

OWNER'S GUIDE &

INSTALLATION INSTRUCTIONS

English

Thru-Hull Mount: *Retractable with Valve*

TriSonic Smart™ Ultrasonic Sensors

UDST820 & UDST822

Patent <http://www.airmar.com/patent.html>

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

WARNINGS:

- Wear safety glasses, a dust mask, and hearing protection during installation.
- Valve is not watertight. Install the insert or blanking plug; fully seat it and tighten the cap nut.
- Lubricate all O-rings; do not dry-fit. Damaged O-rings can prevent full insertion and sealing.
- Ensure the YELLOW O-ring is installed near the top of the insert.
- For housings without a valve, ensure the insert has the BLACK O-ring near the top.
- Attach the safety wire to prevent the insert/blanking plug backing out if the cap nut fails or is installed incorrectly.
- Check for leaks immediately after launching; do not leave the boat unattended for more than 3 hours.
- Stainless housing in metal hull: Ensure the washer contacts the hull. Do not tighten the hull nut with the washer against the isolation bushing.
- Adhere to all guidelines in **Cable Routing & Connecting** on page 6.

CAUTIONS:

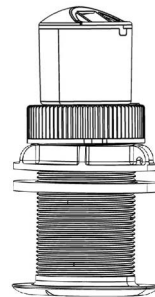
- Do not pull, carry, or hold the sensors by the cable.
- Align the insert arrow forward (toward the bow) with water flow.
- Plastic housing: Do not use a fairing; the exposed sensors can be damaged by impact.
- Metal housing: Do not install in a vessel with a positive ground system.
- Stainless housing in metal hull: Isolate the housing to prevent electrolytic corrosion; use the supplied isolation bushing.
- Do not use solvents; they can damage plastic parts, especially the transducer face.
- Do not power sand or pressure wash the transducer.

How the Ultrasonic Speed Sensor Works

The speed sensor uses ultrasonic pulses to collect echoes from small particles in the water as they pass under two transducers embedded in the insert (Figure 1). These transducers monitor the particles in their respective beams. As the boat travels through the water, both transducers 'view' the same stream of particles. Because it takes time for particles to travel between the two transducers, the aft transducer detects the particles later than does the fore transducer. By measuring this time lapse, the instrument calculates the boat speed. If the boat is airborne, even for a short time, or in highly aerated or clear water, the sensor will measure an incorrect speed.

Record the information found on the cable tag for future reference.

Part No: _____ Serial No: _____
Date: _____ Frequency: _____ kHz



Plastic
Low-profile
P617V Housing



UDST820



UDST822

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

Applications

- Not recommended for boats designed to pull air under the hull.
- Best performance on a hull deadrise angle through 7°. Accommodates up to a 22° deadrise angle.
- **Plastic** housing recommended for fiberglass or metal hull only. *Never install a plastic housing in a wood hull, since swelling of the wood can possibly fracture the plastic.*
- **Bronze** housing recommended for fiberglass or wood hull. *Never mount a bronze housing in a metal hull because electrolytic corrosion will occur.*
- **Stainless steel** housing compatible with all hull materials. Recommended for a metal hull to prevent electrolytic corrosion *provided the stainless steel housing is isolated from the metal hull.*
- **Dual Hull vessels**—Installation instructions for the UDST820 and UDST822 sensors are identical. Refer to **Dual Mode Installations** on page 6 for additional information.

CAST™ App for TriSonic Smart

Download the Airmar CAST App to evaluate your boat's performance by viewing and analyzing TriSonic sensor data. With the CAST App you can perform depth, speed, temperature, and attitude calibrations.

Install the CAST App on your iOS or Android device with Bluetooth® connectivity, then view available NMEA data over a wireless or network connection. Within the CAST App, you can link to and download the CAST App User Guide.

Proceed to **CAST™ App** on page 5 for instructions for downloading and initializing CAST on your smart device.

