

Marine Magnetics 

SeaSPY

Marine Magnetometer



Marine Magnetics makes marine magnetometers. Period.

When we founded Marine Magnetics over 10 years ago, we set out with one goal in mind: to make high sensitivity magnetometers that were rugged, reliable and easy to use. SeaSPY's mandate was to help surveyors save time, money and energy, by taking the realities of field-work into account. It still is.

Innovation

After 10 years, SeaSPY offers three depth options, two of which are unmatched in the industry (5000psi and 9000psi). Its telemetry drives more than 10km of cable with all of the standard accessories, it's the only true longitudinal gradiometer available, and it's the most accurate magnetometer in the world.

We continue to look for ways to ensure that SeaSPY does the best job for our customers. Every time we do, we make the innovations backward compatible to the first SeaSPY ever sold, because we're proud of our mag, and we want to protect your investment.

Easy to Use

Apart from our Explorer Mini Marine Magnetometer, SeaSPY is the lightest mag available. All of its accessories, 50m (164ft) of cable, and SeaSPY weighs 27 kgs making it truly a one man operation.

Rugged

Our connectors are custom made from brass and support a tonne of towing force. A nose cone protects it from side impacts, while maintaining a streamlined tow body.

We have never lost a SeaSPY from the connector, except for the time someone threw one overboard without connecting it to the cable. While there's some human error no mag can account for, the story has a happy ending: the customer went back a year later and found their SeaSPY in working condition.

Sleek Design

SeaSPY's sleek design resists snags. The inexpensive and field replaceable tailfins are the only protruding element, and they are designed to snap off should they ever get snagged on rocky outcroppings.

Reliability

Tough Exterior

The SeaSPY towfish is made of ¼" super strong fiberglass coated with a 'bumper' layer of polyurethane for extra shock absorption. And the sensor is suspended on shock mounts to ensure the quality of your data isn't influenced even if you drag SeaSPY along the sea floor.

Self Diagnostics



A quick glance self diagnostic LED system on our isolation transceiver can save you hours of frustration. If all your connections are hooked up properly, a status LED will glow green. If there's a problem with one of the connections, it will glow yellow. If there's a short somewhere, it will glow red, and the transceiver will safely shut down the output power in microseconds. A blue LED flashes with every mag reading. Customers consistently tell us that these features have saved them countless hours in the field.

Breach

Should even a drop of water penetrate the towfish, a leak detector warning appears on your screen to inform you. Call us over-protective, but in the event of a breach, SeaSPY's electronics module is encased in a polycarbonate housing with 'O' ring seals for another layer of security.

Better Data

Highest Absolute Accuracy

If you want good data you have to start with the most accurate sensor.

SeaSPY sensors are orders of magnitude more accurate than any other magnetometer: 0.1nT.

The repeatability between SeaSPY sensors is also unmatched at better than 0.01nT. Making them the sensor of choice for gradiometer surveys.

World Wide Operation with No Restrictions

SeaSPY will collect accurate data no matter where you are or in which direction

you are surveying. This is not the case with optically pumped magnetometers which have dead zones and must be oriented at a specific angle relative to the earth's magnetic field. This issue can be particularly problematic in equatorial regions where you cannot collect data in every direction.

Eliminate Shifts In Your Data

'Heading error' is a noticeable offset in the magnetometer output caused by changing the heading of the magnetometer within the Earth's magnetic field. Since SeaSPY's Overhauser technology does not display heading error, no matter how the sensor is oriented in the Earth's magnetic field, successive survey lines taken in opposite directions will match up perfectly.

The benefits to the user are four-fold:

1. Targets will not be missed because they fall between mismatched survey lines.
2. Reduces post-processing. Competing technologies require the user to collect tie lines in order to level the data set (match-up inaccurate survey lines).
3. There will be no variation introduced in the data by slight course changes during a survey line.
4. A magnetic map of an area will look the same, regardless of direction in which the survey lines were conducted.

No temperature effect on accuracy

SeaSPY works equally well in cold, deep waters as tropical waters, starting instantly on power-up without requiring warm up. And data collected at -40°C will be identical to data recorded at +60°C.

Maintenance Free Sensors



SeaSPY sensors don't degrade with time, so you'll get the same quality data after 10 years of use as you did the first time you used it.

