

OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

In-Hull: 1-1.5kW, Adjustable-angle

Depth Transducer

Wideband Model: **M422**

Chirp Models: **M135M, M285HW**

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

07/24/18
17-620-01 rev. 03

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

WARNING: Always wear safety glasses, a dust mask, and ear protection when installing.

CAUTION: Chirp transducer—Always operate the transducer in liquid. Operating in air will allow the transducer to overheat resulting in failure.

CAUTION: The fiberglass hull below the transducer must be **SOLID**. The transducer will not transmit through coring material such as foam or balsa wood.

CAUTION: Chirp transducer—Do not install in the engine compartment or other hot place. The transducer may fail if the temperature of the liquid in the base exceeds 60° C (140° F).

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

CAUTION: Do not use an epoxy adhesive because it is too brittle.

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

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

Applications

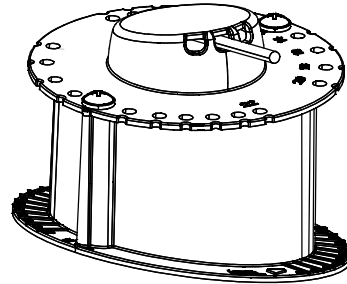
- For fiberglass hulls *only*
- Recommended for high-speed powerboats and racing sailboats
- Accommodates a deadrise angle from 0° to 22°

Tools & Materials

Safety glasses
Dust mask
Ear protection
Adhesive tape
Pole
Detergent (some installations)
Weak solvent (such as alcohol)
Disk sander (some installations)
Thin sealable plastic bag (some installations)
Cable ties (some installations)
Water-based lubricant (such as K-Y® jelly) (some installations)
Angle finder
Carpenter's square
Pencil

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

Part No. _____ Date _____ Frequency _____ kHz



Bonding material (see www.airmar.com for additional brands):

Fiberglass resin: Bondo 401
West Marine #1937762)
or Marine-Tex epoxy putty (14 oz. pack)
or 3M™ Marine Adhesive/Sealant 5200

Propylene glycol (non-toxic antifreeze/coolant) 0.4 liter (14 fl. oz.)

Petroleum jelly

Torque-limiting screwdriver

Level

Grommet(s) (some installations)

Installation in a cored fiberglass hull (page 4):

Cutting tool 20cm or 8" hole
Miniature disk sander
Casting epoxy (Polypoxy #7035/7040) or resin
Paper cup
Stirrer

Mounting Location

About Fiberglass Hulls

The fiberglass hull below the transducer must be solid. Since the hull absorbs acoustic energy, transmitting through the hull reduces the transducer's performance. Fiberglass hulls are often reinforced in places for added strength or to reduce weight. These cored areas contain balsa wood or structural foam which are poor sound conductors. **Do not locate the transducer over coring.**

Choose a Location

- Where the fiberglass is **SOLID** (no air bubbles are trapped in the fiberglass resin) and where no coring, flotation material, or dead air space is sandwiched between the inside skin and outer skin of the hull.
- Where the hull below the transducer will be in contact with the water at all times.
- Where the water flowing under the hull is smoothest with a minimum of bubbles and turbulence (especially at high speeds). Do not mount the transducer in line with or near water intake or discharge openings; or behind strakes, fittings, or hull irregularities that will disturb the water flow.
- Where the transducer beam will not be blocked by the keel or propeller shaft(s).
- 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.
- Where the deadrise angle of the hull does not exceed 22°.
- Where there is space inside the vessel for the size of the base and installing the transducer.
- **Chirp transducer**—Mount in a cool well-ventilated area away from the engine to avoid overheating the liquid inside the base.

