

HRS1 Heading Sensor Installation Manual

532006-2_A



Patents Pending

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Accessory Manual

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IMPORTANT: Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

Thank You!

Thank you for choosing Humminbird®, the #1 name in Fishfinders. Humminbird® has built its reputation by designing and manufacturing top-quality, thoroughly reliable marine equipment. Your Humminbird® accessory is designed for trouble-free use in even the harshest marine environment. In the unlikely event that your Humminbird® accessory does require repairs, we offer an exclusive Service Policy - free of charge during the first year after purchase, and available at a reasonable rate after the one-year period. For complete details, see the separate warranty card included with your accessory. We encourage you to read this manual carefully in order to get full benefit from all the features and applications of your Humminbird® product.

Contact our Customer Resource Center at **1-800-633-1468** or visit our Web site at **humminbird.com**.

Introduction

The Humminbird® HRS1 Heading Sensor is actually three sensors in a single unit—a three-axis magnetic compass, a three-axis accelerometer, and a three-axis rate gyro. The compact housing is waterproof with a single removable cable.

Functions

- Magnetic compass heading
- Rate of Turn
- Angle of pitch and roll
- Rate of pitch and roll

Features

- Waterproof housing
- Waterproof cable system
- Fast response time
- Stable and accurate data in dynamic conditions
- Can be calibrated to compensate for magnetic deviation caused by ferrous metals and other electro-magnetic fields
- Bracket or flush mount

Output

- NMEA 0183: RS-232 interface

WARNING

Navigation Aid Only—The sensor is only an aid to navigation and should never be solely relied upon. It is not a replacement for traditional navigation aids and techniques, and human judgement. Only official government nautical charts contain all the information needed for safe navigation.

Follow the safety precautions below to reduce the risk of poor product performance, property damage, personal injury, and/or death.

WARNING: Correct Installation Important

The sensor must be installed and operated according to the instructions in this owner's guide.

WARNING: Steel Vessel

Do not install the Heading Sensor within a steel hull because it is a ferrous (magnetic) material.

WARNING: Compass Safe Distance

The sensor must be a minimum of 0.3m (1') from other standard and steering compasses.

WARNING: Do Not Install Near Artificial Magnetic Field

Observe a safe distance from ferrous metals and anything that can create a magnetic field to prevent interference to the magnetic compass.

WARNING: Electrical Safety

The power supply must be OFF before making electrical connections.

WARNING: Voltage

The power supply voltage must be 9 - 24 VDC.

WARNING: Fuse or Circuit Breaker

A safe installation requires a 0.5 amp fast-blow fuse or circuit breaker.

WARNING: Battery

Make power connections to a power source that is isolated from the engine start battery(s). Voltage drops may cause the sensor to lose information and/or change operating mode.

WARNING: Installation Safety

Always wear safety goggles and a dust mask when installing.

WARNING: Calibrating the Compass

The internal compass may need to be calibrated on the water after the sensor is installed. Perform the pretest to determine if calibration is necessary.

WARNING:

This product contains chemicals known to the State of California to cause cancer and/or reproductive harm.

WARNING:

Disassembly and repair of this electronic unit should only be performed by authorized service personnel. Any modification of the serial number or attempt to repair the original equipment or accessories by unauthorized individuals will void the warranty.

Materials Supplied

Installation and Operations Manual
Heading Sensor
Bag of Heading Sensor hardware
Bracket
Bag of bracket hardware
Junction box
Serial Cable (RS-232) 1 m
Sensor Cable C47
Power Cable C2

Tools & Materials Needed

Safety goggles
Dust mask
Torpedo level
Pencil
Electric drill
Drill bits and hole saws:
 Pilot hole 3mm *or* 1/8"
 Bracket screw holes 4mm, #23, *or* 9/64"
 Flush mount stud holes 6mm *or* 1/4"
 Flush mount cable hole 38mm *or* 1-1/2"
Phillips screwdrivers
Marine sealant (aluminum hull)
Loctite® 242® *or* other removable thread locker (Flush Mount installation)
Deck gland (some installations)
Grommets (some installations)
Cutting pliers (some installations)
Alcohol
Heat-shrink tubing
Heat gun
Wire strippers
Slip-joint pliers
Cable ties (some installations)
Multimeter

NOTE: *Product specifications and features are subject to change without notice.*

Where to Purchase Parts

Lost, broken, or worn parts should be replaced immediately. Contact our Customer Resource Center by visiting our Web site at humminbird.com or by calling 1-800-633-1468.

