

Installation manual

50/200 Combi C Echo sounder transducer



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MAXIMIZING YOUR PERFORMANCE AT SEA

SIMRAD
A KONGSBERG Company

851-165183

50/200 Combi C Transducer

Installation manual

Warning!

**The transducer cable must not be exposed to oil
or other petroleum fluids. See page 1 inside!**

About this document

Rev	Date	Written by	Checked by	Approved by
Rev.B	18.05.05	RBr	OBG	OBG
Added information about cable glands				

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Simrad Horten AS
Strandpromenaden 50
P.O.Box 111
NO-3191 Horten
Norway
Telephone: +47 33 03 40 00
Facsimile: +47 33 04 29 87

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INTRODUCTION

Purpose

The purpose of this installation manual is to provide the basic information required to install the 50/200 Combi C echo sounder transducer.

Note that although drawings are provided to explain the installation principles, the installation shipyard must provide the final drawings required to fit each individual vessel. Also, when applicable, the installation shipyard must have the drawings and installation approved by the proper authorities.

Transducer order no: **KSV-202193**

Cable gland kit **599-202182** is included with the delivery. Other cable glands must be ordered separately.

Transducer installation

The next chapter in this manual provides generic guidelines for transducer installation. The drawings specific for the 50/200 Combi C transducer are located in the *Drawing file*.

Warning!

The transducer cable must not be exposed to oil or other petroleum fluids.

Technical specifications

Refer to the 50/200 Combi C product specification, Simrad document number 855-164052.

INSTALLATION

This chapter provides general installation guidelines for transducer installation. The following topics are described:

- Transducer location
- Mounting (different methods are shown when applicable)
- Cable glands
- Steel conduit for transducer cable
- Handling and maintenance
- Approved anti-fouling paints

The information in this chapter must be regarded as general guidelines and recommendations only. The installation shipyard must design and manufacture installation hardware to fit each individual vessel.

Whenever required, the installation shipyard must also have the installation approved by the applicable maritime authorities.

Transducer location

General

A single answer to the question where to locate the transducer cannot be given. It depends very much on the vessel's construction. However, there are some important guide lines.

Go deep

The upper water layers of the sea contain a myriad of small air bubbles created by the breaking waves. In heavy seas the uppermost 5 to 10 metres may be air-filled, with the highest concentrations near the surface. Air bubbles absorb and reflect the sound energy, and may in worst cases block the sound transmission totally. Therefore, mount the transducer at a deep position on the hull.

Consider the situation when the vessel is unloaded, and when it is pitching in heavy seas. **The transducer must never be lifted free of the water surface.** Not only will the sound transmission be blocked, but the transducer may be damaged by slamming against the sea surface.

Another reason to go deep is cavitation in front of high power transducers. Cavitation is the formation of small bubbles in the water due to the resulting local pressure becoming negative during parts of the acoustic pressure cycles. The cavitation threshold increases with the hydrostatic pressure.

Vessel heave

Heave is the up and down movement of the vessel. It disturbs the echo traces in the echogram, so that a flat bottom is displayed as a wave. A transducer location in the middle of the vessel minimises the influence of vessel roll and pitch.

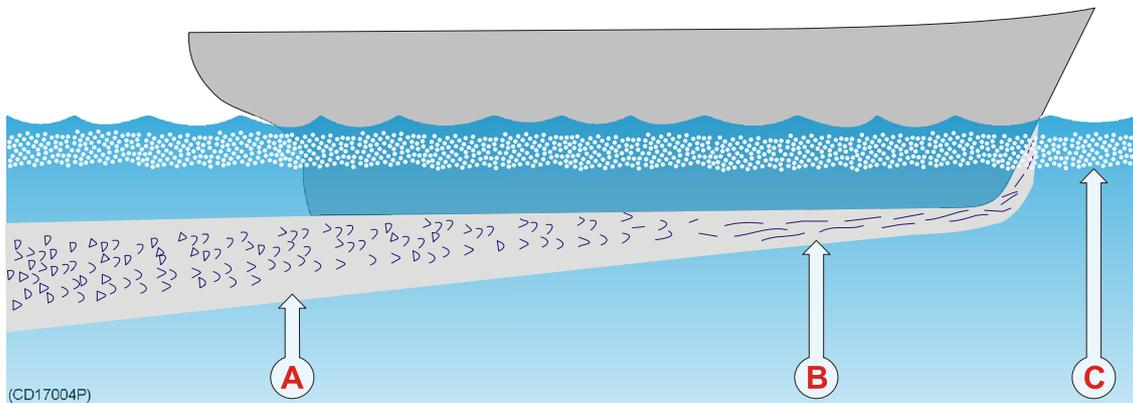
Noises from protruding objects on the hull

Objects protruding from the hull, such as zinc anodes, sonar transducers or even the vessel's keel, generate turbulence and flow noise. Also holes and pipe outlets are noise sources. They may act as resonant cavities amplifying the flow noise at certain frequencies. Do not place an echo sounder transducer in the vicinity of such objects, and especially not close behind them.

For the same reason, it is very important that the hull area around the transducer face is as smooth and level as possible. Even traces of sealing compound, sharp edges, protruding bolts or bolt holes without filling compound will create noise.

Boundary water layer

When the vessel forces its way through the sea, the friction between the hull and the water creates a boundary layer. The thickness of the boundary layer depends upon vessel speed and the roughness of the hull. Objects protruding from the hull, and dents in the hull, disturb the flow and increase the thickness of the boundary layer. The flow in this boundary layer may be laminar or turbulent. A laminar flow is a nicely ordered, parallel movement of the water. A turbulent flow has a disorderly pattern, full of eddies. The boundary layer increases in thickness when the flow goes from laminar to turbulent. The figure below illustrates the boundary layer of a vessel moving through the water.



