

# Manual for FLS 3D Forward Looking Sonar ECHOPILOT



## **INTRO**

Thank you for purchasing the 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 of our manufacture 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**

<b>1. Operating Instructions .....</b>	<b>4</b>
<b>2. Setup Instructions .....</b>	<b>5</b>
<b>3. How FLS Technology Works .....</b>	<b>6</b>
<b>4. Guidance on use .....</b>	<b>7</b>
<b>5. Installation Instructions .....</b>	<b>8</b>
<b>Thru Hull Skin Fitting .....</b>	<b>8</b>
<b>Transducer Installation .....</b>	<b>9</b>
<b>Transducer Interface Installation .....</b>	<b>11</b>
<b>Visual Processor Installation .....</b>	<b>13</b>
<b>Keypad Installation .....</b>	<b>14</b>
<b>Wiring Overview .....</b>	<b>15</b>
<b>6. Raymarine Integration .....</b>	<b>16</b>
<b>Connecting The Visual Processor To The Raynet .....</b>	<b>16</b>
<b>Powering on the FLS 3D .....</b>	<b>16</b>
<b>Using Split Screen On AXIOM Display .....</b>	<b>17</b>
<b>Changing Range Settings .....</b>	<b>18</b>
<b>7. Technical Specifications .....</b>	<b>21</b>
<b>8. Fault Finding .....</b>	<b>22</b>

## 1. Operating Instructions

### **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. Depth contour lines are shown on the display to assist interpretation.

### **To Switch on:**

To switch on the EchoPilot 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.

### **To Switch off:**

To switch off the EchoPilot 3D press the power button. 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.

### **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.

### **Range settings:**

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

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

## **2. Setup Instructions**

### **Settings Menu:**

In order to access the settings menu, press the menu button. 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.

### **Units**

This value can be set to either metres or feet. The standard setting is set to meters.

### **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.

### **Depth Below Waterline**

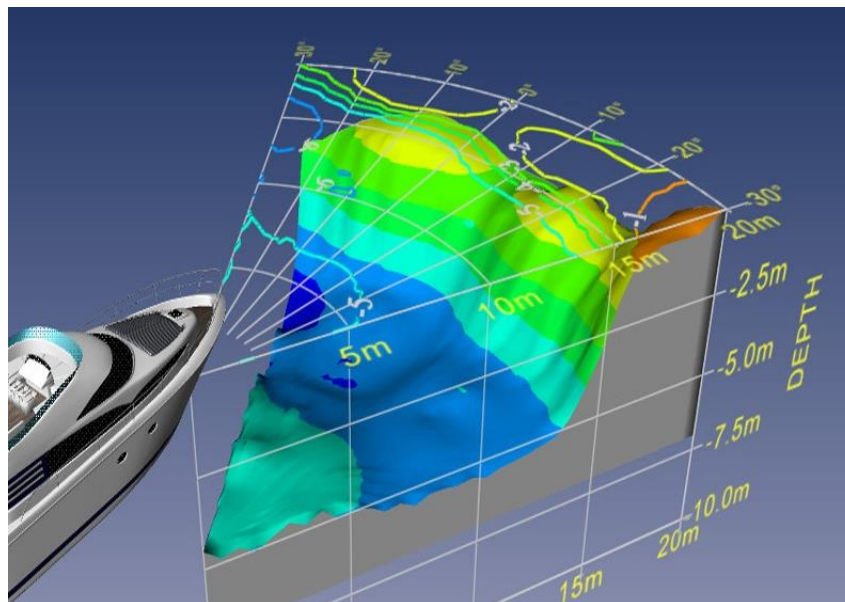
This value should be set to depth that the transducer is below the waterline. The setting can be set between 0 – 5 meters.

### 3. How FLS Technology Works

#### 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).



#### 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.

## **4. Guidance on use**

### **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 approaching 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 picture 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.

### **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.

## 5. Installation Instructions

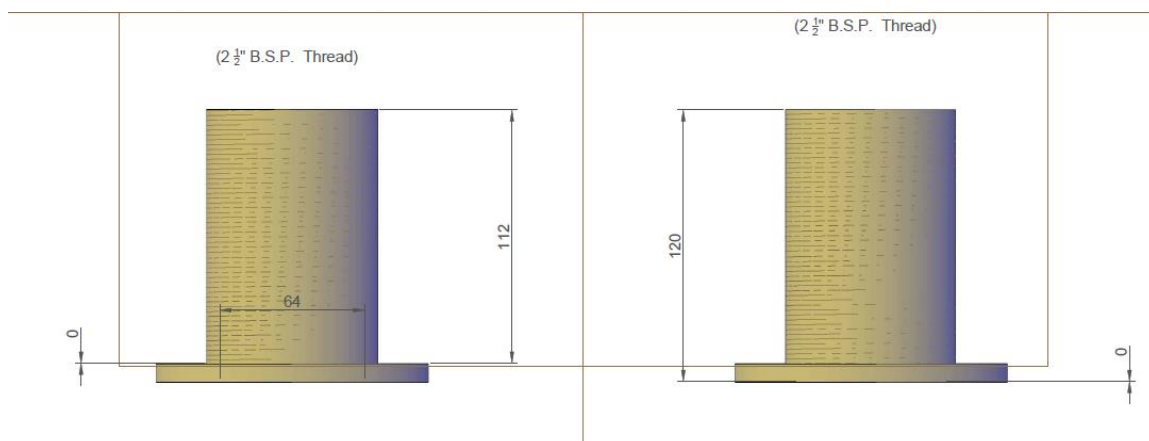
### Thru Hull Skin Fitting

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.

