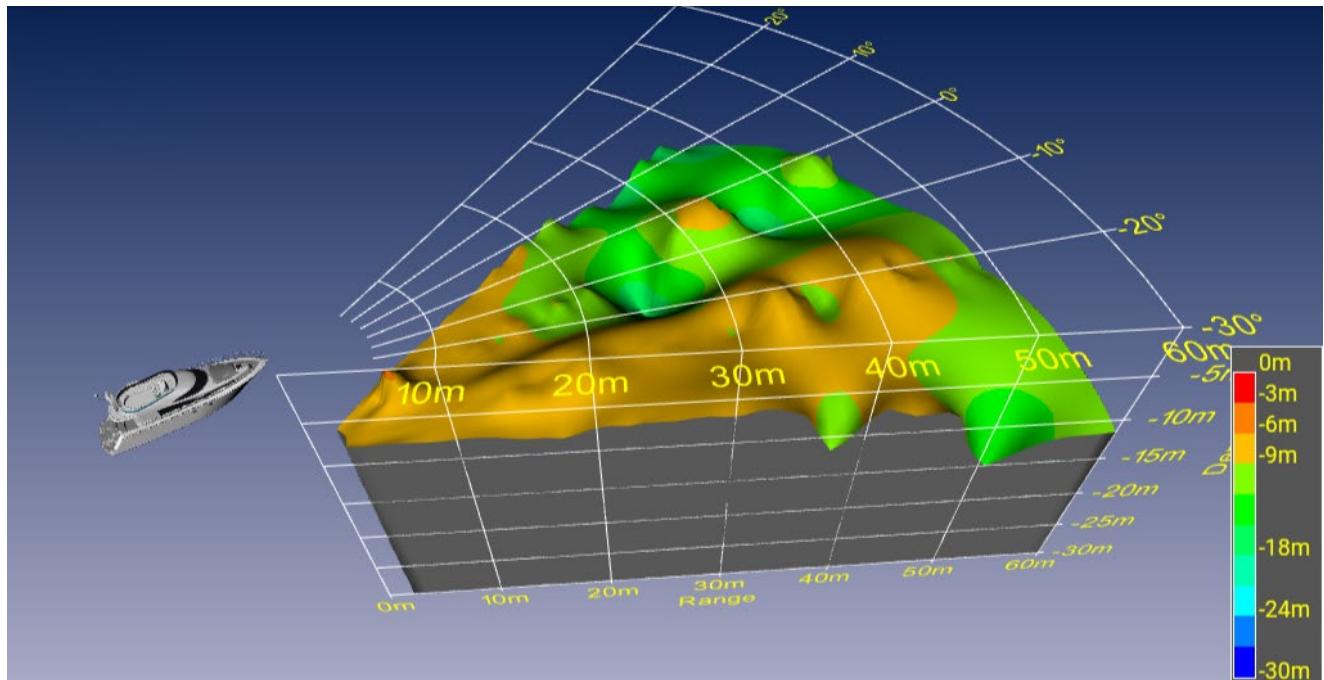


# ECHOPILOT

## FLS 3D Instructions Manual



## INTRO

Thank you for purchasing the EchoPilot FLS 3D Forward Looking Sonar.

Your new EchoPilot instrument has been manufactured to the highest standards by the dedicated staff of a company with many years of experience in marine electronics. You have invested in the most up to date technology available and in a product rigorously tested in the laboratory and at sea.

All goods are backed by a 2-year warranty. Expert advice and guidance are always available by Telephone or mail - just ask for an Echopilot representative.

**Nobody enjoys reading manuals, but please continue to read this one! Installing your instrument correctly is vital to get the maximum performance, pleasure and safety from your equipment, so please take the time to read the instructions.**

**Please observe the following warnings:**

**DO NOT CUT THE CABLES.**

**It is advised to disconnect power before connecting or disconnecting cables.**

**Please do not cut the transducer cables** - they are fine multi-core cable matched to the transducer.

**Please do not remove the transducer plug from its cable** - if a hole is too small make the hole bigger! Any join in the cable will reduce sensitivity / performance.

**Disclaimer:**

Echopilot makes no warranty as to the accuracy or completeness of data that is included or may be downloaded or used in connection with this product, and EchoPilot disclaims any and all express, implied or statutory warranties including the implied warranty of merchantability and implied warranty of fitness for a particular purpose. It is the user's responsibility to use this product prudently. This product is intended to be used only as a secondary aid to navigation and must not be used for any purpose requiring precise measurement of distance, depth, location, or topography.

