

Gaps M7 (G5)

Pre-calibrated 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 and a fiber-optic Inertial Navigation System (INS) within a single housing. It is pre-calibrated by us saving you precious operational time. 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
- Pre-calibrated
- Horizontal tracking
- Highly accurate positioning
- Robust and stable positioning
- Multiple tracking capabilities
- Plug & play deployment & operation
- Tracking & communication

DESIGNED FOR

- Survey applications (Offshore energy & construction...)
- ROV tracking
- Tow fish tracking (UXO, SSS...)
- AUV tracking & communication
- Pipelaying
- Cablelaying
- Dynamic positioning (DP2, DP3)
- Navigation in GNSS denied environment (L/USBL/INS mode)
- Defense/MCM

TECHNICAL SPECIFICATIONS

Positioning performance

Repeatability ^{(1) (2)}	0.06%SR – CEP50
Pre-calibrated accuracy ^{(1) (3)}	0.06%SR – CEP50
Bearing accuracy ⁽⁴⁾	0.03°
Range accuracy	1 cm
Max position update rate	3 Hz
Number of targets	40

Acoustic performance ⁽⁵⁾

Operating frequency	18 – 34 kHz 12 – 34 kHz (LF option)
Range	4,000 m 7,000 m (LF option) ^{(6) (7)}
Coverage	>200°

Embedded INS/AHRS

Type	INS
Heading accuracy	0.01° secant lat (RMS)
Roll/Pitch accuracy	0.01° (RMS)
Heave accuracy	2.5 cm or 2.5% RMS
No aiding for 2 min / 5 min	0.06m / 0.3m (CEP50)

Acoustic communication

Frequency	18–34 kHz
Range	up to 3,000 m
Services	8–80 bytes messages, modem and file transfer
Bitrate	500 bps to 8 kbps

Mechanical

Housing	Carbon fiber
Weight (air/water)	17 kg / -7 kg (positive buoyancy)
Dimensions (HxØ)	640x296
Depth rating	25 m

Environment

Temperature (operating)	-5°C to +35°C
Temperature (storage)	-40°C to +70°C
EMC	EN60945

(1): %SR = % of slant range; CEP50 = Circular Error Probability at 50%

(2): In vertical conditions at input SNR = 20 dB, with MF transponder

(3): In vertical conditions. Including GPS error of 0.1 m. Sound velocity profile compensated. With MF transponder, transmit level = 191 dB ref μPa @ 1 m. Slant range of 1 000 m

(4): RMS value at input SNR = 20 dB, with MF transponder

(5): Positioning max range is 995 m with M3 and M5 export free version. Extended range version is subject to export licence

(6): Maximum operating range with surface noise level < 67 dBref $1\mu\text{Pa}/\sqrt{\text{Hz}}$

(7): Positioning range with LF transponder

Interfaces

Power supply	100 to 240 VAC / 50-60 Hz 24/36 VDC
Power consumption nominal with Gaps Box and 50m cable	30 W
Input/output ports	Ethernet 4 serial RS232/422 (with Gaps BOX)
Synchronisation	1 PPS + 3 IN/OUT (TTL or differential +/-5V)
Control/command & Display	WebMMI NMEA protocol 3D visualization software in option

GAPS BOX TECHNICAL SPECIFICATIONS

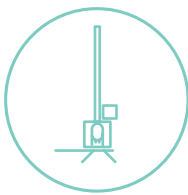
Dimension	233 mm x 330 mm x 94 mm
Weight	4.1 kg
Temperature (operating)	-25°C to +55°C
Temperature (storage)	-40°C to +70°C

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 poleBuoyMoon poolHoisting systemTowed platformDrone (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.

GAPS SERIES TRANSPONDERS

Gaps is compatible with all Exail MF beacons including:

Name	Description	Acoustic communication	Applications
MT9x2 series 	Internal rechargeable battery, OEM, 1,000, 3,000 m depth rated		ROV, Tow fish and diver positioning
MTBx2 series 	Mini transponder for AUV OEM and 300 m depth rated	●	AUV positioning
Canopus 	LBL and Sparse LBL Intelligent transponder 4,000 and 6,000 m depth rated	●	AUV positioning, LBL calibration, Dynamic Positioning (DP)

Third-party transponders compatibility: contact Exail

COMPONENTS