Boundary water layers:

(A) = Turbulent flow

(B) = Laminar flow

(C) = Air bubbles in the water

Furthermore, air bubbles in the sea water are pressed down below the hull and mixed into the boundary layer. The boundary layer is thin underneath the forward part of the vessel, and increases in thickness as it moves towards aft. If the sides of the hull are steep, some of the air bubbles in the boundary layer may escape to the sea surface along the vessel sides. It is our experience that a wide and flat bottom, with a rising angle less than around 13 degrees, is prone to giving air problems for the transducer. In any case a transducer location in the forward part of the hull is preferred in order to minimise the influence of the boundary layer.

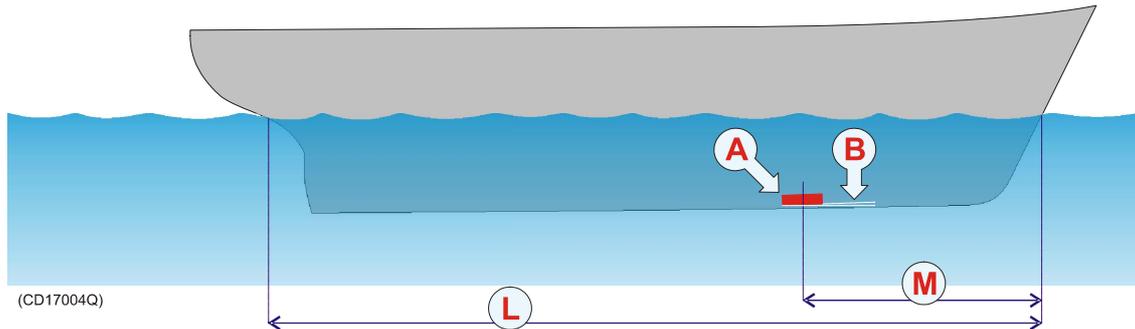
Propeller noise

The propulsion propeller is the dominant noise source on most fishing vessels, research vessels, merchant vessels and pleasure crafts. The noise is transmitted through the sea water. For this reason, the transducer should be placed far away from the propeller, which means on the fore part of the hull. Positions outside the direct line of sight from the propeller are favourable. On small vessels with short distances it is advised to mount the transducer on that side of the keel where the propeller blades move upwards, because the propeller cavitation is strongest on the other side. The cavitation starts most easily when the water flows in the same direction as the propeller blade, and that is to some degree the case at that side of the keel where the propeller blades move downwards.

Bow thruster propellers are extremely noisy. When in operation, the noise and cavitation bubbles make the echo sounder useless, almost no matter where the transducer is installed. And when not in operation, the tunnel creates turbulence, and if the vessel is pitching, the tunnel may be filled with air or aerated water in the upper position and release this in the lower position. Therefore, an echo sounder transducer should be placed well away from the bow thruster.

Summary and general recommendation

Some of the above guide lines are conflicting, and each case has to be treated individually in order to find the best compromise. Generally the propeller noise is the dominant factor, and a recommended transducer location is in the fore part of the hull, with maximum distance from the bow equal to one third of the total length of the hull at the water line.



General recommendation for transducer location:

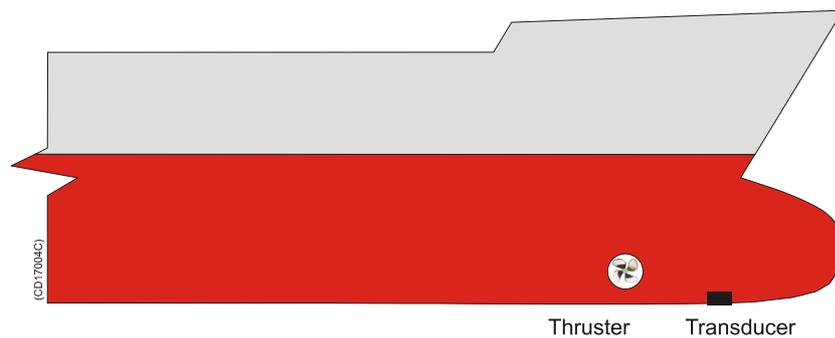
(A) = Transducer

(B) = Angle 1 - 2 degrees

(L) = Hull length at water line

(M) = Maximum 1/3 of the hull length at water line (L)

If the vessel hull has a bulbous bow, this may well be a good transducer location, but also here must be taken into consideration the flow pattern of the aerated water. Often the foremost part of the bulb is preferable.



External mounting

This transducer has a streamlined housing, and it is designed for installation outside the hull.

This transducer is mainly used on smaller vessels. A location approximately **0.5 m** aside from the keel may be adequate for the passage of water between the keel and the transducer. The figures illustrate external mounting of transducers on steel hulls and on wood or polyester hulls respectively.

