

# OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

## Retractable Tri Multisensor

Low-profile and Flush Housings

U.S. Patents: 4,898,029; Re-issue 33, 982; Patents Pending.  
Australian Patent 605,281. Canadian Patent 1,313,775. Japanese Patent 1851014

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

### CAUTION: NEVER USE SOLVENTS

Cleaners, fuel, paint, sealants, and other products may contain strong solvents, such as acetone, which attack many plastics greatly reducing their strength.

## Applications

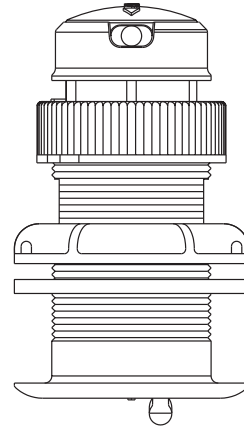
- **Plastic** housing recommended for fiberglass or metal hulls only. *Never* install a plastic housing in a wood hull since swelling of the wood may overstress the plastic causing a fracture.
- **Bronze** housing recommended for fiberglass or wood hulls. *Never* mount a bronze housing in an aluminum hull because electrolytic corrosion will occur.
- **Stainless steel** housing compatible with all hull materials.  
Recommended for metal hulls to prevent electrolytic corrosion.  
*A stainless steel housing must be isolated from a metal hull.*
- *Never* install a metal housing in a vessel with a positive ground system.

## Tools and Materials

- Water-based antifouling paint (**mandatory in salt water**)  
Safety goggles  
Dust mask  
Electric drill with 10mm (3/8") or larger chuck capacity  
Drill bit 3mm or 1/8"  
Hole saw: 51mm or 2" (plastic or bronze housing)  
57mm or 2-1/4" (stainless steel housing in a metal hull)  
Countersink tool (installing a flush housing)  
Sandpaper  
Mild household detergent or weak solvent (such as alcohol)  
File (installation in a metal hull)  
Marine sealant  
Additional washer [for aluminum hull less than 6mm (1/4") thick]  
Slip-joint pliers (installing a bronze housing)  
Zip-ties  
Installation in a cored fiberglass hull (see page 3):  
Hole saw for hull interior 60mm or 2-3/8"  
Fiberglass cloth and resin  
or Cylinder, wax, tape, and casting epoxy

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

Part No. \_\_\_\_\_ Date \_\_\_\_\_ Frequency \_\_\_\_\_ kHz



Plastic  
Low Profile

## Pretest

Connect the multisensor to the instrument and spin the paddlewheel. Check for a speed reading (and the approximate air temperature if applicable). If there is no reading or it is inaccurate, return the instrument to the place of purchase.

## Antifouling Paint

Marine growth can accumulate rapidly on the multisensor's surface reducing performance within weeks. Surfaces exposed to salt water *must* be coated with antifouling paint. Use **water-based** antifouling paint only. *Never* use ketone-based paint, since ketones can attack many plastics possibly damaging the sensor.

It is easier to apply antifouling paint before installation, but allow sufficient drying time.

Reapply paint every 6 months or at the beginning of each boating season. Paint the following surfaces (see Figure 1):

- Outside wall of the insert below the lower O-ring
- Exposed end of the insert
- Paddlewheel cavity
- Paddlewheel
- Exterior lip of the housing
- Bore of the housing up 30mm (1-1/4")
- Blanking plug below the lower O-ring including the exposed end

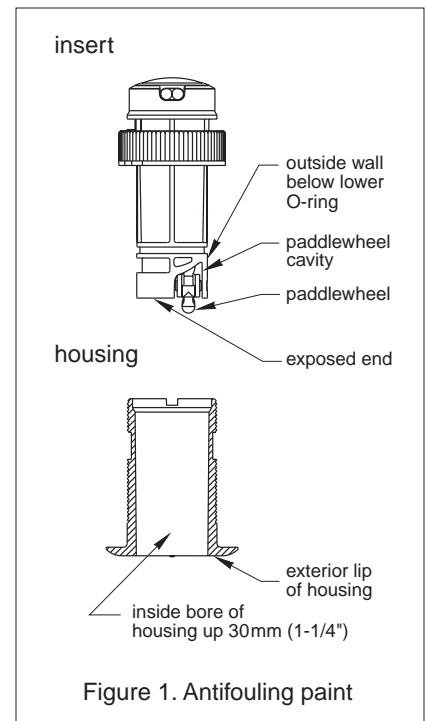
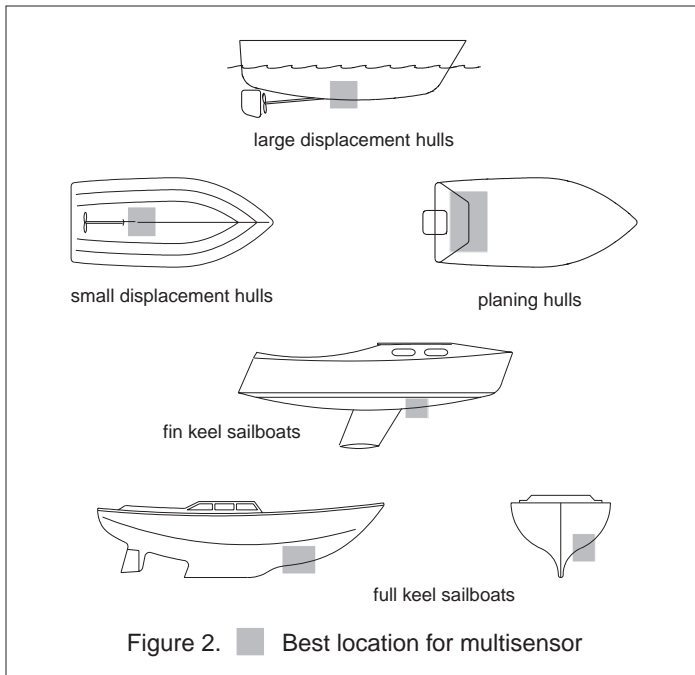