Loctite® and 242® are trademarks of Henkel Corporation.

Choosing the Mounting Location

For accurate readings, selecting the best location for the sensor is very important. It can be mounted on either a vertical or a horizontal surface. Choose a location that balances the requirements below.

- Mount the Heading Sensor as close to the boat's center of gravity as possible. The lower it can be mounted, the more stable it will be, thus giving more accurate compass readings.
- Mount near the center of the vessel's fore-aft axis. This will give more accurate pitch and roll readings. Avoid the areas near the bow and the stern.
- To prevent interference to the internal magnetic compass, keep away from anything magnetic or that can create a magnetic field.
 - Mount a minimum of 0.3m (1') from other standard and steering compasses.
 - Mount away from any structures or equipment that contains ferrous metals.
 - Mount away from anything that may create a magnetic field such as: magnetized materials, electric motors, electronic equipment, engines, generators, power/ignition cables, and batteries. For distances, follow the respective manufacturer's recommendations.
 - *Do not install in a steel vessel (magnetic hull).*
- Choose a surface with minimal vibration for more stable data.
- Mount reasonably level with the waterline for accurate pitch and roll readings.

Installing

CAUTION: The word “FORWARD” on the sensor must be facing forward and parallel to the centerline of the boat for accurate compass readings.

CAUTION: Mount the sensor near the center of gravity of the boat and reasonably level with the waterline for accurate pitch and roll readings.

IMPORTANT: Plan the cable route between the sensor and the Humminbird® Multi-Function Display and/or network before beginning the installation.

Mounting on a Vertical Surface

Mounting the Bracket

1. At the selected mounting location, draw a level line using a torpedo level (see Figure 1).
2. Holding the bracket even with the level line, trace the outline of the two vertical slots. *Do not mark the location of the two interior screw holes at this time.*
3. Using a 3mm or 1/8" bit, drill the pilot holes in the CENTER of the slots. This will allow you to adjust the bracket up and down.
4. Using a 4mm, #23, or 9/64" bit, drill the two mounting holes.
Fiberglass—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.
5. Lightly fasten the bracket to the mounting surface with two of the stainless steel screws supplied. Place the torpedo level on the top of the bracket. Adjust the bracket until it is level. Tighten the screws.
Aluminum hull—Apply marine sealant to the threads of all four stainless steel screws before fastening them in place. This will prevent electrolytic corrosion between the dissimilar metals.
6. Using a 3mm or 1/8" bit, drill the pilot holes for the two center screws. Then use a 6mm or 1/4" bit to drill the holes.
7. Fasten the remaining two stainless steel screws in the center holes to lock the bracket in place.

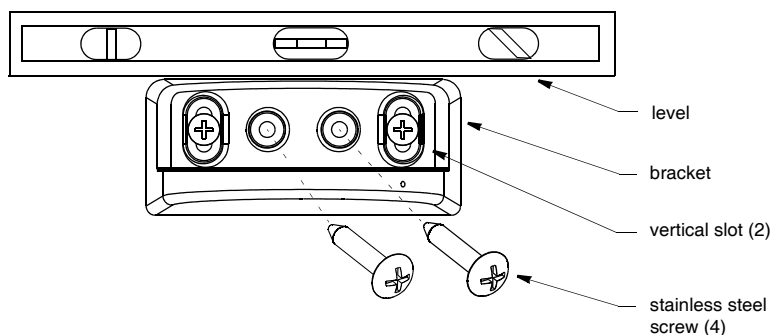


Figure 1. Mounting the bracket

Preparing the Sensor

WARNING: Do not use the studs if there is any danger that a person may be injured by the protruding metal.

