

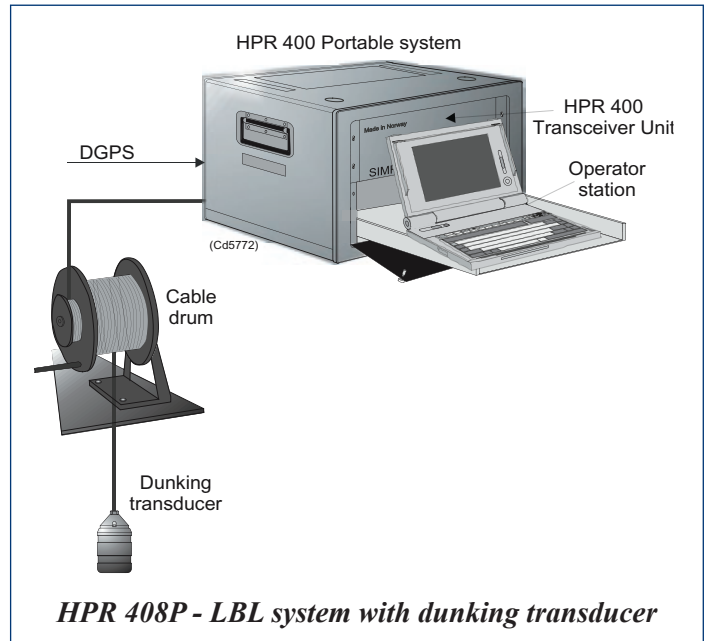
HPR 408P - LBL system with dunking transducer

The HPR 408P is a LBL system. By using LBL software and a dedicated over-the-side dunking transducer, the system becomes a surface system for any LBL or telemetry application.

Available dunking transducers:

- Dunking wide beam (MF)
- Dunking narrow beam (MF)
- Dunking narrow beam (LF)

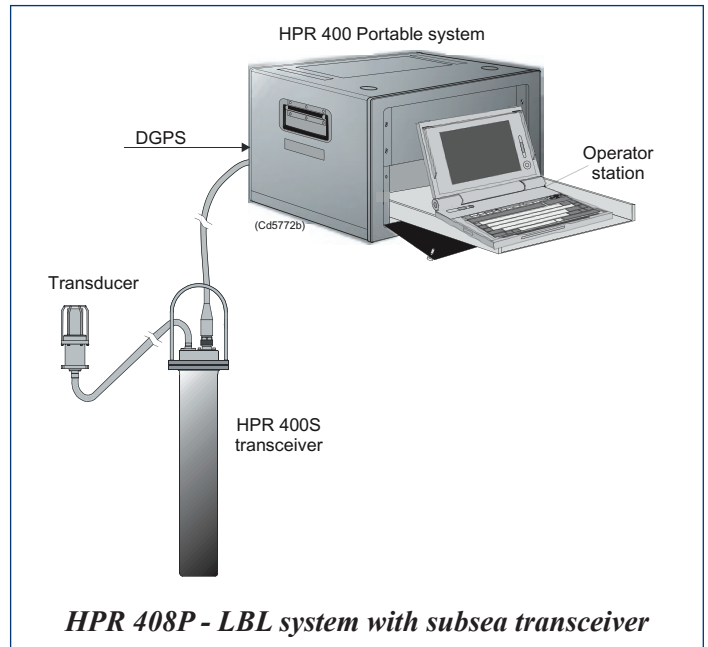
The transducer is delivered with cable and cable drum.



HPR 408P - LBL system with subsea transceiver

The HPR 408P system can also be delivered with a subsea transceiver (HPR 408S) with transducer connected to the portable unit.

This system may be used for Remotely Operated Vehicle (ROV) LBL positioning, as well as for any other subsea module positioning requiring LBL accuracy.



HPR 410P - SSBL system

The HPR 410P is a SSBL system. It is normally delivered with the Portable Mini Transducer (PMT 301). Other transducers are available.

Together with dedicated SSBL software and the PMT 301, this system is applicable as a complete underwater navigation system. The calculation of position is based on range, vertical and horizontal angle measurements, giving three-dimensional transponder positions relative to the system's transducer.

