

# OWNER'S GUIDE &

# INSTALLATION INSTRUCTIONS

External-Mount, 2-3kW

**Depth Transducer** with Temperature Sensor

Models: R99, R109LH, R109LM, R109LHW, R209, R309,  
R409LWM, R509LH, R509LM, R509LHW

U.S. Patent No. 7,369,45; 8,582,393. UK Patent No. 2 414 077

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

**WARNING: Boats capable of speeds above 25 kn (29 MPH)**—You must follow these instructions for a safe installation. For boats exceeding 35 kn. (40MPH) or when the instructions cannot be met, mount an in-hull transducer. At high speeds, the fairing and/or transducer may break away from the boat.

**WARNING:** A stuffing tube is required. The stuffing tube seals the hull forming a water-tight conduit for the cable.

**WARNING:** Always wear safety goggles and a dust mask when installing.

**WARNING:** The fairing must be installed parallel to the keel to ensure proper boat handling and water flow under the transducer.

**WARNING:** Immediately check for leaks when the boat is placed in the water. Do not leave the boat in the water unchecked for more than three hours. Even a small leak may allow considerable water to accumulate.

**WARNING:** Fiberglass hull—The transducer and stuffing tube must be installed in solid fiberglass, not in coring

**CAUTION:** Aluminum hull—The stainless steel hardware must be isolated from an aluminum hull to prevent electrolytic corrosion.

**CAUTION:** Steel hull—Follow generally accepted installation practices.

**CAUTION:** Never install a metal fitting on a vessel with a positive ground system.

**CAUTION:** External mount only. The transducer will overheat if it is mounted in a hull pocket.

**CAUTION:** Never pull, carry, or hold the transducer by its cable. This may sever internal connections.

**CAUTION:** Never strike the transducer.

**CAUTION:** Tighten the nylon locking nuts with a torque wrench using a force not exceeding 27 N-m (20 ft.-lb.). Do not over tighten. It may crack the transducer and/or crush the fairing.

**CAUTION:** Never use solvents. Cleaner, fuel, sealant, paint, and other products may contain solvents that can damage plastic parts, especially the transducer's face.

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

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

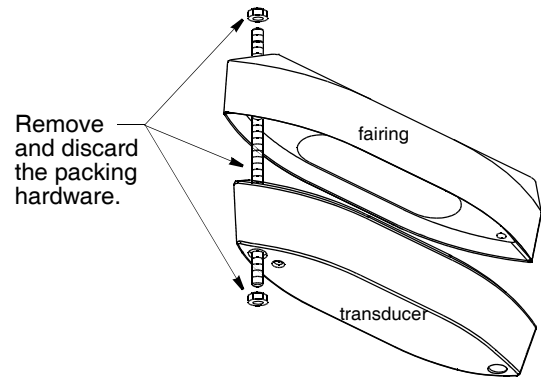


Figure 1. Packing hardware  
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**IMPORTANT:** Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

## Applications

- Recommended for all hull materials
- Not recommended for hulls less than 9 m (30') long
- Not recommended for stepped hulls. Mount an in-hull transducer
- Accommodates a deadrise angle up to 22°

## Unpacking & Pretest

Remove and discard the packing hardware (rod and 2 nuts) (see Figure 1). Connect the temperature function to the instrument and check for the approximate air temperature. If there is no reading or it is inaccurate, check the connections and test again. If there is still a problem, return the product to your place of purchase.

## Tools & Materials

Safety goggles

Dust mask

Angle finder

Band saw (blade must be very sharp)

Rasp or power tool

Electric drill

Drill bits:

pilot hole	3mm or 1/8"
fiberglass, wood, or steel hull	14mm or 9/16"
aluminum hull	15mm or 9/16"

Permanent marker

Mild household detergent or weak solvent (such as alcohol)

Sandpaper

File (installation in a metal hull)

Marine sealant (suitable for below waterline)

Wrenches

Torque wrench

Grommet(s) (some installations)

Cable ties

Water-based anti-fouling paint (**mandatory in salt water**)

