seaman




# FMF-1000

## INSTALLATION MANUAL

# Cutting-edge technology

Both engineering and the development of new technologies have been applied for the creation of an trustful echosounder, capable of working in extreme conditions. FMF Series is a an equipment product line designed for the present challenges that professional fisheries has to face.

The echosounder presents a brand new software, that includes a friendly graphic interface and helps to simplify its own use. These new graphic equipment applied to the software development allows to reflect a screen resolution that achieve even 4K.

The union of the Split beam technology with the chirp pulse technique allows to identify smaller measurable echoes with a better resolution, resulting in a better size statistics. Trawl mid water fishing and purse-seine fishing are specially improved with these features.

FMF Series also includes '+Power' echosounder, which allows to combine different channels in one transducer helping to achieve a high transmission capability. It also includes the '+Mixer', this new concept brings to the user the possibility of creating new mixes of different frequencies and different frequency ranges.

Furthermore, the new '+Acoustic Sign' tool helps to understand the way that every echo develops in different frequency ranges, showing the results as a distinctive curve, this tool in conjunction with the echogram and environment data helps to identify user's own objective. It is apparent that the echosounder is a key implement, created for professional fishers, that focus on sustainability through different methods oriented towards selectivity.

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# Echosounder window

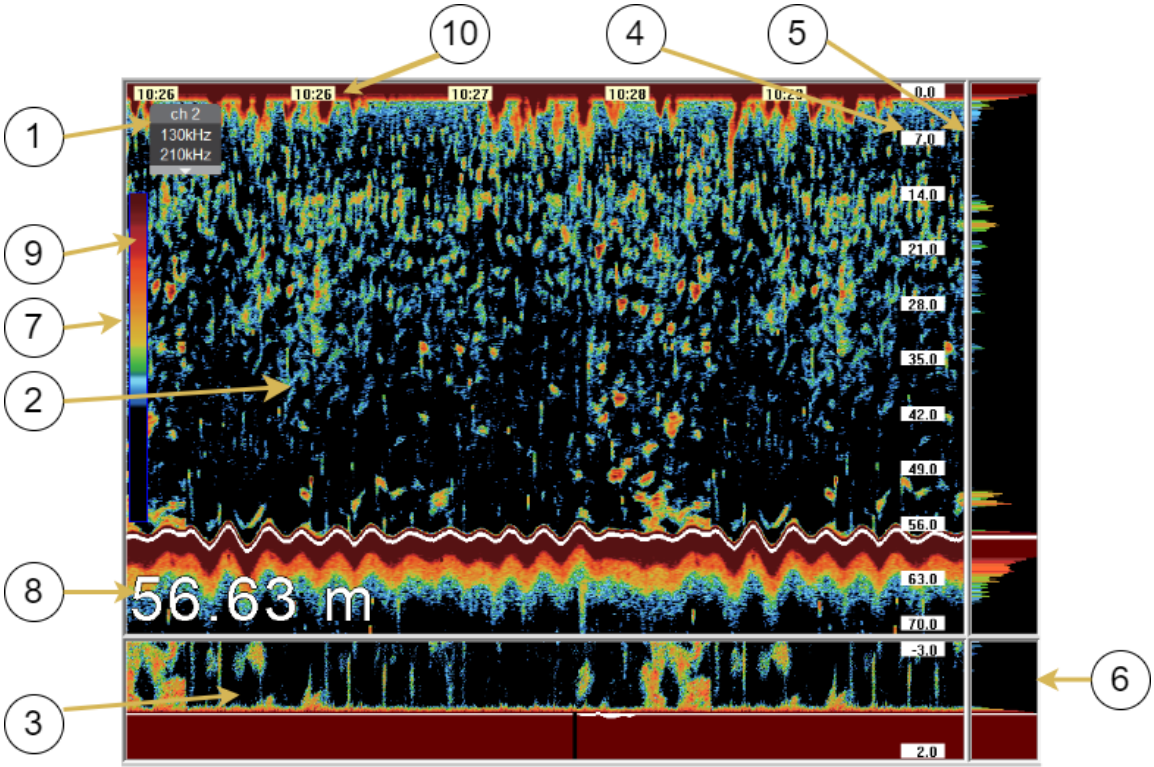



Figure 1: Echosounder window

Each of the components of this window (see Figure 1) is explained in each of the following sections:

# 1 Echosounder settings menu




Figure 2: Echosounder settings channel 1 CW

When clicking the menu button, the next window will show up:




Figure 3: Echosounder settings menu

In this menu you can perform all graphic and functional adjustments of the echosounder. Clicking on the button ”more”, the second part of the menu will be opened. The change of each control can be done by clicking the buttons < and > or by rotating the mouse wheel up and down. In some cases, depending on the area of the button where you spin the wheel, the action will correspond to the tens, hundreds or thousands units.

## 1.1 Level




Figure 4: Level menu

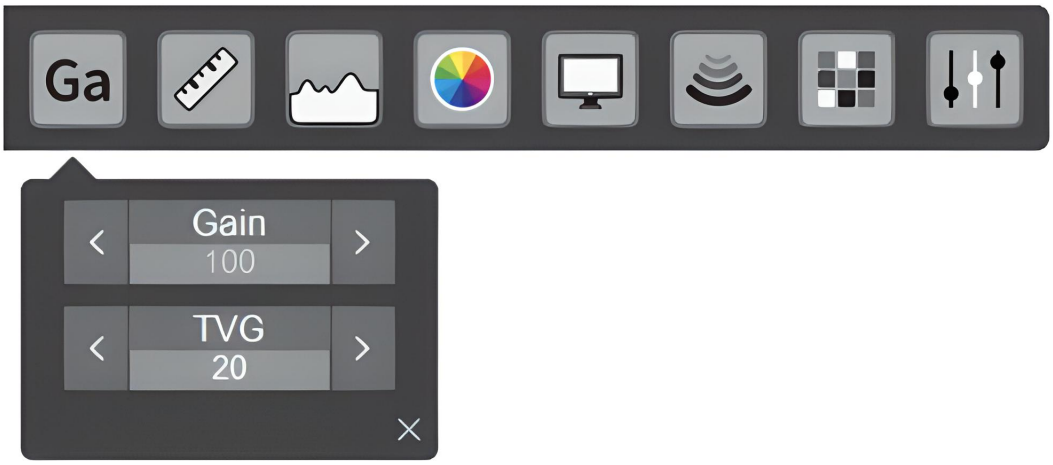



Figure 5: Level submenu

### 1.1.1 Gain

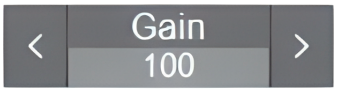



Figure 6: Gain view from the menu

Gain can be adjusted over a range of 0-240. This highest value corresponds to the higher sensitivity of the echosounder. By varying this control, all data shown on the screen is modified, allowing the user to reprocess acquired data in the past with the new gain setting. The same control can be adjusted by turning the mouse wheel on the plotted screen.

### 1.1.2 TVG




Figure 7: TVG view from the menu

The TVG is signal compensation that removes transmission loss effects from echosounder data. Transmission loss is two-way and is due to acoustic beam spreading and absorption in the acoustic medium. TVG adjustment is set manually on a 0-40 range dB.
TVG is an attenuation control that varies logarithmically with respect to depth in a dB scale. The adjustment range of this control is between 0-40 dB. The highest value corresponds to the correct value of compensation for an ultrasonic propagated pulse in water. Lower values of TVG can be used when echoes are larger and saturate in excess the image on screen. For example, a big shoal of anchovy..

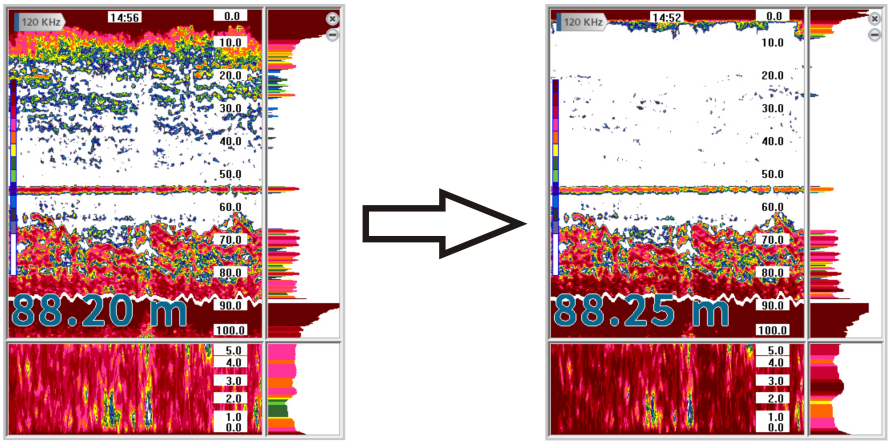



Figure 8: (a)TVG=20 (b) TVG=40

Figure 9: Echosounder‘s view (a) TVG=20 (b) TVG=40

TVG compensates propagation loss of ultrasonic energy. Similar echoes from the energy perspective, will represent the same colors in the screen. TVG is also useful for superficial noise suppression.

## 1.2 Scale



Figure 10: Scale menu

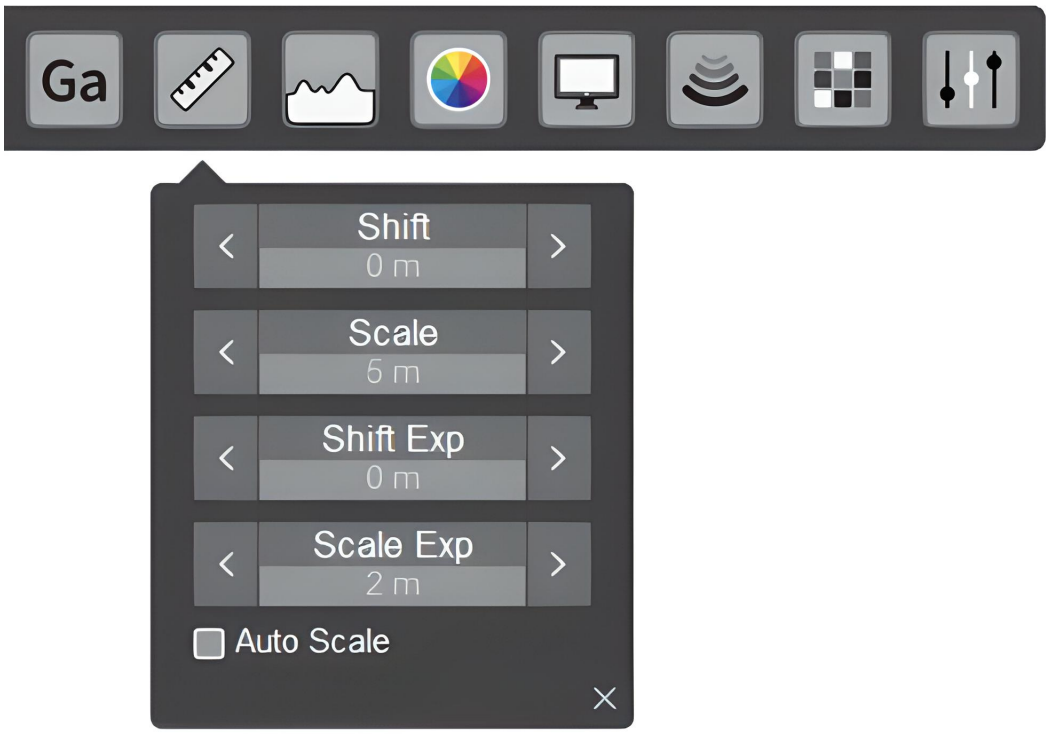



Figure 11: Scale submenu

### 1.2.1 Zero shift

The zero offset control, sets the beginning of plotting in the vertical scale selected in control unit (see section 1.8.1).
This allows the user to start the plotting area in a different area respect to the surface, such as mid-water.

### 1.2.2 Scale




Figure 12: Scale's view from the menu

This control adjusts the maximum depth to be represent from a minimum of 5m to 6000m. The selected scale corresponds to the largest depth posible tote reach. If there is a zero shift, the scope of the sounder will be equal to the displacement plus the scale. Example: If a zero offset of 10m and a scale of 30m are configured, the maximum range is 40m.

