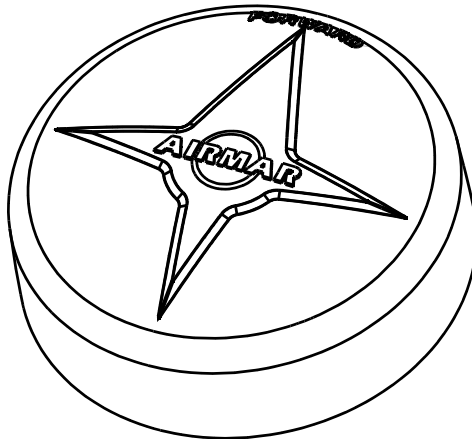




Owner's Guide & Installation Instructions

Heading Sensor

Models: **H2183**
C0183



Patents Pending

Record the serial number found on the underside of the sensor.

Serial No. _____ Date of Purchase _____

Copyright © 2008 - 2011 Airmar Technology Corp. All rights reserved.

All Rights Reserved. Except as expressly provided herein, no part of this manual may be reproduced, copied, transmitted, disseminated, downloaded, or stored in any storage medium, for any purpose without prior written consent of Airmar. Airmar hereby grants permission to download a single copy of this manual and of any revision of this manual onto a hard drive or other electronic storage medium to be viewed and to print one copy of this manual or any revision hereto, provided that such electronic or printed copy of this manual or revision must contain the complete text of this copyright notice and provided further that any unauthorized commercial distribution of this manual or any revision hereto is strictly prohibited.

Information in this manual is subject to change without notice. Airmar reserves the right to change or improve its products and to make changes in the content without obligation to notify and person or organization of such changes. Visit the Airmar website at www.airmar.com for current updates and supplemental information concerning the use and operation of this and other Airmar products.

Table of Contents

Introduction.....	4
Safety Instructions.....	5
Hardware, Tools & Materials.....	6
Choosing the Mounting Location.....	7
Installing.....	8
Mounting on a Vertical Surface.....	8
Flush Mounting on a Horizontal Surface.....	11
Cable Routing & Connecting Guidelines.....	12
Connecting to an NMEA 0183 Display.....	13
Connecting to an NMEA 2000® Network.....	15
Calibrating the Compass.....	16
Software Updates.....	17
Maintenance.....	17
Troubleshooting.....	17
NMEA 2000® Specification.....	18
Where to Purchase Parts.....	18

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

Introduction

Thank you for purchasing an Airmar solid-state sensor. The compact housing is waterproof with a single removable cable. The H2183 is actually three sensors in a single unit—a three-axis magnetic compass, a three-axis accelerometer, and a three-axis rate gyro.

Outputs & Functions	H2183	C0183
Magnetic compass heading	*	*
Heading relative to true north ¹	*	*
Rate of Turn	*	
Angle of pitch and roll	*	
Rate of pitch & roll	*	
NMEA 0183; RS422/RS232	*	*
NMEA 20000®; CAN	*	

1. Only available if magnetic variation is available from an external device such as a GPS.

Features

- Waterproof housing
- Waterproof cable system
- Fast response time
- Stable and accurate data in dynamic conditions
- Can be programmed to compensate for an installation that is not aligned to the front of the vehicle/bow of the boat and/or level
- Can be calibrated to compensate for magnetic deviation caused by ferrous metals and other electro-magnetic fields
- Bracket or flush mount

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 Vehicle/Boat

Do not install the sensor within a steel vehicle/boat because it is a ferrous (magnetic) material. Instead, use Airmar's model GH2183, combination GPS and compass that can be mounted above the vehicle/boat.

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 that specified for the sensor.

- H2183 with RS232 interface 9 - 24 VDC
- H2183 with RS422 interface 9 - 16 VDC
- C0183 9 - 60 VDC

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: Fuse or Circuit Breaker

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

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.