1. Remove the label from over the sensor's socket (part A) (see Figure 2).
2. There are two ways to attach the sensor to the bracket. Choose either a or b.
 - a. **Studs**—It is easier to install and adjust the sensor using the M5 studs. However they will protrude about 20mm (3/4") below the bracket after installation. Apply *removable* thread locker to the two studs. Screw the studs into the underside of the sensor.
 - b. **Screws**—Omit the studs. After the sensor is aligned in the bracket, use the brass machine screws supplied to fasten it in place. The sensor will be flush with the bracket when the installation is complete.
3. Remove the protective cap from the *sensor* connector on the cable. (Save the cap to protect the connector, when the sensor is removed.)
4. Pass the *instrument* connector-end of the cable through the center of the gasket.
5. Plug the sensor connector firmly into the sensor. It fits one way only.
6. Push the gasket (part B) against the sensor (and onto the studs if applicable). Be sure to orient the gasket so that the groove fits over the alignment tab on the connector and the sensor's socket. The screw holes in both the sensor and the gasket must be aligned. (It may be helpful to hold the gasket in place with double-sided tape.)

NOTE: The arrow on the gasket will face the same direction as the word "FORWARD" on the sensor.

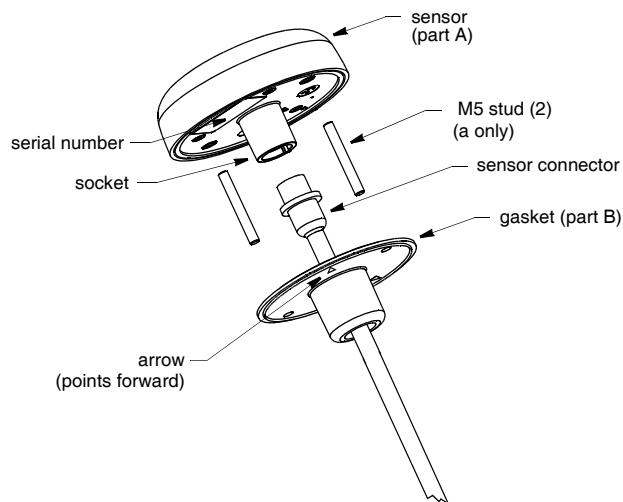


Figure 2. Preparing the sensor

Attaching the Sensor to the Bracket

1. Feed the cable through the mounting bracket (see Figure 3).
2. Align the word 'FORWARD' pointing forward and parallel to the centerline of the boat while holding the gasket firmly against the sensor.
 - a. **Studs**—Push the studs through the mounting bracket. Fasten the sensor to the bracket with a flat washer, a lock washer, and a thumb nut (with the metal side against the washer) on each stud. **Hand-tighten** only. Do not over tighten.
 - b. **Screws**—Place the sensor on the bracket, being sure the screw holes in both the sensor and the gasket are aligned. From the underside of the bracket, fasten the sensor with the two flat washers, lock washers, and brass machine screws supplied.
3. Be sure the word 'FORWARD' on the sensor is pointing forward and parallel to the centerline of the boat. To prevent the sensor from rotating after it is aligned in the bracket, fasten the 1/2" pan-head set-screw into the most convenient of the two alternative holes.

