

Gaps M7

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

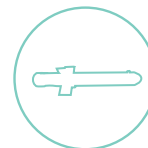
BENEFITS

- 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

TECHNICAL SPECIFICATIONS

Positioning accuracy⁽¹⁾

	CEP50
⁽²⁾ SNR = 0 dB	0.53% x Slant range
⁽²⁾ SNR = 10 dB	0.17% x Slant range
⁽²⁾ SNR = 20 dB	0.06% x Slant range

Range/Bearing accuracy⁽³⁾

	RMS / STD DEV / 1 sigma (68%)
SNR = 0 dB	0.02 m / 0.30°
SNR = 10 dB	0.02 m / 0.09°
SNR = 20 dB	0.02 m / 0.03°

Performance⁽⁴⁾

Operating range ⁽⁵⁾	4,000 m / 7,000m
Coverage	200 deg below acoustic array
Operating frequency	18 to 34 kHz
Position update rate	3 Hz

Mechanical

Housing	Carbon fiber painted
Weight in air/water	16 kg / -7 kg (positive buoyancy)
Overall 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 / 50~60Hz 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 ±5V)
Synchronisation OUT	2 responder lines (TTL or differential ±5V)
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. Transponder transmit level=191 dB ref μ Pa @ 1 m. Slant range of 1 000 m

(2) SNR is input signal to noise ratio

(3) In vertical conditions. Responder mode

(4) For a surface noise level below 67dB ref μ Pa/Transponder transmit level = 191dB ref μ Pa @ 1 m / vertical conditions

(5) Operating range is subject to environmental conditions (noise, ray bending...). Positioning up to 7,000m using exail Oceano LF transponders.

(6) NF X10-812

Acoustic Communication

Telemetry

Message size	2-80 bits
Modes	unicast/broadcast
Data rate	500 bits/s

Modem

Data rate	up to 9 kbits/s
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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	-5°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



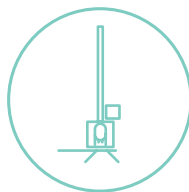
Side pole



Buoy



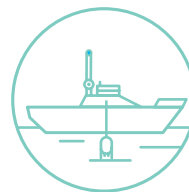
Moon pool



Hoisting system



Towed platform



Drone (USV)



Pipelay Vessel





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

(1) Secant latitude = $1 / \cos$ 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.

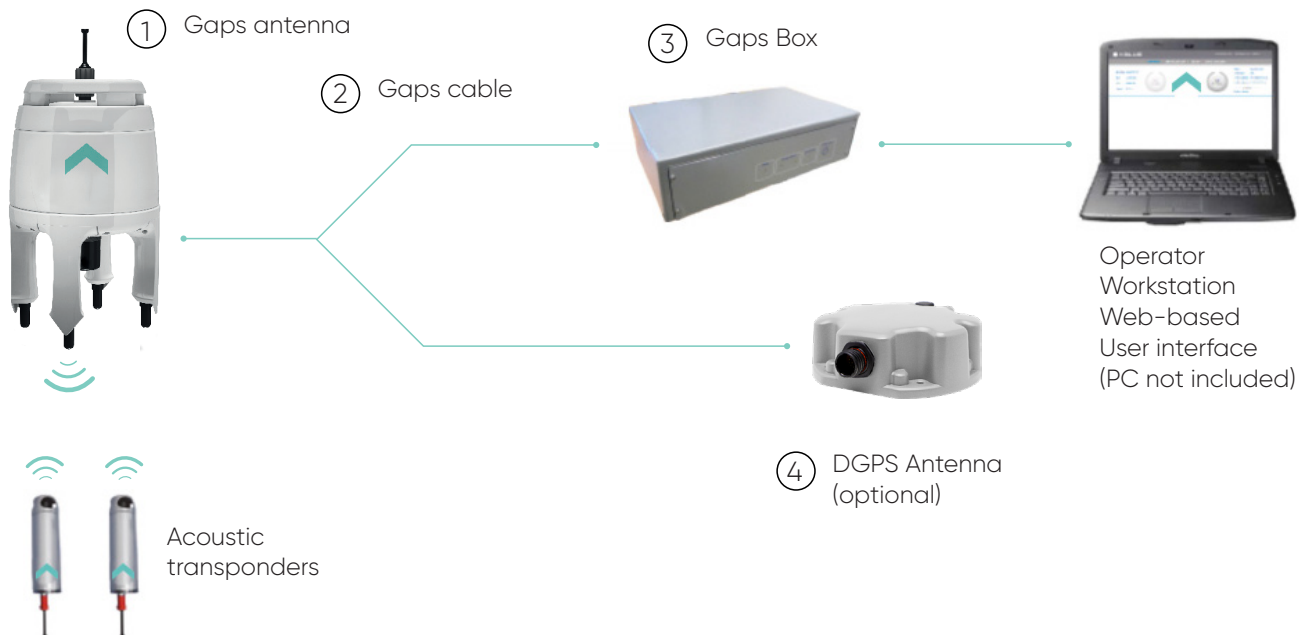
GAPS SERIES TRANSPONDERS

Gaps Series is compatible with all Exail MF beacons including:

Name	Description	Acoustic communication	Applications
MT9x2 series 	Internal rechargeable battery, OEM, 1000, 3000m depth rated		ROV, tow fish and diver positioning
MT8x2 series 	Internal Lithium battery 3000m and 6000m depth rated		ROV, tow fish and diver positioning
MTBx2 series 	Mini transponder for AUV OEM and 300m depth rated	●	AUV navigation
Canopus 	LBL and Sparse LBL Intelligent transponder 4000 and 6000m 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**
20/50/95m long cable used to communicate with Gaps head. Extendable up to 190m 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.