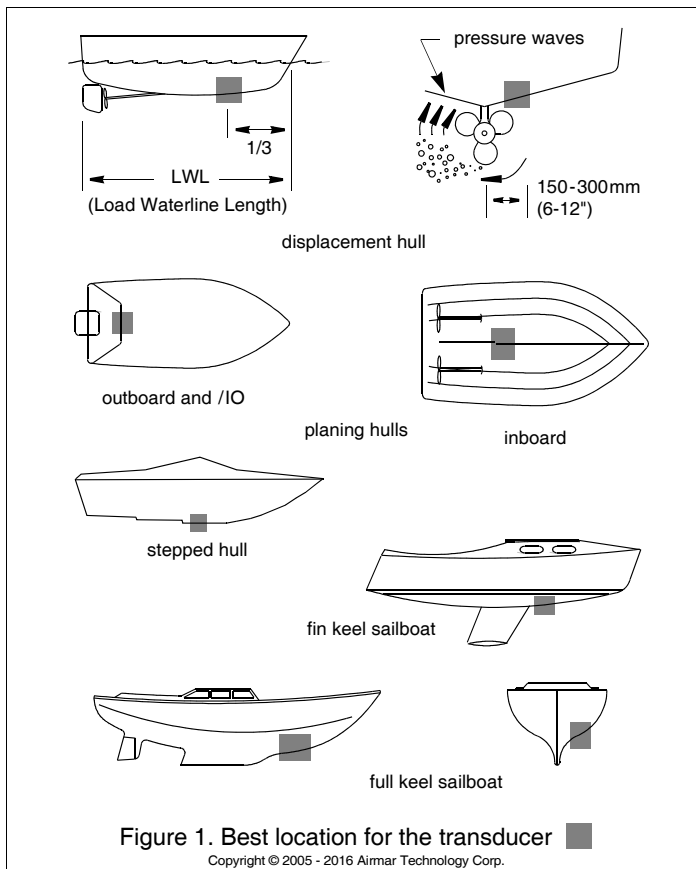


Figure 1. Best location for the transducer
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Boat Types (Figure 1)

- **Displacement hull powerboat**—Locate 1/3 of the way back along the LWL and 150–300mm (6–12") off the centerline. The side of the hull where the propeller blades are moving downward is preferred.
- **Planing hull powerboat**—Mount well aft, on or near the centerline, and *well inboard of the first set of lifting strakes* to ensure that the transducer is in contact with the water at high speeds. The side of the hull where the propeller blades are moving downward is preferred.
Outboard and I/O—Mount just forward of the engine(s).
Inboard—Mount well ahead of the propeller(s) and shaft(s).
Stepped hull—Mount just ahead of the first step.
- **Fin keel sailboat**—Mount to the side of the centerline and forward of the fin keel 300–600mm (1–2').
- **Full keel sailboat**—Locate amidships and away from the keel at the point of minimum deadrise angle.

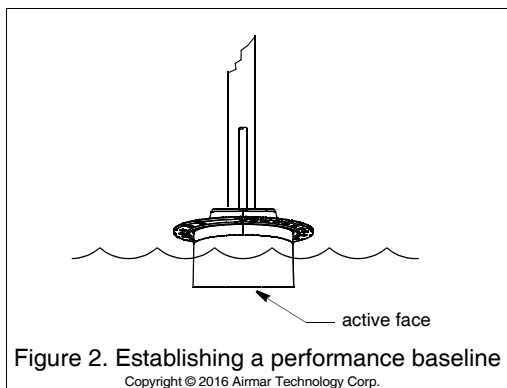


Figure 2. Establishing a performance baseline
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Testing the Selected Mounting Location
Establishing a Performance Baseline

The results of this test are used as a basis of comparison to determine the best in-hull location for the transducer. The test must be done in water to avoid overheating the transducer.

1. Take the boat to the maximum depth in which you will be operating the echosounder. If deep water is not available, find a location with at least 30m (100').
2. Remove the transducer from the base. Save the two screws and rubbery washers and be careful of the O-ring in the groove on the top of the base. Connect the transducer to the echosounder.
3. Tape the transducer to a pole with the cable side up. Hold it over the side of the boat with the active face fully submerged and parallel to the water surface (Figure 2).
4. Observe the echosounder's performance and the depth reading.

Testing the Location

While the boat is at the same site (depth of water), test the transducer inside the hull at the mounting location. Use one of the methods below:

- A. For a location near the stern and a minimal deadrise angle**—Clean away any build-up of dirt and/or grease using detergent or a weak solvent such as alcohol. Place the transducer against the hull and allow bilge water to cover the surface where they touch (Figure 3-A).
- B. For a moderate deadrise angle**—If the hull surface is not smooth, grind it with a disc sander. Place the transducer inside a thin plastic bag. Partially fill the bag with water and close it tightly with a cable tie. Wet the surface of the hull and press the active face of the transducer against it through the bag (Figure 3-B).
- C. For any location**—If the hull surface is not smooth, grind it with a disc sander. Coat the active face of the transducer with a water-based lubricant (such as K-Y® jelly). With a twisting motion, press the face firmly against the hull (Figure 3-C). After testing, wipe all traces of the lubricant from the transducer's face.

Observe the echosounder's performance, and compare it to the baseline. Look for a stable depth reading that is similar to the baseline. Compare the thickness and intensity of the bottom trace.

If the performance is close to the baseline, this is a good mounting location. Remember, some energy is lost transmitting through the hull. If the test reading differs markedly from the baseline, you will need to find another location to install the transducer.