### 1.2.3 Zero shift expander

The zero-shift expander adjust the beginning of plotting in the measure unit selected (see section 1.8.1).
This allows the user to start the plotting area in a different area from the detected bottom.

### 1.2.4 Expander scale

This control adjusts the maximum expander scale (see section 1.8.1). If there is any displacement, the expander range will be equal to the scale plus the displacement.

### 1.2.5 Automatic scale

The automatic scale shown in Figure 11 allows the automatic adjustment of the plotting bottom.

## 1.3 Bottom



Figure 13: Bottom menu

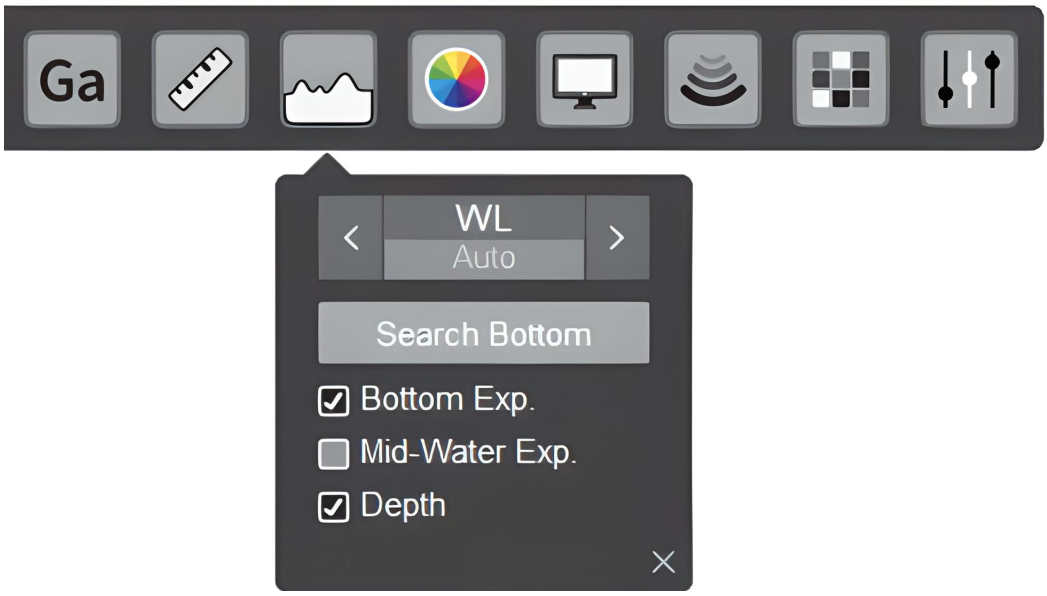



Figure 14: Bottom submenu

### 1.3.1 White line




Figure 15: White line view from the menu

White line control allows the user to adjust the point to be taken as sea bottom from the maximum acquired signal. Here the amount of dB signal corresponds to the signal below maximum point.
If the white line is drawn on the transmission pulse it means that there are no echoes that reach minimum power required for considering it as valid bottom. Otherwise, when the white line is mounted on a schoal, the white line should be decreased until it exceeds such strength signal.
If the white line is not properly draw on the bottom, the depth indicator will show the "–" meaning that the bottom wasn't found.
Setting values for the white line are:

- WL No Draw: white line it is not shown on screen, but bottom depth could be found automatically
- WL Auto: white line works in automatic mode and it is shown on screen.
- 2-200: white line works in manual mode and it is shown on screen

### 1.3.2 Bottom search

From the echosounder menu is possible to set up a determined region for a faster bottom search, this function can be enabled going to the window's box on bottom search settings (see Figure 16). It is also necessary to set up the minimum and maximum depth value. The minimum difference between both of them is the echosounder minimum scale (5 m). The maximum scale of the echosounder will be the result of the maximum value between the graphic scale on the screen and the bottom search setting, in case the last one is already enabled.

If the mentioned function is not enabled, the bottom search will be done as it is shown on the echosounder scale. For scale value until 50 m, the beginning of the search is considered starting on a 10% value of the currently using scale. For a scale value over 50 m, the beginning of the bottom search is considered starting on 6m (20 ft or 3.3 ftm approximately). This tool is especially appropriate in cases where it is required to midwater fishing without losing the location of the bottom. If we do not enable this option, the bottom will only be searched in the scale shown on the screen.

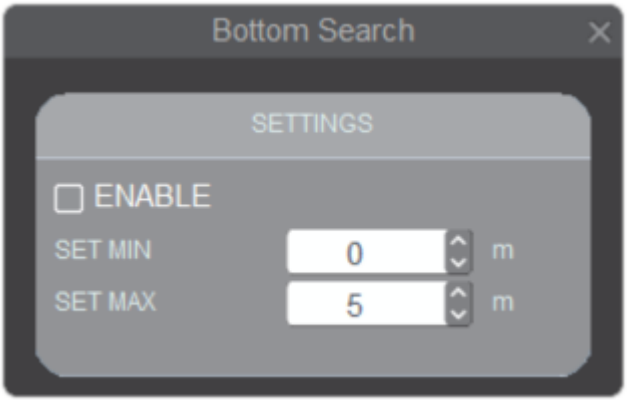



Figure 16: Bottom search settings window

### 1.3.3 Bottom expander

The bottom echo expander will be enabled clicking the option seen on Figure 14 (see section 3.1), with this option the echoes that are above from the bottom line will be draw according to the bottom expander scale that it is adjusted.

### 1.3.4 Variable Expander

As choosing the option seen in Figure 14 the bottom expander will be replaced for the scale section that the user wants to enlarge, for example Mid-water (see section 3.2).

### 1.3.5 Depth indicator

As clicking the depth indicator option of Figure 14 this indicator will be shown on the left inferior corner of the canal screen. This indicator has three different sizes that will be changeable if you click on it.

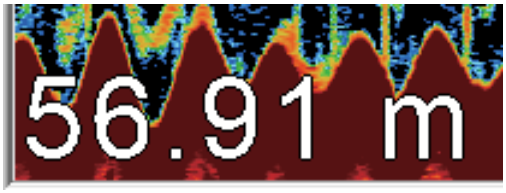



Figure 17: Depth indicator visualization

## 1.4 Colors



Figure 18: Color menu

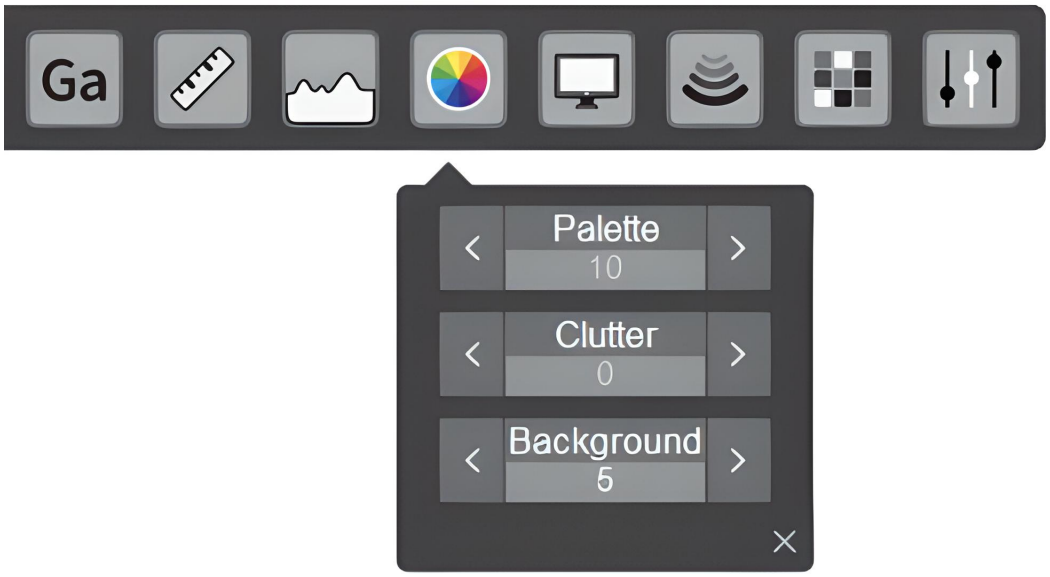



Figure 19: Color submenu

### 1.4.1 Palette




Figure 20: Colors palette visualization from the menu

The echosounder allows ten different color palettes: 12 colors (3 dB per color), 7 colors (6 dB per color), 12 shades of grey (3 dB per color), 15 colors (2 dB per color),15

colors (1 dB per color), 7 colors (6 dB per color), 7 colors (3dB per color), two palettes of 51 colors (0.5 dB per color) y one palette of 63 colors (0.5 dB per color)

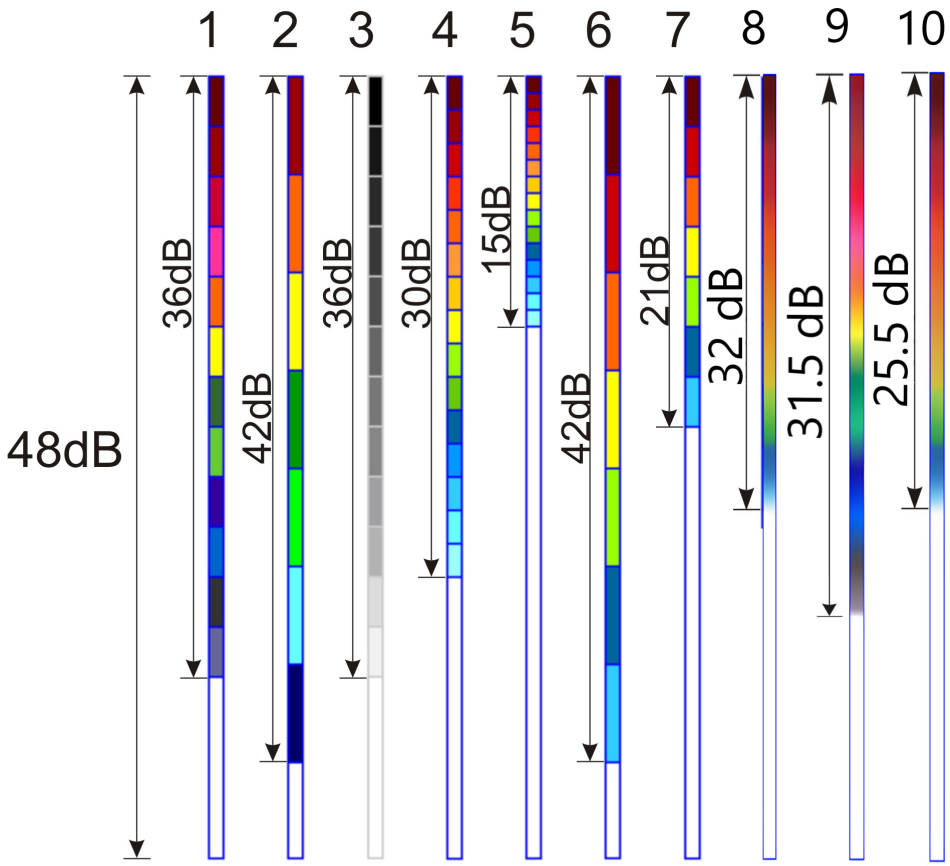



Figure 21: Available variety of colors palette

The 7 colors palette (2 and 6) allows, unlike the others, a greater range of data representation, that is to say, to be displayed on screen 42 dB below the adjusted gain value. Instead, the other palettes can represent less data on the screen, thus obtaining cleaner images, highlighting higher level echoes, when the palette has fewer dB. To use the third pallet (12 grey levels) it must be set the background (see section 1.4.3)

in any other color than black, because it corresponds to the highest level echo.

### 1.4.2 Clutter




Figure 22: Clutter visualization from the menu

Control “Clutter” eliminates the lowest palette colors, being the number indicated in the control the amount of removed color. This is mainly used to clear the small disturbances that occur due to water pollution.