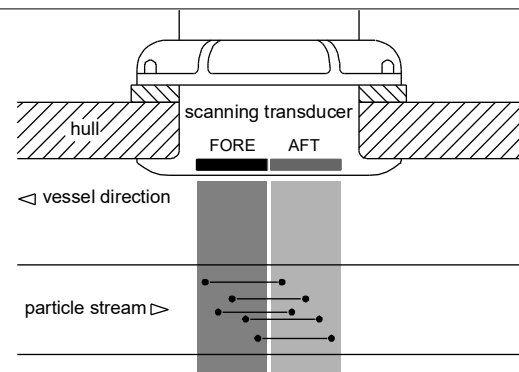


Figure 1. Monitoring particles in the water

Tools & Materials

- Safety glasses
- Dust mask
- Ear protection
- Water-based anti-fouling coating (**mandatory in saltwater**)
- Electric drill [Ø 10mm (3/8") or larger chuck capacity]
- Drill bit for pilot hole Ø 3mm or 1/8"
- Hole saw:
 - Plastic or metal housing in *non-metal* hull Ø 51 mm or 2"
 - Stainless steel housing in metal hull Ø 57 mm or 2-1/4"
- Sandpaper
- Mild household detergent or weak solvent (such as alcohol)
- File (installation in a metal hull)
- Marine sealant (suitable for below waterline)
- Slip-joint pliers (installing a metal housing)
- Grommet(s) (some installations)
- Cable ties
- Installation in a cored fiberglass hull (page 4):
 - Hole saw for hull interior Ø 60 mm or 2-3/8"
 - Fiberglass cloth and resin
 - or Cylinder, wax, tape, and casting epoxy

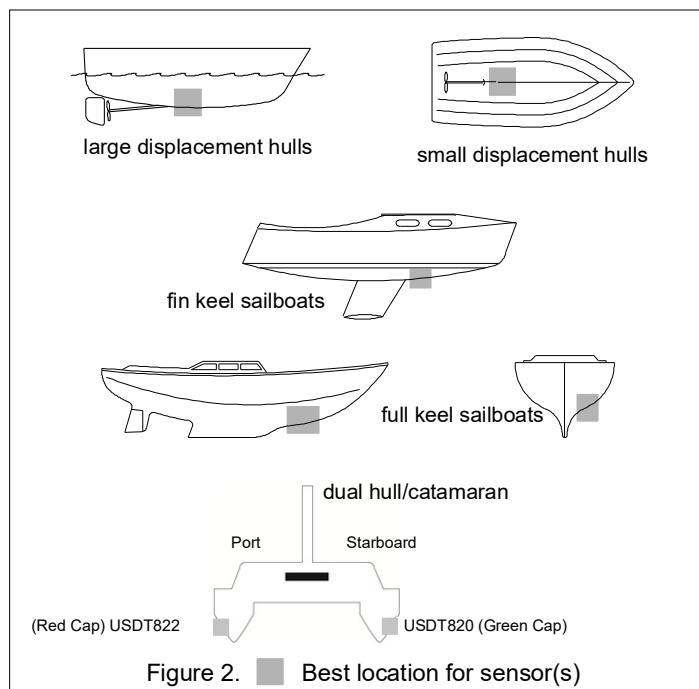
Mounting Location

CAUTION: Do not mount the sensor(s) in line with or near water intake or discharge openings, or behind strakes, fittings, or hull irregularities that will disturb the water flow.

- The water flowing under the hull must be smooth with a minimum of bubbles and turbulence, especially at high speeds.
- The sensor(s) must be continuously immersed in water at all speeds, except for Dual Mode Installations. See page 6.
- The transducer beam must be unobstructed by the keel or propeller shaft(s).
- Choose a location away from interference caused by power and radiation sources such as: the propeller(s) and shaft(s), other machinery, other echosounders, and other cables. The lower the noise level, the higher the echosounder gain setting that can be used.
- Choose a location with a minimum deadrise angle, so the transducer beam will be aimed at the bottom.
- Choose an accessible spot inside the vessel with a minimum of 280mm (11") for the height of the housing, tightening the nuts, and installing the insert.

Boat Types and Sensor Location (Figure 2)

- **Fin keel sailboats**—Mount on or near the centerline and forward of the fin keel 300 to 600mm (1–2').
- **Full keel sailboats**—Locate amidships and away from the keel at the point of minimum deadrise.
- **Displacement hull powerboats**—Locate amidships near the centerline. The side of the hull where the propeller blades are moving downward is preferred.
- **Planing hull powerboats**—Mount well aft to ensure the sensor is in contact with the water at high speeds.
- **Dual Hull/Catamaran**—For dual transducer installations, mount amidships to outside of hulls, placing the UDST820 (with GREEN shipping protection cap) to STARBOARD side and placing UDST822 (with RED shipping protection cap) to PORT side. Also see Dual Mode Installations on page 6.