## INDEX

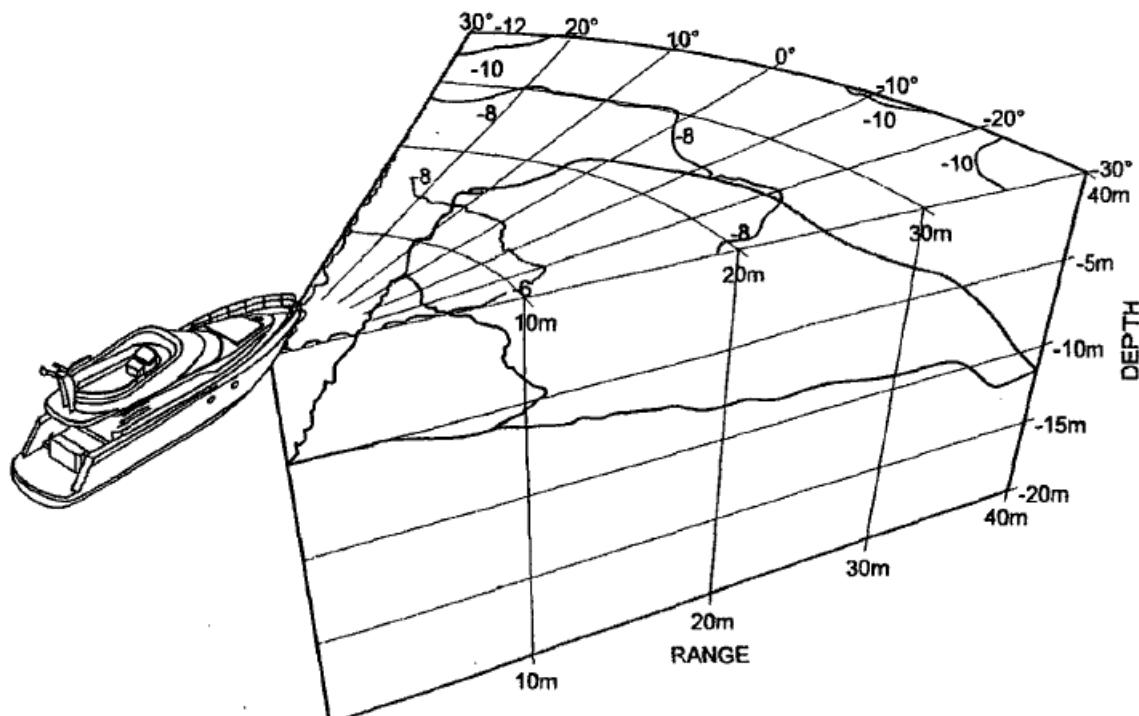
1.	How FLS Technology Works .....	4
1.1	Sonar Beam .....	4
1.2	Distance Ahead.....	5
2.	Guidance on use .....	6
2.1	Practice.....	6
2.2	Operating the FLS 3D at Speed.....	6
3.	Operating Instructions .....	7
3.1	Operation .....	7
3.2	Powering on the system .....	7
3.3	Powering off the system .....	8
3.4	How to Change Range .....	8
3.5	Range settings .....	8
4.	Setup Instructions .....	9
4.1	Settings Menu.....	9
4.2	Units .....	9
4.3	Bow offset.....	9
4.4	Depth Below Waterline .....	9
5.	Installation Instructions .....	10
5.1	Thru Hull Skin Fitting .....	10
5.2	Transducer Installation .....	12
5.3	Transducer Interface Installation.....	15
5.4	Visual Processor Installation.....	16
5.5	Keypad Installation .....	18
5.6	Wiring Overview.....	19
6.	Technical Specifications .....	20
7.	Fault Finding.....	21

## 1. How FLS Technology Works

### 1.1 Sonar Beam

The EchoPilot 3D is a unique and patented invention. It can see through a full arc of 90 degrees, from straight ahead to straight down.

The two transducers have a total horizontal beam of 60 degrees (port to starboard).

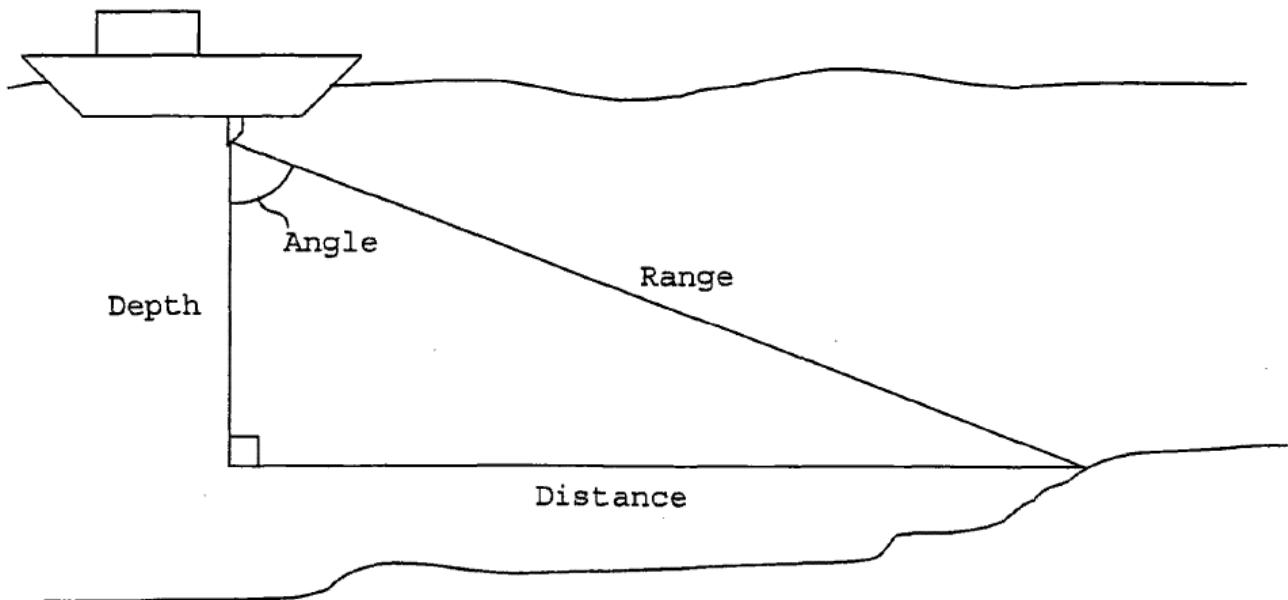


## **1.2 Distance Ahead**

The distance ahead that the FLS 3D can see depends on the depth of water below the vessel, and the laws of physics. The transmit 'ping' radiates at all angles down and out from the vessel, hits the seabed and some of it is returned to the transducer's receivers.

As the 'ping' travels further away from the boat, it hits the seabed at an increasingly acute angle. At a certain point the angle will be so acute that the 'ping' is not returned, and the seabed information is lost - this determines the maximum view ahead.

When on a flat muddy bottom (e.g. river or estuary) the FLS 3D will show the seabed up to ten times the depth away from the boat. This ratio increases if the seabed shoals upward. Rocky bottoms are better targets than muddy ones, and hard vertical surfaces like quay walls, rocks or coral reefs will often be seen at considerable distances.



## 2. Guidance on use

### **2.1 Practice**

When learning to interpret the screen practice with clear targets, e.g. a quay wall. Try moving around an obstruction very gently to see what the maximum range is that different targets become visible.