Figure 1. Antifouling paint



## Mounting Location

- The starboard side of the hull where the propeller blades are moving downward is preferred.
- The multisensor *must* be continuously immersed in water.
- The water flowing across the hull *must* be smooth with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer beam *must* be unobstructed by the keel or propeller shaft(s).
- Choose a location with a minimum deadrise angle.
- Inside the vessel, choose an accessible spot with adequate headroom for the height of the housing, tightening the nuts, and removing the insert. Allow a minimum of 280mm (11").

## Hull Types (see Figure 2)

- **Displacement hull powerboats**—Locate amidships near the centerline.
- **Planing hull powerboats**—Mount well aft, on or near the centerline, and *well inboard of the first set of lifting strakes* to insure that the multisensor is in contact with the water at high speeds.

**Outboard and I/O**—Mount just forward of the engine(s).  
**Inboard**—Mount well ahead of the propeller(s) and shaft(s).  
**Step-hull**—Mount just ahead of the first step.  
**Boat capable of speeds above 25kn (29MPH)**—Review the installation location and operating results of similar boats before proceeding.

- **Fin keel sailboats**—Mount on or as close as possible to the centerline and forward of the fin keel 300–600mm (1–2').
- **Full keel sailboats**—Locate amidships and away from the keel at the point of minimum deadrise.

**Caution:** Do not mount the multisensor in an area of turbulence or bubbles: near water intake or discharge openings; behind strakes, fittings or hull irregularities; or behind eroding paint (an indication of turbulence).

## Installation

**Cored fiberglass hull**—Follow separate instructions on page 3.

## Hole Drilling

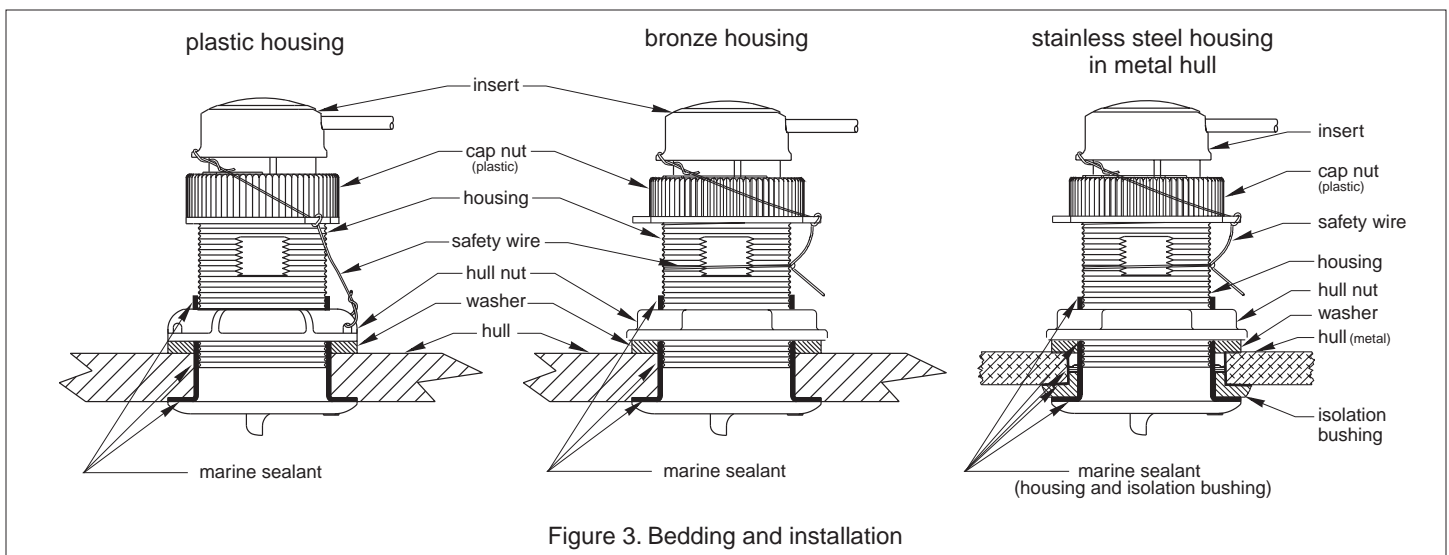
**Warning:** Always wear safety goggles and a dust mask.