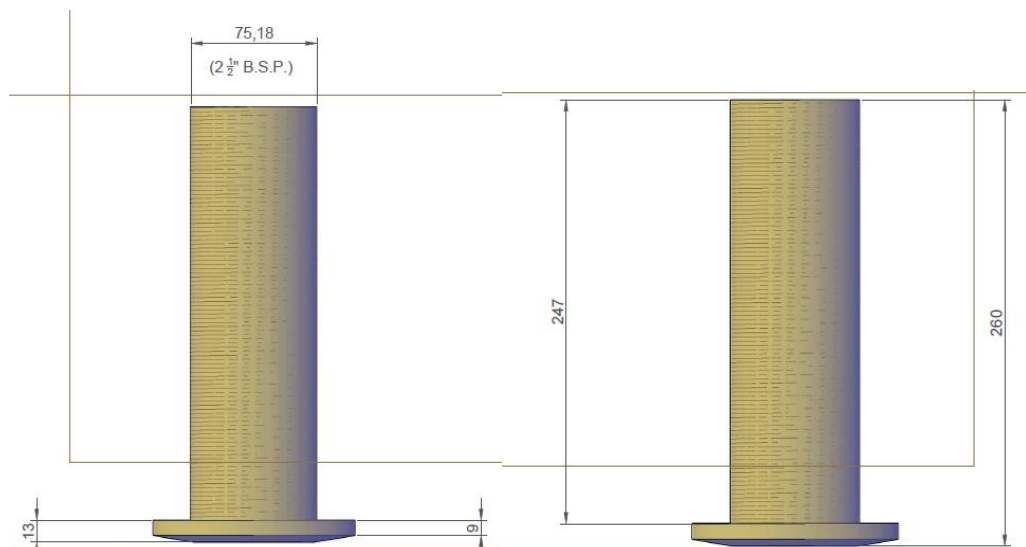
The skin fittings are supplied in three different types of material to match any hull type. They are offered in **Bronze, Aluminum or Steel.**

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



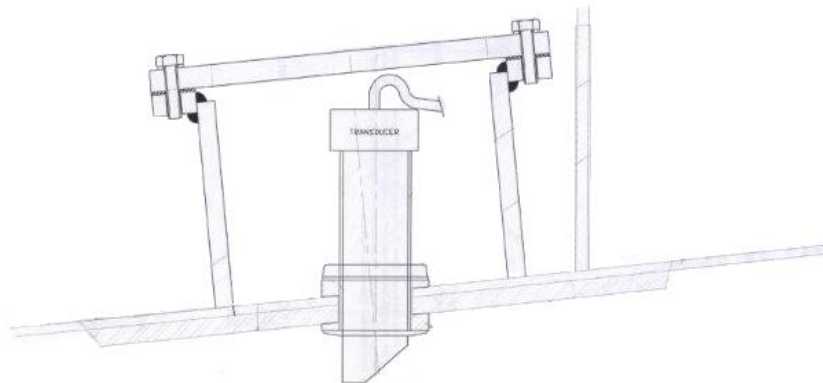
#### 10" Skin Fitting





## Transducer Installation

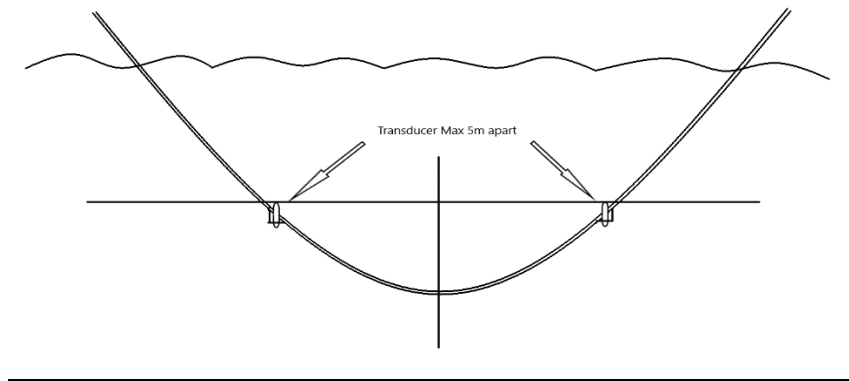
- The transducer must be 100% vertically installed.
- The transducer should be placed as far forward from other sounders as possible to avoid interference.
- The transducers should have a clear line of sight. Each Transducer has a 30 degree forward view. The transducer should have a clear line of sight 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 tubulence are not generated. Bow thrusters and ports can make disturbed water.
- Do not route transducer cables together with other cables.