### **!!!!!! WARNING !!!!!**

If you approach a target, select a range longer than you think you need. Most people (including us!) seriously underestimate distances to quays, buoys, walls etc.

Note that going astern can push turbulence past the transducer, reducing sensitivity or sometimes obliterating all the pictures so take care! Maneuver with the minimum use of astern (reverse) power, especially with the propeller (on twin screw vessels) on the side of the transducer.

Turbulence from other vessels, especially in shallow water, can also adversely affect performance. Algae (normally in spring), Plankton and pollution can all show up as 'noise' on the screen.

### **2.2 Operating the FLS 3D at Speed**

Ultrasonic signals travel well through solids and liquids but are greatly attenuated in air. It follows that a stream of turbulence and air bubbles will limit the performance of the FLS 3D system, or any depth system for that matter. However, if a place can be found on the hull where there is a clear flow of water, then good results can be obtained even at speed.

### **2.3 Average Forward Depth**

The FLS 3D Forward Looking Sonar is equipped with a new technology called Average Forward Depth. You can see the Average Forward Depth indicator in the top left hand corner next to the range indicator.

The Average Forward Depth is the average depth of the water ahead, based on sonar readings. It gives a quick idea of the underwater terrain in front of the sonar system

Sonar systems send out sound pulses (called pings) and measure how long it takes for the sound to bounce off underwater surfaces and return. By using the speed of sound in water—which changes with temperature, salt levels, and pressure—the system calculates the water's depth.

The area "scanned" by the Forward Looking Sonar spreads out at an angle on both sides of the sonar's forward direction (for example, 30 degrees to starboard and 30 degrees to port, making a total of 60 degrees). Within this area, the sonar collects depth information from multiple angles.

The maximum distance the sonar can measure is set by the user and controls how far ahead it can 'see.' This setting also affects how detailed the depth data is.

The Average Forward Depth is the average of all valid depth measurements within the sonars view. It smooths out small bumps or dips and gives a clear picture of the general depth ahead of the sonar.

**Note:** The accuracy of the Average Forward Depth can be affected by things like water conditions, how well the sonar is set up, and the area the sonar covers. For a more detailed view of the underwater terrain, it's better to look at individual depth readings or high-resolution sonar images.

### 3. Operating Instructions

#### 3.1 Operation

Your EchoPilot 3D forward sonar is designed to be simple to operate and easy to interpret, though practice always helps with understanding any new instrument on a boat. The FLS 3D looks under the water up to 200 metres ahead of the vessel. The distance ahead that the FLS 3D sees depends on the depth of water below the boat and the laws of physics. The transmit 'ping' radiates at all angles down and out from the vessel, hits the seabed and some of it is returned to the transducer's receivers.

As the 'ping' travels further away from the boat, it hits the seabed at an increasingly acute angle. At a certain point the angle will be so acute that the 'ping' is not returned, and the seabed information is lost - this determines the maximum view ahead, though often 10 to 20 times depth ahead.

In the horizontal plane the 3D covers an overall area of 60 degrees in front of the vessel.

In the vertical plane the 3D can see from under the transducers to the sea surface ahead. The depth colour scale on the right-hand side of the screen shows red for the shallowest readings, through the colours of the rainbow up to dark blue for the deepest readings.

All depths shown are the depths below the sea surface.

#### 3.2 Powering on the system

To switch on the EchoPilot FLS 3D press the power button on the keypad. There is a five second delay between pressing the button and the LED on the keypad illuminating. Shortly after the LED is lit the display will show the EchoPilot logo. From this point the system will take approximately 30 seconds to boot.

The first time the FLS 3D is switched on it will boot with the following settings:

Range: 40m

Units: Meter

Bow Offset: 0.0

Depth below waterline: 0.0

Once the settings are changed and saved they will be fixed for future power on.

The system will always boot in the lowest range setting: 40 meters or 119 feet depending on the Units settings chosen.

### **3.3 Powering off the system**

To switch off the EchoPilot FLS 3D press the power button on the keypad. The Echopilot logo will appear and a message saying “shutting down” will appear. The shutdown takes approximately 10 seconds. Once the system is off the display will become blank and the LED on the keypad will turn off.

It is also possible to execute a forced shut down of the system by pressing and holding the power button for three seconds. This is bad practice and should only be done in emergency situations where sonar blackout is required immediately.

### **3.4 How to Change Range**

To change range, use the up and down keys on the Keypad. Use the up key to increase the range and the down key to decrease the range. If you press the up or down key several times it will jump instantly to the required range. For example, if you are on the 40m range and you press the up key three times the range will jump instantly to the 100m range.

### **3.5 Range settings**

In Meters: 40m, 60m, 80m, 100m, 150m, 200m

In Feet: 119ft, 180ft, 239ft, 299ft, 399ft, 600ft

## 4. Setup Instructions

### **4.1 Settings Menu**

In order to access the settings menu, press the menu button on the keypad. The left/right keys move between the settings. The up/down keys change the values of the current setting. The enter key saves the changes to the settings and closes the settings screen.

### **4.2 Units**

This value can be set to either meters or feet. The standard setting is set to meters. Once you have chosen your preferred unit setting press enter to save the setting. You will now see that the units on the FLS 3D image changes to the units chosen.

### **4.3 Bow offset**

This value should be set to the distance that the transducer is set back from the bow. The setting can be set between 0 – 10 meters from the bow.

### **4.4 Depth Below Waterline**

This value should be set to depth that the transducer is below the waterline. The setting can be set between 0 – 5 meters.