### 1.4.3 Background




Figure 23: Background submenu

The echosounder background can be switched between five possible colors: white, blue, grey, blue and black.

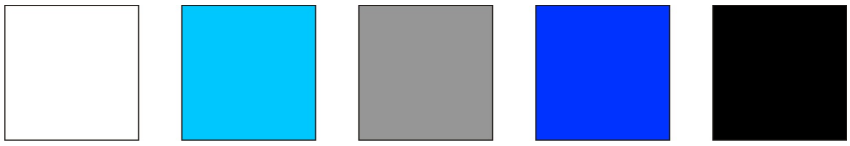


Figure 24: Background colors

The black background color is not recommended for the grey color palette (see section 1.4.1) because this one corresponds to the highest-level echo for this palette.

## 1.5 Screen settings



Figure 25: Screen settings menu

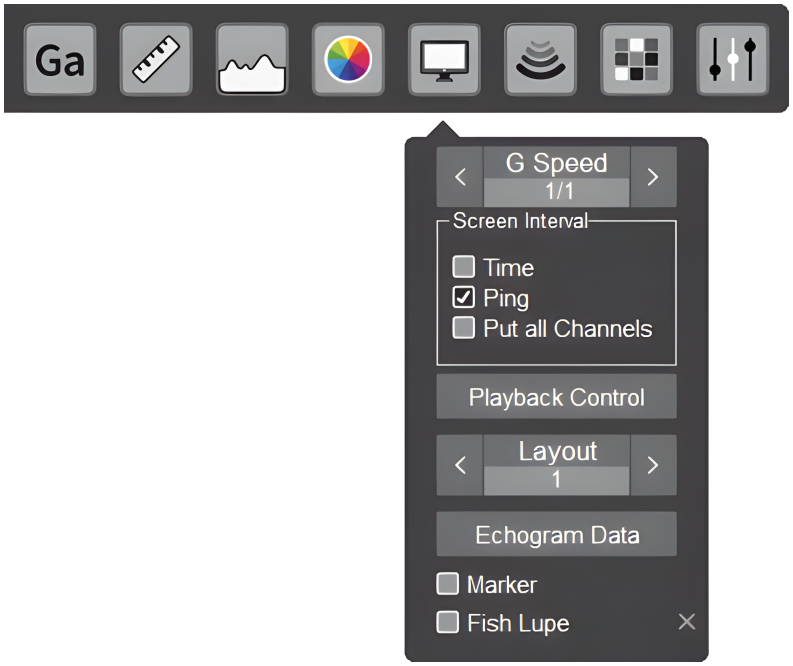



Figure 26: Screen submenu

### 1.5.1 Graphical speed




Figure 27: Graphical speed visualization from the menu

This control adjusts the movement speed of the screen relative to the ping amount. It could be set for the following values: 4/1, 2/1, stopped, 1/1, 1/2, 1/4, 1/8, 1/16, 1/32

and 1/64. Fractions indicate vertical lines scanning transmission; so, ”1/2” means a vertical line every two transmissions. When selecting the forward speed of the image, high speeds lengthen the echoes horizontally and low speeds contract them. This must be taken into account.
Graphic speed adjustment is useful when the vessel is traveling at low speed. In this case a screen will proceed showing essentially the same information.
When the echosounder is also used jointly with other lower resolution screens, speeds 2/1 or 4/1 must be selected. Representations will then be similar in time.

### 1.5.2 Depth lines

By clicking the option seen on Figure 26, horizontal dotted lines on each value scale will appear on the screen with each other.

### 1.5.3 Fish lupe

By activating this option, a graph with amplitudes and proportional colors to their intensities, will show up the echoes with each transmission, is obtained on the right side of the screen. This presentation is useful for detailed observation of fish in mid-water depth and near the bottom. Depending on the set width, a graph as the one in Figure 28 or Figure 29 can be observed. This last one, has a wider window than the previous one.

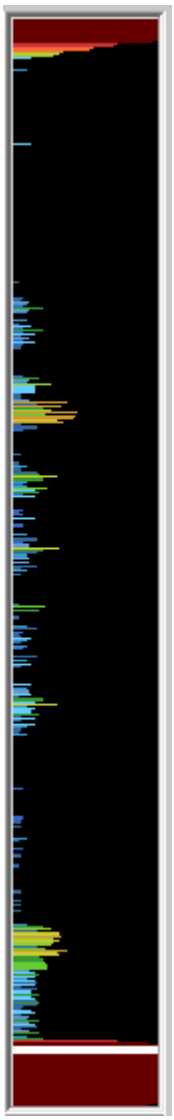


Figure 28: Simple Fish lupe

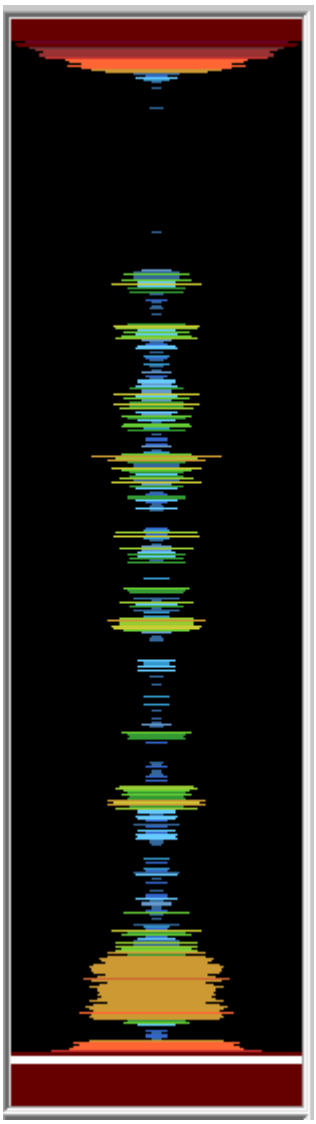


Figure 29: Double Fish lupe

## 1.6 Pulse



Figure 30: Pulse menu




Figure 31: Pulse submenu

### 1.6.1 Pulse width

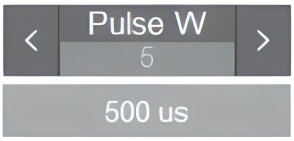



Figure 32: Pulse width visualization from the menu

This control allows the user to select from different types of pulse-width values. The equipment transmits with the same power independent of pulse width, which can vary the speed of repetition.

- some pulse-widths preconfigured by the user on the general setting's window of the RXTX submenu (see section 1.8.4)
- automatic pulse which adapts according to the selected scale

**Note: on split beam mode, the used pulse-width will be the number 2. On the single beam mode, the used pulse-width will be the automatic mode.**

## 1.7 Applications



Figure 33: Applications menu

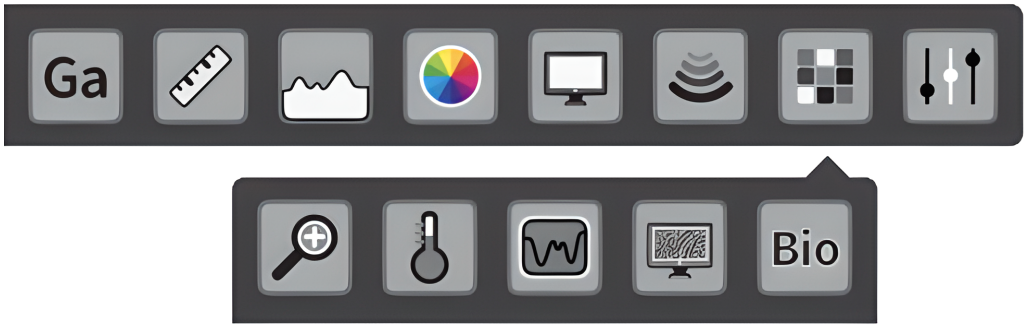



Figure 34: Aplications submenu

### 1.7.1 Zoom



Figure 35: Zoom visualization from the menu

By clicking this button, a zoom window will be opened. This window shows a direct representation in a scaled version of the selection area from the echogram. In split beam mode, such selection corresponds to the area 1 from the histogram. Zoom window dimensions can be modified by clicking and keeping pressed left mouse click from the bottom right corner from the window. The selection can be moved around trough the whole echogram.
On the other side, in single beam mode, the selection is taken from a fixed dimension area and only can be moved around the whole echogram section as desired.

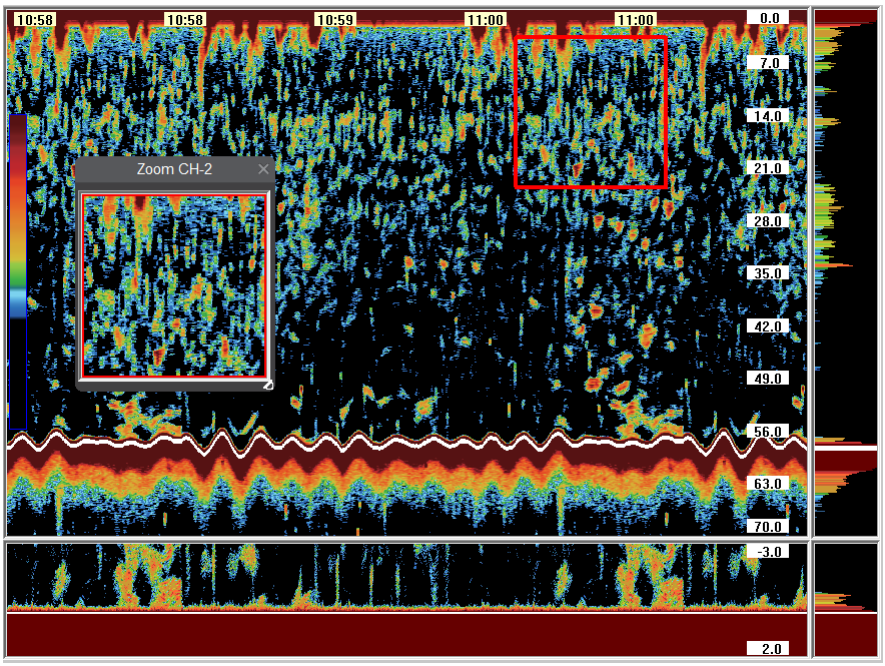



Figure 36: Zoom window visualization from the echogram selection

### 1.7.2 Hardness and roughness



Figure 37: Hardness and roughness visualization from the menu

In this window, a representation of the hardness and roughness of the detected bottom are shown.

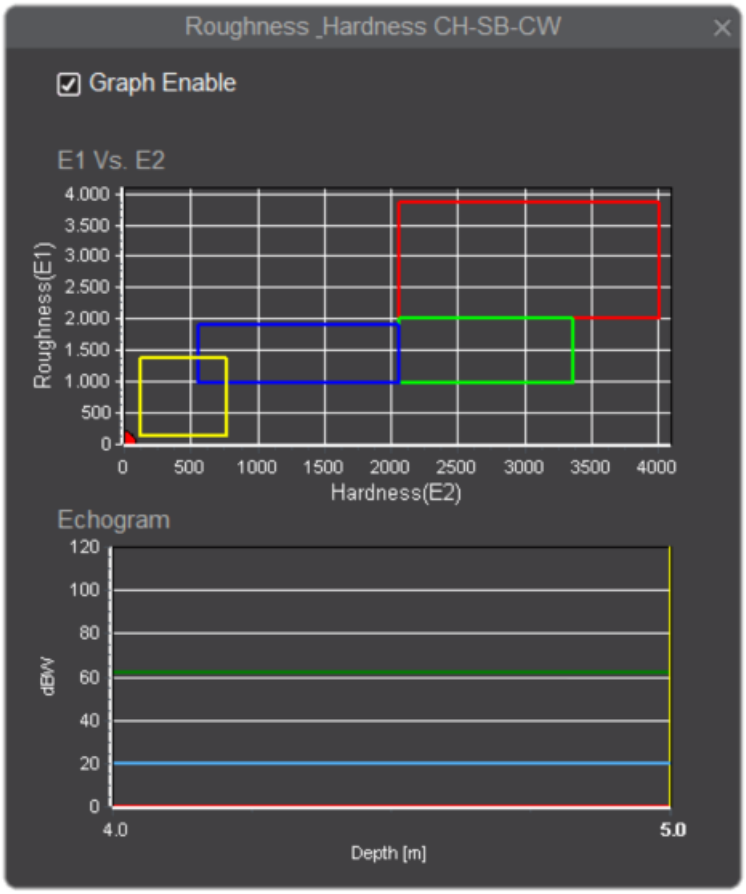



Figure 38: Hardness and roughness setting window

In order to get a proper indicator, the white line (see section 1.3.1) should be correctly adjusted. It is the same that the depth gauge (see section 8) is other than "- -"
The first graph shows quantitatively RoxAnn hardness parameters.
The second graph plots the profile of the bottom, indicating the position of the white line and its percentage of hardness and roughness. Parallel to this graph there is a vertical scroll bar that lets the user change the value of the white line.