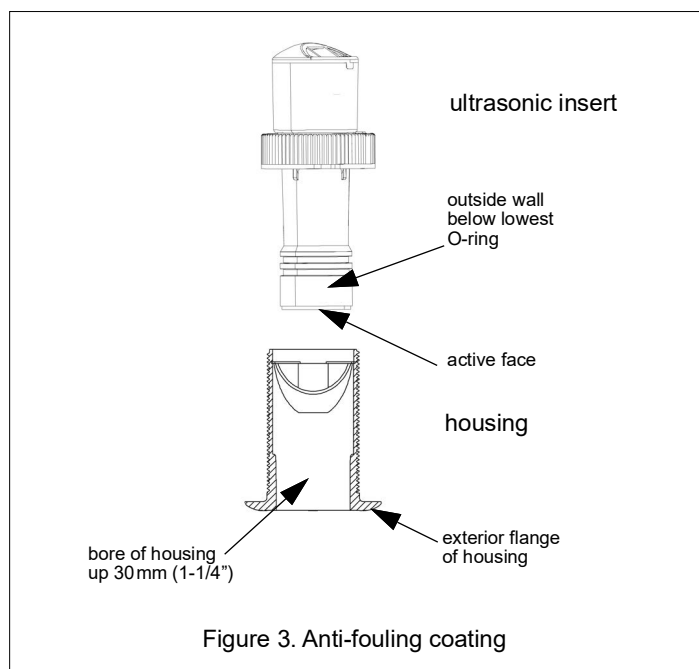
Anti-fouling Coating

Marine growth can accumulate rapidly on the sensors surfaces, reducing performance within weeks. Surfaces exposed to saltwater must be covered with an anti-fouling coating, such as FoulFree™ by Propspeed®. Use a *water-based* anti-fouling coating made for transducers only. Never use ketone based paint, since ketones can attack many plastics, possibly damaging the transducer.

It is easier to brush on anti-fouling coating before installation, but allow sufficient drying time. Re-coat every 6 months or at the beginning of each boating season.

Coat the following surfaces (Figure 3):

- Outside wall of the insert below the lowest O-ring
- Active face of the insert
- Exterior flange of the housing
- Bore of the housing up 30mm (1-1/4")
- Blanking plug below the lower O-ring including the exposed end