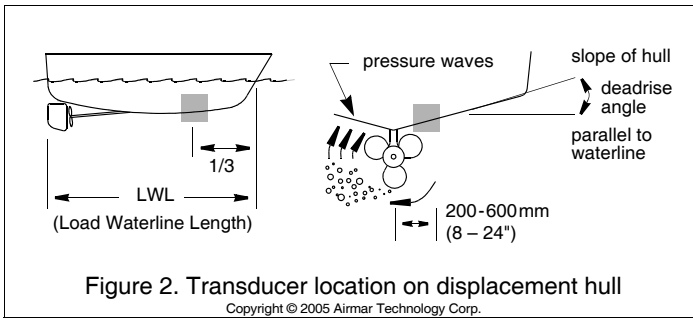


Figure 2. Transducer location on displacement hull

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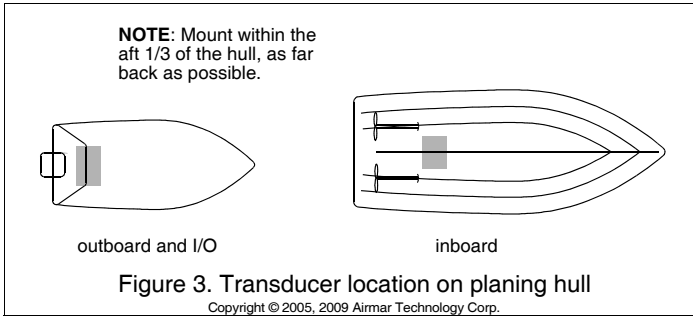


Figure 3. Transducer location on planing hull

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## Mounting Location

### Guidelines

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

**CAUTION:** Do not mount the sensor where the boat may be supported during trailering, launching, hauling, or storage to avoid damaging the transducer's face.

- The water flowing under the hull must be smooth with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer must be continuously immersed in water.
- 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 minimal deadrise angle, not to exceed 22°.
- Choose an accessible spot inside the vessel with adequate space for the height of the stuffing tube and tightening the nuts.

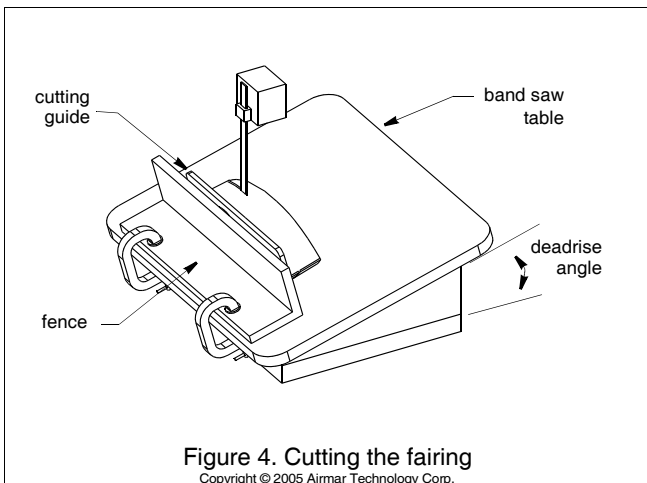


Figure 4. Cutting the fairing

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## Hull Types

- **Displacement hull powerboat**—Locate about 1/3 of the way along the LWL and 200–600mm (8–24") off the centerline (see Figure 2). The starboard side of the hull where the propeller blades are moving downward is preferred.
- **Planing hull powerboat**— (see Figure 3)
  - Mount within the aft 1/3 of the hull, as far back as possible.
    - Outboard and I/O**—Mount just forward of the engine(s).
    - Inboard**—Mount ahead of the propeller(s) and shaft(s).
  - Mount on or as close to the centerline as possible, and well inboard of the first set of lifting strakes to ensure that the transducer is in contact with the water at high speeds.
  - Mounting on the starboard side of the hull where the propeller blades are moving downward is preferred.

## Stuffing Tube

After determining the best mounting location for the transducer, install the stuffing tube. Follow the installation instructions packaged with the stuffing tube.

## Fairing: Cutting, Bedding & Installing

### Cutting the Fairing

**CAUTION:** Shape the fairing to the hull as precisely as possible. If there are gaps between the fairing and the hull near the ends, cut a new fairing. Over tightening the rods to minimize gaps may crack the transducer and/or crush the fairing.

1. Measure the deadrise angle of the hull at the stuffing tube using an angle finder or digital level (see Figure 2).
2. Tilt the band saw table to the measured angle and secure the cutting fence (see Figure 4). *Do not exceed 22°.*
3. Place the fairing on the table so the cutting guide rests against the fence (see Figures 4 and 5). Note the fairing is symmetrical.
4. Adjust the fence so the fairing will be cut in about two equal parts. The section that will become the fairing must be a minimum of 20mm (3/4") at its thinnest dimension (see Figure 6).
5. Recheck steps 1 through 4; then cut the fairing.
6. Check the fit by placing the fairing against the hull. **Be sure the fairing is parallel to the centerline of the boat (keel),** and the stuffing tube is about 2/3 of the way back in the cavity (see Figure 5). Hold the fairing on the ends and try to rock it back and forth. Shape the fairing to the hull as precisely as possible with a rasp or power tool until it no longer rocks.