In addition SeaSPY sensors contain no consumable parts, so you won't have to replace anything, like the expensive lamps that wear out in optically pumped mags.

Stable Time



The clock used in the SeaSPY electronics module is accurate to 1ppm throughout the entire temperature range, (as opposed to 100ppm found in competing magnetometer systems) so it will be accurately time stamped to sync with diurnal correction (base station) information.

Proven Sensitivity Specs

Don't just take our word for it. We put our sensors under scrutiny, through rigorous independent testing, by a world authority belonging to INTERMAGNET. Intermagnet is the global network of observatories, monitoring the Earth's magnetic field. The tests confirm our specifications: 0.01nT/Hz; counter sensitivity is 0.001nT.

Overhauser Effect

SeaSPY is a pulsed Overhauser magnetometer that measures the ambient magnetic field using a specialized branch of nuclear Magnetic Resonance technology, applied specifically to hydrogen nuclei.

Please see our Application Guide for details.

Ultra Low Power Consumption

With a power requirement of only 1W standby 3W max, you can power your SeaSPY for up to 150 hrs from one car battery, or continuously on two 26Ah lantern batteries for up to 104 hours.

Integrate With Side Scans and Other Platforms

An easy all in one solution to integrate SeaSPY with side scans. A single 10m tow cable is terminated with everything you need. No modifications to your magnetometer or gradiometer are required. Simply swap out your tow cable for the integration cable and you are ready to go. Best of all, your accessories, including power supply, are still compatible.

The integration maintains the basic system integrity of each product, ensuring they can both run independently as well as together.

Gradiometer Configurations

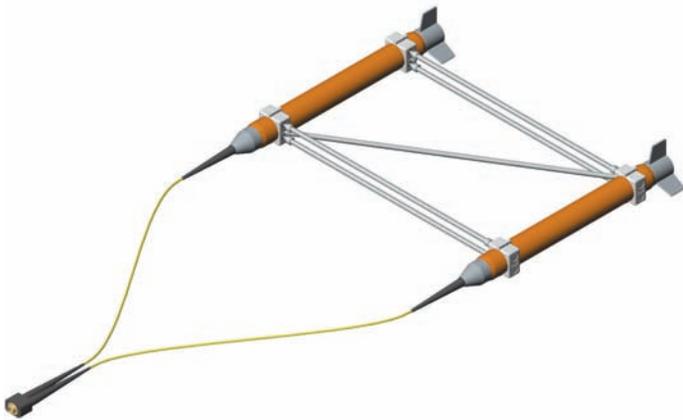
SeaSPY sensors are highly accurate and repeatable, making them ideal for gradiometers

A magnetic gradiometer measures magnetic gradient in one dimension by subtracting the difference between two independent magnetic sensors. Since the Earth's magnetic field is three dimensional, up to three independent gradient directions can be measured – vertical, horizontal (across-track) and longitudinal (along-track).

Marine Magnetics offers each of these gradiometer configurations. In addition, all SeaSPY magnetometers are compatible, enabling existing SeaSPY customers to upgrade their magnetometer to the gradiometer configuration of their choice, as they need to.

Horizontal or Vertical Transverse Gradiometer

Marine Magnetics' transverse gradiometers provide a rigid 2m structure linking the sensors, and are well suited for close-in precision surveys for small ferrous targets where short sensor separation is needed.



Applications

UXO Detection of Small Ferrous Targets – Short baseline gradient measurement in any direction (longitudinal, horizontal, or vertical) is useful for eliminating geological interference and diurnal variation.

Cable and Pipeline Survey – A horizontal transverse gradiometer can be used to track cables, or pipelines in real time from relatively high towing altitudes.

Longitudinal Gradiometer

Longitudinal gradiometers provide the largest variation in available baselines, from 1.5m to 500m+. Again, Marine Magnetics' communication technology is unmatched in its ability to support extremely long distances between the two towfish. Long baselines provide superior gradient measurement sensitivity and increased detection range. Longitudinal gradiometers are also extremely hydrodynamically stable when deployed.

Applications

Shipwreck, Search and Salvage – Medium baseline longitudinal gradient measurement can eliminate interference by geological bodies, while highlighting massive magnetic sources like steel hulls, boilers or engines. Smaller sources such as anchors or cannons will require a shorter baseline, and lower towing altitude.