Sectional View Taken Through  
Centre Line of Transducer Pot

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 angle and 30 degrees horizontal angle 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 centreline, 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 transducers with the brass arrows 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 vertical installation of the transducers. Consideration must also be paid to access for maintenance.

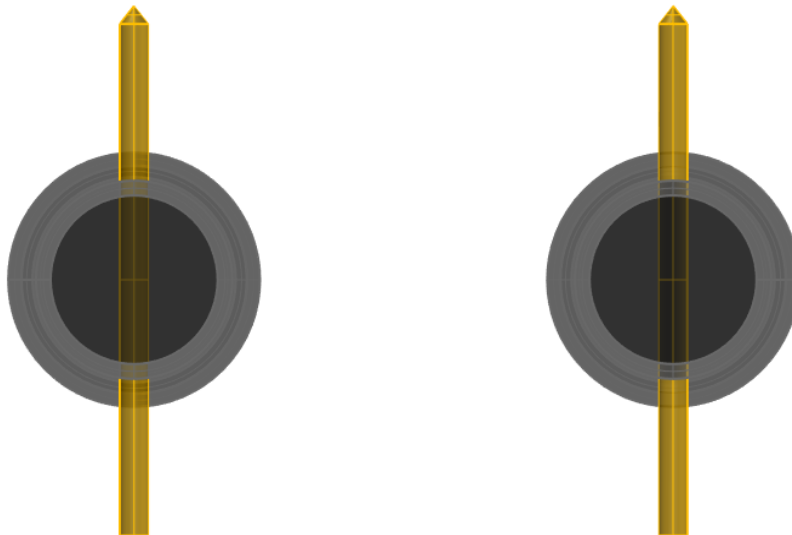
Each transducer is tuned to work with its own cable, as such the cable must not be cut, and the connector must not be removed. If it does not reach, you have the option to extend the transducer cable up to 22 meters. Contact your local supplier/dealer for more info on transducer extension cables.

**OBS: When extracting the transducer from the thru hull skin fitting ALWAYS 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:** Fit port transducer (red bands) to port and starboard transducer (green bands) to starboard

### Transducer Interface Installation

The transducer interface 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. Each transducer is clearly

marked with either port (red bands) or starboard (green bands). The transducer interface is also clearly marked showing which socket is for the port transducer and which is for the starboard.

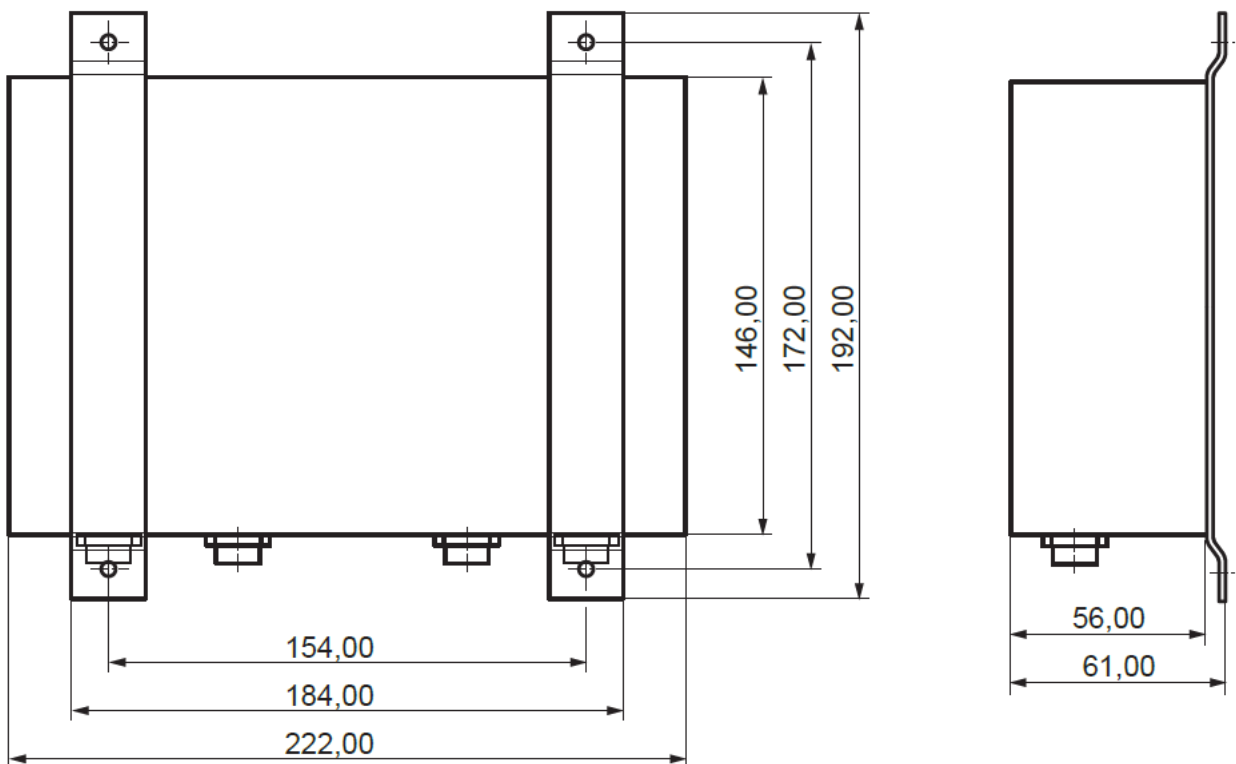
The data cable only has one socket on the transducer interface that this will plug into, which is clearly marked data.