**Note: for a correct calculation of the parameters it is necessary to set the angle of the transducer properly (see section 11.1.)**

### 1.7.3 Temperature



Figure 39: Temperature visualization from the menu

In this window, internal temperature, external temperature of the equipment and its historical graph are shown. Additionally, the user can select the measurement unit: ºC or ºF.

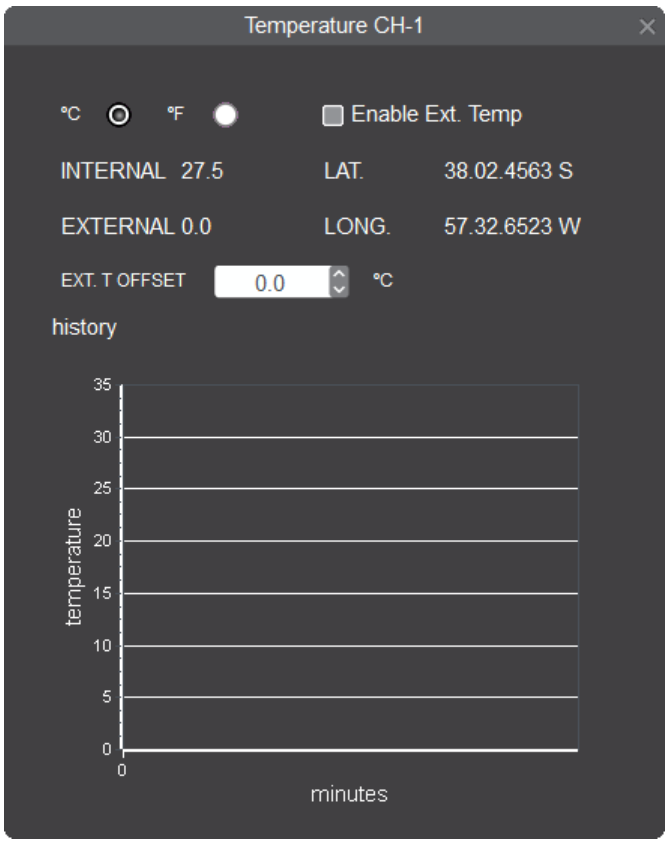



Figure 40: Temperature graphical visualization window

If an external temperature sensor is connected, the user should first enable it in the program settings window (see section 16.3). After this, the user can make a correction to the measurement using the adjustment control below the actual external

temperature indicator. It can only be enabled if the license is obtained.
The historical graph stores every minute of the temperature and position data, being the latest value on the right of the graph. To visualize the data, simply move the pointer over the chart, and they will appear in the numerical indicators in the upper right side of the window.

### 1.7.4 Noise Analyzer



Figure 41: Noise analyzer visualization from the menu

In this window, a spectrum analyzer can be used for every echosounder we desire to check. Once the windows is opened, it is possible to start application by enabling it with the checkbox. Once it starts, it is important to highlight that hydrophone mode is being used. This means, that transmission of the echosounder is not enabled. All echoes coming now to the echosounder are analyzed in the frequency domain. This is a vital tool during installation process. It allows technicians to identify possible non desired interference in the bandwith we are currently using.

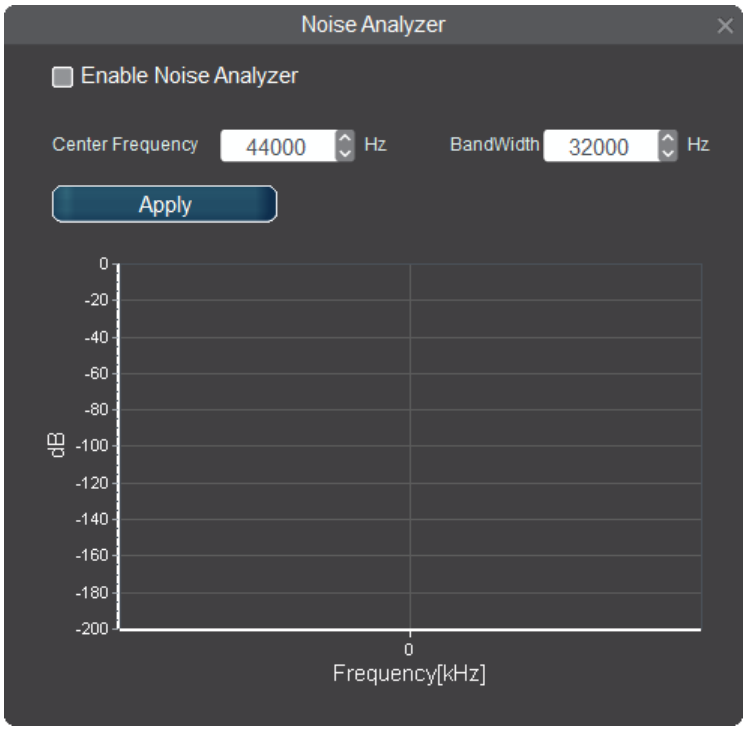



Figure 42: Noise analyzer window

It is possible to enable transmission of the echosounder to identify our own pulse and its frequency content. This could be helpful to confirm that our transmission is not overlapped with external signals.

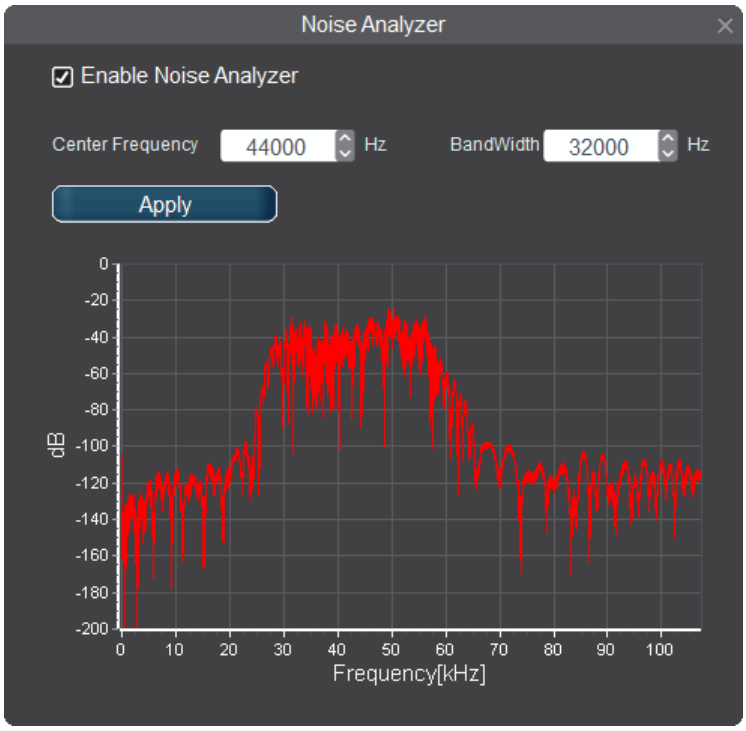



Figure 43: Noise analyzer window running for low band frequency and pulse transmission in chirp mode

### 1.7.5 Biomass




Figure 44: Biomass visualization from the menu.

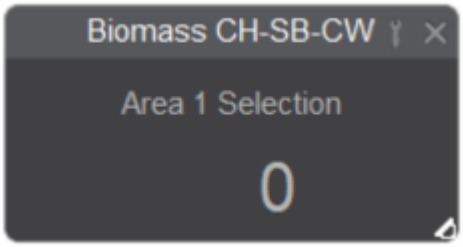



Figure 45: Biomass window

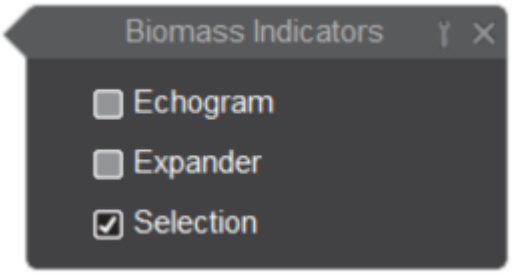



Figure 46: Window selection of biomass sources data

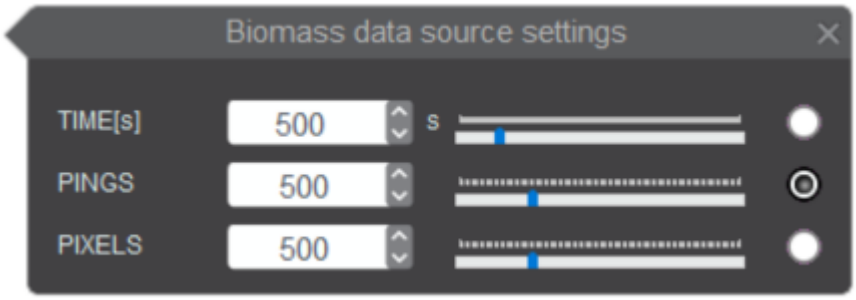



Figure 47: Source data settings for the biomass

By clicking on the biomass button from menu shown in Figure 34, a window with the biomass index information is displayed. The available options for the biomass index calculations can be set in the tools icon in the upper right corner of the window shown in Figure 46. The data source can be selected for echogram and expander cases. The following settings for these mentioned options should be set:

- Time: definition for the amount of seconds for a complete screen statistics
- Ping: definition of pings amount previously to the current ping
- Pixels: definition of pixels amount for the echogram

**Note: in single beam mode, for the biomass index calculation, it should be considered making a transducer calibration.**

## 1.8 General settings



Figure 48: General settings menu

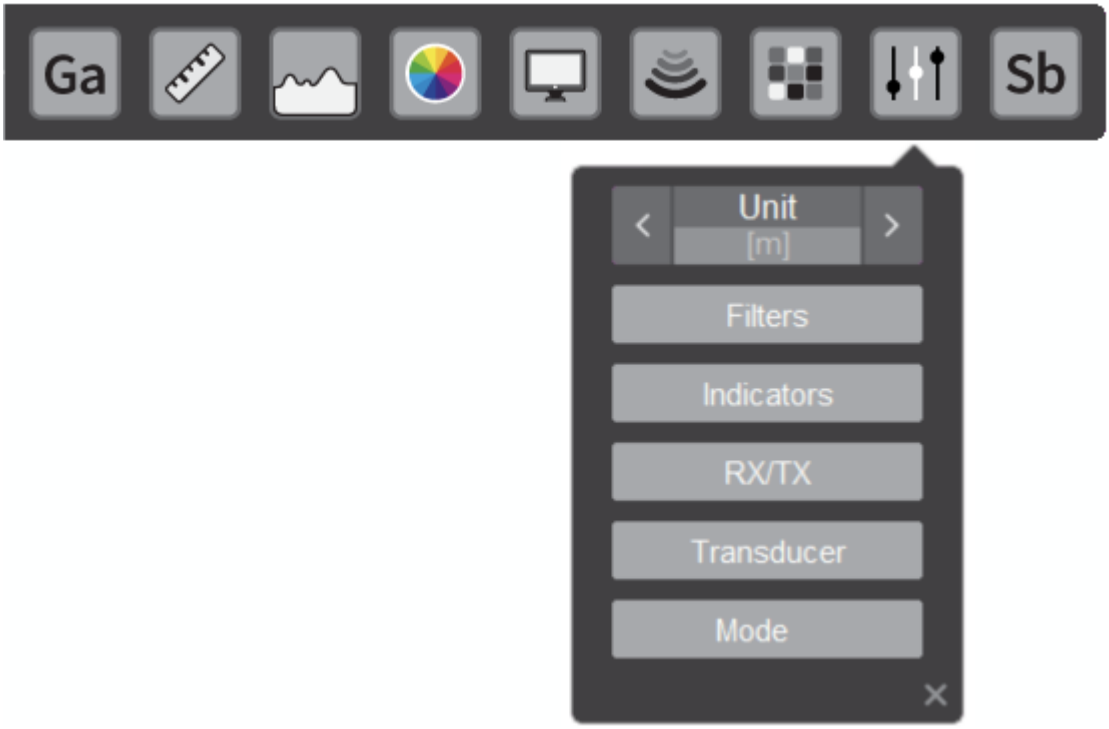



Figure 49: General settings submenu

### 1.8.1 Measure Unit




Figure 50: Unit visualization from the menu

This control allows the user to select between three possible measurement units: meter [m], feet [ft] and fathom [FTM]. When switching between them, the scales and the depth indicator will be recalculated (see section 8).