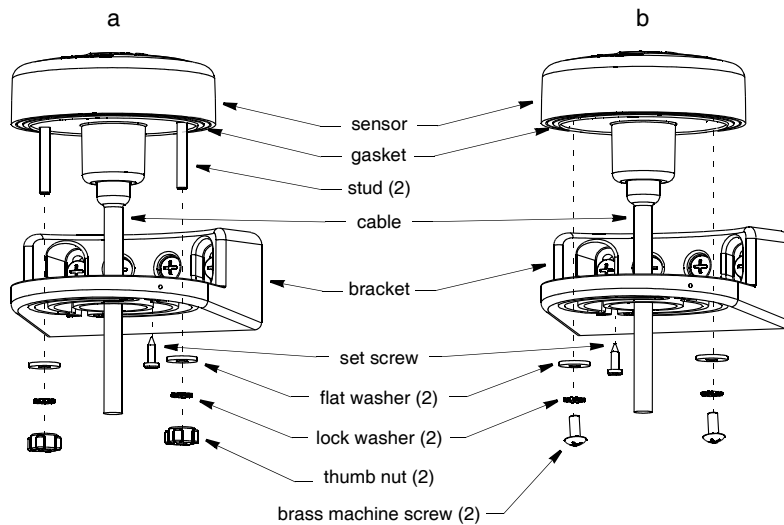


Figure 3. Installing the sensor in the mounting bracket

Flush Mounting on a Horizontal Surface

1. Remove the label from over the sensor's socket (part A) (see Figure 4).
2. Apply *removable* thread locker to the two studs supplied. Screw the studs into the underside of the sensor.
3. Using a torpedo level, check that the mounting surface is reasonably level. If necessary, use shims to level the surface or choose another mounting location.
4. Using the gasket (part B) as a template, position it at the selected mounting location *upside down with the arrow facing forward and parallel to the centerline of the boat*. Mark the position of the two mounting holes and the center cable hole.
5. Using a 3mm or 1/8" bit, drill the pilot holes. Using a 6mm or 1/4" bit, drill the two mounting holes for the studs. Drill the cable hole with a 38mm or 1-1/2" hole saw.
Fiberglass—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.
6. Pass the *instrument* connector-end of the cable through the center of the gasket and down through the center mounting hole in the boat.
7. Plug the sensor connector firmly into the sensor's socket.
8. Orient the gasket with the arrow facing in the same direction as the word "FORWARD" on the sensor. Push the gasket onto the studs and slide it over the connector.
- NOTE:** *The gasket fits one way only. A groove in the gasket fits over the alignment tab on the connector.*
9. With the word "FORWARD" pointing forward and parallel to the centerline of the boat, push the studs through the mounting surface. *Check to be sure the gasket is tucked under the lip of the sensor.* From underneath the mounting surface, slide a flat washer and lock washer onto each stud. Fasten them with the thumb nuts: metal side touching the washer. **Hand-tighten** only. Do not over tighten.

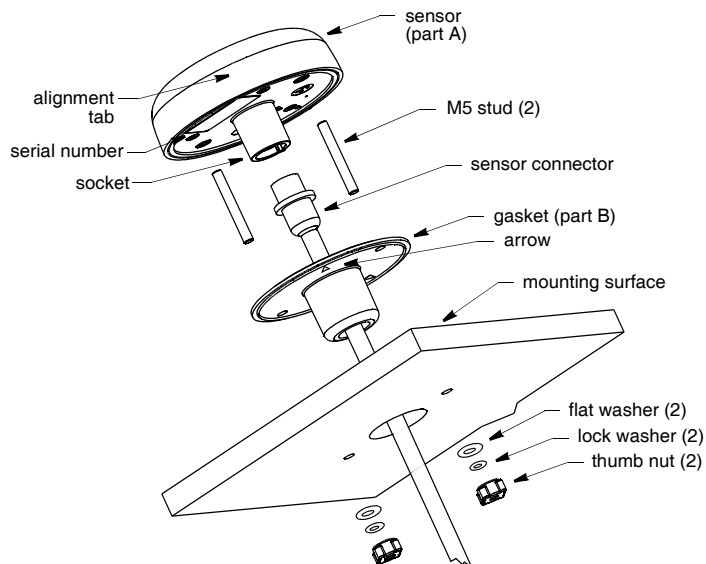


Figure 4. Flush mount

Connecting

WARNING: The power supply must be OFF before making electrical connections.