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.



## **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 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 must also be connected to a 12v supply. The positive of both the transducer interface 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 must also be connected to a 24v supply. The positive of both the transducer interface and the visual processor must be at the same potential with respect to ground.

The grounds (0v connection) for both the transducer interface 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.

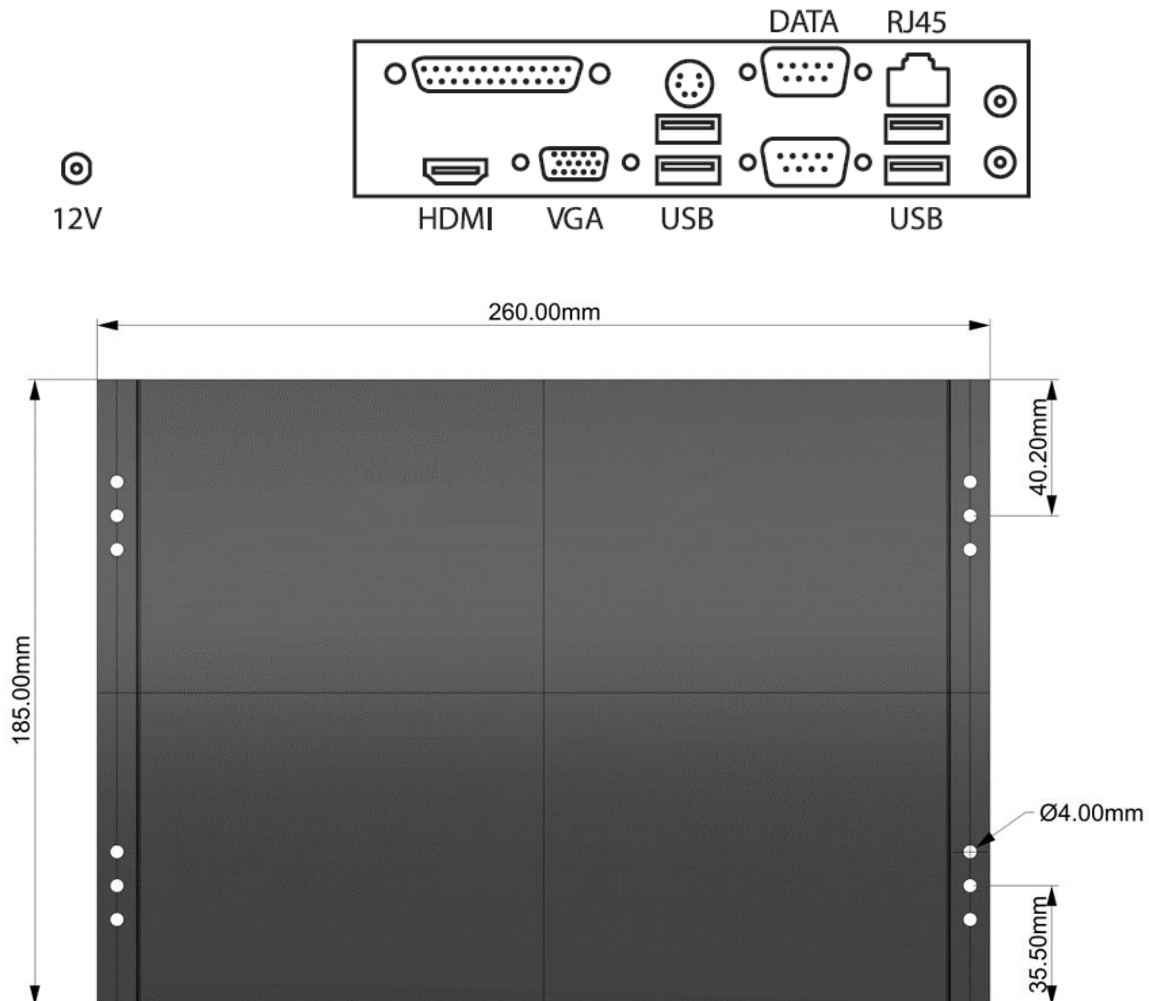
The HDMI and the VGA outputs will provide high quality pictures and are the advisable outputs to use.

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 of 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.