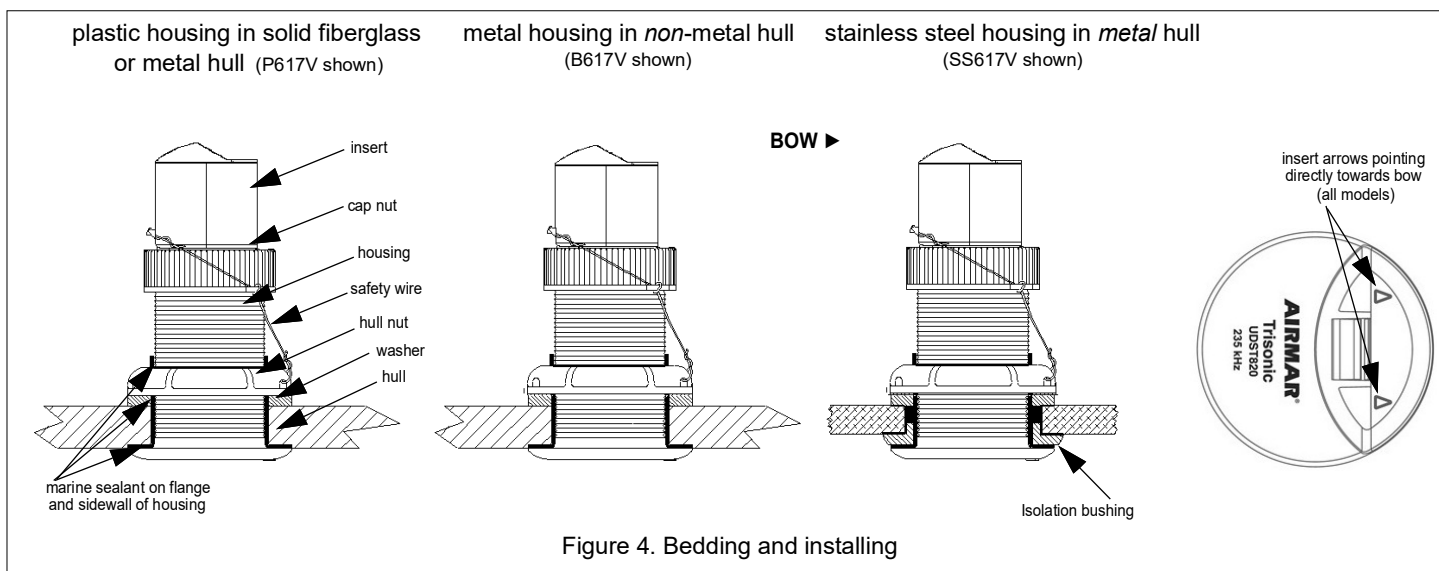


Figure 4. Bedding and installing

Installation

Hole Drilling

Cored fiberglass hull—Follow separate instructions on page 4.

1. Drill a Ø 3mm or 1/8" pilot hole from inside the hull. If there is a rib, strut or other hull irregularity near the selected mounting location, drill from the outside.
2. Using the appropriate size hole saw, cut a hole perpendicular to the hull from outside the hull.
3. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.

Metal hull—Remove all burrs with a file and sandpaper.

Bedding

CAUTION: Be sure the surfaces to be bedded are clean and dry.

Apply a 2mm (1/16") thick layer of marine sealant around the flange of the housing that contacts the hull and up the sidewall of the housing. *The sealant must extend 6mm (1/4") higher than the combined thickness of the hull, the washer, and the hull nut* (Figure 4). This will ensure there is sealant in the threads to seal the hull and to hold the hull nut securely in place.

Stainless steel housing in a metal hull—A stainless steel housing must be isolated from a metal hull to prevent electrolytic corrosion. Slide the isolation bushing onto the housing. Apply *additional* sealant to the surfaces of the bushing that will contact the hull, filling any cavities in and around the bushing.

Installing

CAUTION: The bottom of the insert must be flush with the bottom of the housing for the sensor(s) to work properly.

1. From outside the hull, push the housing into the mounting hole using a twisting motion to squeeze out excess sealant (Figure 4).
2. From inside the hull, slide the washer onto the housing.

Stainless steel housing in a metal hull—Be sure the washer contacts the hull. *Do not tighten the hull nut with the washer against the isolation bushing, as the housing will not be firmly installed.* If necessary, sand the isolation bushing until the washer rests against the hull.

3. Screw the hull nut in place.

Plastic housing—Do not clamp tightly on the wrench flats,

causing the housing to fracture.

Plastic hull nut—Hand tighten only. Do not over tighten.

Metal hull nut—Tighten with slip-joint pliers.

Cored fiberglass hull—Do not over-tighten, crushing the hull.

Wood hull—Allow for the wood to swell before tightening the nut.

4. Remove any excess marine sealant on the outside of the hull to ensure smooth water flow under the sensor(s).
5. *All the O-rings must be intact and well lubricated to make a watertight seal.* After the marine sealant cures, inspect the O-rings, including the **YELLOW** O-ring, on the insert (replace if necessary) and lubricate them with the silicone lubricant supplied. Also lubricate the bore of the housing above the valve.
6. The insert must be fully inserted into the housing and the cap nut screwed on completely to make a watertight seal. Slide the insert into the housing with the *arrow on the top pointing forward toward the bow*. Screw the cap nut several turns until the threads are engaged. Being sure the arrow on the top of the insert and the cable exit are pointing forward toward the bow, continue to tighten the cap nut completely. Be careful not to rotate the housing and disturb the sealant. **Hand tighten** only. Do not over tighten.
7. Always attach the safety wire to prevent the insert from backing out in the unlikely event that the cap nut fails or is screwed on incorrectly.

Plastic housing—Attach the safety wire to one eye in the hull nut. Keeping the wire taut throughout, lead the wire in a counterclockwise direction and thread it through one eye in the cap nut. Thread the wire through the eye a second time. Then lead the wire through the eye in the insert. Twist the wire securely to itself.

Metal housing—Wrap one end of the safety wire tightly around the housing and twist it together with the long end. Keeping the wire taut throughout, lead the wire straight up and through one eye in the cap nut. Thread the wire through the eye a second time. Then lead the wire counterclockwise and through the eye in the insert. Twist the wire securely to itself.

Installing in Housing WITHOUT Valve

To create a watertight seal in a housing that does NOT have a valve, the insert must have a **BLACK** O-ring near the top. Use Replacement O-ring Kit 20-519-01 and follow the instructions supplied.