### 1.8.2 Filters

By clicking on the filters button Figure 49, the following window will open.

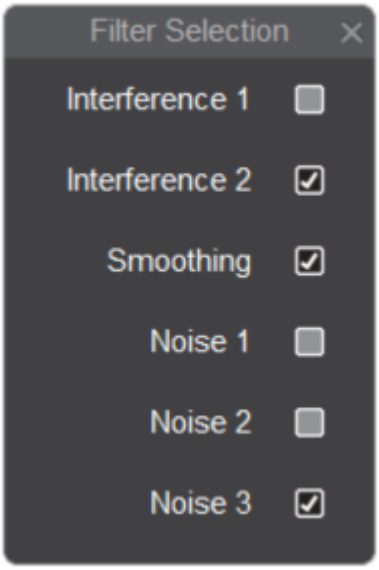



Figure 51: Filter settings menu

In this window you can select the filters that are applied to the data acquired by the echosounder, generating the following graphic effects.

1. **Interference 1:** this filter type is useful when the noise is synchronous. For example, if there is a presence of other shots of the echosounder which are not synchronously with this one (usually a noise produced by the 50 Hz or 60Hz frequencies from mains)
2. **Interference 2:** this filter operates similar to the Interference 1 filter but this one additionally eliminates noises of higher intensity
3. **Smoothing:** this filter type improves fish mark representation among echosounder pings
4. **Noise 1:** this filter limits the bandwidth of the echosounder by softening the data in the vertical direction
5. **Noise 2:** this filter operates similar to ”Noise 1”, but softens the image further in the vertical direction
6. **Noise 3:** this filter operates similar to the previous two, but it softens even more the image vertically

Because of the generated effects by each filter, the first two are mutually exclusive like the last three. Thus, only one can be selected at the same time from of the first two along with the third and only one from of the last three.

**Note: by default, interference 2 and noise 1 filters are set.**

### 1.8.3 Indicators

By clicking on the indicator button seen on Figure 49 the next window will open:

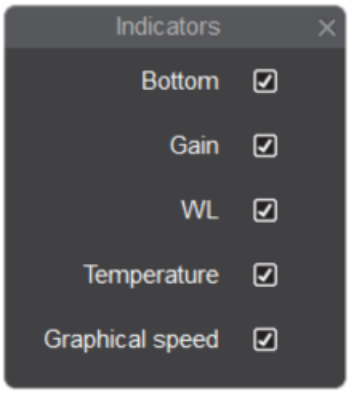



Figure 52: Indicators window visualization

By selecting the different options, the selected indicators will appear on the screen

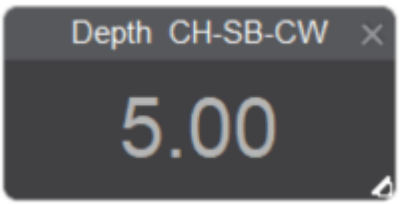



Figure 53: Bottom indicator visualization

The bottom indicator shows on the screen the depth of the bottom. In case the bottom echo is not detected, the indicator will show zero. This indicator has two variants, the left option enabled the box shown on Figure 53. This box can change its size and can be put in any place that the user prefers. The right option enabled the bottom indicator shown on Figure 17.

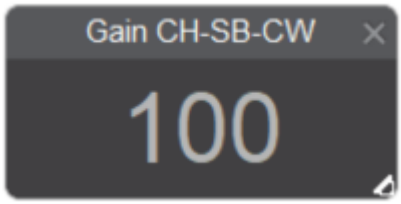



Figure 54: Gain indicator visualization

Indicator seen on Figure 54 shows the gain value of the current channel.

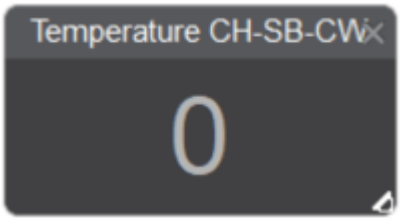



Figure 55: Temperature indicator visualization

Indicator seen on Figure 55 shows the external temperature value of the equipment.

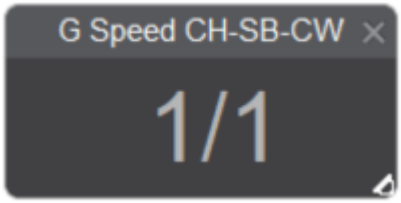



Figure 56: Graphical speed indicator visualization

Indicator seen on Figure 56 shows the graphical speed relative to the amount of soundings that were made.




Figure 57: WL indicator visualization

Indicator seen on Figure 57 shows the WL current value.

### 1.8.4 RX/TX

By clicking the RX/TX button shown on Figure 49 the window seen on Figure 59 (Chirp Mode) or the one seen on Figure 58 (CW Mode) will open

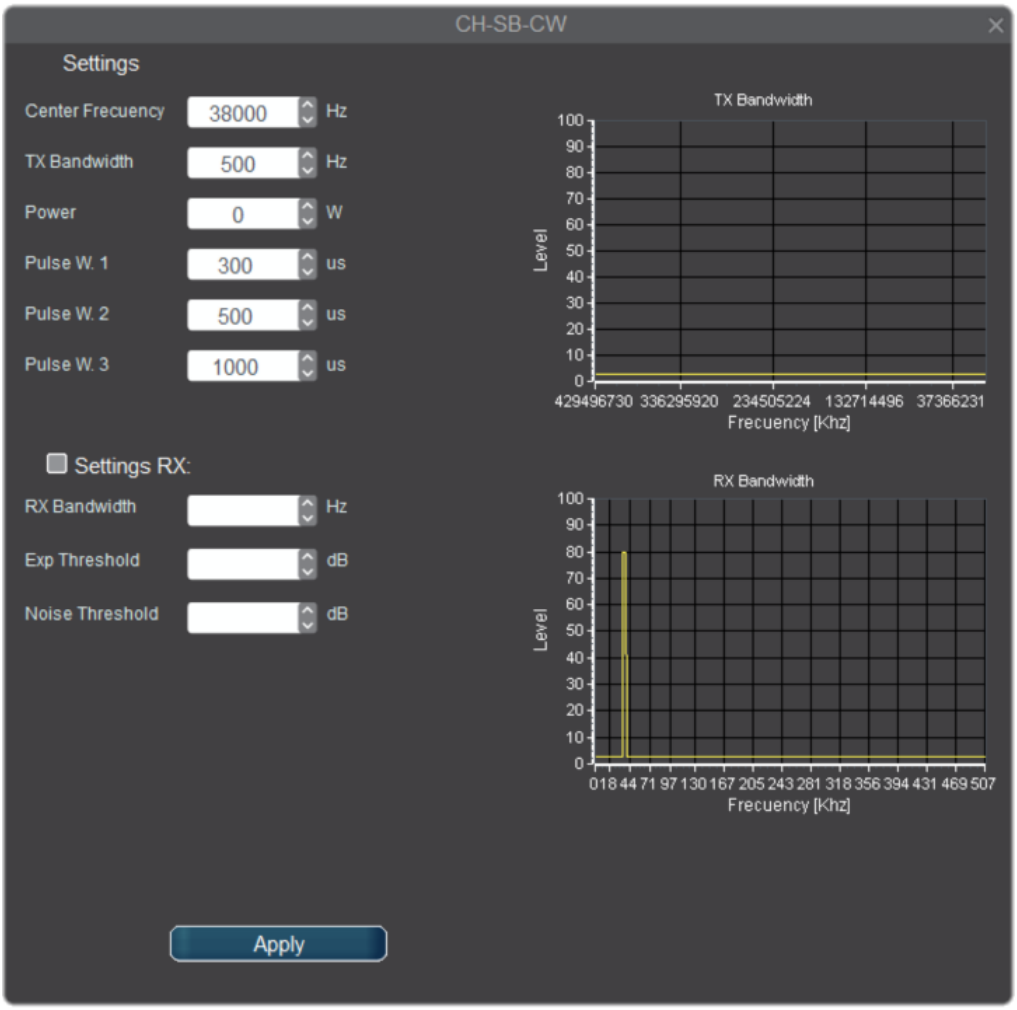



Figure 58: RX/TX submenu visualization on CW mode

This submenu allows to adjust the parameters of transmission and receiving operation on CW mode.
The following transmission adjustment will be found on the left side:

- **Pulse width (1-2-3):** Pulse width pre-adjustment that can be choose from the echosounder menu (see section 1.6)

After the transmission adjustment the following parameters of the receiver are shown:

- **Frequency filter:** define the bandwidth of the reception filter.

- **Noise floor:** the number of samples that are discard affecting the echo sounder receptor sensibility. This samples are taken after its conversion on the A/D.

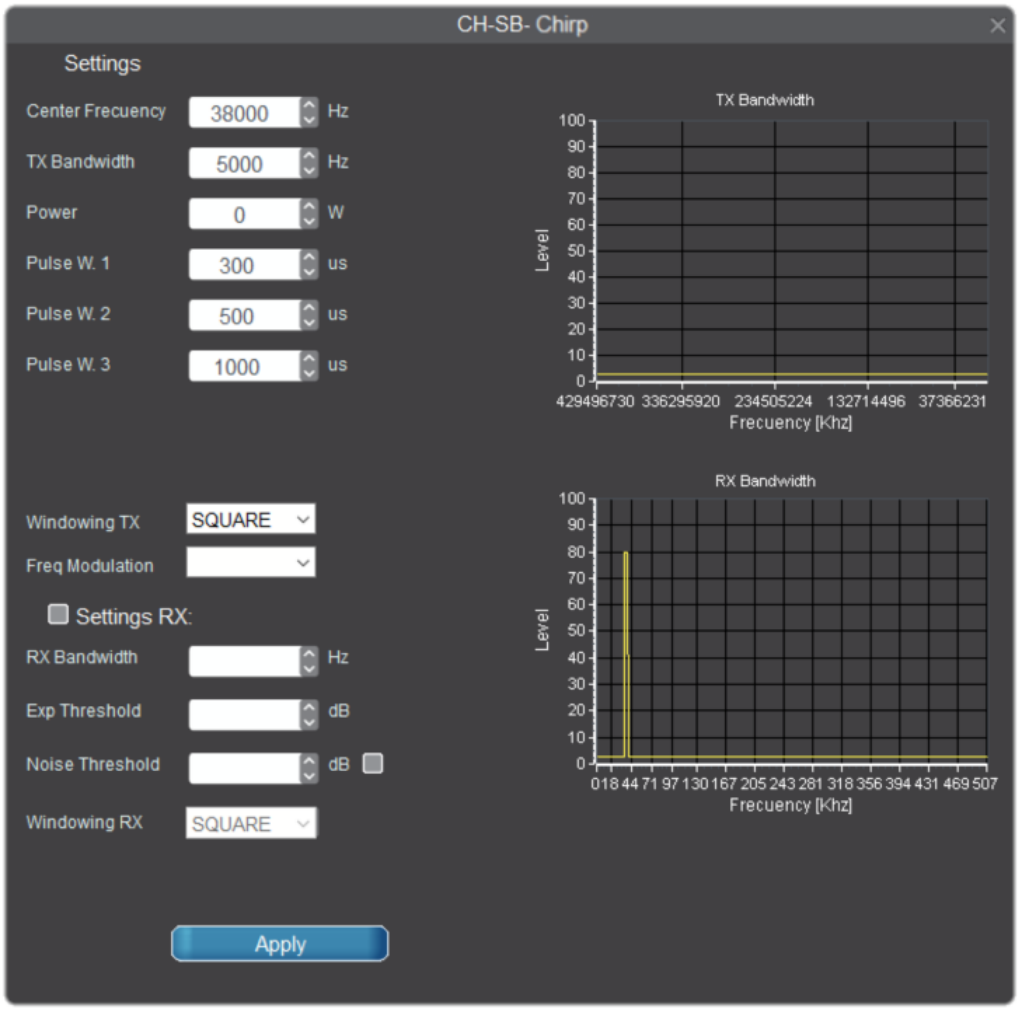



Figure 59: RX/TX submenu visualization on Chirp mode

On the window seen on Figure 59 the parameters of transmission and reception on Chirp mode are shown. These are the only adjustments shown on Chirp mode:

- **Chirp limit:** defines the attenuation filtering in the bottom sea
- **Chirp noise:** The number of samples that are discarded

### 1.8.5 Transducer

By clicking the transducer button seen on Figure 49 the following menu will show up

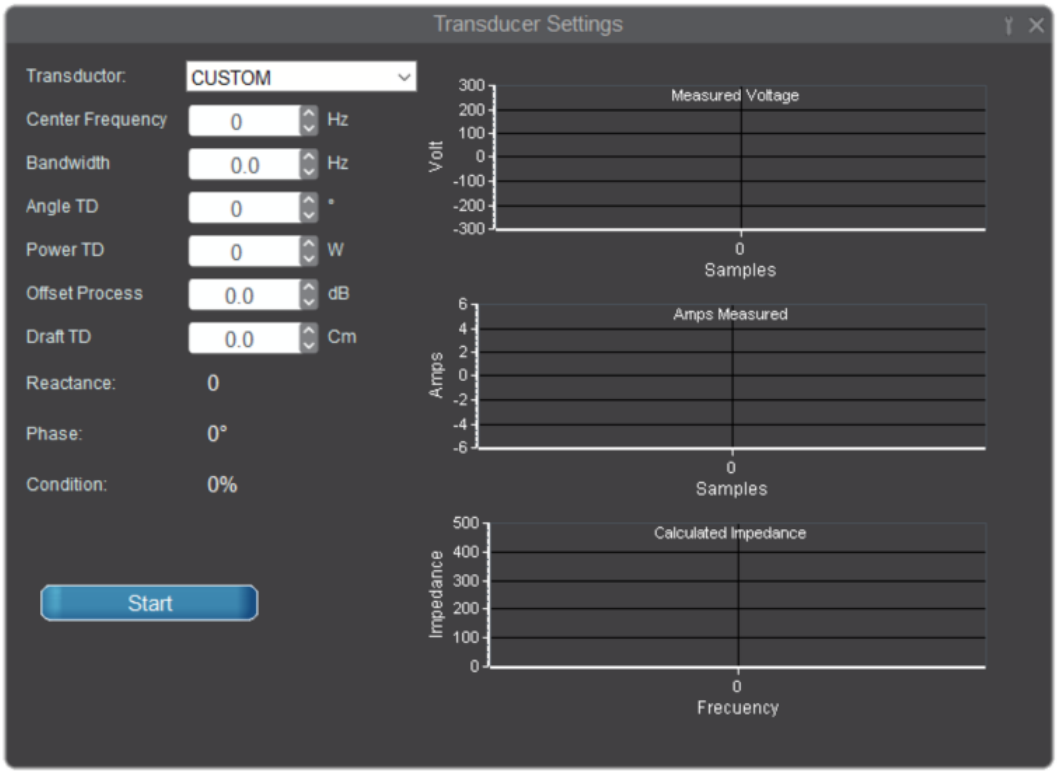



Figure 60: Transducer visualization from the menu

On this window it is shown the type of transducer that it is connected to the channel, the center frequency and the bandwidth.

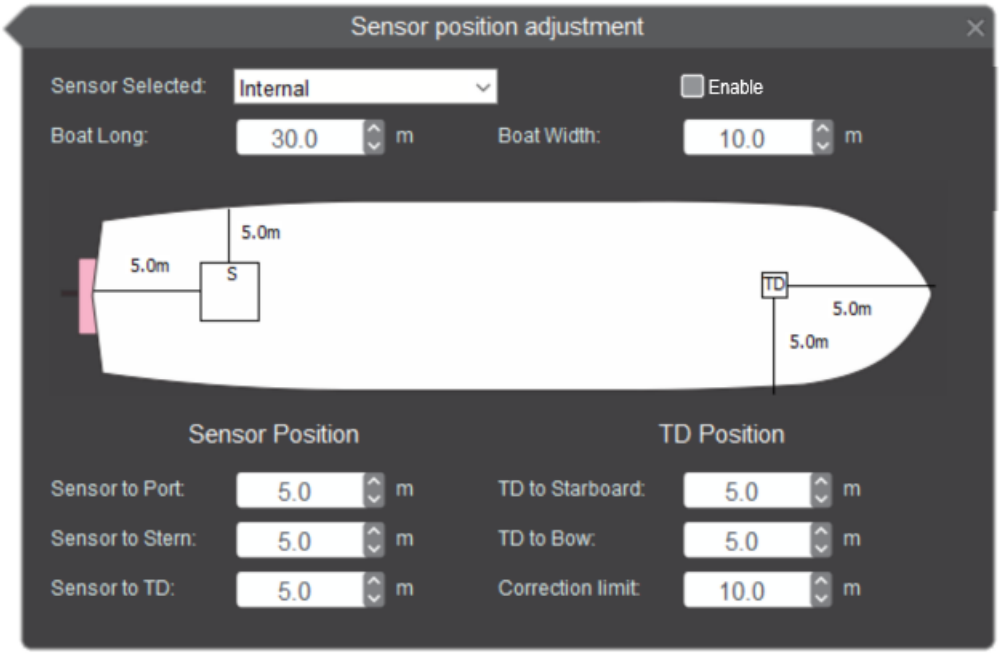



Figure 61: Transducer settings visualization

By clicking on the adjustments button inside the Figure 60 will show up the Figure 61. On this window is possible to assign the installation transducer position to each channel. In essence, the physical location of the transducer in the vessel. This allows to make an external heaving compensation from the configured NMEA data, for example from a satellite compass or gyro or an internal compensation of the accelerometer. A detailed description for each field is given as follows:

- **Enable:** enable or disable the compensation
- **Data source:** indicate the compensation data source
- **Boat long:** associated measurement of the long of the boat
- **Boat width:** associated measurement of the width of the boat
- **TD to bow:** associated measurement from the transducer to the bow of the vessel
- **TD to Starboard:** associated measurement from the transducer to starboard
- **Sensor to Port:** associated measurement from the sensor to port
- **Sensor to Stern:** associated measurement from the sensor to the stern of the vessel

- **Sensor to TD:** associated distance from the sensor towards the transducer in the vertical direction, perpendicular to the vessel deck
- **Correction limit:** maximum possible compensation value

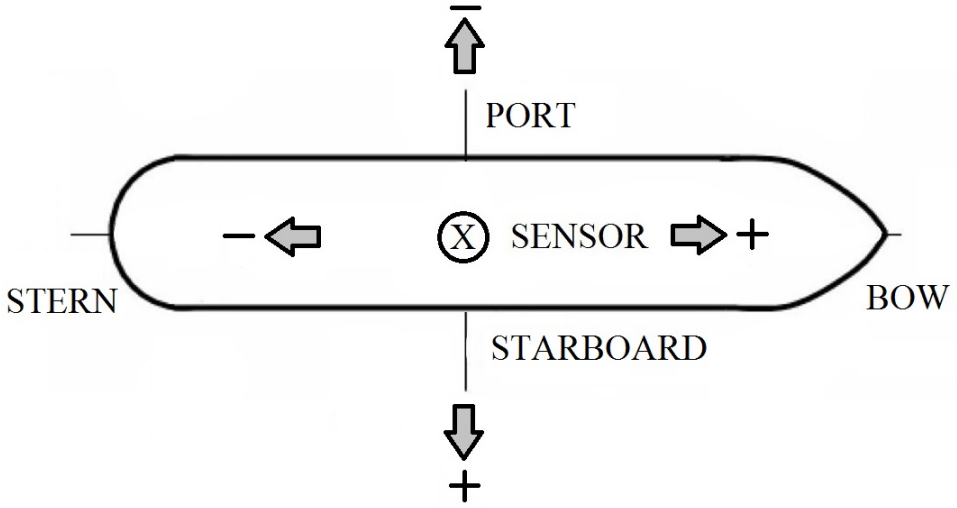



Figure 62: Sense reference for installed sensor position respect to the transducer in the vessel hull

From the shown scheme in Figure 62 it can be seen that exist 4 possible quadrants positions for the transducer installation respect to the sensor. The indicated position of the sensor in the middle of the vessel is only defined as an example. The sensor location it could be anywhere in the vessel.

### 1.8.6 Mode

By pressing on the transmission button mode seen on Figure 49 the selection menu will show up, allowing the user to choose between CW mode or Chirp mode.

CW mode will transmit a determined fixed frequency. On Chirp mode the transducer will issue pulses in the frequency range chosen by the user. This frequency range has a maximum limit determined by the transducer manufacter. Chirp mode give a better resolution, allowing to differentiate objects that are close to one another. The Chirp mode only can be activated if the transducer can handle it and its feature is licensed.

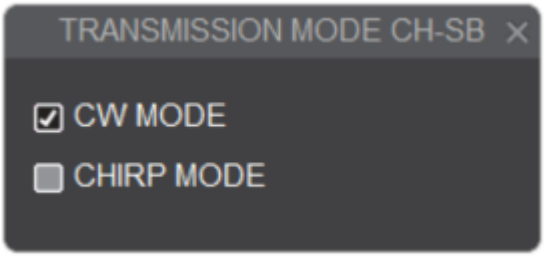



Figure 63: Transmission mode screen visualization

# 2 Echosounder graphic area

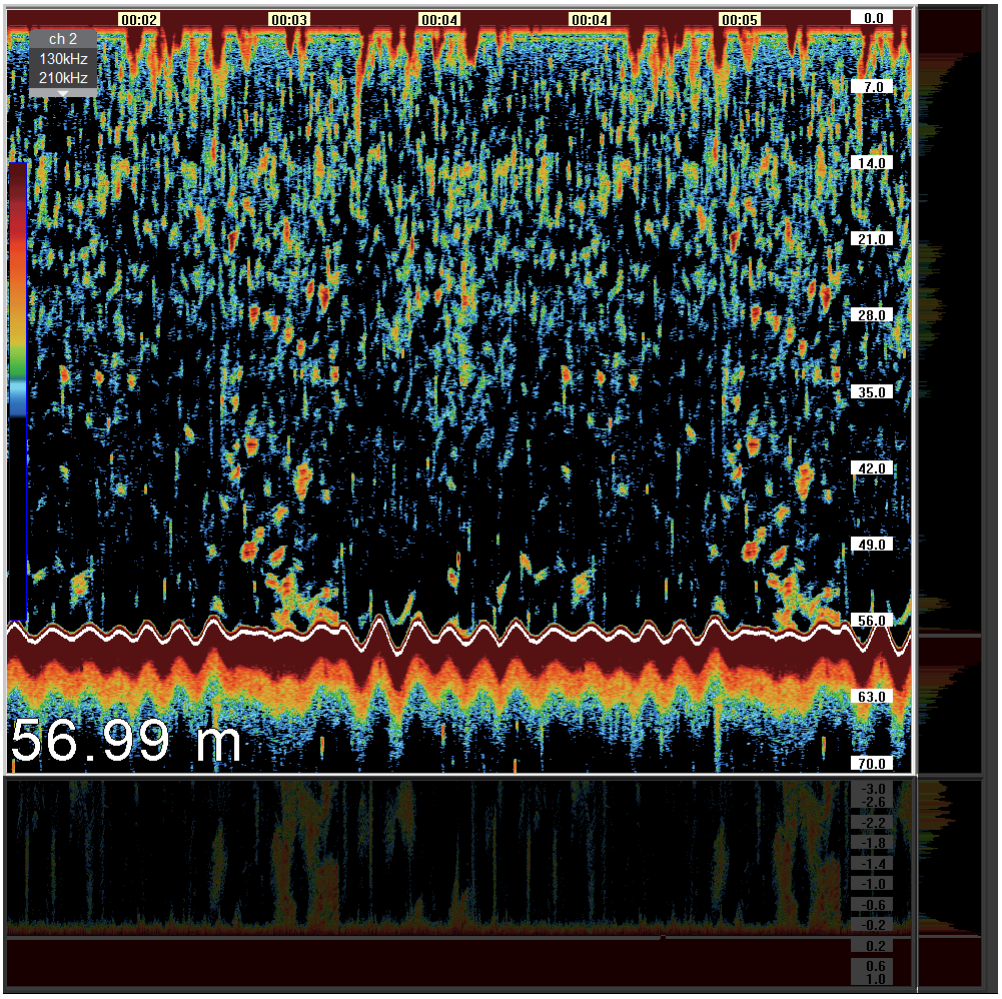



Figure 64: Graphic screen visualization

Inside the plotted area, the corresponding echoes from the shoals and the bottom will be displayed.