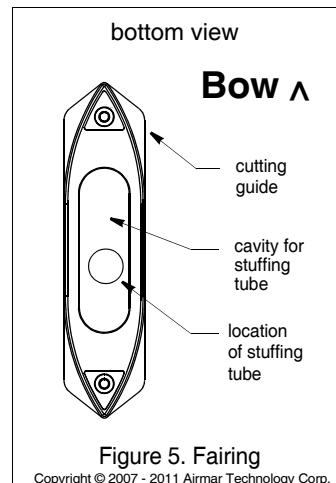


Figure 5. Fairing

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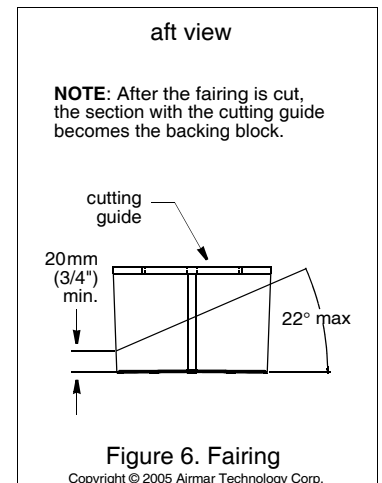
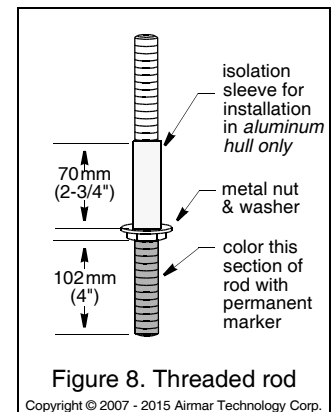
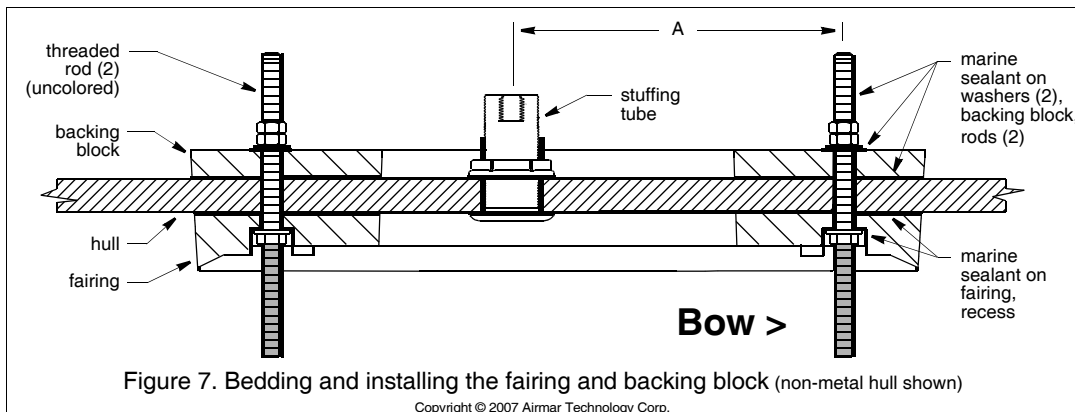


Figure 6. Fairing

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7. The remaining section of the fairing with the cutting guide will be used as the backing block inside the hull. It will provide a level surface for tightening the nuts on the threaded rods.

### Dry Fitting the Fairing

1. To locate the hole for the *forward* threaded rod (nearest the bow), measure the distance between the cable exit and the forward hole in the transducer, center to center. (The rounded bottom is forward and the temperature sensor is aft.) **Being sure the fairing will be parallel to the centerline of the boat (keel)**, measure this distance A on hull and mark the hole (see Figure 7).
2. Drill a pilot hole at the marked location. Using the appropriate size drill bit, drill the hole through the hull for one threaded rod. *Do not drill the second hole at this time.*
3. Prepare the threaded rods (see Figure 8). Using a permanent marker, draw a line on each threaded rod 102mm (4") from the end and color this section. (The colored section will be used to fasten the transducer to the fairing.) Screw a nut onto the colored section of each threaded rod *above* the 102mm (4") line drawn.
4. Place the fairing against the hull. Push the *uncolored* end of the threaded rod through the fairing and the hull until the nut rests inside the recess in the fairing (see Figure 7). With a person stationed inside the vessel, slide the backing block onto the rod. Temporarily secure the rod with a stainless steel washer and nut.
5. **Align the fairing parallel to the centerline of the boat (keel).** Using the aft hole in the fairing as a guide, drill a pilot hole. Then drill the hole using the appropriate size drill bit.
6. Remove the fairing from the hull. Clean and sand the area around the holes, inside and outside, to ensure that the marine

sealant will adhere properly. Remove any petroleum residue with a mild household detergent or a weak solvent such as alcohol.