Cables & Connecting/Converting Hardware

The Heading Sensor can be connected in several ways. **You must have the correct cable and any needed hardware before beginning the installation.**

Sensor Cables

	<u>Length</u>	<u>Part No.</u>
• NMEA 0183 Cable	10m	33-862-02
• NMEA 2000® Cable	6m	33-1029-02
• NMEA 2000® Cable	10m	33-1104-01

NOTE: Additional cable lengths are available.

Connecting/Converting Hardware

• NMEA 0183 to USB Converter		33-801-01
• NMEA 0183 Combiner		33-800-01
• NMEA 2000® CAN to USB Gateway		33-727-01
• NMEA 0183 & NMEA 2000® Splitter	15m	33-632-01
• NMEA 0183 & NMEA 2000® Splitter	30m	33-632-02

Tools & Materials

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)

Heat-shrink tubing (some installations)

Heat gun (some installations)

Wire strippers (some installations)

Cable ties (some installations)

Multimeter (some installations)

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 sensor as close to the vehicle/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 vehicle/boat's fore-aft axis. This will give more accurate pitch and roll readings. Avoid the areas near the front/bow and the rear/stern.
- To prevent interference to the 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 within a steel vehicle/boat (magnetic material).*
- Choose a surface with minimal vibration for more stable data.
- Mount reasonably level (with the waterline on a boat) 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 vehicle/boat for accurate compass readings.

CAUTION: Mount the sensor near the center of gravity of the vehicle/boat and reasonably level (with the waterline on a boat) for accurate pitch and roll readings.

IMPORTANT: Plan the cable route between the sensor and the 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 4 mm, #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.

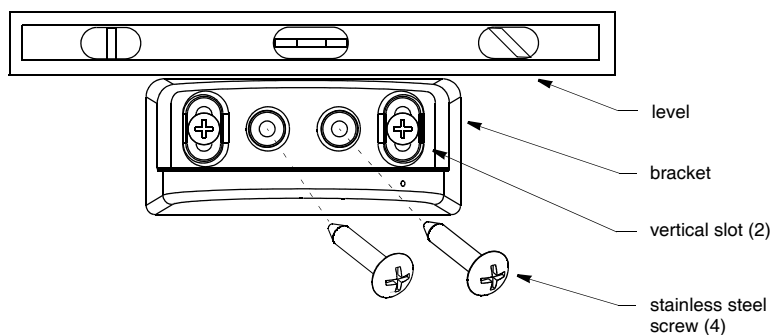


Figure 1. Mounting the bracket

Copyright © 2008 - 2009 Airmar Technology Corp.

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.

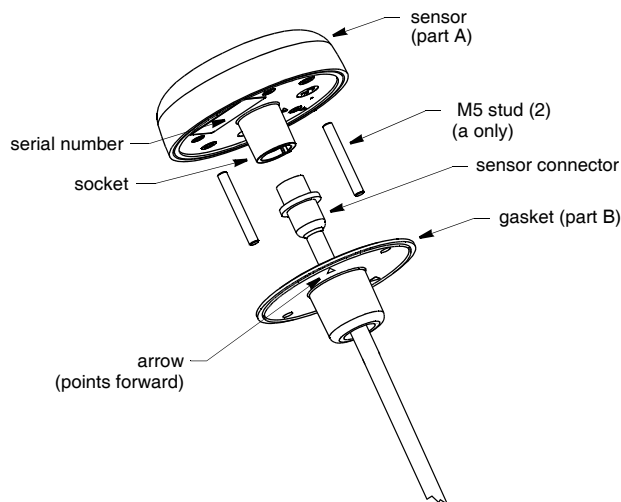


Figure 2. Preparing the sensor

Copyright © 2008 Airmar Technology Corp.

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 vehicle/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 vehicle/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.