CAUTION: Do not remove the waterproof connector(s) to ease cable routing. If the cable must be cut and spliced, use the splash-proof Junction Box supplied. Removing the waterproof connector or cutting the cable, except when using the Junction Box, will void the sensor warranty.

CAUTION: To reduce electrical interference from other electrical wiring and any on-board equipment with a strong magnetic field such as radar equipment, radio transmitters, boat engines, generators, etc., separate the cables by at least 1 m (3').

CAUTION: Be careful not to tear the cable jackets when passing them through bulkheads and other parts of the boat. Use a deck gland to prevent water seepage into the boat. Use grommets to prevent chaffing.

CAUTION: The sensor must be supplied with 9 - 24 VDC at 0.5 amp.

CAUTION: Use a multimeter to check the polarity and the connections to the power supply before applying power to the sensor.

CAUTION: Coil any excess cable(s) and secure with cable ties to prevent damage.

Hole Drilling & Cable Routing

1. Select a convenient dry mounting location for the Junction Box within 1 m (3') of the Humminbird® Multi-Function Display. Wherever possible, maintain a minimum of 1 m (3') from other electronic equipment and cables.
2. Hold the Junction Box at the selected location and mark the position of the screw holes.
3. At the marked locations, drill 3mm or 1/8" pilot holes to a depth of 10mm (3/8").
Do not fasten the Junction Box in place at this time.
4. Route the Serial Cable (RS-232) from the display to the Junction Box.
Do not plug in the connector or fasten the cable in place at this time.
5. Route the Sensor Cable from the sensor to the Junction Box.
Do not plug in the connector or fasten the cable in place at this time.
6. Route the Power Cable from the power source to the Junction Box.
Do not plug in the connector or fasten the cable in place at this time.

Preparing the Cables

IMPORTANT: Do not remove the colored insulation from the wires.

1. Allowing an extra 25cm (10") for wiring ease, cut each cable to length.
2. Remove the red cover of the Junction Box. Set it aside along with the contents of the box.
3. Carefully push approximately 100mm (4") of each cable through the appropriate grommet (see Figure 5). To ease sliding, apply alcohol to the cable jacket.
4. Strip 60mm (2-1/2") of the outer jacket and foil shielding from each cable.
5. **Sensor Cable**—Separate the shielded pair from the other wires within the cable and remove 38mm (1-1/2") of the foil shielding.
6. Protect the cables' foil shielding from causing a short circuit inside the box by using heat-shrink tubing around the jacket where the wires emerge from the cable. The tubing must overlap the wires a minimum of 6mm (1/4"). Use a heat gun to shrink the tubing.
7. **Sensor Cable**—The blue and brown wires are not needed. Cover the ends separately with heat-shrink tubing. Use a heat gun to shrink the tubing.
8. **Serial Cable (RS-232)**—The red wire is not needed. Cover the end separately with heat-shrink tubing. Use a heat gun to shrink the tubing.