Inclination of the transducer face

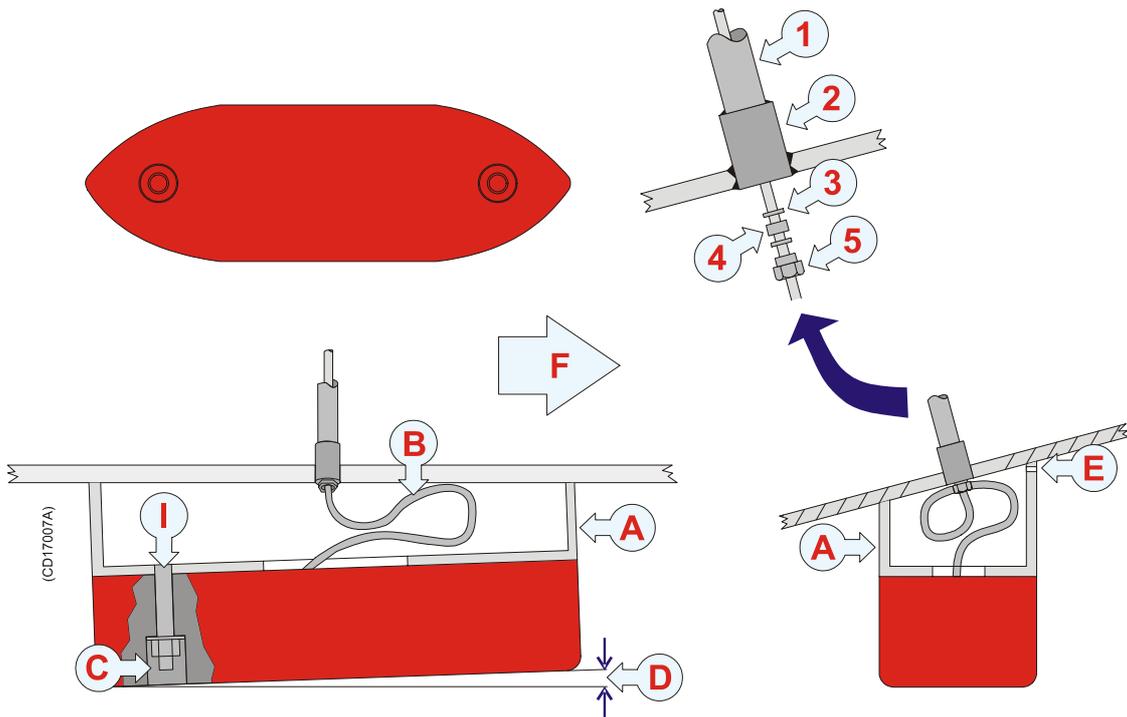
Incline the transducer face approximately 1-2 degrees (D), so that the flowing water meets it directly. This assures laminar water flow. Mounting screws must not be extruding from the transducer, and the space around the screws must be filled with a compound (C) and/or a locking ring.

Smooth surface

Ensure that the surface of the transducer face, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulent flow.

Steel hull

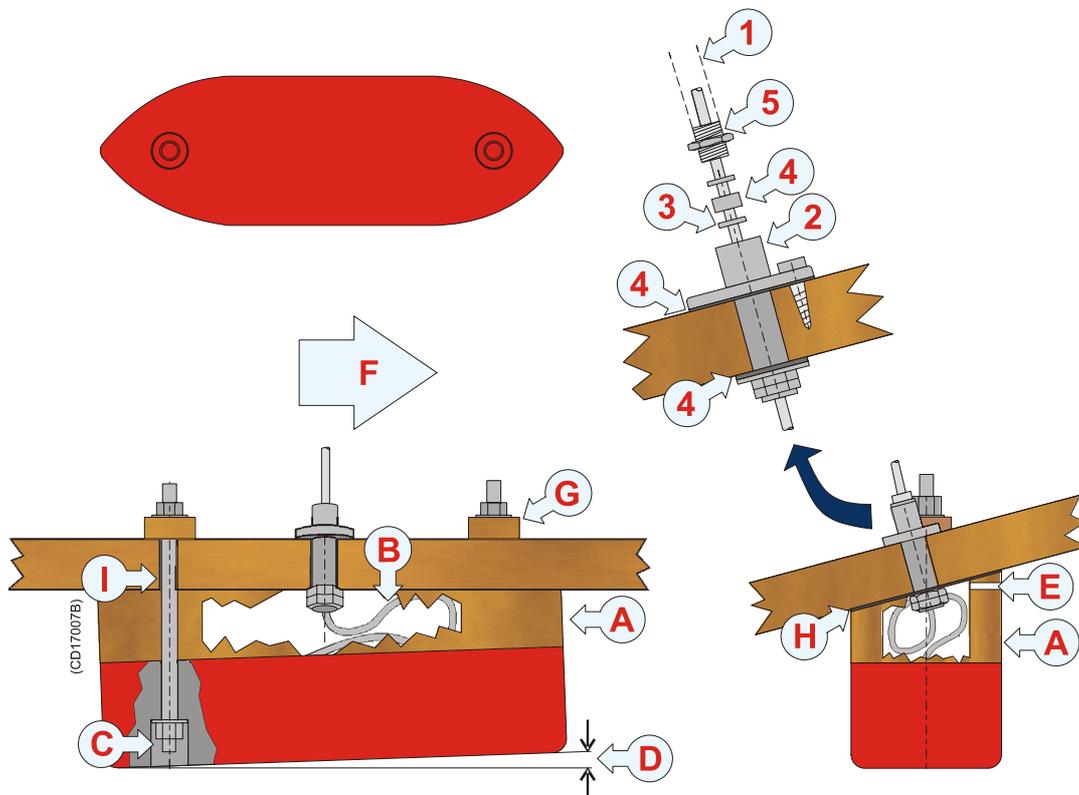
A fairing (A), made by the shipyard, is placed between the transducer and the hull. It is required in order to adapt for the deadrise angle of the hull, and it will also house a cable service loop (B). The fairing can be made of wood or steel, and should have the same outline dimensions as the transducer. Remember to create an air outlet (E) on the fairing, and to fill the bolt holes with a filling compound to ensure a smooth transducer surface.



- | | |
|---|----------------------|
| (A) = Fairing | (1) = Steel conduit |
| (B) = Cable service loop | (2) = Stuffing tube |
| (C) = Filling compound | (3) = Washer |
| (D) = 1-2 degrees inclination | (4) = Rubber gasket |
| (E) = Air outlet | (5) = Packing nipple |
| (F) = Forward | |
| (I) = Threaded rod with nuts and washers, or bolt | |