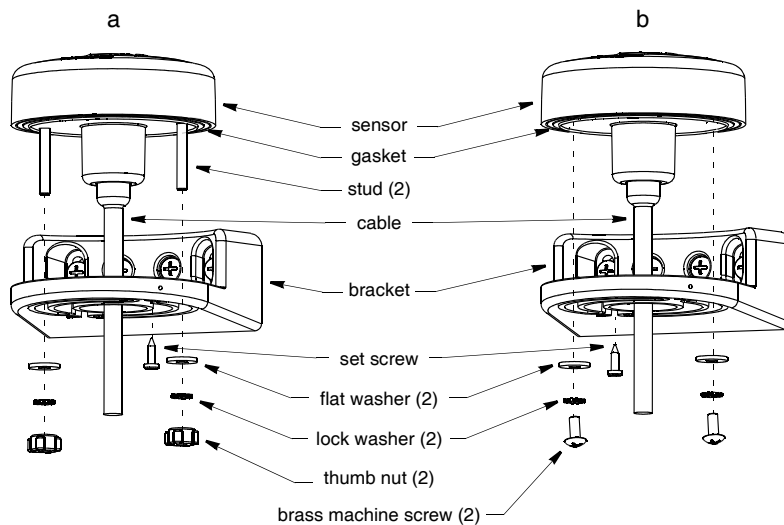


Figure 3. Installing the sensor in the mounting bracket

Copyright © 2008 - 2009 Airmar Technology Corp.

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 vehicle/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 vehicle/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 vehicle/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.

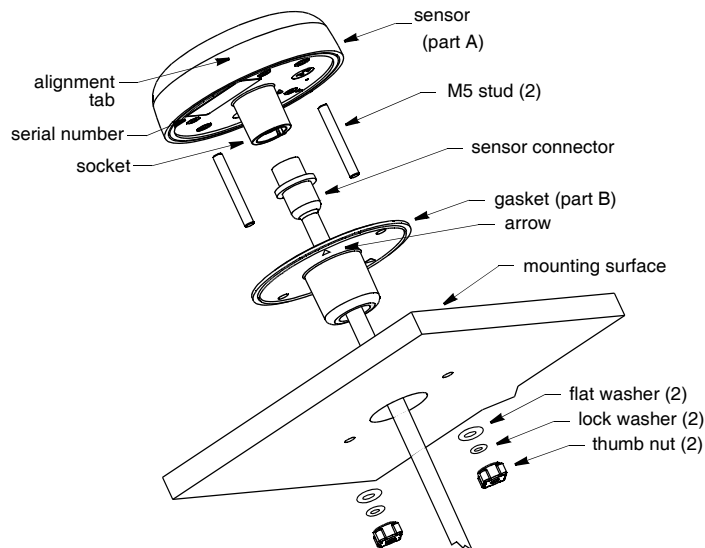


Figure 4. Flush mount

Copyright © 2008 Airmar Technology Corp.

Cable Routing & Connecting Guidelines

Depending on the equipment you will be using, route the sensor cable to an Airmar Converter or Combiner, an NMEA 0183 display, an NMEA 2000 network, a laptop, or other device. After reading the cautions below, go to the appropriate instructions.

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

CAUTION: Do not remove the waterproof connector(s) to ease cable routing. Buy a cable without a connector. Instructions for wiring are supplied.

CAUTION: To reduce electrical interference from other electrical wiring and any any equipment with strong magnetic fields such as radar equipment, radio transmitters, engines, generators, etc., separate the cables by at least 1 m (3'). Ensure that all the cable shields are appropriately grounded.

CAUTION: Be careful not to tear the cable jackets when passing them through compartments, bulkheads, or walls. Use a deck gland to prevent water seepage into a boat. Use grommets to prevent chaffing.

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.

Power Supply Voltage

H2183 with RS422 interface	9 - 16 VDC
H2183 with RS232 interface	9 - 24 VDC
C0183	9 - 60 VDC

Connecting to an Airmar Converter or Combiner

Follow the installation instructions that are supplied with the unit.

Connecting to an NMEA 0183 Display

1. Route the sensor cable to the display. *Do not fasten the cable in place at this time.*
2. Connect the sensor to the display in one of two ways.
 - **Connector**—If your sensor cable has a connector on the display end, and it can be plugged into the port on your NMEA 0183 display, do so now. Coil any excess cable and secure it with cable ties to prevent damage. Fasten the cable in place.
 - **No connector**—If your sensor cable does not have a connector on the display end, it must be hard wired. Refer to the owner's manual that came with your display and connect the colored wires as shown in the table below and Figure 5.