## 5. Installation Instructions

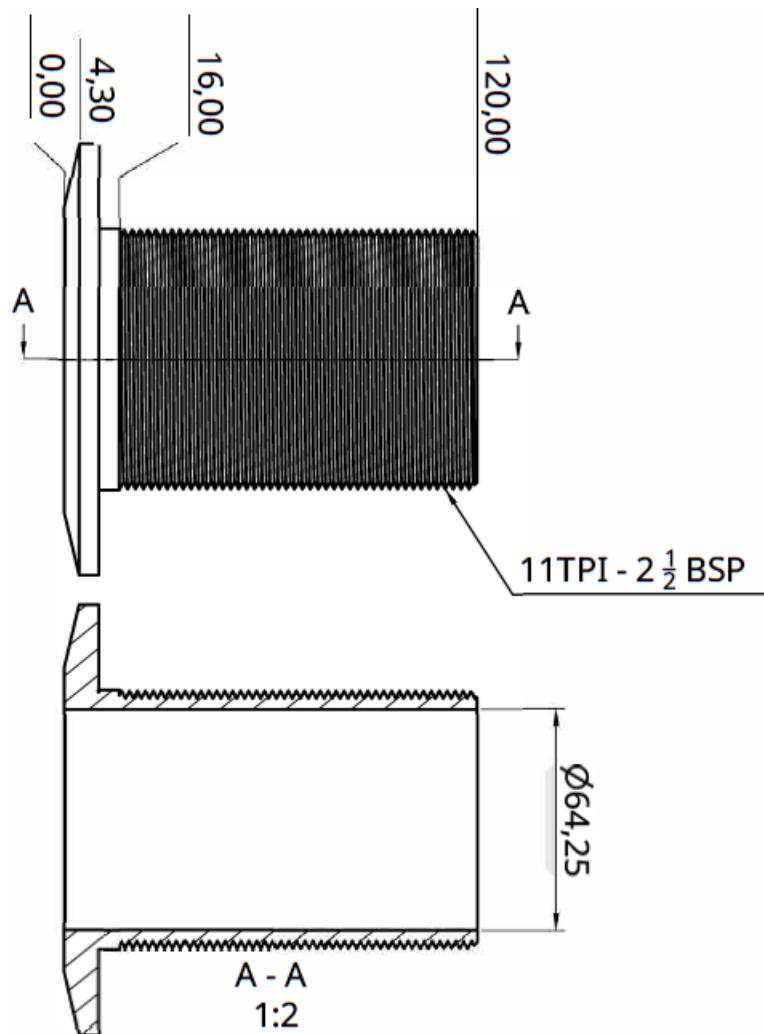
### 5.1 Thru Hull Skin Fitting

The FLS 3D system is supplied with a thru hull skin fitting for each transducer. The transducers are to be mounted in these skin fittings to secure and protect the transducers in the hull.

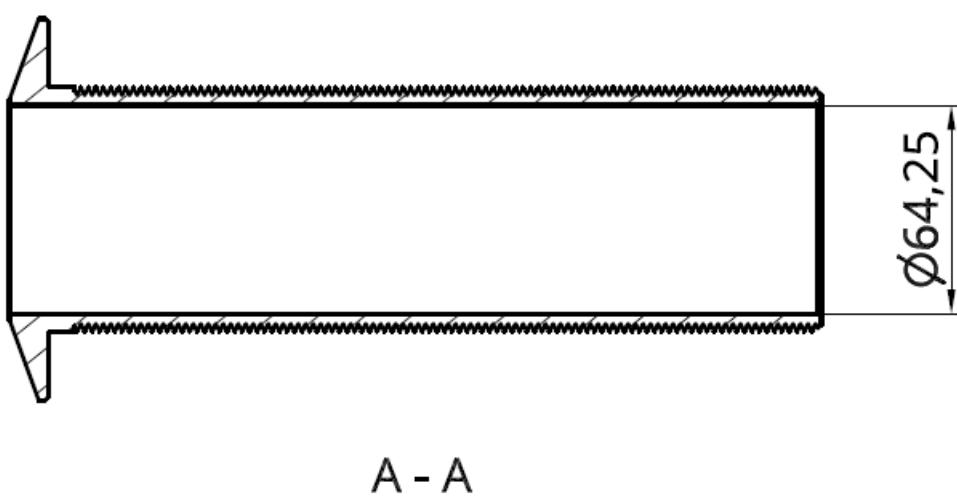
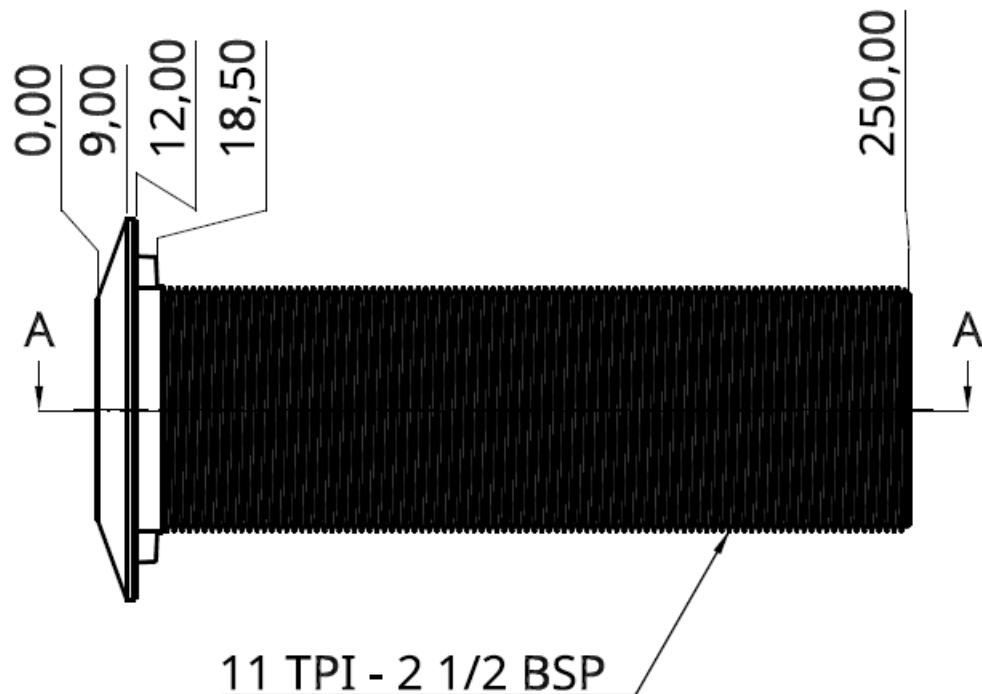
The skin fittings are supplied in three different types of material to match any hull type. They are offered in **Bronze, Aluminum or Steel**.