Wood or polyester hull

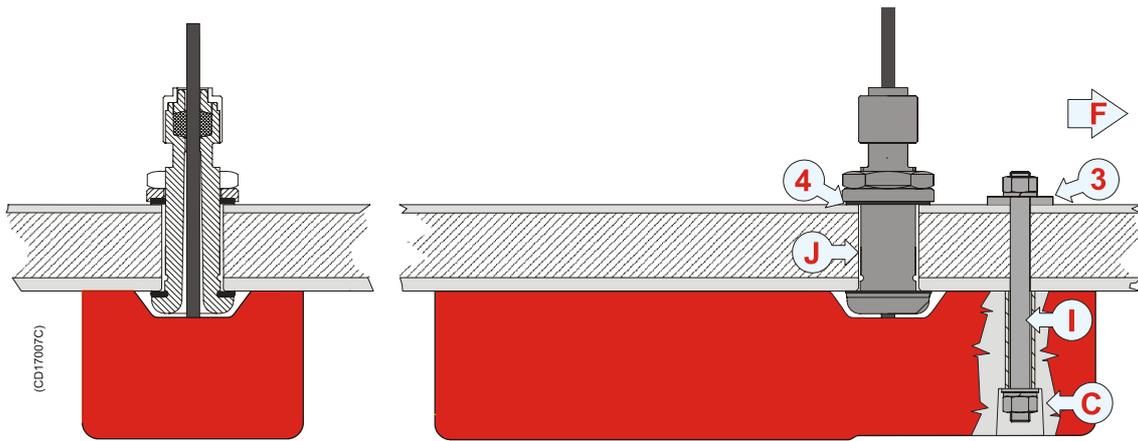
A fairing (A), made by the shipyard, is placed between the transducer and the hull. It is required in order to adapt for the deadrise angle of the hull, and will also house a cable service loop (B). The fairing is made from wood, polyester or steel, and should have the same outline dimensions as the transducer. Use tarred felt (H) between the fairing and the hull. Remember to create an air outlet (E) on the fairing, and to fill the bolt holes with a filling compound to ensure a smooth transducer surface.



- | | |
|--|----------------------|
| (A) = Fairing | (1) = Steel conduit |
| (B) = Cable service loop | (2) = Stuffing tube |
| (C) = Filling compound | (3) = Washer |
| (D) = 1-2 degrees inclination | (4) = Rubber gasket |
| (E) = Air outlet | (5) = Packing nipple |
| (F) = Forward | |
| (G) = Shim (wood) | |
| (H) = Tarred felt | |
| (I) = Threaded rod with nuts and washers | |

Flat hull

If the vessel's hull is flat you do not need a fairing. The transducer is then be bolted directly to the hull using two bronze or stainless steel bolts (I) and a cable bushing. Note that the cable bushing must be mounted with proper gaskets (4) under and over the hull, as well as sealing compound (J) around the its body. Also, fill the bolt holes with a filling compound to ensure a smooth transducer surface.



(C) = Filling compound

(3) = Washer

(F) = Forward

(4) = Rubber gaskets

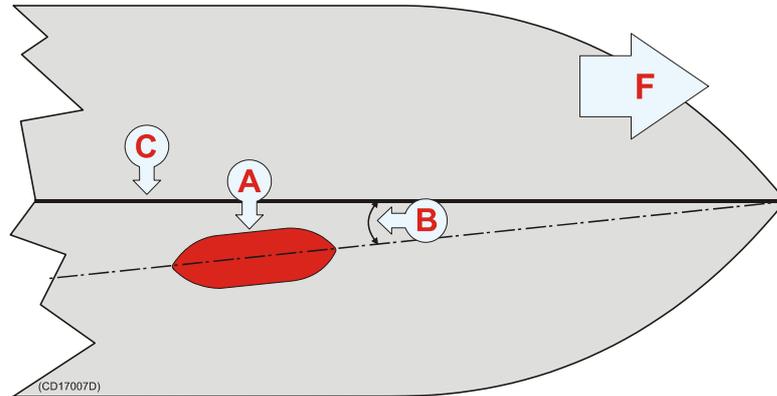
(I) = Threaded rod with nuts and washers

(J) = Sealing compound

Longitudinal angle

On displacement hulls, the transducer (A) must be mounted in an angle of 5 to 8 degrees (B) in relation to the keel (C).

With a planing hull, this angle must be 0 degrees.



(A) = *Transducer*

(B) = *5 to 8° on displacement hulls, 0° on planing hulls*

(C) = *Keel*

(F) = *Forward*

Cable glands

The transducer cable must pass through the hull using approved cable glands for the type of vessel in question.

A **steel** cable gland is normally used on professional vessels with steel hulls. A **bronze** cable gland can be delivered as an option for vessels with wood or fibreglass construction. Vessel not to be classified can as an option use a cable gland made of **plastic**.

Note

Simrad strongly recommends that a length of conduit is fitted around transducer cable glands made of steel or bronze and extended over the water-line inside the vessel. This precaution reduces the danger of flooding in the event of gland failure and transducers installed in this manner are also easier to replace.

Some vessels may experience difficulties finding suitable areas of the hull for mounting transducer cable glands due to existing water tanks, concrete ballast or other obstacles. A possible solution in such cases is to run the transducer cables in a steel conduit aft along the hull until a suitable cable gland location is available. The respective cable gland can then be installed as described in the following instructions.

Note

Simrad takes no responsibility for the correct installation of cable glands, associated hull modifications and/or structural support of transducer cable penetration. These activities are subject to individual approval by the respective classification society for the vessel in question.

