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WHICH COMPASS IS BEST FOR A

MARINE NAVIGATIONAL SYSTEM

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Which Compass is Best for a Marine Navigational System?

When buying or upgrading a boat, most people wonder where to begin. Most boat owners and operators will tell you to start with the navigational system. There is always room for improvement when your boat relies on a traditional magnetic compass or has a built-in autopilot. Whether you are running a radar system, a chart plotter, or updating your autopilot, the core device of these different systems is the compass. But which compass should you buy? How do you know what is best for you and what will set you up for success now and in the future? When buying a compass for your boat, the question will arise, "do I use a traditional magnetic compass, a fluxgate electronic compass, or a GNSS compass"? This is a common question and one that can be confusing for most customers. For example, "what is the difference besides pricing?" What are the advantages of GNSS over a fluxgate compass and vice versa?

To answer these questions, we must look further into the different technologies.

Why is a compass so important?

When setting up a navigational solution for a boat, the key component will always be a reliable and accurate compass. The compass is the heartbeat of any navigational system whether it is an indicating system for manual steering, or if it is a component in a complete autopilot solution. The compass provides the answer to "which way" in navigation. Which direction are we going? Are we maintaining a proper heading? These questions are answered with the use of a compass. Over the years, compasses have grown in different directions. A compass is typically offered in three different varieties: a traditional magnetic compass, a fluxgate compass, or a GNSS compass.

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What is a Traditional Magnetic Compass?

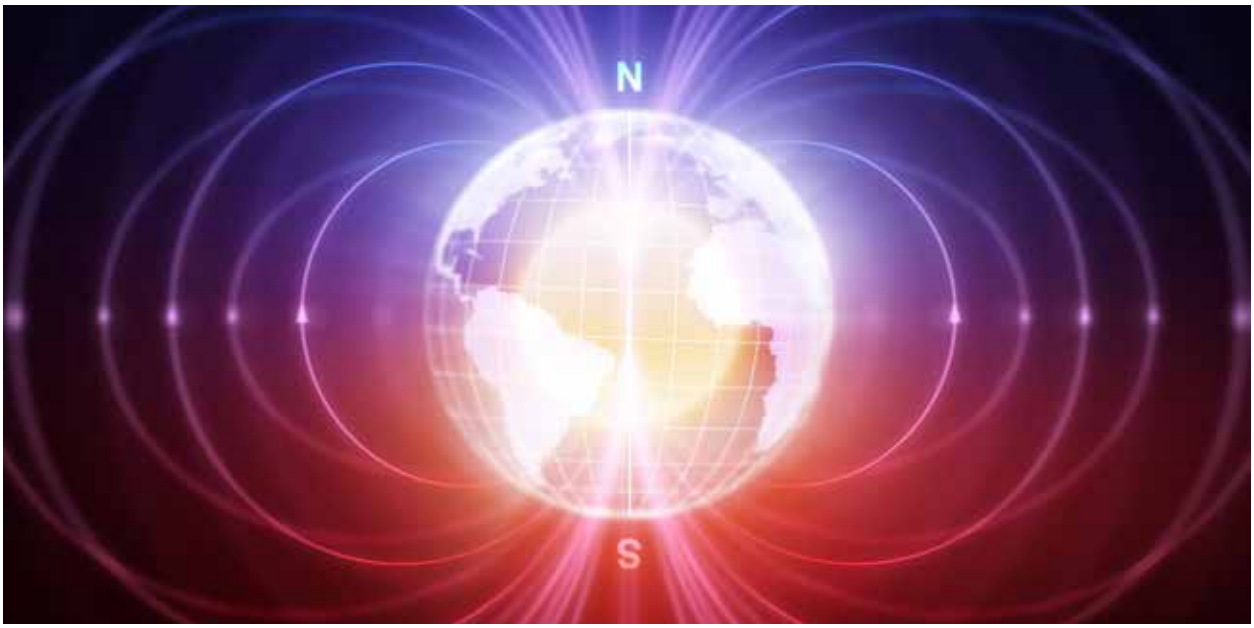
The first variety is the traditional magnetic compass. The magnetic compass has been used for over a thousand years and relies on magnetic north to be the guide for heading. The magnetic compass is good for standard manual steering, but it does not provide much use to autopilot systems, chart plotters, or radars. Traditional magnetic compasses are also susceptible to magnetic interference caused by any large electronic devices, bridges, or other interference found in ports and waterways.