## **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.

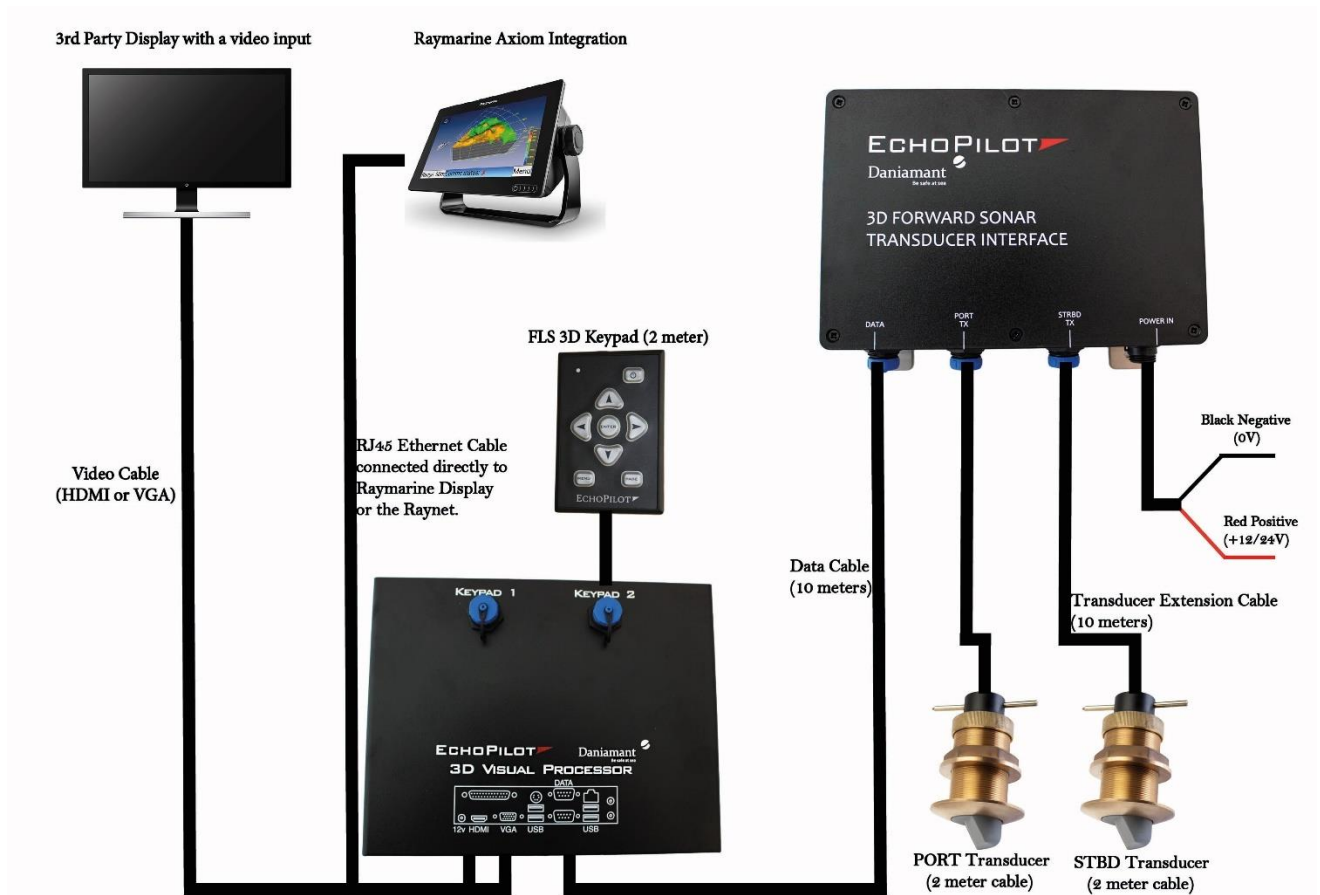
The keypad has been designed for panel mounting. It is provided with a stainless-steel mounting bracket, two plastic m6 studs and two m6 plastic nuts.

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 the plastic nuts. Do not over tighten 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.

### Wiring Overview

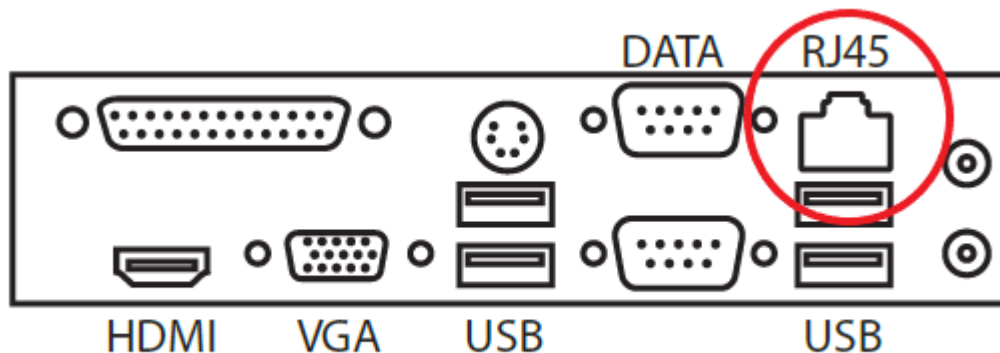


## 6. Raymarine Integration

The FLS 3D is fully integrated with the Raymarine Axiom displays. The integration is made to the Raynet or directly to the Axiom display via a RJ45 to Raynet network cable. The cable is not included in the FLS 3D kit and will need to be purchased separately.