Order numbers

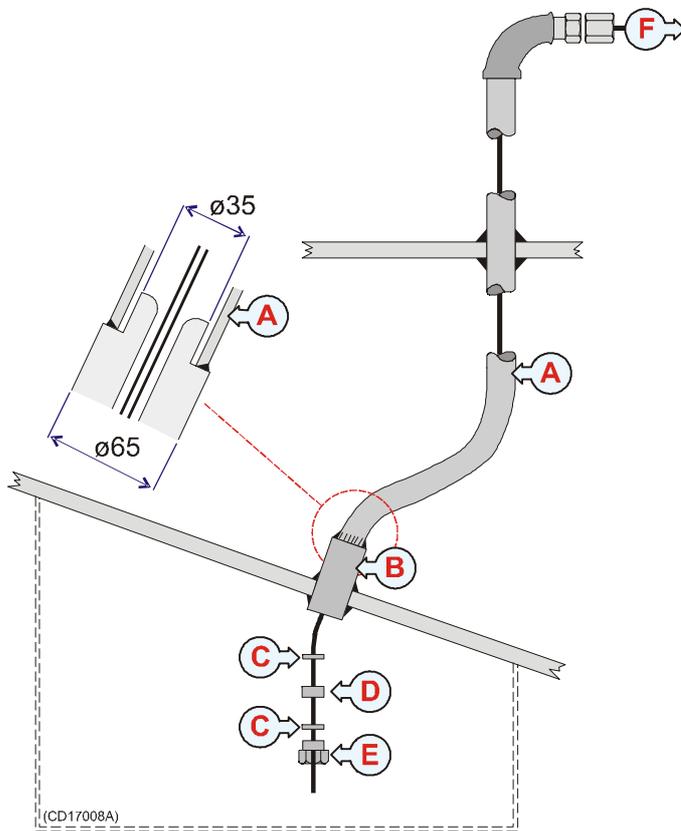
Steel hull cable gland kit: 599-202216

Wood/GRP hull cable gland kit: 119-038200

Small vessel cable gland kit: 599-202182

Cable gland installation for steel hulls

This cable gland kit is designed for steel vessels. It must be welded to the hull plates.



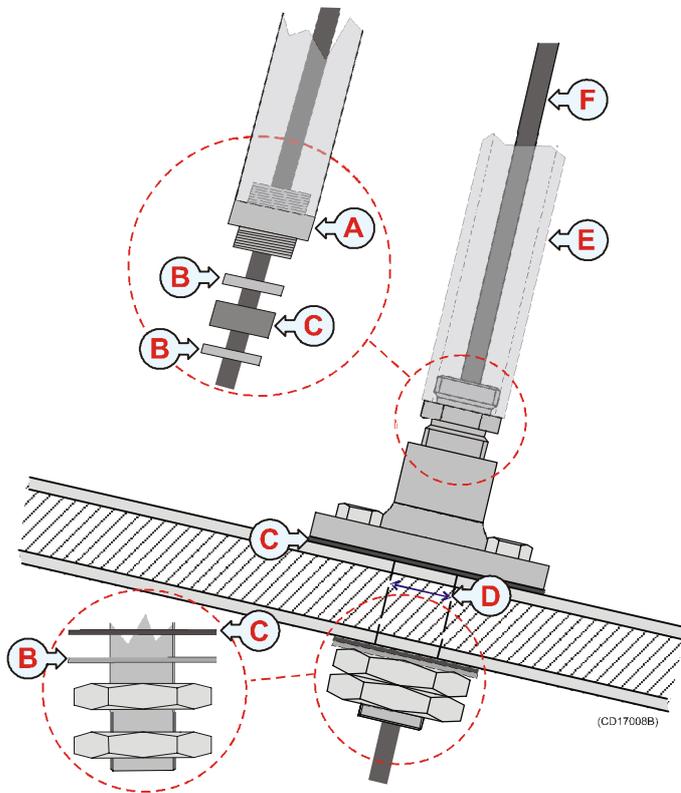
- (A) = Steel conduit
- (B) = Stuffing tube, DNV approved carbon steel st52.3
- (C) = Washers, 24 x 8 x 2 mm
- (D) = Rubber gasket
- (E) = Packing nipple. Make sure that you do not damage the transducer cable by tightening the packing nipple too hard!
- (F) = Cable to the echo sounder (or a junction box)

The gland kit includes all of the necessary parts needed to install the unit excluding screws.

Simrad recommends that a one inch steel conduit (that the transducer cable will be run through) with an inside threaded diameter of three-quarter inches is welded to the gland's stuffing tube. The conduit must extend to above the vessel's water line.

Gland installation for wood or GRP hulled vessels

A bronze cable gland kit is available for wood and GRP vessels.



(A) = Packing nipple. Make sure that you do not damage the transducer cable by tightening the packing nipple too hard!

(B) = Washers

(C) = Rubber gaskets

(D) = Hole diameter 28 mm

(E) = Steel conduit

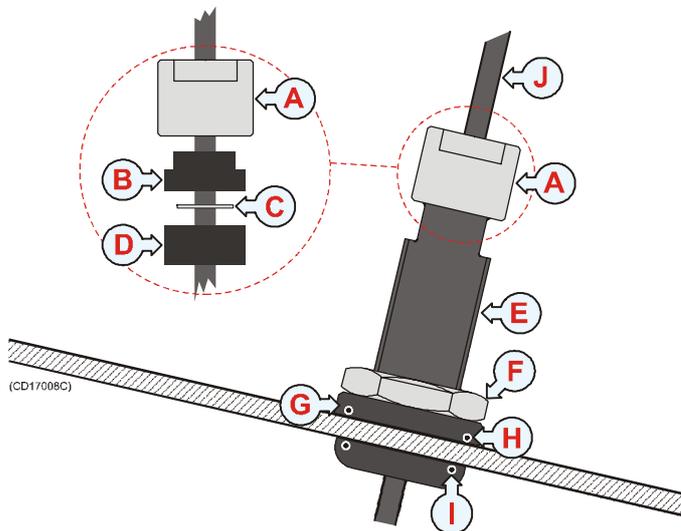
(F) = Cable to the echo sounder (or a junction box)

The gland kit includes all of the necessary parts needed to install the unit excluding screws.

Simrad recommends that a one inch steel conduit (that the transducer cable will be run through) with an inside threaded diameter of three-quarter inches is attached to the gland's packing nipple. This connection must be watertight, and the conduit must extend to above the vessel's water line.

Cable gland installation for smaller vessels

This cable glands made of plastic is designed for those smaller vessels that do not need to be classified.



(A) = Packing nut (bronze).
 Ensure that you do not to damage the transducer cable by tightening the packing nut too hard!

