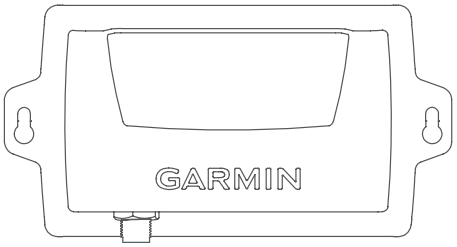
GARMIN



9-AXIS HEADING SENSOR INSTALLATION INSTRUCTIONS

Important Safety Information

⚠ CAUTION

Always wear safety goggles, ear protection, and a dust mask when drilling, cutting, or sanding.

NOTICE

When drilling or cutting, always check what is on the opposite side of the surface to avoid damaging the vessel.

Tools Needed

- Safety glasses
- Drill and drill bits
- Phillips screwdriver
- Cable ties
- Portable or handheld compass (to test for magnetic interference)
- Anti-seize lubricant (optional)
- Additional screws appropriate for the mounting surface, if needed

Software Update

You must update the Garmin® chartplotter software when you install this device. For instructions on updating the software, see your chartplotter owner's manual at support.garmin.com.

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Mounting Considerations

⚠ CAUTION

Do not install or store the sensor near strong magnets, including speakers. A strong magnetic field can damage the sensor.

For best performance, observe these considerations when selecting a mounting location.

- The sensor should not be mounted near known ferrous metal objects such as a toolbox or compass.
- The sensor is not a GPS device and is not required to have a clear view of the sky.
- A handheld compass should be used to test for magnetic interference in the area where the sensor is to be mounted.

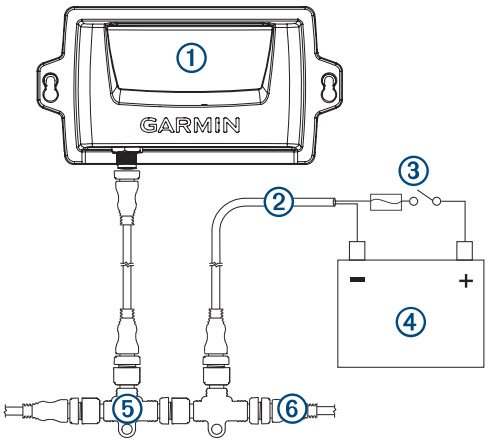
  If the needle on the handheld compass moves when you hold it where you intend to mount the sensor, magnetic interference is present. You must choose another location and test again.
- The sensor should be mounted horizontally on a rigid surface for best performance.
- The sensor should be mounted with the cable facing toward the front of the boat for best performance.

  NOTE: You can set the heading alignment automatically if a GPS source is connected to the NMEA 2000® network. If you are not using a compatible Garmin chartplotter, the boat must be able to reach a cruising speed of at least 6.4 km/h (4 mph). You can set or fine-tune the heading alignment using Fine Heading Alignment with a compatible Garmin chartplotter. If these options are not available, you must align the heading by adjusting the sensor installation manually to point the cable toward the front of the boat, parallel to the keel.
- Mounting screws are provided with the sensor. If you use mounting hardware other than the provided screws, the hardware must be made of quality stainless or brass material to avoid magnetic interference with the sensor.

  NOTE: Test all mounting hardware with a handheld compass to make sure no magnetic fields are present in the hardware.
- Do not use excessive force when installing mounting screws. Use only the amount of force needed to keep the sensor in place.
- Apply force evenly between the mounting screws.

NMEA 2000 Connection Considerations

- This sensor connects to an existing NMEA 2000 network on your boat.
- If the included NMEA 2000 drop cable is not long enough to reach your NMEA 2000 network, a drop cable of up to 6 m (20 ft.) can be used, according to the NMEA 2000 guidelines.



Item	Description
1	Sensor
2	NMEA 2000 power cable (existing; not included)
3	Ignition or in-line switch (existing; not included)
4	12 Vdc power source
5	NMEA 2000 T-connector (included)
6	NMEA 2000 terminator or backbone cable (existing; not included)

Calibration

After installation is complete, you must calibrate the heading sensor for best results. Depending on the types of devices connected to the NMEA 2000 network, you can calibrate the sensor using either a menu-based method or a basic method.