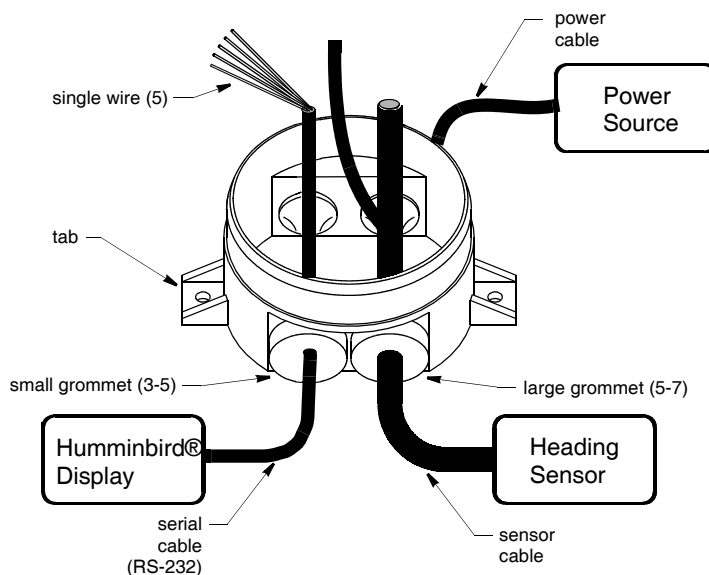


Figure 5. Cables inserted in the Junction box

Wiring

CAUTION: The Serial Cable (RS-232) has both a black and a dark-grey wire. Be sure to correctly identify them.

1. Make the connections using the supplied butt connectors. See Table 1 on the next page and insert the end of the first colored wire from the Serial Cable (RS-232) into one of the holes in a butt connector (see Figure 6). *Do not remove the colored insulation.*

NOTE: There are two extra butt connectors supplied.

2. Continue to follow the wire order shown in Table 1, and insert the proper colored wire from the Sensor Cable into the neighboring hole in the butt connector.
3. With the wires pushed tightly against the far inside wall of the connector, use slip-joint pliers to squeeze the red button until it depresses. Gently tug on each wire to ensure that it is securely fastened.
4. Repeat this process until all the wires are connected with the exception of the blue and brown wires in the Sensor Cable and the red wire in the Serial Cable (RS-232).

NOTE: The butt connectors have three holes to accommodate up to three wires. Two of the connectors will contain three wires. One of the connectors will hold three black wires. One of the connectors will hold two bare wires and a DARK-GREY wire.

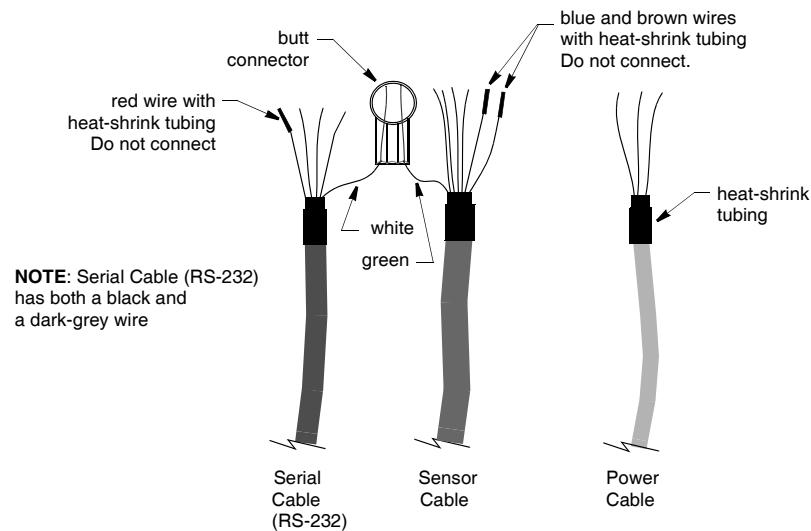


Figure 6. Using the butt connectors

Table 1. Cable Wire Colors and Functions

Serial Cable (RS-232) Wire Colors	Display Functions	Sensor Cable Wire Colors	Sensor Functions	Power Cable Wire Colors	Power Functions
White	Tx	Green	Rx		
Green	Rx	White	Tx		
Red	Not Available	Red	VDC +	Blue	VDC +
Black	VDC -/ground	Black	VDC -/ground	Black	VDC -/ground
Dark Grey	Shield	Bare	Shield	Bare	Shield
		Blue	Not Available		
		Brown	Not Available		

Closing & Mounting

1. From outside the Junction Box, carefully pull each cable until only 13mm (1/2") of the cable *jacket* remains inside the box. This will invert the nipples to seal the grommets.
2. Arrange the wires neatly inside the Junction Box.
3. Close the box with the red cap. Expel the excess air inside the box by placing a thumb on the center of the cap and applying pressure for 3 seconds.
4. Screw the Junction Box to the selected mounting surface at the holes previously drilled. Use the two mounting screws provided.
5. Fasten all the cables in place. Coil any excess cable and secure it using cable ties to prevent damage.
6. Connect the Power Cable to the power source.
7. Connect the Serial Cable (RS-232) to the Humminbird® display. Hand-tighten the screw nut on the Serial Cable (RS-232) connector to secure the cable.
8. Your installation is complete. To begin receiving data, see your Humminbird® operations manual.