(B) = Rubber gasket

(C) = Plastic disk

(D) = Rubber gasket

(E) = Stuffing tube

(F) = Backing nut (bronze)

(G) = Backing washer (plastic)

(H) = O-ring 42.5 x 3.0 N

(I) = O-ring 39.5 x 3.0 N

(J) = Cable to the echo sounder (or a junction box)

Stuffing tube hole diameter: 36 mm ±1.5 mm.

Apply ample amount of sealant between the backing washer (H) and the hull plate.

The cable gland kit contains all the listed parts, except the sealant.

Note *The two O-rings must be clean, in good condition and free of cuts or other defects which could affect their water-tight integrity.*

Splicing

If you need to cut the transducer cable, you must splice it correctly.

Note *DO NOT solder the wires together with only electrical tape for insulation, as this will result in electrical noise and reduced operational performance.*

To splice the cable, use a metal junction box. The chassis of the junction box must be grounded, but the cable shielding must NOT be connected to the junction box ground.

Cable in steel conduit

It is strongly recommended to lay a steel conduit from the transducer's cable gland to the echo sounder transceiver, and to pull the transducer cable through this conduit. There are two reasons for this.

- First, it will make it easier at a later stage to replace the transducer.
- Second, noise and interference from other electrical equipment is greatly reduced.

With a steel conduit the installation will satisfy the EU regulations for EMC interference. Without a steel conduit, there is a risk of reduced echo sounder performance.

The steel conduit must be unbroken and watertight from the transducer to above the water line. From there, the cable can be pulled further, or a junction box can be installed to facilitate further connections. Note that the steel conduit must act as a continuous electrical screen all the way. To ensure proper shielding, the conduit must be electrically connected to the echo sounder transceiver chassis.

Steel conduit dimensions:

- minimum 35 mm inner diameter
- minimum 6 mm wall thickness (4.5 mm if galvanised).

If two or more transducers are installed close to each other it is possible to pull their cables in the same steel conduit, provided the conduit diameter is increased accordingly. However, for easy replacement it is recommended that each transducer has its own steel conduit.

Handling and maintenance

Do not lift the transducer by the cable.

Some transducers are delivered with a cover plate on the face for protection during transport. Let this plate stay on as long as possible, but do not forget to remove it before the vessel goes into the sea.

An anti-fouling paint may be applied to the transducer face. Because some paint types may be aggressive to the polyurethane in the transducer face, please consult Simrad's list of approved paints on the next page.

Note

Arctic tanks have acoustic windows made of polycarbonate. These must neither be painted nor cleaned with chemicals.

During dry docking of the vessel, the transducer face may be cleaned for shells and other marine fouling. Be careful not to make cuts in the transducer face. Use a piece of wood or a very fine grade emery paper.

Approved anti-fouling paints

This is Simrad's list of approved antifouling paints on polyurethane transducer housing.

From Jotun Paints, Sandefjord Norway:

- Antifouling Seamate HB 33
- Antifouling Seamate HB 66
- Antifouling Seamate HB 99
- Racing
- Non-stop

From International Paints:

- Intersleek tie coat + 425 FCS
 - BXA386/BXA390/BXA391 Grey
 - HKA563/HKA570/HKA571 Yellow

Mix BXA386, BXA390 and BXA391 first, then apply. When dry, mix HKA563, HKA570 and HKA571, apply.

From Hempel IFA Coatings AS:

- Hempel A/F Classic 76550

From Jotun-Henry Clark Ltd:

- Anti-fouling Seaguardian

Note

Refer to the manufacturer's documentation and data sheets for a complete procedure.

DRAWING FILE

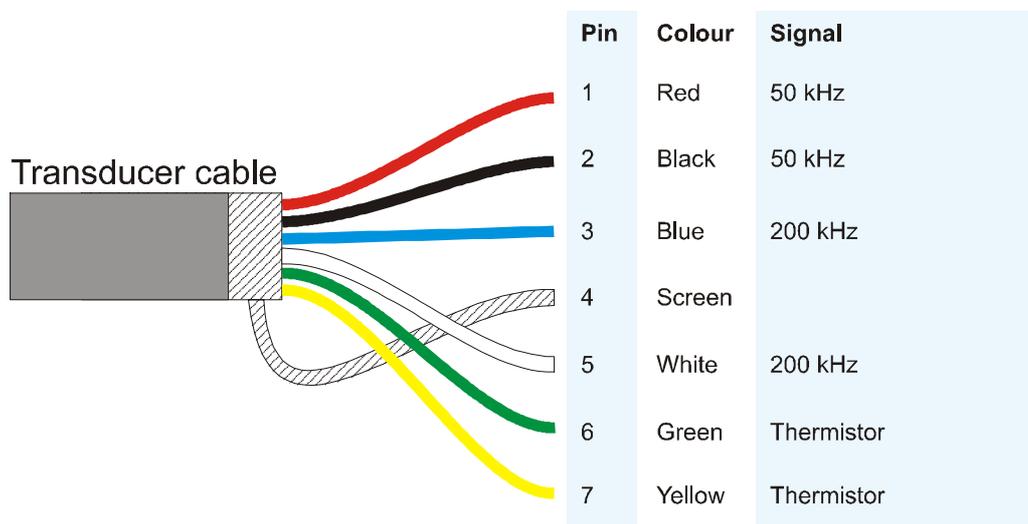
The following installation drawings have been included.

Note

These drawings are for information and guidance only. They are not in scale. All dimensions are in mm unless otherwise is noted.

The drawings are available on AutoCad and/or PDF format.
Contact your local Simrad dealer for assistance.