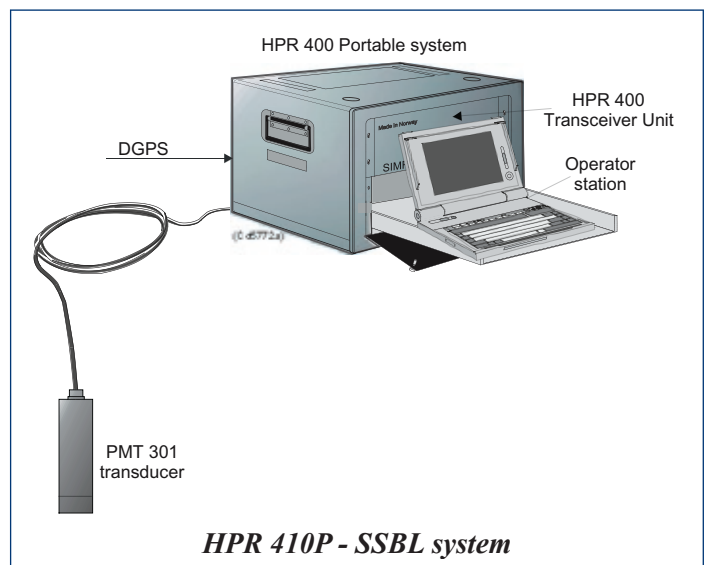
Available transducers:

- **PMT 301** - used for LBL and SSBL operations.
 - The PMT 301 has an internal Roll / Pitch Inclinometers.
 - The PMT 301 includes an adapter for pole mounting.
- **HPR standard wide / medium beam, (MF)** - used for LBL and SSBL operations.
 - This transducer requires an external VRU.
- **HPR narrow beam, (MF)** - used for LBL and SSBL operations.
 - This transducer requires an external VRU.
- **HPR medium beam, (LF)** - used for LBL and SSBL operations.
 - This transducer requires an external VRU.

HPR 418P - combined LBL and SSBL system

The HPR 418P system is a powerful portable underwater positioning system. It is capable of solving most underwater positioning applications. The system is a combination of the HPR 408P and the HPR 410P, and can work in a combined mode using a LBL and SSBL transducer.

For details, see the HPR 408P and HPR 410P information above.



System units

A complete HPR 400 portable system comprises:

- Operator station
- HPR 400 transceiver unit
- Transducer with cable
- Transponder(s)
- External sensors (optional)

Operator station

The operator station is a portable computer (Compact PC) It contains the APOS (system) software.

HPR transceiver units

Transceiver units available:

The HPR 400 Transceiver Unit (Surface unit) and the HPR 400S (Subsea unit).

The transceiver is the acoustic signal processor with transmitter and receiver electronics and software.

It processes the acoustic signals, calculates the transponder position(s) and the acoustic telemetry data, and sends the information to the Compact PC where it is presented on the display.



Portable cabinet - rear side

- The transceiver has interfaces for the transducer(s), a gyro and a pitch / roll sensor.
- The **Surface unit** can operate up to 4 transducers. (2 SSBL + 2 LBL)
- The **Subsea unit** can operate up to 2 transducers. (LBL only)
- The acoustic telemetry functions are also controlled from this unit, using the same transducers.

Transponders

Several transponder types are available. The HPR 400P system can operate with up to 56 transponder channels and feature transponder telemetry communication for use with transponder release, sensor readings and all LBL functionalities.

In addition the 14 “old” SSBL channels from the HPR 300 family can also be used.

External sensors

Vertical Reference Unit (VRU)

A VRU can be interfaced to the HPR 400P transceiver if required. The system can thereby automatically compensate for the vessel’s roll and pitch movements.

It can use the same VRU as the Dynamic Positioning (DP) system (if one is fitted).

Gyro

A number of different gyro types can be interfaced to the HPR 400P transceiver if required (syncro or serial).

Specifications

Portable unit

The HPR 400 Portable unit is a 19 inch wide and 6U high transport housing. The housing has an internal support frame with anti-vibration mounts. The unit contains the HPR 400 Transceiver Unit and the Compact PC.