Sensor Function	Sensor Cable Wire Color	Display Function
NMEA input A/+	Yellow	NMEA output A/+ (see Note 2)
NMEA input B/-	Orange	NMEA output B/-
NMEA output A/+	White	NMEA input A/+
NMEA output B/-	Blue	NMEA input B/-
VDC +	Red (see Note 1)	VDC + (see Note 3)
VDC -/ground	Black	VDC -/ground
Shield	Bare	Shield

NOTE 1: *The sensor must be supplied with the specified voltage at 0.5amp. from a power source that is isolated from the engine start battery(s).*

NOTE 2: *The display power may be wired directly to the sensor cable, or it may be wired separately.*

NOTE 3: *If your display does not have NMEA 0183 output connections, the yellow and orange wires are not needed. Each end should be covered separately with heat-shrink tubing. (Alternatively, yellow and orange wires can be connected to an external sensor.)*

No Connector: Wiring

1. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
2. Strip 60 mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable (see Figure 4).
3. Strip 10 mm (3/8") of conductor insulation from the end of each colored wire.
4. Protect the cable's foil shielding from causing a short by using heat-shrink tubing around the jacket where the wires emerge from the cable. The tubing must overlap the jacket a minimum of 6 mm (1/4"). Use a heat gun to shrink the tubing.
5. Being sure the power supply is OFF, connect the wires to the display (see Figure 5).
6. Fasten the cable in place.
7. Your installation is complete. To begin receiving data, refer to the owner's manual that came with your display.

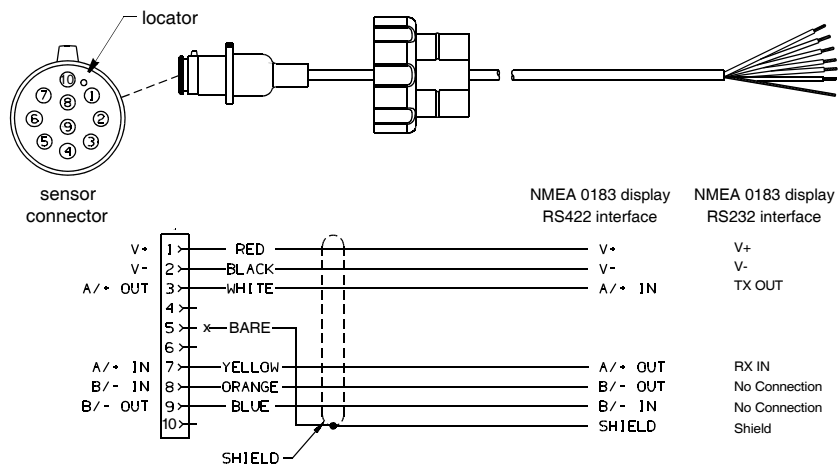


Figure 5. NMEA 0183 Sensor Cable

Copyright © 2008 - 2011 Airmar Technology Corp.

Connecting to an NMEA 2000® Network

CAUTION: Only two termination resistors are required on an NMEA 2000 network. More than two will degrade the bus performance.

Route the sensor cable to the NMEA 2000 network. Plug the NMEA 2000 connector into the network node (see Figure 6). Coil any excess cable and secure with cable ties to prevent damage.