Calibrating the Compass

WARNING: The internal compass may need to be calibrated on the water after the sensor is installed. Perform the pretest to determine if calibration is necessary.

CAUTION: The Pretest and AutoCalibration Procedures must be done in calm seas in a 0.8 km (0.5 mile) open area away from other boats and ferrous objects such as structures and aids to navigation. Avoid congested areas and waters with strong currents as calibration will be difficult and possibly hazardous.

Pretest

While making a full circle with the boat, compare the sensor's heading data to the boat's compass. Check all headings. If the data agrees, there is no magnetic influence on the sensor. It does NOT need to be calibrated.

AutoCalibration Procedure

IMPORTANT: Calibration requires the vessel to complete 2 to 3 circles.

IMPORTANT: In the event of a calibration failure, repeat the procedure.

1. Navigate the vessel to an open area of water, 0.8 km (0.5 mile) of open space away from other boats or ferrous objects (structures or aids to navigation). Choose calm seas.
2. Select the display page on the vessel's NMEA instrument that shows Heading.
3. Shut OFF and then turn ON the DC power that is connected to the sensor.
4. Within 2 minutes of recycling power to the sensor, start the vessel in a slow [4 to 6 knots (4.5 to 7 MPH)] circular turn that takes about 2 to 3 minutes to complete.*
If the vessel completes 1.5 circles within 3 to 4.5 minutes, AutoCalibration will begin. Heading will stop being reported on any NMEA 0183 display until the calibration is finished.
5. Keep turning the vessel in the same circle for 1 to 2 more complete circles.
Do not change the vessel speed or rate of turn through the circle.
6. When calibration is completed successfully, Heading will return to the display.
If calibration fails, the display will flash Heading ON and OFF in 10 second intervals for 60 seconds. (Display times may vary by manufacturer.)

* The optimum rate of turn is 180°/minute: 3°/second, 30°/10 seconds, 45°/15 seconds, and 90°/30 seconds.

Maintenance

CAUTION: Do not disassemble the sensor. There are no user-serviceable parts inside. Removing the screws from the sensor (part A) will damage the waterproof seal, thus voiding the warranty.

CAUTION: Do not immerse in water or pressure wash. Doing so may allow water to infiltrate the sensor, voiding the warranty.

Since the sensor has no moving parts, it requires minimal maintenance. Clean the sensor with a soft damp cloth and mild household detergent.

Troubleshooting

Problems with the Sensor

- Is there power to the sensor?
- Are all the connections tight?
- Is the cable-run free of kinks or damage?
- Is the sensor wired correctly?
- Is there damage to the sensor?
- Is the sensor exposed to excessive vibration?

Problems with the Compass

- Is the sensor installed facing forward and parallel to the centerline of the boat?
- Is the compass calibrated?
- Is there interference from ferrous metals, electronic equipment, electric motors, batteries, or cables that are creating a magnetic field?
- Is the sensor mounted near the boat's center of gravity?

Problems with the Rate Gyro or Accelerometer

- Is the sensor installed reasonably level with the waterline?
- Is the sensor mounted near the center of the vessel's fore-aft axis?

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Contact Humminbird®

Contact the Humminbird® Customer Resource Center

in any of the following ways:

By Telephone:

(Monday - Friday 8:00 a.m. to 4:30 p.m. Central Standard Time):

1-800-633-1468

By e-mail:

(typically we respond to your e-mail within three business days):

service@humminbird.com

For direct shipping, our address is:

Humminbird

Service Department

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