### Connecting The Visual Processor To The Raynet

The Visual Processor can only be connected to the Raynet via the ethernet port on the back of the Visual Processor.



The Visual Processor processor can be connected several different ways to the axiom displays:

1. Connect directly to the Axiom Display: You can connect the Visual Processor directly with an Axiom display by connecting a RayNet (F) to RJ45 (M) Port. Connect the RJ45 to the ethernet port and the Raynet connector to the network port on the Axiom display.
2. Connect to the Raynet via SeaTalkHS Network Switch Box: You can connect the Visual Processor to the Raynet via a SeaTalkHS Network Switch Box. Connect the RayNet (F) to RJ45 (M) Port to the ethernet port on the visual processor and to the SeaTalkHS Network Switch Box. It is important that the AXIOM Display I also connected to the Raynet to be able to connect.

### Powering on the FLS 3D

When the FLS 3D Visual Processor is connected to the AXIOM display or the Raynet you need to power on the Visual Processor and the Raymarine AXIOM Display.

The Visual Processor is powered on by pushing the power button on the keypad.

If you have chosen not to have the keypad, but you have the connected power button with art. Number: XXXX, simply push the power button and the visual processor will power on.



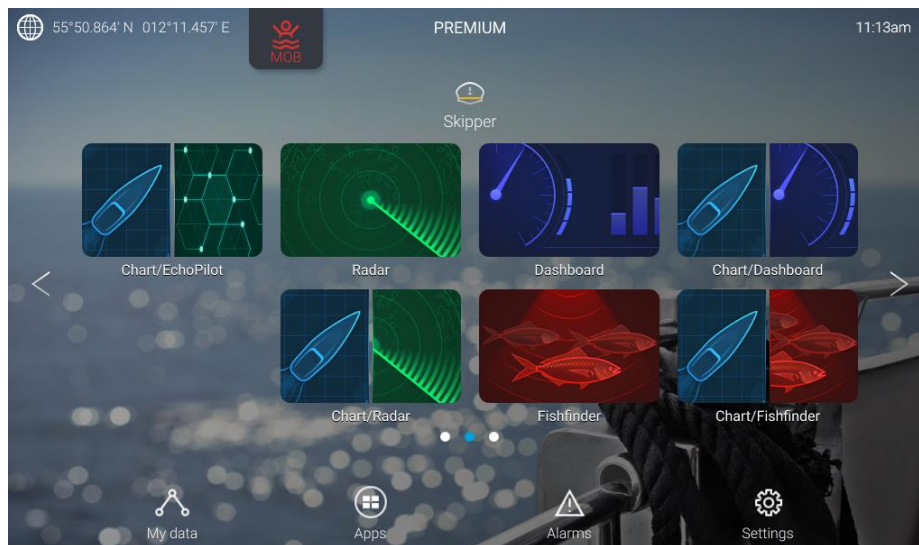
Once the visual processor and AXIOM display is turned on it will take approximately 2 minutes before the EchoPilot App is visible under the app section on the AXIOM display. By pushing the EchoPilot App Icon on in the AXIOM displays app section you will now enter the EchoPilot Forward Looking Sonar program.

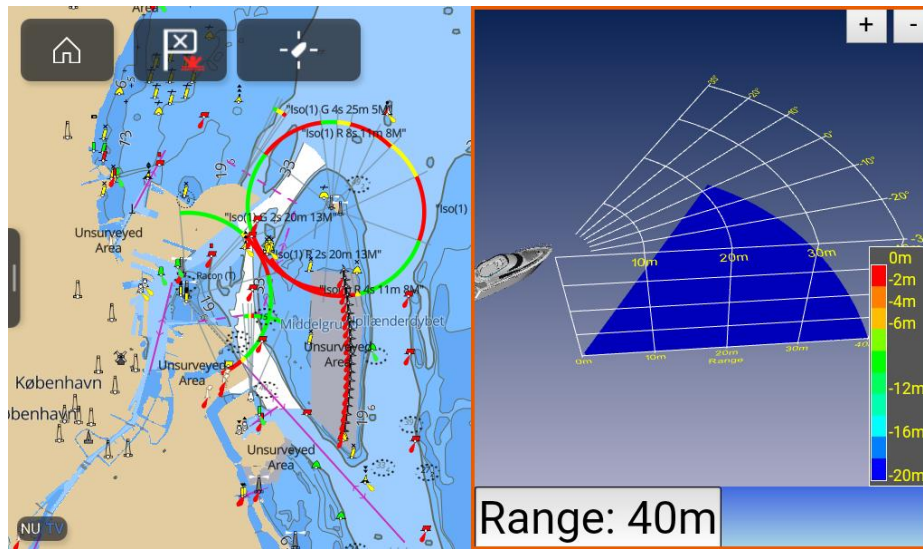
### **Using Split Screen On AXIOM Display**

When you are on the home screen on the AXIOM display, push and hold your finger on the display. This will open the window “Customise this app page”.