The skin fittings are also supplied in two different sizes to accommodate different vessel types and the amount of thread needed for a 100% vertical installation in the hull. The sizes are:

**5" Skin Fitting :**



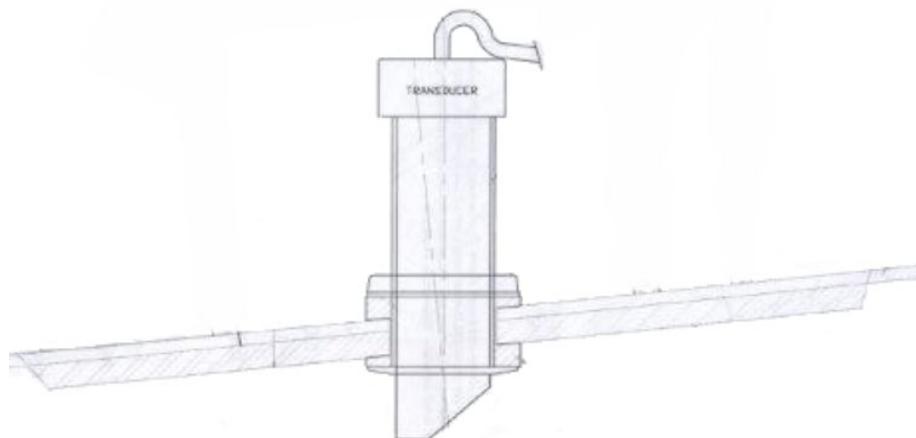
**10" Skin Fitting**



## **5.2 Transducer Installation**

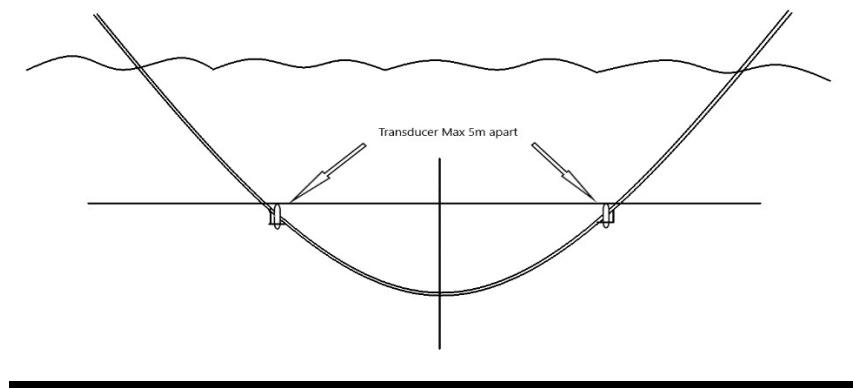
- The transducer must be 100% vertically installed.
- The transducer should be placed as far forward from other sounders as possible to avoid interference.
- The transducers should have a clear line of sight. Each Transducer has a 30 degree forward view. The transducer should have a clear line of sight in a 30 degree forward angel.
- The transducers should be placed where they will always be submerged in water. Not coming out of water when planning.
- The transducers should be placed in an area with calm water where air bubbles or turbulence are not generated. Bow thrusters and ports can make disturbed water.
- Do not route transducer cables together with other cables.

Transducer Installed 100% vertical in hull



The choice of transducer position will have a major effect on final performance so please carefully consider all factors and if in any doubt, contact the factory on +45 4737 3800.

**There is no minimum distance between transducers but transducers cannot be placed more than 5 meters apart from each other.**



The following text will enable you to decide where to install transducers in your hull:

The transducer transmits a “ping” and when transducer receives the “ping” back, it generates the 3D visualization on the display unit according to the characteristics of the received “ping”. As you can imagine, it is important that the “ping” is returned from the seabed and not the keel of the boat or other disturbances like sounders, air bubbles etc.

When installing the transducer, it is important that the transducer has a clear line of sight in a 90 degrees vertical angel and 30 degrees horizontal angel on each transducer. Before installing the transducers, stand under the boat with your head near the proposed position and check that you can see from your toes up to above the horizontal ahead.

The transducers must be mounted 100% vertically, equidistant from the centerline, equidistant from the bow and equidistant from the waterline. If it leans forward the seabed will appear to slope up, and if it rakes aft then a degree of surface clutter may show.

Take great care to mount the starboard transducer with the grey STRBD TX pointer and the port transducer with the grey PORT TX pointer on top pointing straight forward in the sailing direction.

Do not fit downstream of any other through hull fittings (for example intakes, log, toilet sea cocks etc.) and choose a location with good access for withdrawing the transducer for cleaning.

Fairings, pads, tapered washers may be required during the fitting of the transducers to achieve a 100% vertical installation of the transducers. Consideration must also be paid to access for maintenance.

Each transducer is tuned to work with its own cable, as such the cable must not be cut, and the connector must not be removed. If it does not reach, you have the option to extend the transducer cable up to 22 meters. Contact your local supplier/dealer for more info on transducer extension cables.

**OBS: When extracting the transducer from the thru hull skin fitting **ALLWAYS** pull using the bronze pointer, NOT the cable.**

**OBS: Do not route transducer cables together with other cables.**

## **NEVER CUT THE TRANSDUCER CABLE**

Sailing direction



(Top view)

**Note:** The transducer installed on the port side must have the grey PORT TX pointer pointed in the sailing direction. The transducer installed on the starboard side must have the grey STRBD TX pointer in the sailing direction.

### **5.3 Transducer Interface Installation**

The transducer interface box requires reasonable protection from moisture. Ensure that you mount it within reach of the transducer cables and the data cable.