Checking for Leaks

When the boat is placed in the water, **immediately** check around the sensor(s) for leaks. Note that very small leaks may not be readily observed. Do not leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat "Bedding" and "Installing" **immediately** (page 3).

Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the housing to become loose.

CAUTION: Completely seal the hull to prevent water seepage into the core.

1. Drill a $\varnothing$ 3 mm or 1/8" pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. (If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.)
2. Using a $\varnothing$ 51 mm or 2" hole saw, cut the hole from outside the hull through the *outer* skin only (Figure 5).
3. From inside the hull, use a $\varnothing$ 60 mm or 2-3/8" hole saw to cut through the *inner* skin and most of the core. The core material can be very soft. Apply only light pressure to the hole saw after cutting through the inner skin to avoid accidentally cutting the *outer* skin.
4. Remove the plug of core material so the *inside* of the outer skin and the inner core of the hull are fully exposed. Sand and clean the inner skin, core, and the outer skin around the hole.
5. If you are skilled with fiberglass, saturate a layer of fiberglass cloth with a suitable resin and lay it inside the hole to seal and strengthen the core. Add layers until the hole is the correct diameter.
6. Alternatively, a hollow or solid cylinder of the correct diameter can be coated with wax and taped in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.
7. Sand and clean the area around the hole, inside and outside, to ensure that the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
8. Proceed with "Bedding" (page 3).

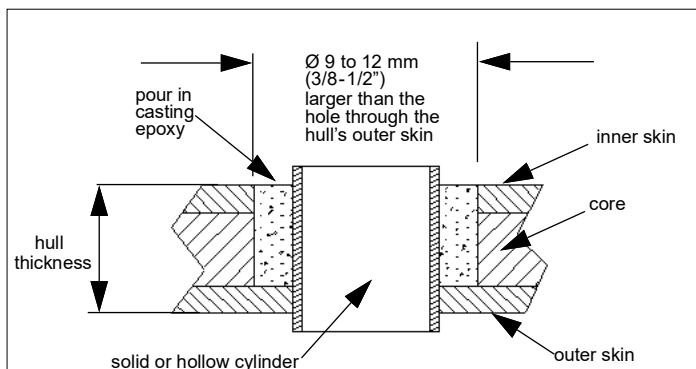


Figure 5. Preparing a cored fiberglass hull

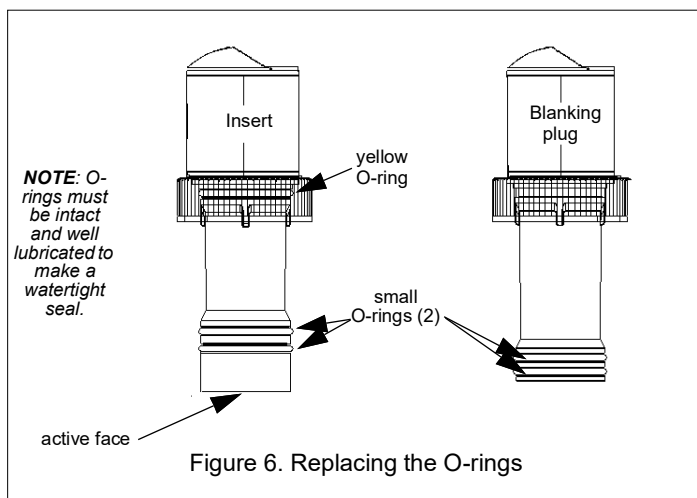


Figure 6. Replacing the O-rings

Operation, Maintenance & Parts

How the Valve Works

THE VALVE IS NOT A WATERTIGHT SEAL! The sensor incorporates a self-closing valve which minimizes the flow of water into the boat when the insert is removed. The curved flap valve is activated by both a spring and water pressure. Water pushes the flap valve upward to block the opening, so there is no gush of water into the boat. Always install the insert or the blanking plug secured with the cap nut and safety wire for a watertight seal.