Environmental Survey – Medium baseline measurement with a longitudinal gradiometer can highlight shallow magnetic sediments, while eliminating deeper geological influences. The baseline should be on the order of magnitude of the expected towing altitude.



Exploration Geophysics – Long-baseline measurement with a longitudinal gradiometer is ideal since the bodies of interest are often far from the sensor, and produce very small gradients. The baseline should be on the order of magnitude of expected depth-to-source.

A SeaSPY Magnetometer System consists of:

SeaSPY Magnetometer

- **Overhauser Sensor**
Omnidirectional sensor that does not contain any consumable parts.
- **Electronics Module**
Contains all of the driving electronics and Larmour counter.
- **Leak Detector**
Let's you know if even a drop of water penetrates the towfish.
- **Lead Weights**
4 internal lead weights increase the weight of the towfish and prevent it from rotating while being towed.
You can adjust the weight in the field by adding or removing weights.
- **Depths Available**
1000m (1500psi), 3000m (5000psi), 6000m (9000psi)

Tow Cable

The cable is made up of one twisted pair of conductors, a Vectran strength member, water block and yellow polyurethane jacket. Length determined by customer.

Isolation Transceiver

Provides the complete interface between the PC and the mag. It provides two-way digital communication along the same conductors that power the mag. It also conditions the mag's power supply.

Dims: 11 x 6 x 3 cm (4 x 2 x 1") Weight 130g (0.28 lbs)

Power Supply

Accepts any AC line power, from 100-240VAC and 50/60Hz to provide conditioned and clean 24V DC power.

Dims: 11x 6 x 3.5cm (4 x 2 x 1") Weight 165g (0.36 lbs)

Battery Clip Cable

Use this cable instead of the power supply. The mag's total power consumption is only 3W. A single 12V car battery can power it for days.

RS232 Cable

Connects the mag and PC.

BOB

Data acquisition and visualization software.

Reusable Aluminum Shipping Case

Holds all accessories listed above.

Options

- Pressure Sensor
- Altimeter
- Transponder
- Side Scan Integration
- Deck Cable
- Tow Cable Termination Kit
- FreeWheel Wireless Cable Spool

Specifications

Operating Zones NO RESTRICTIONS
SeaSPY will perform exactly according to spec throughout the entire range.

Absolute Accuracy	0.1nT
Sensor Sensitivity	0.01nT
Counter Sensitivity	0.001nT
Resolution	0.001nT
Dead Zone	NONE
Heading Error	NONE
Temperature Drift	NONE
Power Consumption	1W standby, 3W maximum
Timebase stability	1ppm, -45°C to +60°C
Range	18,000nT to 120,000nT
Gradient Tolerance	Over 10,000nT/m
Sampling Range	4Hz – 0.1Hz
External Trigger	By RS-232
Communications	RS-232, 9600bps
Power Supply	9V-30V or 100-240 VAC
Operating Temperature	-45°C to +60°C
Temperature Sensor	-45°C to +60°C, 0.1 step

Towfish

Towfish Length	124 cm (49 inches)
Towfish Diameter	12.7 cm (5 inches)
Towfish Weight in Air	16kg (35 lbs)
Towfish Weight in Water	2kg (4.4 lbs)

Tow Cable

Conductors	Twisted pair
Strength Member	Vectran
Breaking Strength	2,500 kg (5,500 lbs)
Outer Diameter	1 cm (0.4 inches)
Bending Diameter	16.5 cm (6.5 inches)
Weight in Air	125 g/m (84 lb/1000 ft)
Weight in Water	44 g/m (29.5 lb/1000 ft)
Outer Jacket	Yellow Polyurethane
Cable Termination	Field Replaceable

Floation Cable

Conductors	Twisted pair
Strength Member	Vectran
Max Working Load	2,500 kg (5,500 lbs)
Outer Diameter	1.9 cm (0.74 inches)
Bending Diameter	25 cm (10 inches)
Weight in Air	125 g/m (0.084 lbs/ft)
Weight in Water	-20 g/m (0.03 lbs/ft)
Outer Jacket	Orange Polyurethane
Cable Termination	Field Replaceable

“We have now completed the first full Antarctic season using our SeaSPY magnetometer and can report that we are delighted with its performance.

It has proved to be very robust and trouble free in operation and has delivered consistently good data. There is no doubt that we chose the right instrument.”

Peter Morris

British Antarctic Survey

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