1. Drill a 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 from outside the hull.  
**Flush housing**—Use a countersink tool to make a "seat" in 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

Apply a 2mm (1/16") thick layer of marine sealant around the lip 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, washer(s), and hull nut (see Figure 3). 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**—To prevent electrolytic corrosion, the stainless steel housing *must* be isolated from the metal hull. Slide the isolation bushing onto the housing. Apply additional sealant to the surfaces of the bushing that will contact the hull.



## Installing

**Caution:** Never pull, carry, or hold the multisensor by the cable as this may sever internal connections.

1. From outside the hull, push the housing into the mounting hole using a twisting motion to squeeze out excess sealant (see Figure 3). *Align the arrow on the lip of the housing to point forward toward the bow.* If the multisensor is not installed on the centerline, angle the housing slightly toward the centerline to align it with the water flow.
2. From inside the hull, slide the washer onto the housing.  
**Aluminum hull less than 6mm (1/4") thick**—Use an additional rubbery, fiberglass, or plastic washer. *Never* use bronze since electrolytic corrosion will occur. *Never* use wood since it will swell, possibly fracturing the plastic housing.
3. Screw the hull nut in place *being sure* the notch on the upper rim of the housing and the corresponding arrow on the lip are still positioned forward toward the bow.  
**Wood hull**—Allow for the wood to swell before tightening the hull nut securely.  
**Plastic housing**—*Do not* clamp tightly on the wrenching flats, possibly causing the housing to fracture.  
**Plastic hull nut**—**Hand-tighten** only. *Do not* over tighten.  
**Metal hull nut**—Tighten with slip-joint pliers.
4. Remove any excess sealant on the outside of the hull to ensure smooth water flow over the multisensor.

**Warning:** The O-rings must be intact and well lubricated to make a watertight seal.

5. After the sealant cures, inspect the O-rings on the insert (replace if necessary) and lubricate them with the silicone lubricant supplied.
6. Slide the insert into the housing with the arrow on the top pointing forward toward the bow. Screw the cap nut several turns until there is resistance. *Rotate the insert until the key engages the notch in the housing.* The arrow on the top of the insert, the cable exit, the notch in the housing, and the arrow on the lip will all be aligned. Continue to tighten the cap nut. *Be careful* not to rotate the housing and disturb the sealant. **Hand-tighten** only. *Do not* over tighten.

**Warning:** 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.

7. Attach the safety wire.

**Plastic housing**—Attach the safety wire to one eye in the hull nut. 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. 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.

**Caution:** If your multisensor came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box 33-035 and follow the instructions provided. Cutting the cable or removing the connector, except when using Airmar's junction box, will void the warranty.

8. Route the cable to the instrument *being careful* not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. To reduce electrical interference, separate the

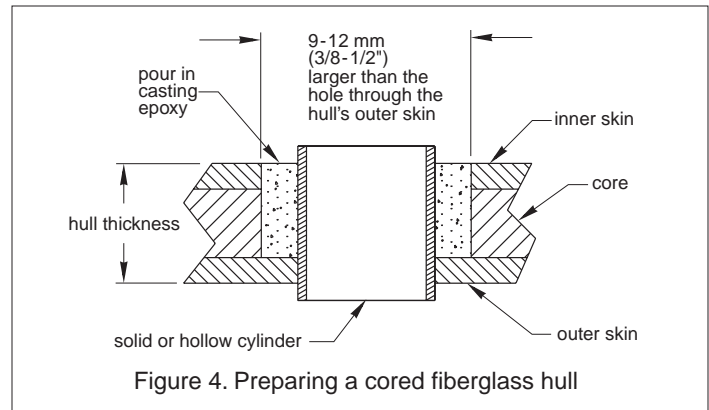


Figure 4. Preparing a cored fiberglass hull

multisensor cable from other electrical wiring and the engine. Coil any excess cable and secure it in place with zip-ties to prevent damage.

9. Refer to the instrument owner's manual to connect the multisensor to the instrument.

## Checking for Leaks

**Warning:** Never install a thru-hull multisensor and leave the boat in the water unchecked for several days.

When the boat is placed in the water, **immediately** check around the thru-hull multisensor for leaks. Note that very small leaks may not be readily observed. It is best not to 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** (see page 2).