NOTE: *If there is no reading or it is erratic, the transducer may be positioned over coring which is absorbing the acoustic energy. Choose another location. If no other location is available, check with the boat manufacturer to be certain coring is present before proceeding with the instructions for "Installation in a Cored Fiberglass Hull" (page 4).*

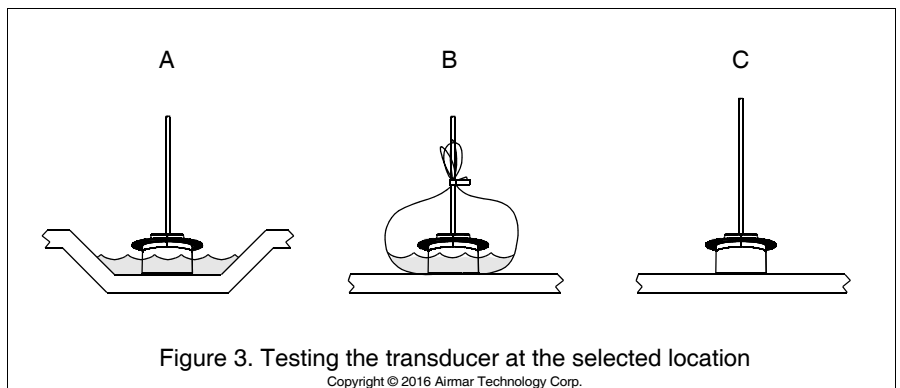
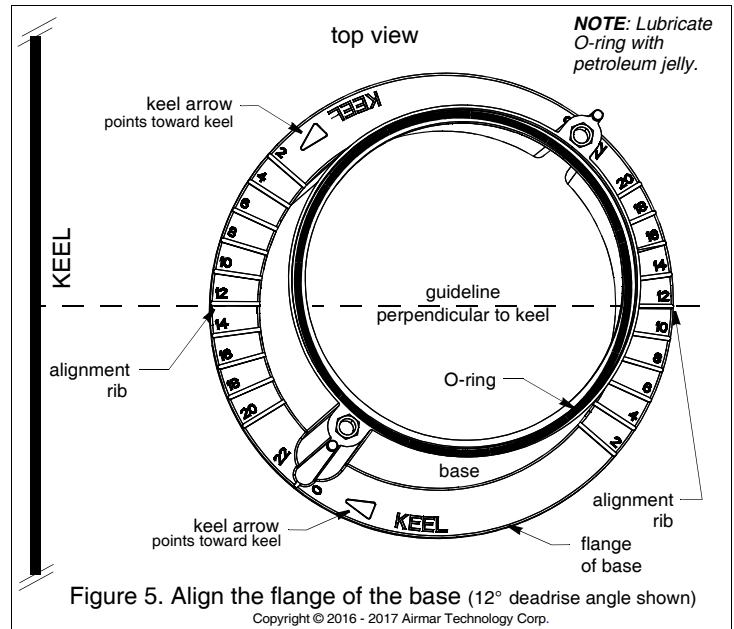
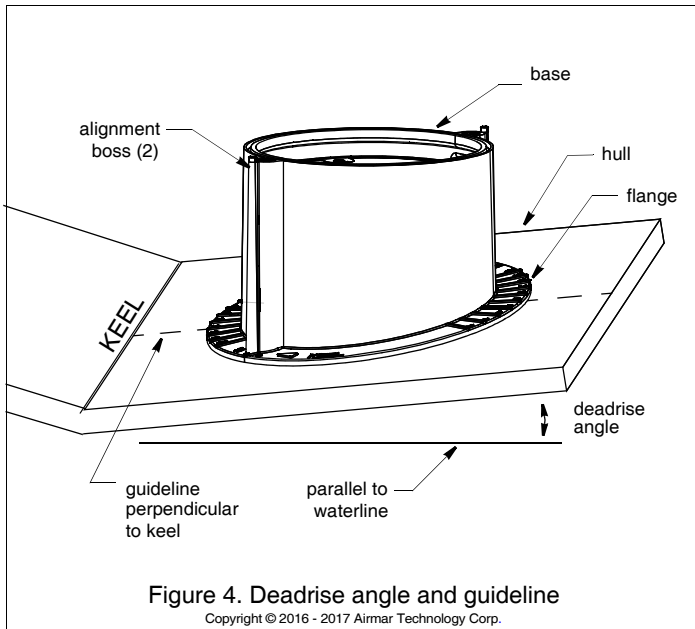


Figure 3. Testing the transducer at the selected location
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Installation

Cored fiberglass hull—Follow separate instructions on page 4.