All the plugs on the transducer interface have a threaded locking ring in order to prevent them from coming loose through vibration, and to protect from moisture. Do not over tighten these locking rings.

Make sure that the correct transducer is connected to the correct plug. Port side transducer connected to POR TX connector and Starboard transducer connected to STRBD TX connector.

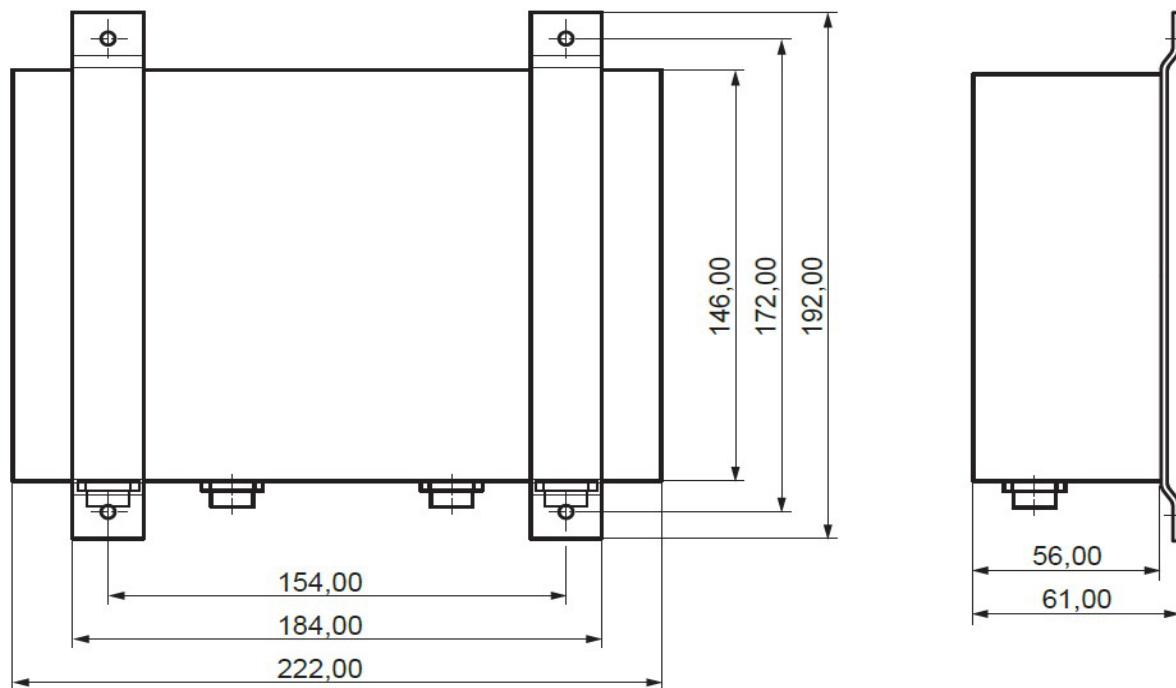
The data cable only has one socket on the transducer interface that this will plug into, which is clearly marked data.

The power cable plugs into the socket that is marked power. The power cable has two cores, red (positive +12 / 24v), and black (negative 0v).

The transducer interface will require four mounting screws or bolts which will go through the stainless-steel mounting brackets. We advise the use of stainless-steel fixings.

### **Do under no circumstances unscrew the two mounting brackets!**

As shown on the diagram below the spacing for the fixings is 154 mm x 172mm



## **5.4 Visual Processor Installation**

The power cable plugs into the socket that is marked 12V. The power cable has two cores, red (positive +12 / 24v), and black (negative 0v).

The visual processor is based on a pc. As such it should be mounted in a protected location. However, it should still be accessible for maintenance.

The data cable from the transducer interface box plugs into the socket that is marked data. Please note that there are two identical sockets for the data cable. You must connect to the top socket which is marked DATA as seen below.

If the visual processor is connected to a 12+ Vdc supply, then the transducer interface box must also be connected to a 12v supply. The positive of both the transducer interface box and the visual processor must be at the same potential with respect to ground.

If the visual processor is connected to a 24v supply, then the transducer interface box must also be connected to a 24v supply. The positive of both the transducer interface box and the visual processor must be at the same potential with respect to ground.

The grounds (0v connection) for both the transducer interface box and the visual processor must be at the same potential.

The keypad cable connects to the socket marked keypad on the visual processor. The plug has a threaded locking ring in order to prevent it from coming loose through vibration, and to protect from moisture. Do not over tighten this locking ring.

The visual processor has two video output options. These are HDMI and VGA.