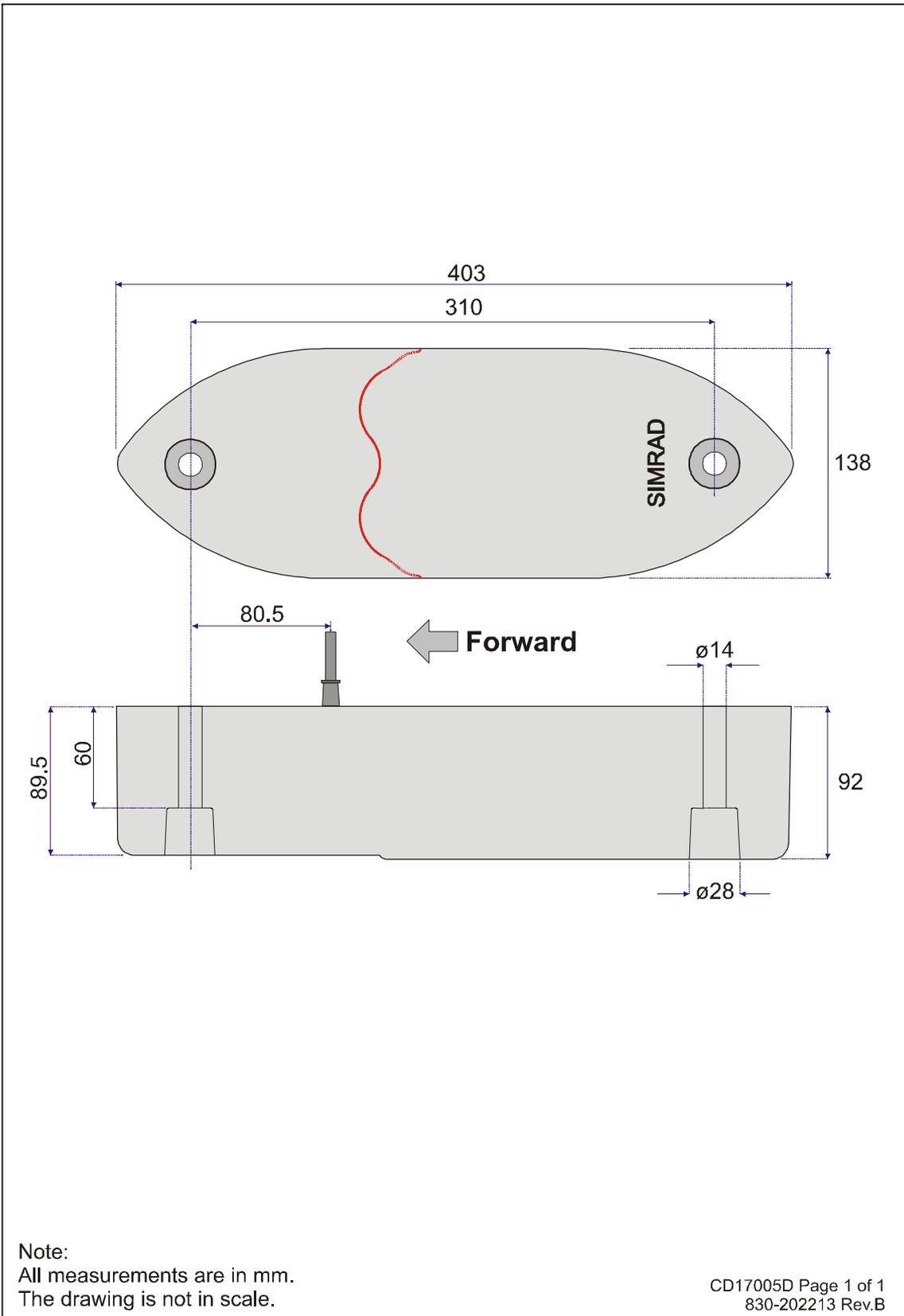
- *Wiring (830-202218), page 20*
- *Outline drawing (830-202213), page 21*
- *Recommended mounting arrangement (830-201729), page 22*



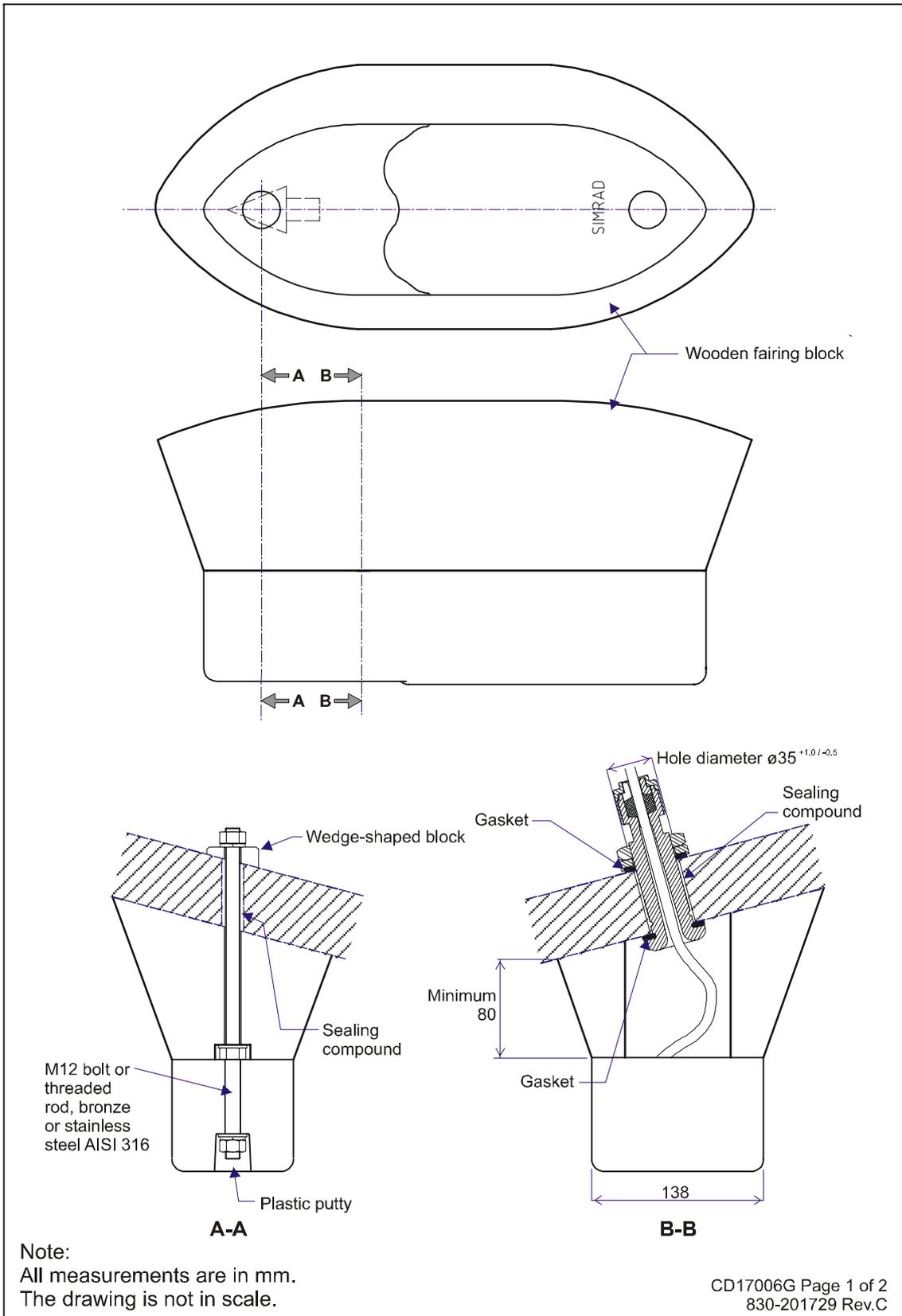
Note:
 All measurements are in mm.
 The drawing is not in scale.