CAUTION: The base must be liquid-tight. To ensure a tight bond, the hull surface under and around the base must be smooth, free of paint or any other finish, clean, and dry.

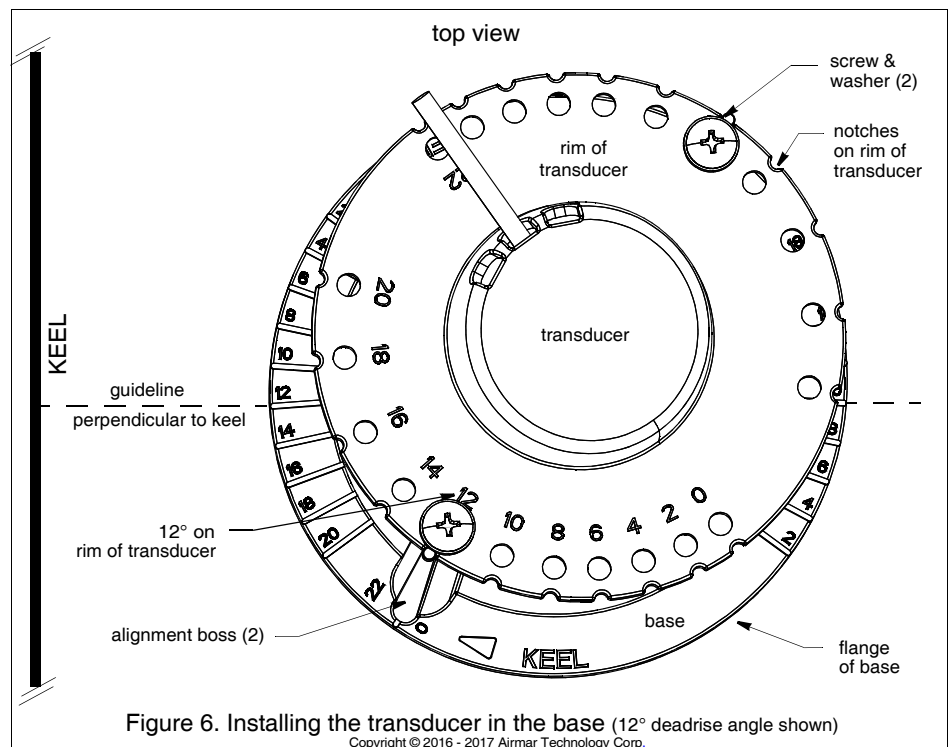
CAUTION: The top of the transducer must be level when the installation is complete.

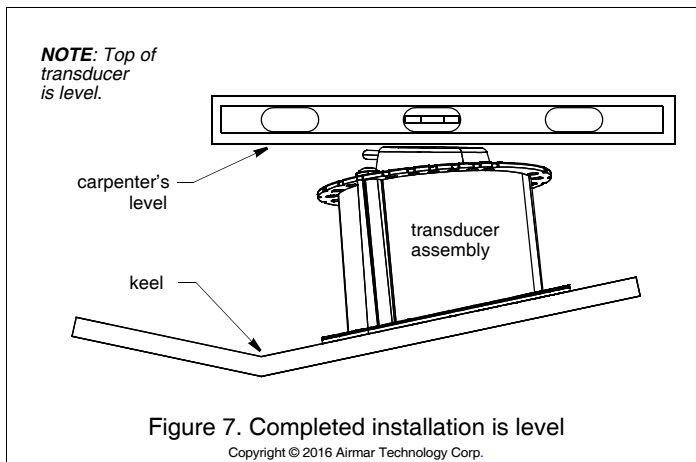
1. Measure the deadrise angle of the hull at the selected location (Figure 4). *Measure carefully, because the installed transducer must be within 5° of vertical.*
2. The hull surface to be bonded must be smooth and free of paint or any other finish. If the surface is rough, use a disk sander to smooth an area 18cm (7") in diameter.
3. To ensure a tight bond, clean and dry both the selected area of the hull and the underside of the base. Remove any dust, grease, or oil with a weak solvent, such as alcohol.
4. Using a carpenter's square, draw a line on the hull *perpendicular* to the keel through the center of the mounting location. This will be used as a guideline to orient the base.
5. The numbers on the flange of the base represent deadrise angles (Figure 5). *On the side of the flange between the KEEL arrows, identify the number that most closely corresponds to the deadrise angle of the hull. Find the matching number on the opposite side of the base. Keeping the two keel arrows aimed toward the keel, align both ribs with the guideline you drew on the hull.*
6. When you are satisfied that the location of the transducer is optimal and the orientation of the base corresponds to the deadrise angle of the boat, you are ready to bond the base to the hull. Use an approved bonding material (see "Tools & Materials" on page 1). Follow the manufacturer's instructions for use. *Press the flange firmly in place to form a liquid-tight seal.* Allow the bonding material to cure.
7. After the bonding material has cured, pour 0.4 liter (14 fl. oz.) of *propylene glycol* into the base. *Do not over fill.* Be sure to follow the manufacturer's directions for use.