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

### Bedding & Installing the Fairing

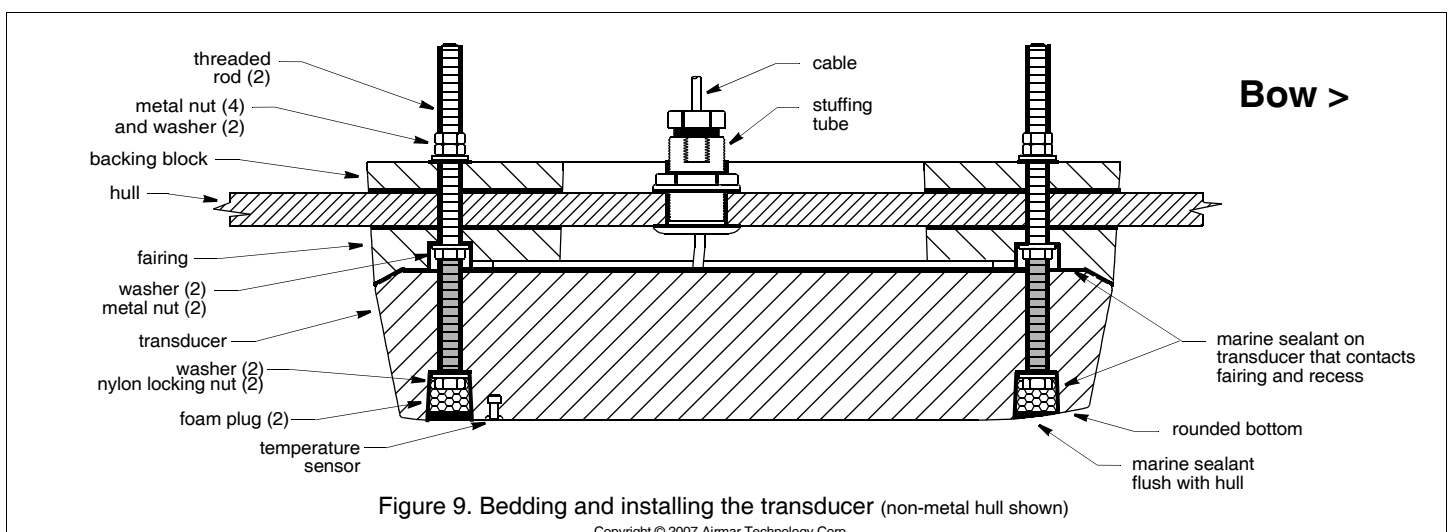
**CAUTION:** Be sure the surfaces to be bedded are clean and dry.

1. If there is any residue on the fairing and transducer, remove it with a mild household detergent to ensure the marine sealant will adhere properly.
2. Apply a 2mm (1/16") thick layer of marine sealant: (see Figure 7)
  - To the surface of the backing block that will contact the hull
  - To the surface of the fairing that will contact the hull
  - To the recesses in the fairing for the washers and nuts
  - To the threaded rods
  - To the surface of the washers that will contact the backing block

**NOTE:** Be sure the rods have marine sealant on the threads under the nuts. Back each nut off 13mm (1/2") and apply sealant to the threads. Then return each nut to the marked location on the rod.

3. Slide a washer along the *uncolored* section of each threaded rod until it rests against the nut (see Figure 8).

**Aluminum hull**—The stainless steel rods must be isolated from an aluminum hull to prevent electrolytic corrosion. Cut the isolation sleeve 70mm (2-3/4") long. Slide the isolation sleeve over the *uncolored* section of each bedded rod as far down as possible. Apply a 2mm (1/16") thick layer of the marine sealant to the outside of the sleeving.



4. Push the *uncolored* section of each threaded rod through the fairing, the hull, and the backing block until the washer rests inside the recess in the fairing (see Figure 7). With a person stationed inside the vessel, secure each rod with a washer (bedded side against the backing block) and double stainless steel nuts. Use a wrench to hold the lower nut while tightening the top nut against it.