On this page select Layout, 2 apps. Now choose your Raymarine app and EchoPilot app. Finish by pressing ‘Next’.

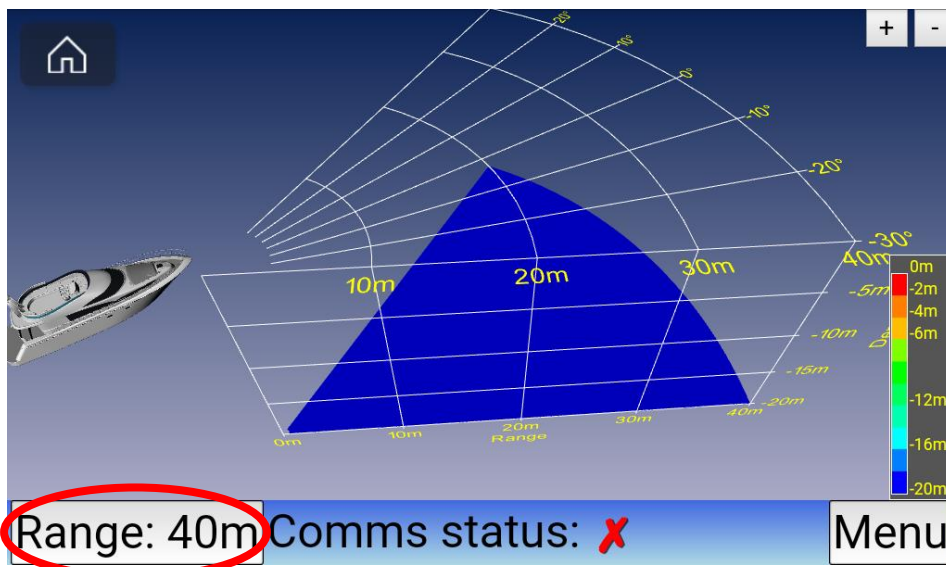
You will then be guided to the page ‘Rename page’. Here you can give your application any name. After you have chosen your name press ‘Save’. Once you have pushed save you will see the split screen application on the Axiom home page.





### Changing Range Settings

While in full screen mode or in split screen mode you can change the range setting by pushing the range button

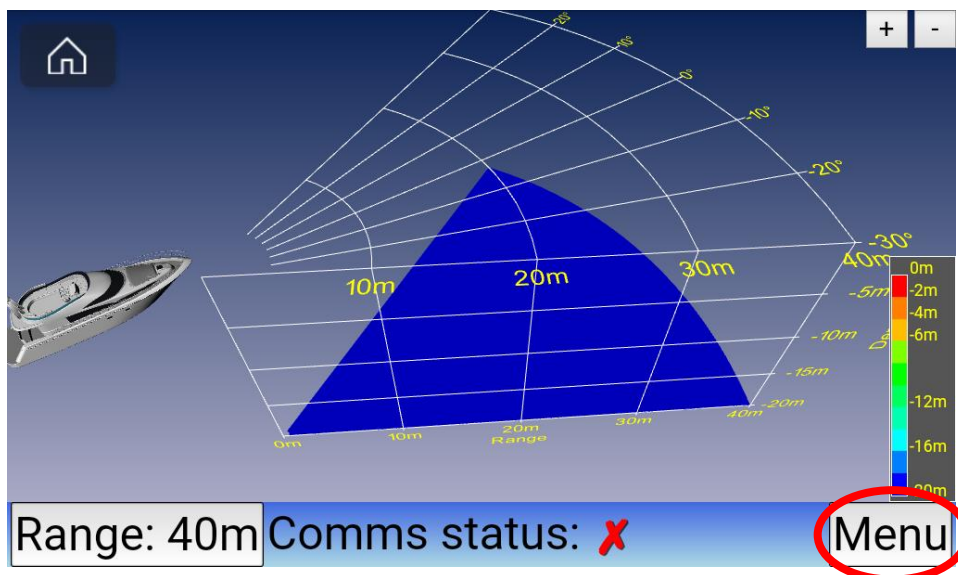


Once you have pushed range a window will appear with different ranges to choose from: 40m, 60m, 80m, 100m, 150m, 200m. Simply push your decired range and you will be brought back to the Sonar image and the range will update to the chosen range.