Using the Blanking Plug

To protect the insert, use the blanking plug:

- When the boat will be kept in saltwater for more than a week.
 - When the boat will be removed from the water.
 - When aquatic growth buildup on the paddlewheel is suspected due to inaccurate readings from the instrument.
1. *All the O-rings must be intact and well lubricated to make a watertight seal.* On the blanking plug, inspect the O-rings (replace if necessary) and lubricate them with the silicone lubricant supplied or petroleum jelly (Figure 6).
 2. Remove the insert from the housing by removing the safety wire and unscrewing the cap nut (Figure 4). This will jack up the insert. Remove the insert with a slow pulling motion. Replace it by sliding the blanking plug into the housing.
- NOTE:** In the very unlikely event that the valve breaks, replace the housing the next time the boat is hauled.
3. With the blanking plug fully inserted, screw the cap nut several turns until the threads are engaged. Continue to tighten the cap nut completely. **Hand tighten** only. Do not over tighten.
- NOTE:** The blanking plug must be fully inserted in the housing and the cap nut screwed on completely for a watertight seal.
4. Reattach the safety wire to prevent the blanking plug from backing out in the unlikely event that the cap nut fails or is screwed on incorrectly.

Winterizing

After the boat has been hauled for winter storage, remove the blanking plug to let the water drain away before reinserting it. This will prevent any water from freezing around the blanking plug and possibly cracking it.

CAST™ App

Download the CAST app by Airmar to view, analyze, and share sensor data and evaluate your boat's performance. Install the CAST app on your iOS or Android device to view available NMEA data over a wireless or network connection (Figure 7).

With the CAST app you can perform depth, speed, temperature, and attitude calibrations. Smart devices with Bluetooth® connectivity can be used to view the data.

Within the CAST App, you can link to and download the CAST App User Guide. Simply press the **Menu** icon, and select **Help**. The Airmar **CAST™** page opens at:

<https://www.airmar.com/Software-Apps/CAST>

Also see <https://www.airmar.com/quick-start-guides>

Downloading the CAST App

1. Go to the App Store or Google Play Store.
2. Search for word "Airmar CAST."
3. Download the free CAST app.



For PSTI-compliant models - CAST

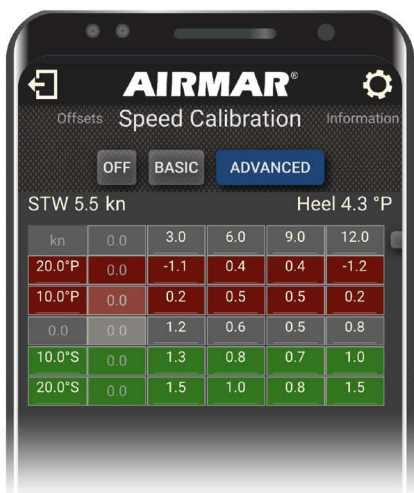
1. Obtain the QR Code from the label attached to the cable or the included CAST Quick Start Guide.
2. Follow the directions in CAST and scan the QR code when prompted.

For complete details, refer to the **Quick Start Guide**, online and included in the unit packaging.

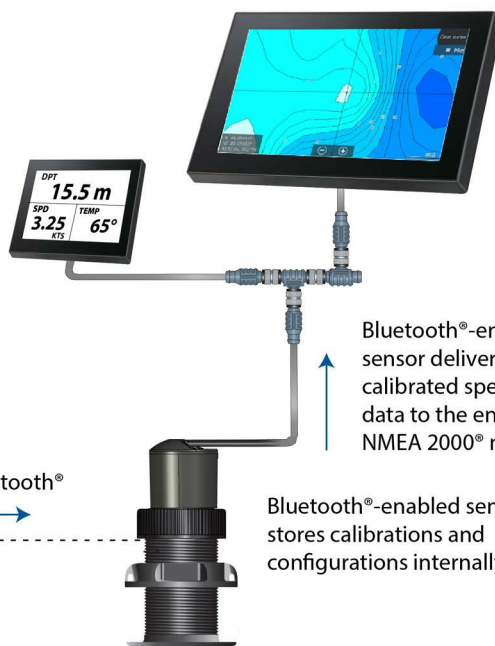
CAST App with Bluetooth®-enabled Sensor



Use the Airmar CAST™ app to calibrate speed at multiple heel angles and numerous speeds for optimal performance.



Connects via Bluetooth®



Bluetooth®-enabled sensor delivers calibrated speed data to the entire NMEA 2000® network.

Bluetooth®-enabled sensor stores calibrations and configurations internally.

Figure 7. Connecting TriSonic Smart™ Sensor to a network and the CAST™ app

Servicing the Ultrasonic Insert

CAUTION: The active face of the ultrasonic insert is easily damaged. Do not scratch, gouge, or sand it with coarse sandpaper.

