0.17 % x Slant range	0.34 % x Slant range
SNR = 20 dB	0.06 % x Slant range[1]	0.25 % x Slant range[2]

Range/Bearing accuracy[3]

1 sigma (68%)	MF BAND	LF BAND[5]
SNR = 0 dB	0.02 m / 0.30°	0.04 m / 0.60°
SNR = 10 dB	0.02 m / 0.09°	0.04 m / 0.18°
SNR = 20 dB	0.02 m / 0.03°	0.04 m / 0.12°

Performance

	MF BAND	LF BAND[5]
Operating range[4]	4,000 m	7,000m
Operating frequency	18-34 kHz	10-15.5 kHz
Acoustic cover	> 200°	
Acoustic cover	Up to 3 Hz	

Mechanical

Housing	Carbon fiber painted
Weight in air/water	16.9 kg / -7 kg (positive buoyancy)
Overal dimension HxØ	638 mm x 296 mm - min gate valve required: 300 mm / 12'
Depth rating	25 m standard / 100 m non destructive

Environments[6]

Operating temperature / Storage	-5 °C to +35 °C / -40 °C to +70 °C
EMC	89 / 336 / EEC – EN 60945

Interfaces

Power supply range	100 to 240 VAC / 50~60 Hz or 24/36 VDC - 30 W
Control/command	Ethernet - Control & command protocol - Web MMI
Input/output ports	8 Ethernet - 4 serial (232/422/485)
Synchronisation IN	1 PPS and 1 external trigger (TTL or differential ±5 V)
Synchronisation OUT	2 responder lines (TTL or differential ±5 V)
Display	Delph RoadMap 3D display software (option) - Compatible with most of navigation software
Web MMI	Delph RoadMap 3D display software (option) - Compatible with most of navigation software

(1) In vertical conditions. Including GPS error of 0.1 m. Sound velocity profile compensated. Exail MF transponder MT9x2 transmit level=191 dB ref µPa @ 1 m. Slant range of 1 000 m
(2) In vertical conditions. Including GPS error of 0.1 m. Sound velocity profile compensated. Exail LF RTA61 or MT9x1 transponder transmit level=191 dB ref µPa @ 1 m. Slant range of 1 000 m
(3) SNR: Signal to Noise Ratio
(4) Operating range is subject to environmental conditions (noise, ray bending...). Maximum range for surface noise level of 67 dB ref µPa / √Hz.
(5) LF transponder positioning in option, activable on all Gaps M7 G5 systems

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GAPS BOX TECHNICAL SPECIFICATIONS

Dimensions	233 mm x 330 mm x 94 mm
Weight	4.6 kg
Operating and Storage temperatures	-25 °C to +50 °C -40 °C to +80 °C

INERTIAL NAVIGATION SYSTEM SPECIFICATIONS

Performance[1]

Position precision with GPS	Three times better than GPS accuracy
No aiding for 2 min / 5 min	3 m / 20 m (CEP50)
Pure inertial mode	0.6 nm / hour (CEP50)
Heading accuracy	0.01 deg secant latitude RMS
Roll and pitch dynamic accuracy (no aiding)	0.01 deg RMS
Heave accuracy (Smart Heave) [2]	2.5 cm or 2.5 % RMS

SYSTEM DEPLOYMENT

Side pole | Buoy | Moon pool | Hoisting system | Towed platform | Drone (USV) | Pipelay Vessel

Contact Exail for pole drawings.
Exail can provide the hoisting system.

(1) Secant latitude = 1 / cosine latitude
(2) Whichever is greater for periods up to 30 seconds. Smart heave is delayed by 100 s fixed value.
Real-time heave accuracy is 5 cm or 5 % whichever is greater.

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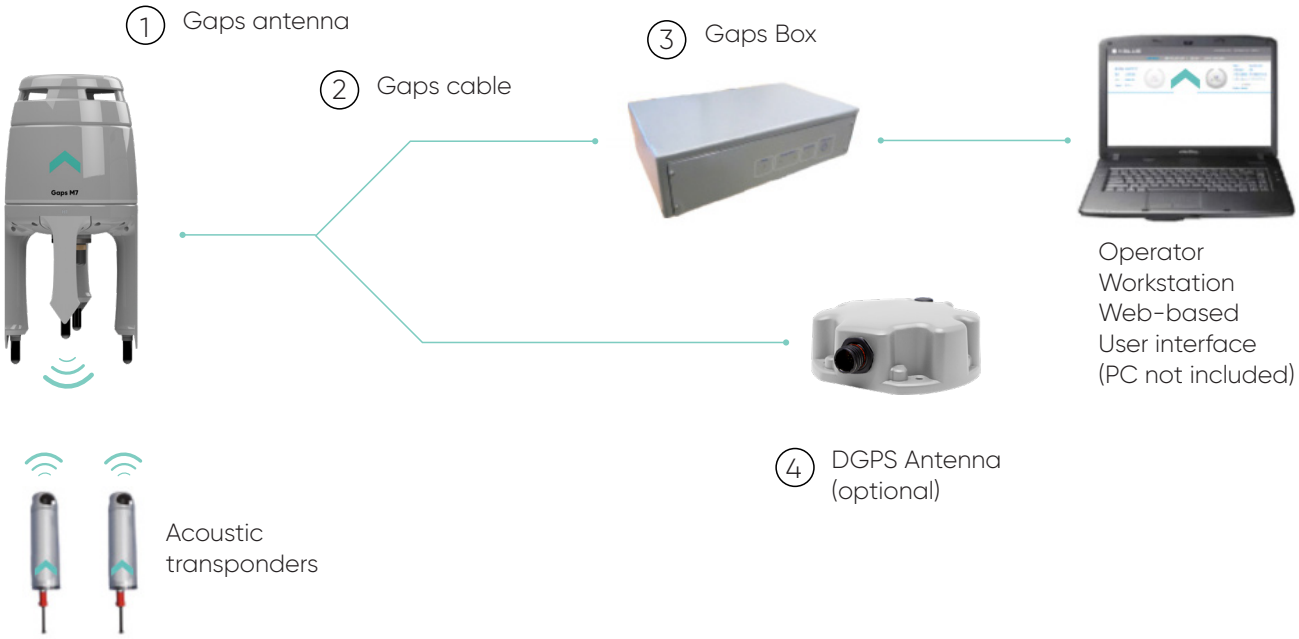
GAPS SERIES TRANSPONDERS

Gaps Series is compatible with all Exail MF beacons including:

Name	Description	Acoustic communication	Applications
MT9x2 series 	Internal rechargeable battery, OEM, 1000, 3000 m depth rated		ROV, tow fish and diver positioning
MT8x2 series 	Internal Lithium battery 3000 m and 6000 m depth rated		ROV, tow fish and diver positioning
MTBx2 series 	Mini transponder for AUV OEM and 300 m depth rated	●	AUV navigation
Canopus 	LBL and Sparse LBL Intelligent transponder 4000 and 6000 m depth rated	●	AUV positioning, LBL calibration, Dynamic Positioning (DP)

Third-party transponders compatibility: contact Exail

COMPONENTS



1 **Gaps antenna**
This is the main part of the Gaps system. It combines a USBL acoustic array and INS/AHRS in the same mechanical structure.

2 **Gaps cable**
20/50/95 m long cable used to communicate with Gaps head. Extendable up to 190 m with a Repeater Box.

3 **Gaps Box**
Gaps Box designed to interface between the Gaps head and external peripherals.

4 **DGPS Antenna**
A complete turnkey solution is available on option, including a GPS receiver.

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