General

Dimensions (W x H x D) (534 x 360 x 560) mm

Weight 33 kg

Mains supply 230 Vac (110 Vac on request)

Frequencies

Medium Frequency (MF)..... 21,000 Hz - 32,500 Hz

Low Frequency (LF):..... 9,500 Hz - 15,750 Hz

Temperatures

Operating..... -10° to +55° C

Storage -40° to +70° C

HPR 400 Transceiver Unit

For information on the HPR 400 Transceiver Unit, refer to separate documentation.

Compact PC

For information on the Compact PC refer to separate documentation.

HPR 400S units

Power supply..... 110 / 230 Vac or 24 Vdc

Power consumption..... max. 25 W

HPR S31 MF, 1000 m depth rated

- Length / diameter..... 1100 mm / 200 mm

- Weight in air / water 18 kg / 8 kg

HPR S33 MF, 3000 m depth rated

- Length / diameter..... 1035 mm / 195 mm

- Weight in air / water 32 kg / 22 kg

HPR S16 LF, 6000 m depth rated

- Length / diameter..... 1100 mm / 178 mm

- Weight in air / water 30 kg / 15 kg

Specifications

PMT 301 Portable Mini Transducer

Height / diameter..... 410 mm / 100 mm
 Weight in air / water..... 8.6 kg / 6.1 kg
 Accuracy inclinometer 0.2°
 Transducer-cable 30 m (standard) or 60 m (option)

HPR standard MF / LF Transducer

Height / diameter..... Depends on model
 Weight in air / water..... Depends on model
 Transducer-cable 30 m (standard) or 60 m (option)

Dunking transducer

Height / diameter..... Depends on model
 Weight in air..... Depends on model

The dunking transducers listed below, (marked *), are all delivered with 75 m transducer-cable on a drum with winch.

ROV - RTD 333 transducer / bronze

Depth rating 3000 m
 Height / diameter..... 300 mm / 102 mm
 Weight in air / water..... 5 kg / 4 kg
 Transducer-cable 5 m
 Connector..... at the base

ROV - RTD 333 transducer / aluminium

Depth rating 3000 m
 Height / diameter..... 273 mm / 108 mm
 Weight in air / water..... 2.3 kg / 1.2 kg
 Transducer-cable 5 m
 Connector on the side

Transducers

Transducer type	Accuracy	TD type	
HPR PMT 301, MF 20-32 kHz - Wide beam ±80°	≤ 2 % of slant range	PMT-089962	The specification is based on: <ul style="list-style-type: none"> • Line of sight from transducer to transponder • No influence from ray-bending • Signal-to-Noise ratio in the receiver ≥ 20 dB rel. 1µPa • Relevant signal output from transponder • No error from heading and roll / pitch sensors
HPR Standard, MF 20-32 kHz - Wide beam ±80° - Medium beam ±55°	≤ 5 % of slant range ≤ 2 % of slant range	TDS-067538	
HPR Narrow beam, MF 20-32 kHz - Wide beam ±80° - Narrow beam ±22.5°	≤ 5 % of slant range ≤ 1 % of slant range	TDN-081633	
HPR, LF 10-15 kHz - Wide beam ±80° - Medium beam ±55°	≤ 5 % of slant range ≤ 2 % of slant range	TDL-0834290	
* Dunking, MF 20-32 kHz - Narrow beam approx ±50°	*	TDD-080585	* The position accuracy for LBL operation depends on the transponder array geometry, sound velocity errors and Signal-to-Noise ratio. The accuracy can also be shown by simulations. Range accuracy's down to a few centimetres can be obtained, while ROV and vessel positions can be calculated to within a few decimetres.
* Dunking, MF 20-32 kHz - Wide beam approx ±100°	*	TDD-088319	
* Dunking, LF 10-15 kHz - Beam approx ±50°	*	TDD-103114	
* ROV - RTD 333, MF 20-32 kHz - «Doughnut» shape / bronze	*	312-089793	
* ROV - RTD 333, MF 20-32 kHz - «Doughnut» shape / aluminium	*	100-213493	

Transponders - range capabilities

Transponder type	Operating range	
Standard transponder w/ 188 dB SL	Typical 800 m - 1500 m	The range capabilities depends on; the vessels noise level, transponder signal level and transducer type. Ray-bending effects may also reduce the operating range.
High power transponder w/ 195 dB SL	Typical 1500 m - 2000 m	
High power transponder w/ 206 dB SL	Typical 2500 m - 4000 m	