When you connect the sensor to the same NMEA 2000 network as a compatible Garmin chartplotter, you are prompted to begin menu-based calibration when the chartplotter detects the new sensor (*Performing Menu-Based Calibration*, page 4). Go to www.garmin.com for a list of compatible chartplotters.

NOTE: A software update available in mid-2017 enables you to perform menu-based calibration using a compatible chartplotter. If your chartplotter has software that predates this update, you must perform basic calibration.

If you connect the sensor to a NMEA 2000 network without a compatible Garmin chartplotter, you must perform basic calibration instead of menu-based calibration (*Performing Basic Calibration*, page 5).

Performing Menu-Based Calibration

Before you can perform menu-based calibration, you must connect the sensor to the same NMEA 2000 network as a compatible Garmin chartplotter.

If the sensor has not been calibrated successfully, a message appears each time you turn on a compatible Garmin chartplotter.

1. From the sensor calibration screen, select **Compass Cal.**.

   TIP: You can open the calibration page at any time by selecting the device from **Menu** > **Settings** > **Communications** > **NMEA 2000 Devices**.
2. Select **Begin**.
3. Follow the on-screen instructions until the compass calibration is complete, taking care to keep the boat as steady and level as possible.

   The boat should not list during calibration.

   If possible, you can turn the vessel in place by engaging two engines in opposite directions.

   When the compass calibration is complete, a value appears near the Compass Cal. setting. A value near 100 indicates the sensor was installed in a perfect magnetic environment and calibrated correctly. If the heading performance is unacceptable, and the value is closer to 0 than it is to 100, you might need to relocate the sensor and calibrate the compass again.
4. Select **Auto Heading Alignment**.

   NOTE: Auto Heading Alignment is available only if there is a GPS source connected to the NMEA 2000 network. If you do not have a GPS source connected, you must perform the Fine Heading Alignment instead (*Adjusting the Fine Heading Alignment*, page 4).
5. Select **Begin**.
6. Follow the on-screen instructions until the alignment is complete.

Adjusting the Fine Heading Alignment

If you do not have a GPS source connected to the NMEA 2000 network, Auto Heading Alignment is not available as part of menu-based calibration, and you must adjust the Fine Heading Alignment instead.

You can adjust the Fine Heading Alignment in conjunction with Auto Heading Alignment to fine-tune the heading output (optional).

1. From the sensor calibration screen, select **Fine Heading Alignment**.
2. Using a landmark or a known good compass, determine the heading of your boat.
3. Adjust the heading until it matches your measurement.
4. Select **Done**.

Performing Basic Calibration

If you connect the sensor to a NMEA 2000 network without a compatible Garmin chartplotter, you must perform basic calibration instead of menu-based calibration.

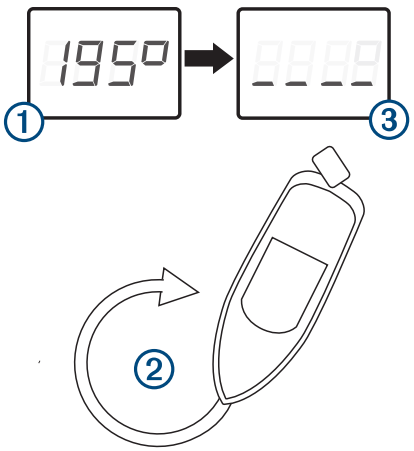
You must be able to view heading data from the sensor on a connected chartplotter or marine display before you can perform basic calibration. If you cannot view heading data on your connected display, check the NMEA 2000 network and power connections.

All other sources of heading data that are not based on GPS must be removed from the NMEA 2000 network while performing basic calibration.

When performing basic calibration, you first calibrate the compass and then align the heading in one continuous procedure. If you installed the sensor with the cable pointing toward the bow, parallel to the keel, it may not be necessary to align the heading.

NOTE: If you choose to align the heading, you must connect a GPS source to the NMEA 2000 network. The boat must be able to reach a cruising speed of at least 6.4 km/h (4 mph) to perform the heading alignment.