Aquatic growth will seriously affect the performance of the ultrasonic insert. Clean the active face with a dull putty knife, being careful to avoid scratching the surface (Figure 6). If fouling is severe, lightly wet sand the active face with fine grade (#320) wet/dry paper.

All the O-rings must be well lubricated and free of abrasions and cuts to ensure a watertight seal. Install the O-rings on the ultrasonic insert as shown (Figure 6). The remaining O-rings are placed in similar positions on the blanking plug.

Dual Mode Installations

Vessels with dual hull configurations, such as a catamaran, can use both a UDST820 and a UDST822 for instances when one hull is not immersed in water. Refer to the CAST Quick Start Guide for information about configuring dual sensors. Place the UDST820 (with GREEN shipping protection cap) to STARBOARD side and place UDST822 (with RED shipping protection cap) to PORT side.

Dual Mode BUS Configuration

Vessels with both a UDST820 and a UDST822 must be configured on the same BUS with no other transducers present on the BUS.

CAST App with dual Bluetooth® - enabled Sensors



Use the Airmar CAST™ app to calibrate speed at multiple heel angles and numerous speeds for optimal performance.

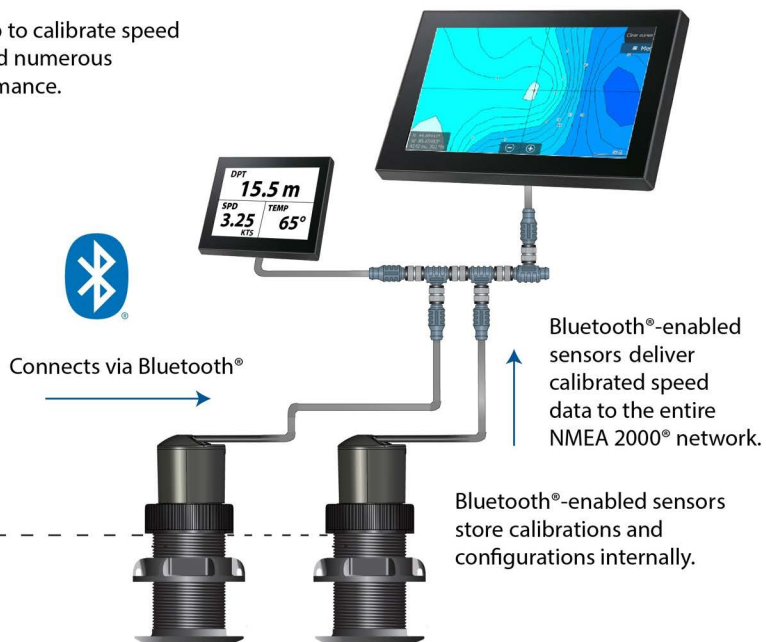


Figure 8. Connecting dual TriSonic Smart™ Sensors to a network and the CAST™ app

Cable Routing & Connecting

As each vessel has different configurations, use the following guidelines during cable routing and connecting:

- The power source must be OFF before making electrical connections.
- The power source voltage must be that specified for the model.
- Make power connections to a power source that is isolated from the engine start battery. Voltage drops may cause the sensor to lose information and / or change operating mode.
- Separate the cables by at least 1 m (3') to reduce electrical interference from other electrical wiring and any on-board equipment. Ensure that all the cable shields are appropriately grounded.
- Do not remove the waterproof connector(s) to ease cable routing. Removing the waterproof connector will void the warranty.
- Be careful not to tear the cable jackets when passing them through compartments, bulkheads, or walls. Use grommets to prevent chaffing.
- Coil any excess cable(s) and secure with cable ties to prevent damage.

Replacement Multisensor & Parts

The information needed to order a replacement Airmar sensor is printed on the cable tag. Do not remove this tag. When ordering, specify the part number, date, and frequency in kHz. For convenient reference, record this information on the top of page one.

Lost, broken, or worn parts should be replaced immediately. If you have purchased a plastic housing and have a wood hull or desire greater strength, purchase an Airmar metal housing.

For parts, contact your Distributor for local dealer information or visit <https://www.airmar.com/How-To-Buy>.

Gemeco

USA

Tel: +1 803.693.0777
email: sales@gemeco.com

Airmar EMEA

Europe, Middle East, Africa

Tel: +33.02.23.52.06.48
email: sales@airmar-emea.com

Airmar ANZ

Australia and New Zealand

Tel: +61 3 8796 8888
email: sales@airmar-anz.com



35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA

www.airmar.com