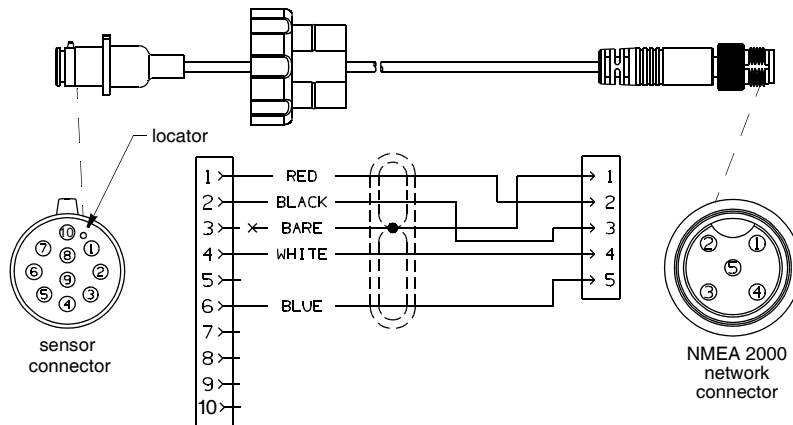


Figure 6. NMEA 2000® Sensor Cable [6m (20') shown]

Copyright © 2008 - 2011 Airmar Technology Corp.

NOTE: Sensor cables longer than 6m (20') have a termination resistor built into the sensor connector (see Figure 7).

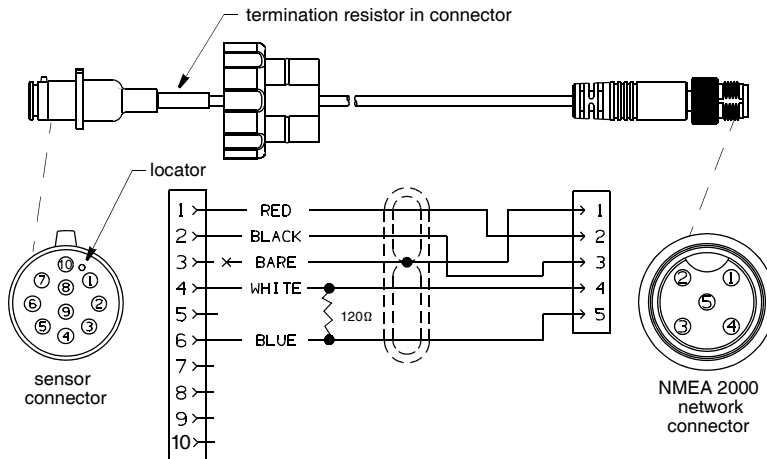


Figure 7. NMEA 2000® Sensor Cable [10m (33') shown]

Copyright © 2009 - 2011 Airmar Technology Corp.

Calibrating the H2183/C0183 Compass on a Boat

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 Procedure 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 H2183/C0183 heading data to the boat's compass. Check all headings. If the data agrees, there is no magnetic influence on the H2183/C0183. It does NOT need to be calibrated.

About Calibration

Calibration can be done in one of two ways.

- Calibrate the compass using the WeatherCaster™ software and a PC.
- Follow the AutoCalibration Procedure below.

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 boat'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 or NMEA 2000 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 manufacture.)

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

Software Updates

Airmar may release updated versions of the sensor's firmware. Check Airmar's website at www.airmar.com to down-load the latest revision, or contact Airmar's technical support personnel for a CD.

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 wiring correct?
- 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 vehicle/boat?
- Does the compass need to be 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 vehicle/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 vehicle/boat's fore-aft axis?

Specification: NMEA 2000

LEN is the amount of current a device draws from an NMEA 2000 network.

(1 LEN = 50 mA)

NMEA 2000® Load Equivalency Number (LEN)

H2183 with RS232 interface.....2

H2183 with RS422 interface.....3

Where to Purchase Parts

Obtain parts from your instrument manufacturer or marine dealer. Lost, broken, or worn parts should be replaced immediately.

Gemeco

Tel: 803.693.0777

(USA)

Fax: 803.693.0477

Email: sales@gemeco.com

Airmar EMEA

Tel: +33.(0)2.23.52.06.48

(Europe, Middle East, Africa)

Fax: +33.(0)2.23.52.06.49

Email: sales@airmar-emea.com

Trademarks

Airmar® is a trademark of Airmar Technology Corporation.

Loctite® and 242® are trademarks of Henkel Corporation.

NMEA 2000® is a registered trademark of the National Marine Electronics Assoc.

WeatherCaster™ is a trademark of Airmar Technology Corporation.

NOTES



35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA
www.airmar.com