**Aluminum hull**—The top of the isolation sleeve must be below the top of the backing block to prevent the sleeving from interfering with tightening the nuts.

**Wood hull**—Allow the wood to swell before tightening the nuts.

## Transducer: Bedding & Installing

1. Apply a 2mm (1/16") thick layer of marine sealant to the surface of the transducer that will contact the fairing including the recesses for the washers and nuts (see Figure 9).
2. Thread the transducer cable through the stuffing tube.
3. Slide the transducer onto the threaded rods being sure the *rounded bottom is facing forward toward the bow and the temperature sensor is aft*. Seat the transducer firmly within the recess in the fairing. Secure the transducer in place by applying a washer and a nylon locking nut to each threaded rod.

Tighten each nut with a torque wrench using a force not exceeding 12N-m (10ft.-lb.). *Then tighten each nut again using a force not exceeding 27N-m (20ft.-lb.).* Do not over tighten as it may crack the transducer and/or crush the fairing. **Be sure the rods extend a minimum of 3 threads beyond the nut after being tightened.**

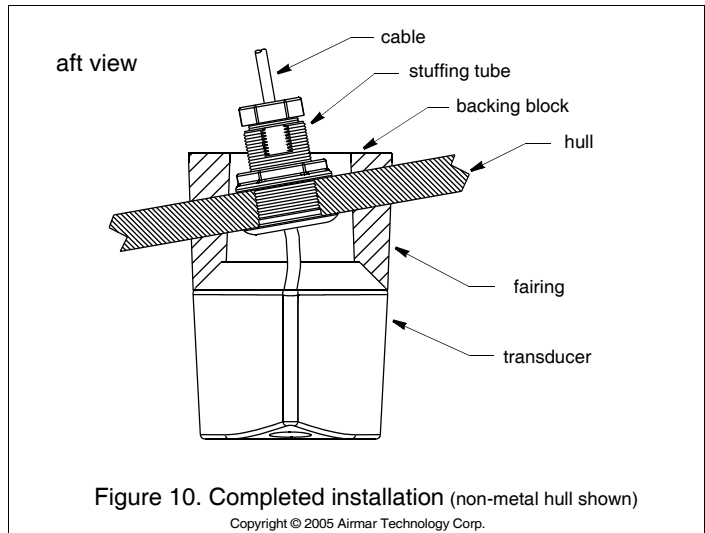
4. Plug the mounting holes to minimize turbulence on the surface of the transducer. *Be sure there is marine sealant on the exposed threads of the rods.* Cut the white foam plugs to length so that when installed, each plug is recessed 5mm (3/16") below the surface of the transducer. Push the foam plugs into the holes. Use marine sealant to fill the remaining recess flush with the transducer's surface.
5. Remove excess marine sealant on the outside of the hull to ensure smooth water flow under the transducer.

## Sealing & Routing the Cable

To form a watertight seal inside the stuffing tube, follow the installation instructions that came with your stuffing tube. The completed installation will look like Figure 10.

Route the cable to the echosounder being careful not to tear the cable jacket when passing it through the bulkhead and other parts of the boat. Use grommet(s) to prevent chafing. To reduce electrical interference separate the transducer cable from other electrical wiring and the engine. Coil any excess cable and secure it in place with cable ties to prevent damage.

Refer to your echosounder owners manual to connect the cable to the instrument.



## Checking for Leaks

When the boat is placed in the water, **immediately** check around the threaded rods and the stuffing tube for leaks. Note that very small leaks may not be readily observed. It is best not to leave the boat in the water unattended for more than 3 hours before rechecking. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat the bedding and installing procedures beginning on page 3 **immediately**.

## Maintenance, Repair & Replacement

### Anti-fouling Paint

Surfaces exposed to salt water must be coated with anti-fouling paint. Use water-based anti-fouling paint only. Never use ketone-based paint since ketones can attack many types of plastic possibly damaging the transducer. Reapply anti-fouling paint every 6 months or at the beginning of each boating season.

### Cleaning

Aquatic growth can accumulate rapidly on the transducer's surface reducing its performance within weeks. Clean it using a Scotch-Brite® scour pad and mild household detergent, being careful to avoid making scratches. In severe cases, lightly wet sand the surface with fine grade wet/dry paper.

### Replacement Transducer & Parts

The information needed to order a replacement Airmar transducer 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, and worn parts should be replaced immediately.

Fairing & Stuffing Tube 33-439-01

Obtain parts from your instrument manufacturer or marine dealer.

Gemeco Tel: 803-693-0777  
(USA) Fax: 803-693-0477  
email: sales@gemeco.com

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