- **Left click:** the quick settings menu is shown, where you can control the gain (see section 1.1.1), the TVG (see section 1.1.2), the graph speed (see section 1.5.1) and the scale (see section 1.2.2) will be opened
- **Right click:** the instantaneous menu view (see section 2.1) will be opened

- **Central rotation of the wheel:** while rotating the wheel, it will increase or decrease the gain accordingly
- **Central wheel click:** a vertical line, used to mark the echoes of interest, is drawn

## 2.1 Instantaneous view



Figure 65: Instant visualization window from ping data corresponding to the current cursor position cursor

The snapshot allows you to visualize historical data presented on the screen. It is possible to to open this visualization by the usage of the mouse: right click over the echogram for single beam mode and scroll mouse click for split beam mode. For this purpose, after opening the window, just move the cursor to the desired area and the data will be updated. After opening the instantaneous window over the echogram, it is possible to move the pointer to the zone under interest and the shown data will be updated automatically.
Data from the instantaneous windows belong to the current mouse position and are detailed as follows:

- Latitude: corresponding value to the ship for the selected ping
- Longitude: corresponding value to the ship for the selected ping
- Speed: corresponding value to the ship for the selected ping
- Course: corresponding value to the ship for the selected ping
- Temperature: corresponding value to the exterior temperature in case a sensor was previously configured
- Depth: corresponding detected bottom value for the selected ping
- Date: corresponding value to the selected ping
- Time: corresponding value to the selected ping
- Signal: signal level corresponding to the selected ping at the cursor position
- Beam diameter: corresponding level to the ping at the cursor position

- Cursor depth: corresponding level to the ping at the cursor position
- Ping rate: pings per seconds rate at the cursor position
- Pulse width: corresponding value at the cursor position

# 3 Echo expander

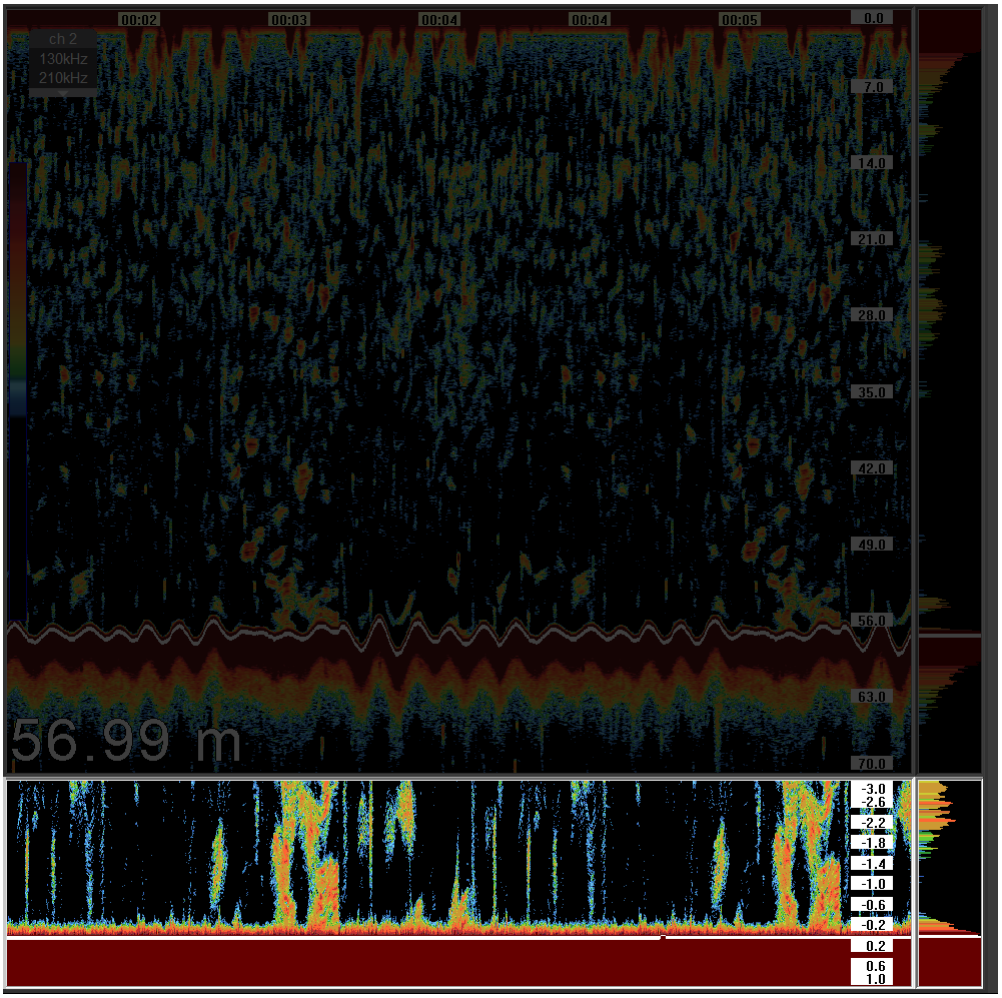



Figure 66: Echo expander window

The echosounder expander is available from the menu of the echosounder (see section 1.3.3) and (see section 1.3.4). Two different types of visualizations can be made: bottom echo expander and variable expander.

## 3.1 Bottom echo expander

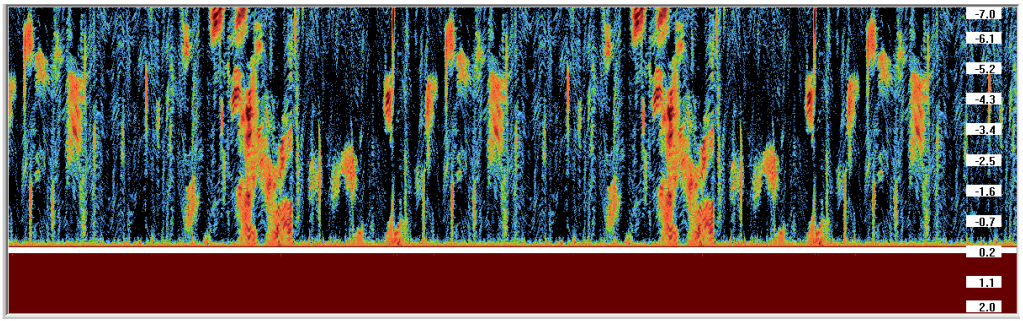



Figure 67: Bottom echo expander window

Bottom echo expander from this echosounder allows identify two scales next to the detected bottom.

- Above bottom echo expander: on this window it is possible to visualize echoes from the bottom to the surface direction. There is a ”flat” graphical effect between the echoes and it allows visualize the produced echoes by the fishes that swim closer to the bottom. Its scale can be adjusted by turning the mouse wheel on the scale area or or by opening a shortcut menu. The scale value corresponds to the number of meters, feet or fathoms detected from the bottom to the surface. For this data to be valid, it is necessary that the bottom is detected correctly. For this purpose, it is very important to adjust the white line properly (see section 1.3.1).
- Under bottom echo expander: additionally, several power levels can be detected from the backscattering echoes from the bottom towards deeper direction. Scale is possible to be adjusted placing the mouse cursor over the zero value and turning the wheel.

## 3.2 Mid-water depth expander

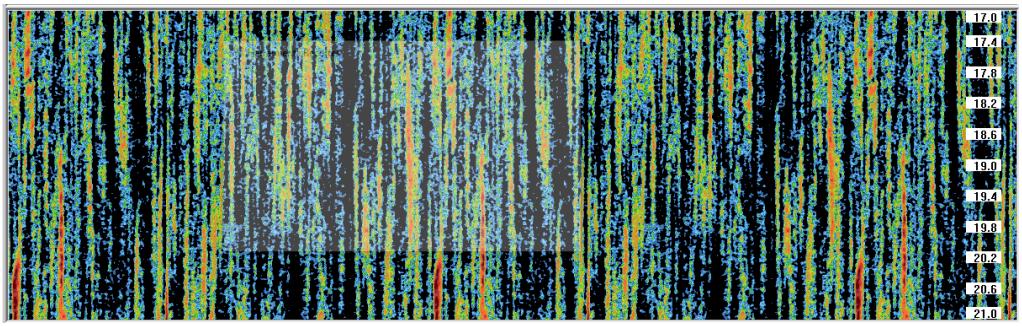



Figure 68: Middle water echo expander window

This type of window allows the user to make an ”expanded” plotted area that can be adjusted as the window of the echosounder with an offset of zero and an independent scale.
Both the scale and the zero displacement can be adjusted by turning the mouse wheel on the scale area or by opening a shortcut menu by clicking the left button.
This is very useful when the user wants to display a shoal of mid-water depth fish, without losing sight of the whole range of the echosounder from the surface to the bottom (see section 2).

# 4 Echosounder scale area

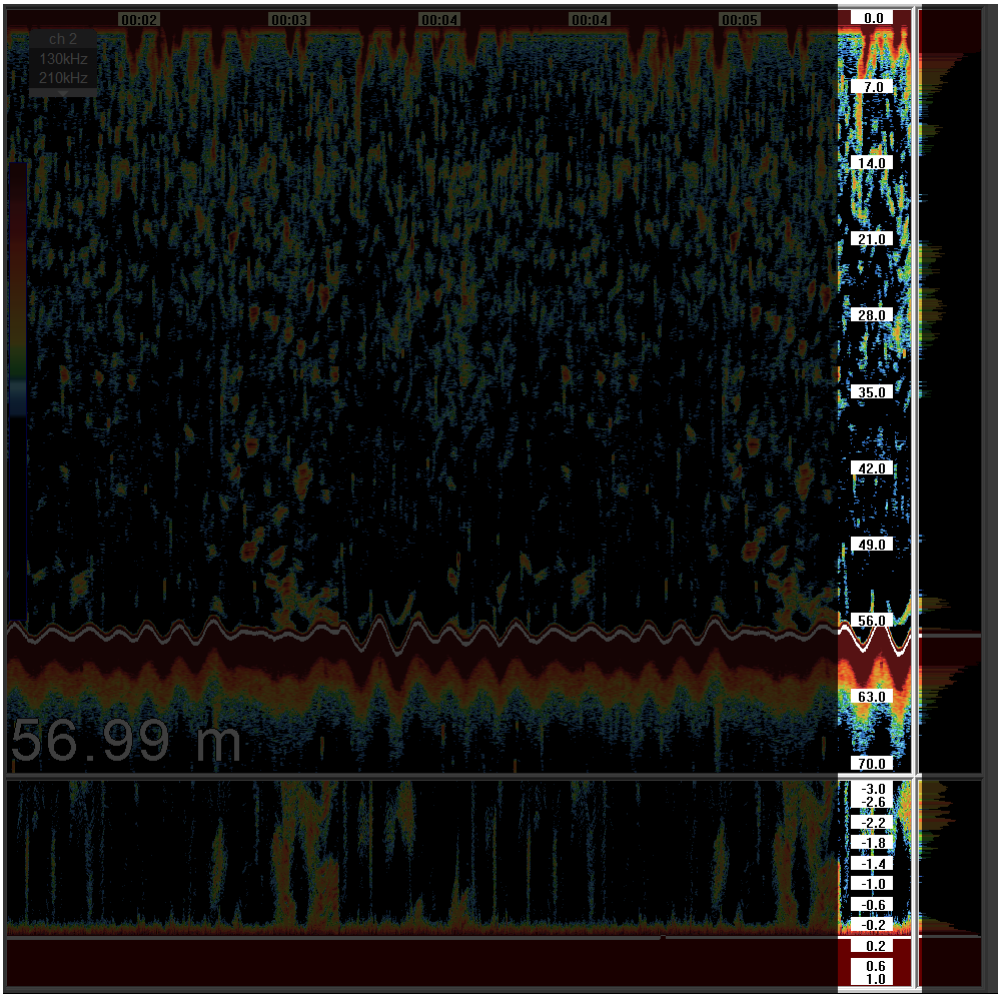



Figure 69: Scale visualization

This area allows the user to perform a quick scaling and displacement of the zero by simply turning the mouse wheel. The zero shift is adjusted by placing the pointer over the lower scale value and the scale value by placing the mouse over any part of the area.