8. Remove the O-ring from the base. Lubricate the O-ring with petroleum jelly. This will help to seal the transducer to the base, preventing the propylene glycol from leaking. Carefully return the O-ring to the groove in the top of the base. *Be sure it will not be gouged or cut when the transducer is screwed in place.* The O-ring must be intact and well lubricated to make a liquid-tight seal.

9. Carefully place the transducer into the base to avoid causing the propylene glycol to overflow (Figure 6). *Turn the transducer until the number on the rim that corresponds to the deadrise angle is directly over the alignment boss closest to the KEEL side of the base.* The transducer will drop into place when the two notches in the rim fit around the two alignment bosses on the base.

10. Each of the two holes in the transducer's rim will be directly over an alignment boss. Secure the transducer to the base by inserting a washer and screw into each hole. Tighten the screws using a force not exceeding 1.8 N-m (1.3ft-lb). **Do not over tighten.**





11. When the transducer assembly is installed correctly, the top will be level (Figure 7). If the deadrise angle is shallow, the transducer may appear to be level even if it is not. Use a carpenter's level to check the installation.

Cable Routing & Connection

CAUTION: If the transducer 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 No. 33-035 and follow the instructions supplied. Removing the water-proof connector or cutting the cable, except when using a water-tight junction box, will void the transducer warranty.

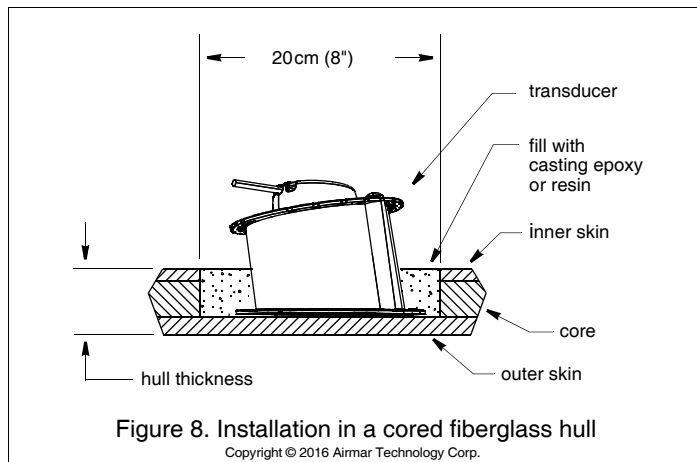
1. Route the cable to the echosounder being careful not to tear the cable jacket when passing it through the bulkhead and other parts of the boat. Use grommets to prevent chafing. To reduce electrical interference, separate the transducer cable from other electrical wiring and sources of electrical noise. Coil any excess cable and secure it in place with cable ties to prevent damage.
2. Refer to the instrument owner's manual to connect the transducer to the instrument.

Installation in a Cored Fiberglass Hull

Installation in a cored hull is difficult. The objective is to bond the base to the **inside surface of the hull's outer skin** while preventing any moisture from penetrating the core.

CAUTION: There is no way to determine if the outer skin is solid (no trapped air bubbles in the fiberglass) at the selected location before cutting the inner skin.

1. Cut a 20cm or 8" hole through the *inner* skin and the core at the selected location (Figure 8). 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* hull.

2. Remove the plug of core material, so the inner core of the hull is fully exposed. Sand the *inside surface of the outer skin* using a miniature disk sander. Slightly undercut the surrounding coring if possible.
3. Clean and dry both the *inside surface of the outer skin* and the transducer with a weak solvent, such as alcohol, to remove any dust, grease, or oil.
4. Place the base in the cavity. Fill the gap between the base and the hull with casting epoxy or resin following the manufacturer's directions for its use.
5. After the casting epoxy or resin has cured, proceed with "Installation" (page 3).

Replacement Transducer & Parts

The information needed to order a replacement 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, or worn parts should be replaced immediately. Obtain parts from your instrument manufacturer or marine dealer.

Gemeco

USA

Tel: 803-693-0777

email: sales@gemeco.com

Airmar EMEA

Europe, Middle East, Africa

Tel: +33.(0)2.23.52.06.48

email: sales@airmar-emea.com



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