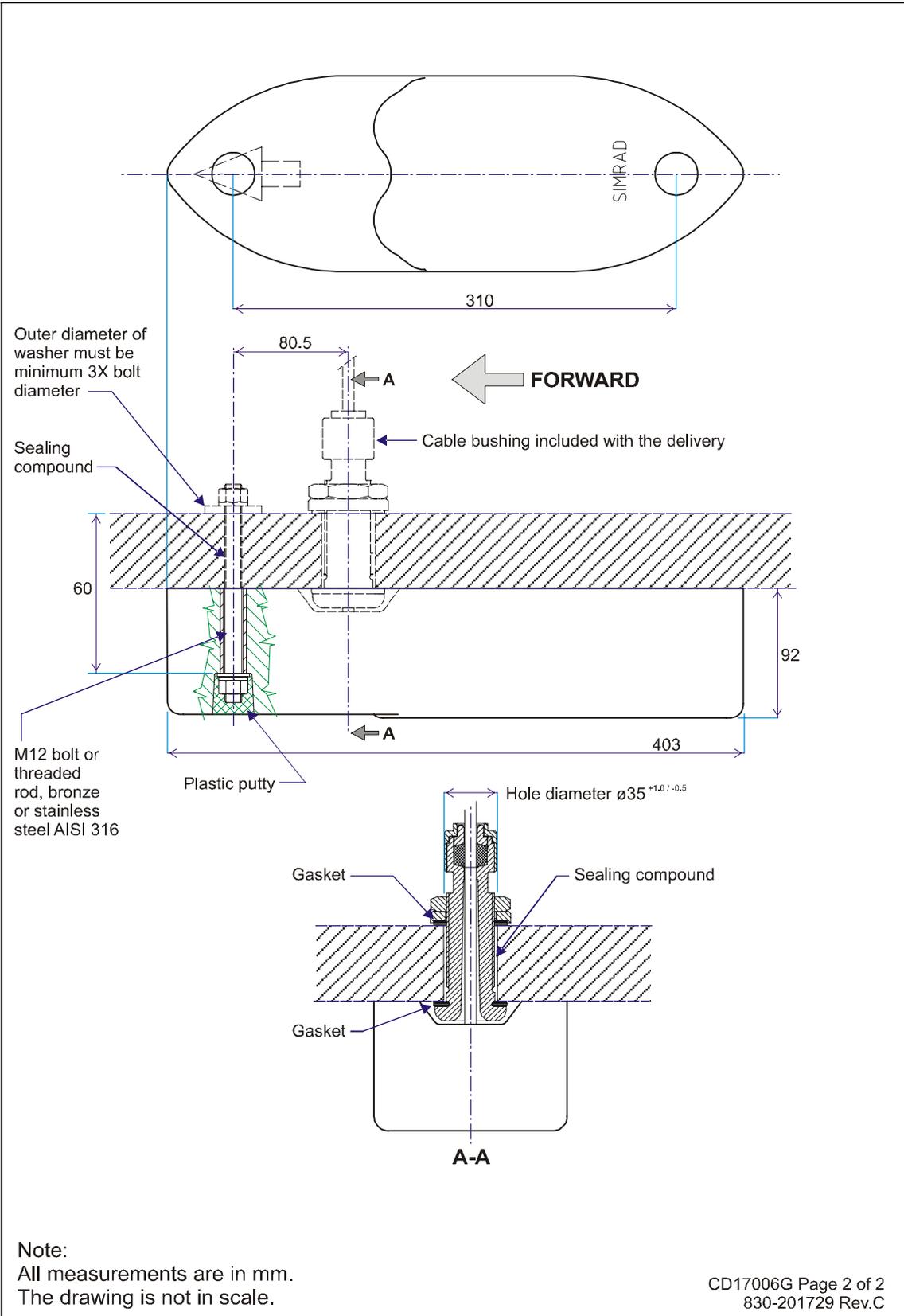
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50/200 Combi C - Connections



50/200 Combi C - Outline dimensions





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Simrad Horten AS
Strandpromenaden 50
P.O.Box 111
NO-3191 Horten
Norway
Telephone: +47 33 03 40 00
Facsimile: +47 33 04 29 87

www.simrad.com

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