1. Drive the boat to a location with calm, open water.
2. Set the display to view heading data from the connected sensor.
3. Disconnect the sensor from the NMEA 2000 network or turn off the power to the NMEA 2000 network.
4. Wait while the boat becomes level and stationary.
5. Turn on power to the sensor, and wait until the heading data appears on the display ①.



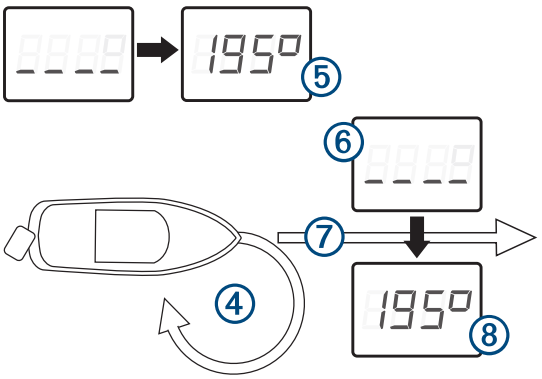
6. Within three minutes, complete two full, slow, tight circles ②, taking care to keep the boat as steady and level as possible.

   The boat should not list during calibration.

   If possible, you can turn the vessel in place by engaging two engines in opposite directions.

   When the sensor is prepared to calibrate the compass, the heading data disappears from the display ③

   You may receive an error message that the heading was lost. You can ignore this message.
7. Continue turning in the same direction at the same speed ④ for approximately 1 $^{1}/_{2}$ rotations until the heading data appears ⑤.



When the heading data appears, the compass has been calibrated successfully, and you can align the heading (optional).

8 Select an option.

- If you want to align the heading to match the front of the boat, proceed to the next step.
- If you installed the sensor with the arrow pointing parallel to the front of the boat, and do not want to align the heading, stop turning and wait, keeping the boat stationary. Over the next two minutes the heading data should disappear and then reappear. When the heading data reappears, the compass should be calibrated and no heading offset should be applied.

  NOTE: If an unwanted heading offset is applied, you must disconnect all GPS sources from the NMEA 2000 network, and repeat the calibration. If the only available heading display is also a GPS source, you must repeat the calibration, and disconnect the sensor after step 7.

9 Continue turning in the same direction at the same speed for approximately ten seconds, until the heading data disappears from the display ⑥.

10 When it is safe, straighten the boat and drive in a straight line ⑦ at cruising speed (must be at least 6.4 km/h (4 mph)) until the heading data appears ⑧.

When the heading appears, the compass has been calibrated, and the heading has been aligned on the sensor.

11 Test the results of the calibration, and repeat this procedure if necessary.

Restoring Factory Default Settings

If you relocate the sensor or do not believe the calibration was successful, you can delete all calibration information from the sensor, and restore its factory default settings. After restoring the factory default settings, you must configure the sensor before you can use it with your system.

1 Select **Settings** > **Communications** > **NMEA 2000 Devices** > **Device List**.

2 Select the name of the sensor.

3 Select **Review** > **Factory Defaults** > **Yes**.

Specifications

Specification	Measurement
Dimensions (L × W × H)	170 × 90 × 50 mm (6.7 × 3.5 × 2 in.)
Weight	200 g (7 oz.)
Temperature range	From -15° to 70°C (from 5° to 158°F)
Material	Fully gasketed, high-impact plastic
Water resistance	IEC 60529 IPX7[1]
NMEA 2000 input voltage	From 9 to 16 Vdc
NMEA 2000 LEN @ 9 Vdc	4 (200 mA)
Compass-safe distance	Negligible

NMEA 2000 PGN Information

Transmit

PGN	Description
127250	Vessel heading
127251	Rate of turn
127257	Attitude data

Receive

PGN	Description
127258	Magnetic variation

Limited Warranty

The Garmin standard limited warranty applies to this accessory. For more information, go to www.garmin.com/support/warranty.

[1] The device withstands incidental exposure to water of up to 1 m for up to 30 min. For more information, go to www.garmin.com/waterrating.