## 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.

**Warning:** Always wear safety goggles and a dust mask.

1. Drill a 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. (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 51 mm or 2" hole saw, cut the hole from outside the hull through the *outerskin* only (see Figure 4).
3. From inside the hull, use a 60mm or 2-3/8" hole saw to cut through the *innerskin* 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 *outerskin*.
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.

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

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. 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.

- 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.
- Proceed with "Bedding" and "Installing" (see page 2).

## Maintenance, Repair & Parts

### Using the Blanking Plug

To protect the paddlewheel, use the blanking plug when the boat will be kept in salt water for more than a week, the boat will be removed from the water, or aquatic growth build-up on the paddlewheel is suspected due to inaccurate readings from the instrument.

**Warning:** The O-rings must be intact and well lubricated to make a watertight seal.

- Inspect the O-rings on the blanking plug (replace if necessary) and lubricate them with the silicone lubricant supplied or petroleum jelly (Vaseline®) (see Figure 5).
- Remove the insert from the housing by removing the safety wire. Loosen the cap nut (see Figure 2).
- With the blanking plug ready in one hand, pull the insert most of the way out. Remove the insert and rapidly replace it with the blanking plug. With practice, only 250ml (10oz.) of water will enter the boat.
- Screw the cap nut several turns until there is resistance. *Rotate the insert until the key engages the notch in the housing. Be sure the arrow on the top of the blanking plug is facing forward toward the bow.* Continue to tighten the cap nut. **Hand-tighten only. Do not over tighten.**

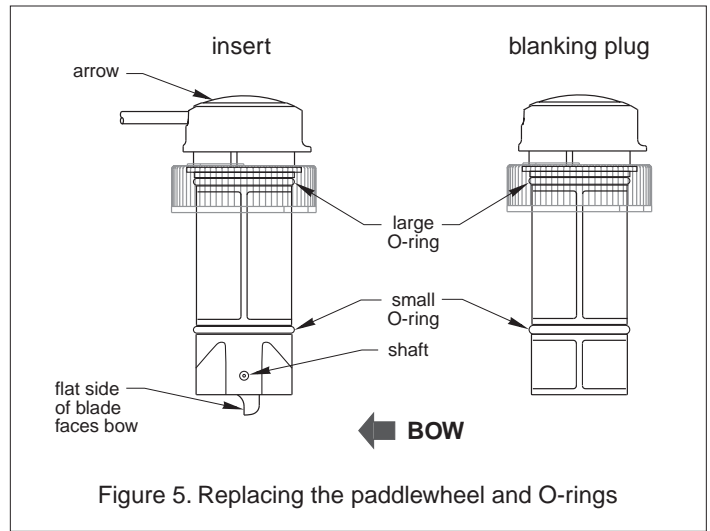
**Warning:** Always attach the safety wire to prevent the insert from backing out in the unlikely event that the cap nut fails or is screwed on incorrectly.

- Reattach the safety wire.

### Servicing the Insert

Aquatic growth can accumulate rapidly on the depth transducer's surface and impede or freeze the paddlewheel's rotation reducing performance within weeks. Clean the insert with a soft cloth and mild household detergent. If the fouling is severe, remove the paddlewheel with needle-nose pliers. Use a stiff brush or putty knife to remove the growth *taking care* to avoid scratching the depth transducer. Lightly wet sand with fine grade wet/dry paper.

The water lubricated paddlewheel bearings have a life of up to 5 years on low-speed boats [less than 10kn (11MPH)] and 1 year on high-speed vessels. Paddlewheels can fracture and shafts can bend due to impact with water borne objects and mishandling in boat yards. O-rings must be free of abrasions and cuts to ensure a watertight seal. A replacement Paddlewheel Kit 33-398-04 is available.



- Remove the old paddlewheel shaft with needle-nose pliers (see Figure 5).
- Place the new paddlewheel in the cavity with the flat side of the blade facing the same direction as the arrow on the top of the insert.
- Tap the new shaft into place until the end is flush with the outside wall of the insert.
- Install a large O-ring near the top of the insert. Install a small O-ring near the paddlewheel.
- Place the remaining two O-rings in similar positions on the blanking plug.

### Replacement Parts

Lost, broken, and 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. If you have purchased a low profile housing and prefer a flush housing, see below. Obtain the following parts from your marine dealer or instrument manufacturer.

Blanking Plug	Hull Nut	Housing, Nut & Washer	Paddlewheel, Shaft & O-rings
20-336-01	04-004 (P) 02-030 (B)	33-100 (B) 33-094-01 (SS)	33-398-04

### Multisensor Replacement

The information needed to order a replacement Airmar multi-sensor is printed on the cable tag. *Do not* remove this tag. When ordering, specify the part number, date, and frequency in kHz.