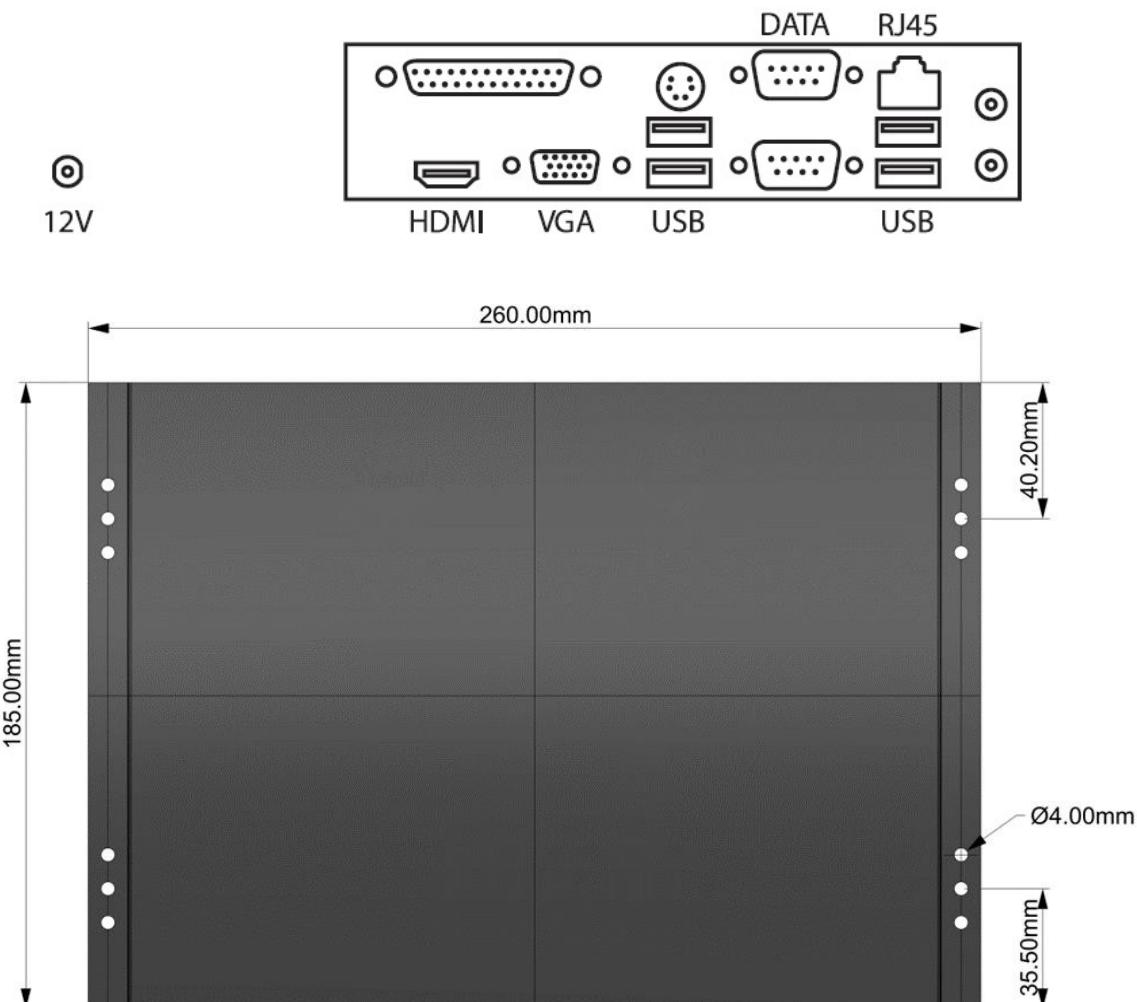
The HDMI and the VGA outputs will provide high quality pictures and are the advisable outputs to use.

You can only use one video output at a time. You cannot use both the HDMI and VGA output at the same time. Choose one video output and use only this.

If you need to change the output turn off the visual processor, change the video output, and turn on the visual processor.

The visual processor will require four mounting screws or bolts which will go through the mounting brackets. We advise the use of stainless-steel fixings.

As shown on the diagram below the spacing for the fixings is 260 mm x 185mm.



## **5.5 Keypad Installation**

The waterproof keypad plugs into the visual processor as explained on the previous page.

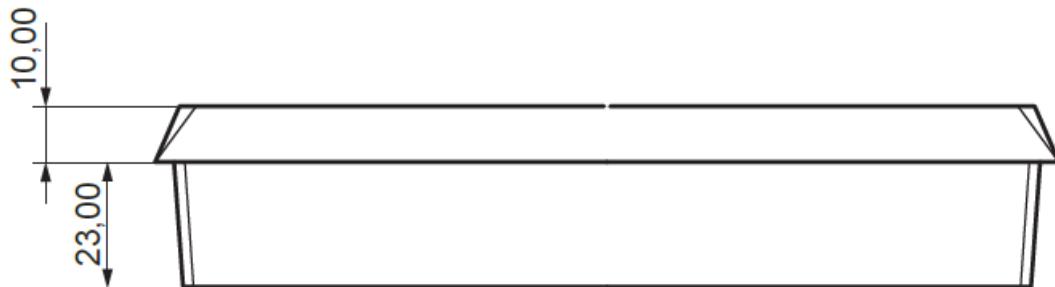
The keypad should be mounted as near as possible to the display which the EchoPilot 3D is being shown.

The keypad has been designed for panel mounting. It is provided with a stainless-steel mounting bracket, two plastic m6 studs and two m6 plastic nuts.