What is a Fluxgate Electronic Compass?

The second variety is a fluxgate compass, which is an electronic compass that works when an electric current is passed through the internal coils of the core material making it work like an electromagnet that senses the direction of the horizontal component of the Earth's magnetic field. This technology solves the known issues of magnetic north commonly found in the traditional magnetic compass. Fluxgate compasses can be used with autopilot systems, chart plotters, and radars as a point heading indication. The fluxgate compass, if calibrated and maintained properly, can achieve approximately 1° of heading accuracy. Some of the downsides of the Fluxgate occur when there is an increase in temperature – which can cause drifts in the fluxgate accuracy. Additionally, any time a system depends on the Earth's magnetic field, issues can be introduced. Since the Earth's magnetic field is not a perfect sphere around the world, there are areas where the magnetic field is inconsistent and can lead to inconsistent performance for the fluxgate compass. Specifically, in an instance where the Earth's magnetic field dips in a certain area, the magnetic pole from one direction could increase if the fluxgate compass is not completely vertical in reference to the magnetic field. Most fluxgates are mounted on a gimbal system, but this is known to help in some, but not all cases. The introduction of magnetic fields outside of the Earth can cause interference for the fluxgate compass. Large forms of magnetic interference in ports, and tighter waterways can cause inaccurate readings and be detrimental to a navigational system.

What is a GNSS Compass?

The third variety of compasses is the GNSS compass. The GNSS compass uses a completely different form of navigational technology. Unlike the magnetic and the fluxgate compass, the GNSS compass uses GNSS satellite measurements to determine the position and heading of a boat. The position and heading are determined using two antennas to calculate the measurements to determine the difference between the measurements based on a known baseline (separation of the two antennas). In addition to the positioning and heading portion of the GNSS compass, it also works with an



internal gyro system to determine pitch, roll, and heave; giving your navigation system a complete understanding of the attitude and orientation of the boat in open waters. A GNSS compass is typically mounted higher on the boat to have visibility to the sky, allowing the GNSS compass to track the maximum number of satellites. The more satellites the GNSS compass can track and use, the more robust the position and heading accuracy will be. Depending on the level of GNSS compass, heading results can vary from <1° to 0.01°. Since GNSS compasses are satellite-driven, they are not as susceptible to the Earth's magnetic field.

What is the best GNSS Compass?

Hemisphere's all-in-one Vector™ GNSS compass solutions provide precise heading and positioning for hydrographic surveying vessels, fishing vessels, leisure boats, workboats, and other general marine navigation applications.

The rugged and reliable design is an ideal solution to replace traditional gyrocompasses, at a fraction of the cost. Combining Hemisphere's single and multi-frequency technologies and multipath-resistant antennas, the Vector compasses bring a collection of robust features including heave, pitch and roll output as well as NMEA (National Marine Electronic Association) 0183 and NMEA 2000 support.

Hemisphere's integrated technologies and hardware supply marine applications in three market segments:

1. **Professional**: dredging and survey projects requiring up to 2 to 10-cm positioning accuracy and up to 0.01-degree (or better) heading accuracy.
2. **Commercial**: dredging projects and commercial navigation that require sub-meter positioning accuracy and up to 0.5-degree heading accuracy.
3. **Recreational**: yachting and other general marine applications which need 1 to 2-degree heading accuracy and 1 to 2 m accuracy for positioning.

Conclusion:

Why should I buy a GNSS compass over a traditional or fluxgate compass? The answer is easy: the GNSS compass is the most complete and feature rich compass available. Allowing for easy integration in radars, chart plotters, and autopilot systems. GNSS compasses are less susceptible to the Earth's magnetic field, which makes them more reliable. Also, the GNSS compass uses a complete attitudebased approach for the boat, while offering superior positioning and heading performance to the traditional and fluxgate compass. In short, the GNSS outperforms the other varieties of compasses in every category. When buying or updating a boat, be sure to future-proof your investment and give your navigational system the best in the business. For all inquiries, reach out to a Hemisphere GNSS Dealer or contact Hemisphere GNSS at **Sales@hgnss.com**.

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