### Entering Menu Settings

Enter the menu by pushing the menu button:



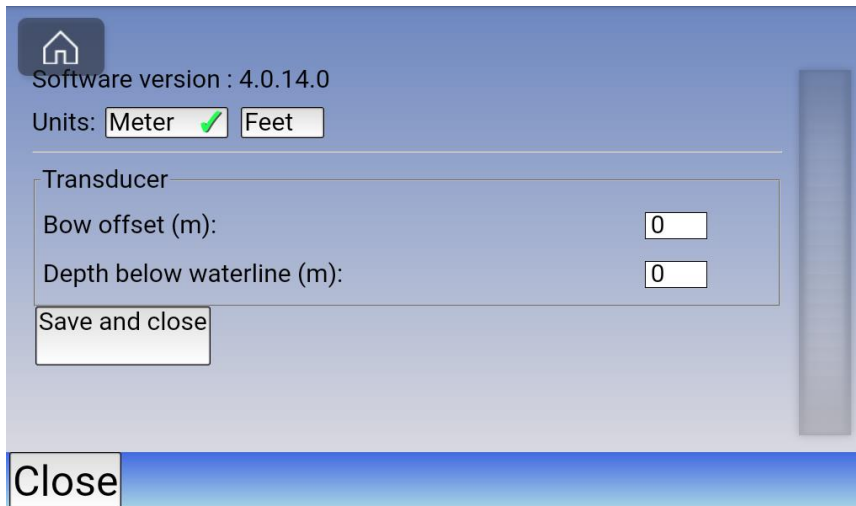
Inside the menu you can choose three different setting:

1. Units: Choose if you want to see the range in meters or feet
2. Bow offset (m): 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.

3. Depth below waterline (m): This value should be set to depth that the transducer is below the waterline. The setting can be set between 0 – 5 meters.

The settings are chosen by using the scroll wheel to the right on the menu page.

Once you are happy with the settings push 'Save and close' and you will be brought back to the main screen and your settings will be saved.

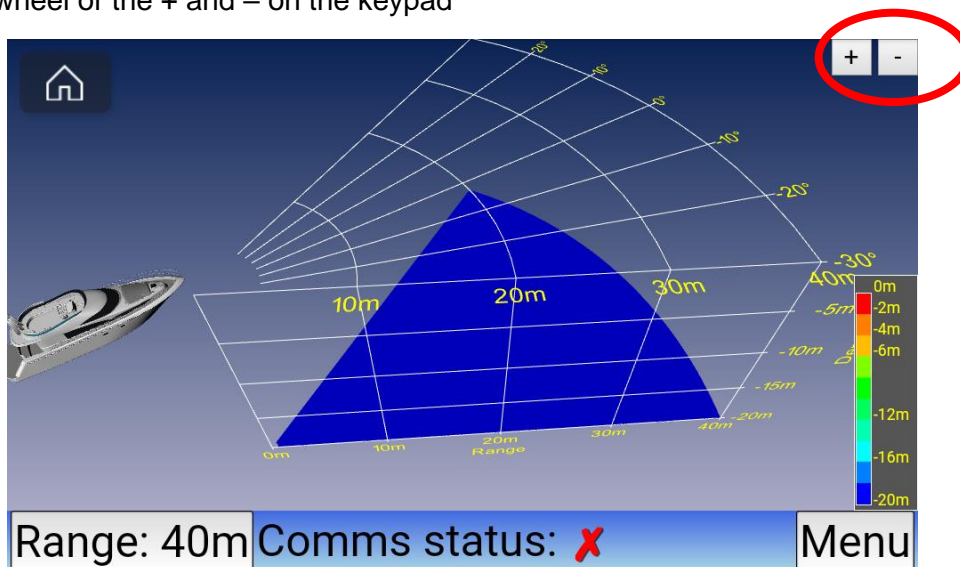


### Using zoom function and 360 rotation

360 Rotation of the image: You can rotate the FLS 3D image via touch directly on the display.

The zoom function can work in two different ways:

1. You can Zoom in and out by pushing the + or – in the top right corner of the screen
2. You can zoom using the Raymarine RMK-10 keypad. Zoom function will work by using the scroll wheel or the + and – on the keypad



## 7. Technical Specifications

Specification	EchoPilot FLS 3D
Operational Speed	Up to 20 Knots
3D Forward Looking Image	✓
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

## 8. 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.

#### **My 3D has a red ? in coms. Status (Only on Axiom Displays):**

This indicates that the Visual Processor and Axiom Display has lost its connection with each other. This can indicate that the network port or network cable is damaged.

Try turning off both visual processor and Axiom Display. Change the network cable to a new cable. Turn on both systems again. If the image is back, then it is due to a damaged network cable. If this does not fix the issue, we will need the visual processor sent to our factory for testing and potential repair.

#### **The EchoPilot App is not appearing on my Axiom Display (Only on Axiom Displays):**

This indicates that the Visual Processor and Axiom Display has lost its connection with each other.

Try turning of both visual processor and Axiom Display. Turn on both systems again and see if the app does not appear after approximately 2 minutes after both systems have re-booted.

If this does not fix the issue, try to change the network cable to a new cable. Turn on both systems again. If this does not fix the issue, we will need the visual processor sent to our factory for testing and potential repair.

#### **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 angle 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 too 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 we need the **Visual Processor** 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, to test 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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