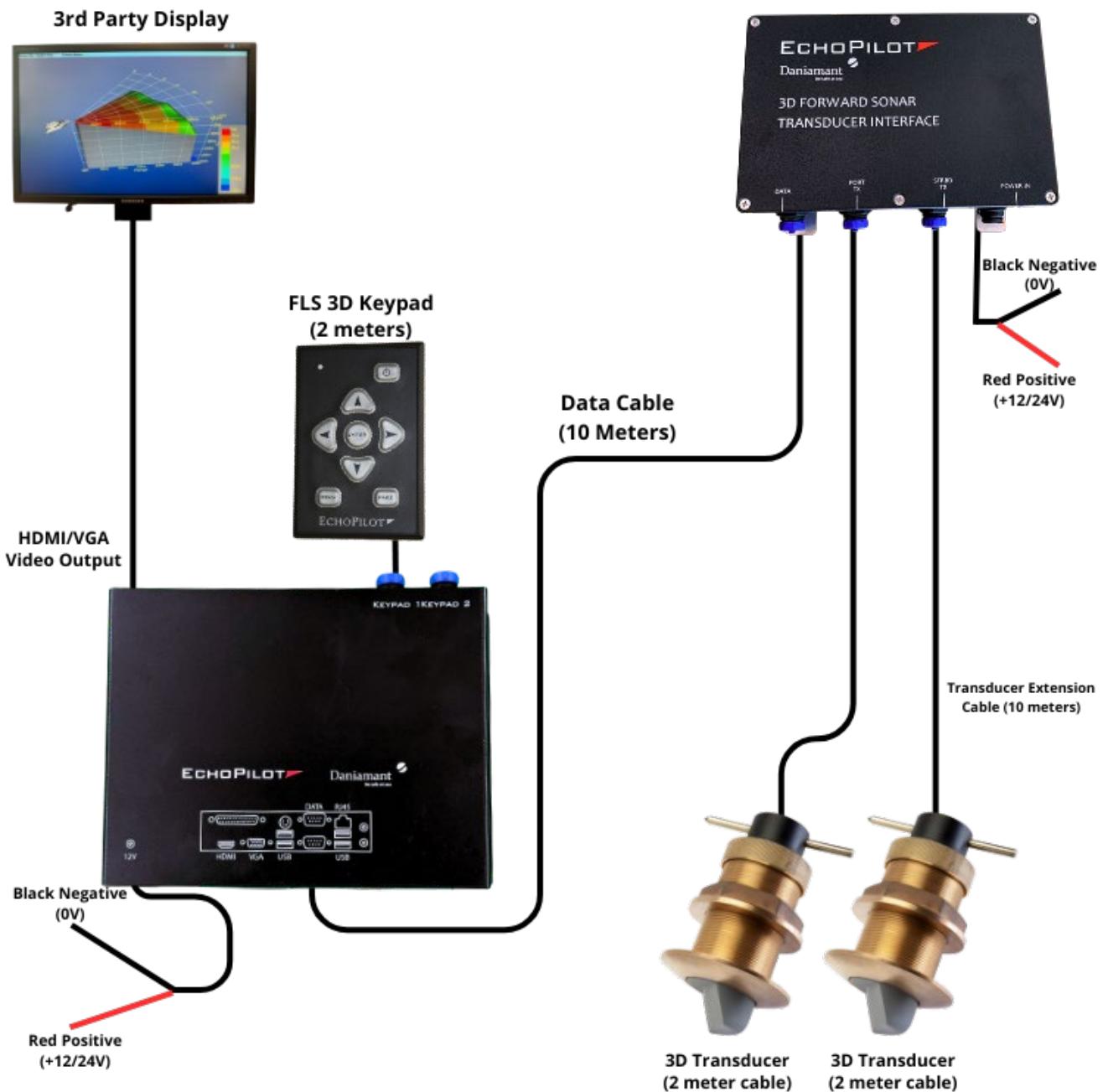
Once you have decided on the best position for the keypad (making sure that the cable reaches the visual processor), cut out a rectangular hole measuring 72mm x 112mm. Place the keypad into the cut out with the m6 studs already screwed into the threaded holes in the back of the keypad (you may also wish to seal with a small amount of suitable sealant). Place the stainless-steel bracket on the studs and tighten with plastic nuts. Do not overtighten the mounting nuts.

The Keypad comes with a standard 2-meter cable. If you require additional cable length extension cables can be purchased to achieve 12 or 22 meters of total cable length. Contact your local supplier if additional cable length is needed.

The standard kit is supplied with one keypad. It is possible to connect a second optional keypad to the visual processor for control in two locations. If a second optional keypad is needed please contact your local dealer.



## 5.6 Wiring Overview



## 6. Technical Specifications

Specification	EchoPilot FLS 3D
Operational Speed	Up to 20 Knots
3D Forward Looking Image	Yes
Display	3rd part dependent
Bottom Mapping Range	20x water depth
Display Update Rate	1 second pr. update
Maximum Depth Detection	100m
Maximum Forward Range	200m
Operating Frequency	200 kHz
Power Requirements	12/24 V, ~20W
Maximum Output Power	28W
Angular Accuracy	~1.5 degree
Roll/Pitch Stabilization	N/A
Operating System	Windows
Update Rate	1 – 1½ second
Video Output	HDMI and VGA
Multi Display Option	Yes
Direct Raymarine Integration	Yes

## 7. Fault Finding

### Some Common Faults

#### **My FLS 3D wont switch on:**

Is the blue LED light on the keypad on?

- If yes then the FLS 3D is working. Check the video cable or the ethernet cable to see if they are connected correctly or if there is any damage to the cables.
- If not then check if there is power to the visual processor. If the visual processor is receiving power, the visual processor will need to be sent into the factory for test and potential repair.

#### **My 3D has no coms. (red cross in comms status):**

- Check that the Transducer Interface Box receives power and is correctly connected to a power source.
- Check that the data cable between the Visual Processor and Transducer Interface is correctly connected and that there is no damage to the data cable.
- Make sure that the data cable has not been amended in any way. If the cable has been amended, then you must replace the data cable.

#### **Poor seabed picture or excessive noise:**

- Suitable range not selected – Try to change the range setting so that it matches with the maximum range the FLS 3D is able to see
- Poor connection of transducer – Check if the transducers are connected correctly. Also check if there has been any damage to the transducer cables.
- Transducer mounted at an angle – If the transducer is mounted in an angel and is not installed 100% vertically, you will need to make a new and correct installation of the transducers.
- Turbulence at transducer location – If the transducers are placed in an area where turbulence and air bubbles are generated you will need to re-install the transducers in a different location.
- Interference from other 200KHz sounders (same boat or other boats) – If your transducers are located to closely or just behind another sounder, this will cause interference.
- Turbulence/wake from other boats
- Dirty transducer/covered with barnacles – Check if the transducers are nice and clean. If there is a lot of growth on the transducers this will cause poor seabed picture.

#### **My FLS 3D has lost half the picture:**

Because the 3D has two transducers it is easy to tell if the problem is with the transducer or the transducer interface, if you swap the connectors of the Stbd. and Port side transducer on the transducer interface you should see the problem change to the other side of the display.

If the problem does not change side, then the problem is with the Transducer Interface and it needs to be sent in for repair.

**The display seems to be unstable or jumpy:**

The FLS 3D is a "Real Time Sonar" not a historical recording like a fish finder, so some pings will come back and some will miss. It updates about once a second and two successive pictures will rarely be the same. This can give an uneasy picture.

We recommend testing out in open water with the boat moving gently through the water.

**ECHOPILOT** 

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**Protected by USA Patent 5530680 and European (UK) Patent 0624253**

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