# 5 Resizing panels

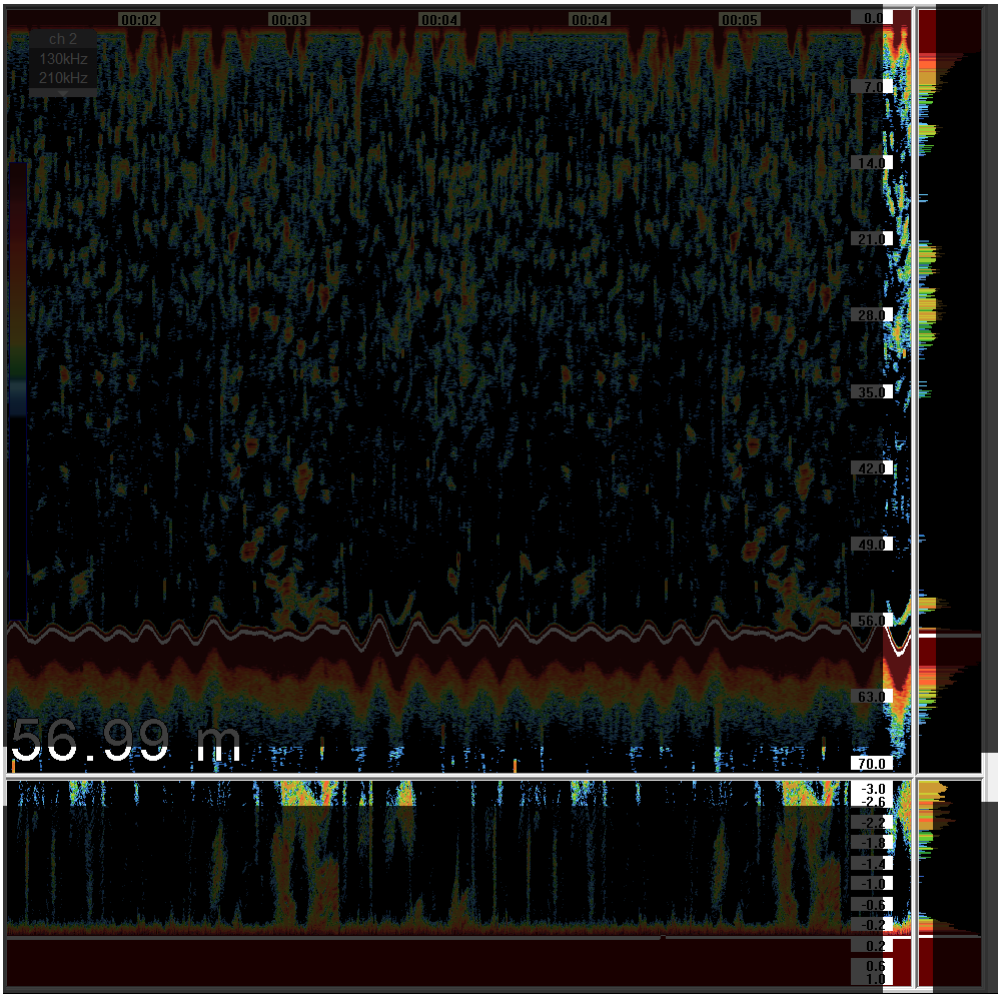



Figure 70: Resizing panels area visualization

Each echosounder has a set of active zones which are identified when the cursor changes ( or ) to go over these. The panels of each echosounder can be resized simply by positioning the cursor on one of the hot spots, pressing without releasing it, move it in the desired direction.

# 6 Resizing sounding window

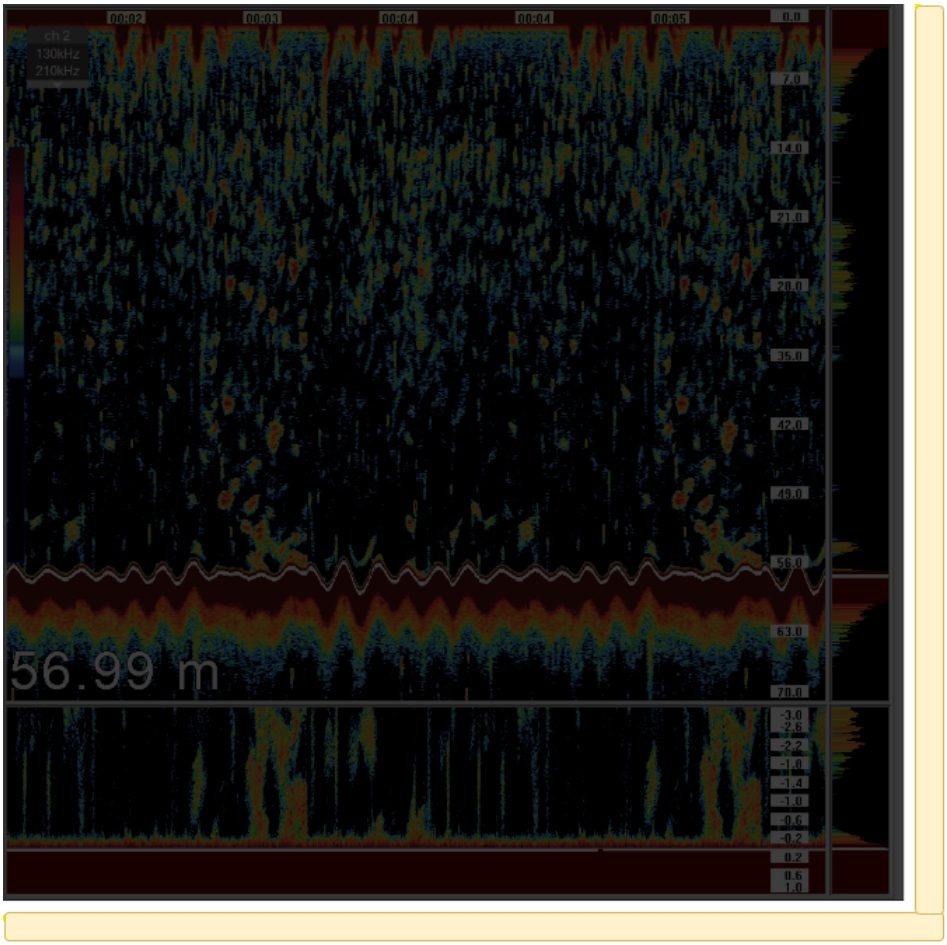



Figure 71: Resizing sounding window visualization

Each echosounder has a set of active zones which are identified when the cursor changes ( or ) to go over these. The panels of each echosounder can be resized simply by positioning the cursor on one of the hot spots, pressing without releasing it, move it in the desired direction.

# 7 Echosounder window displacement

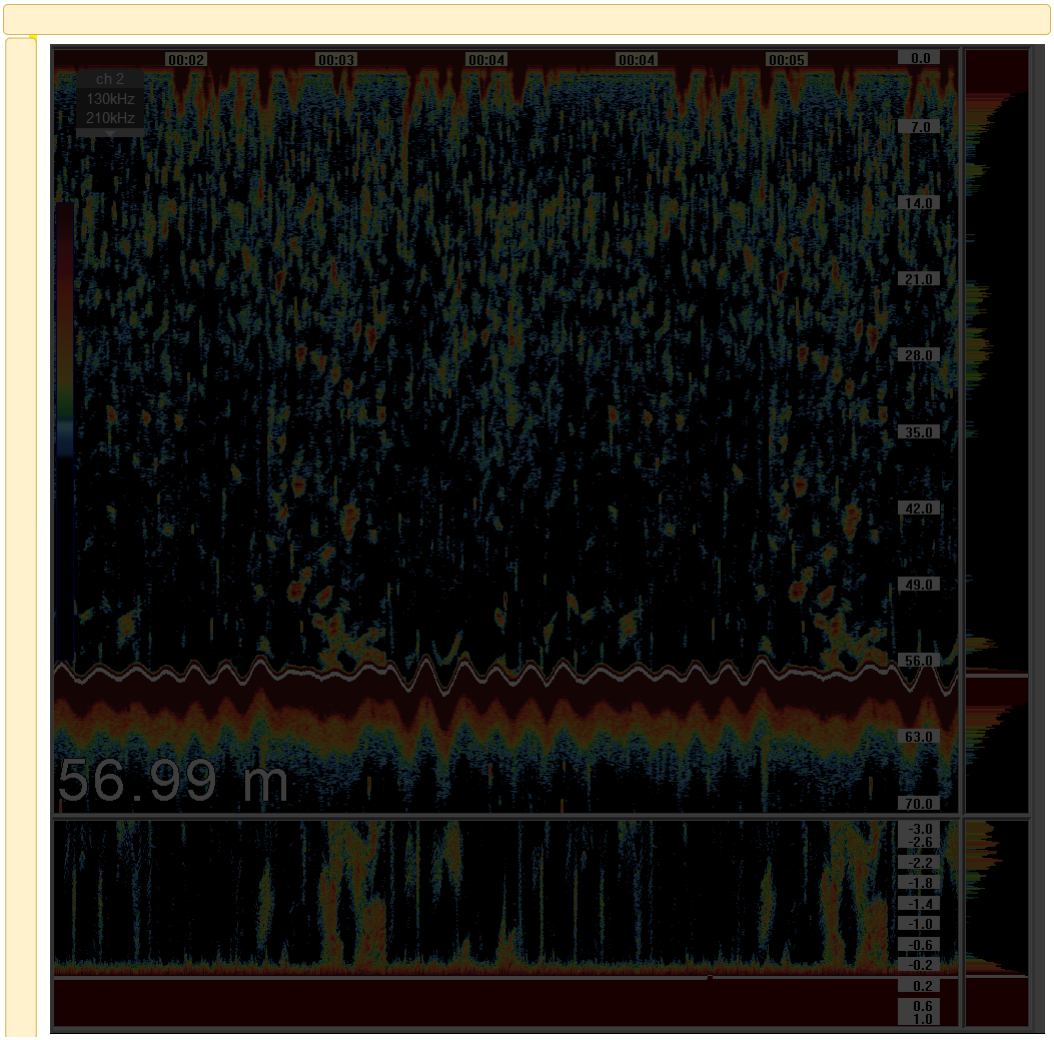



Figure 72: Echosounder window displacement zone visualization

Each echosounder has a set of active zones which are identified when the cursor changes (↔ or ↕) to go over these ones. The window of the echosounder can be resized simply by positioning the cursor on one of the active zones, pressing without releasing it, moved it in the desired direction.

# 8 Depth indicator

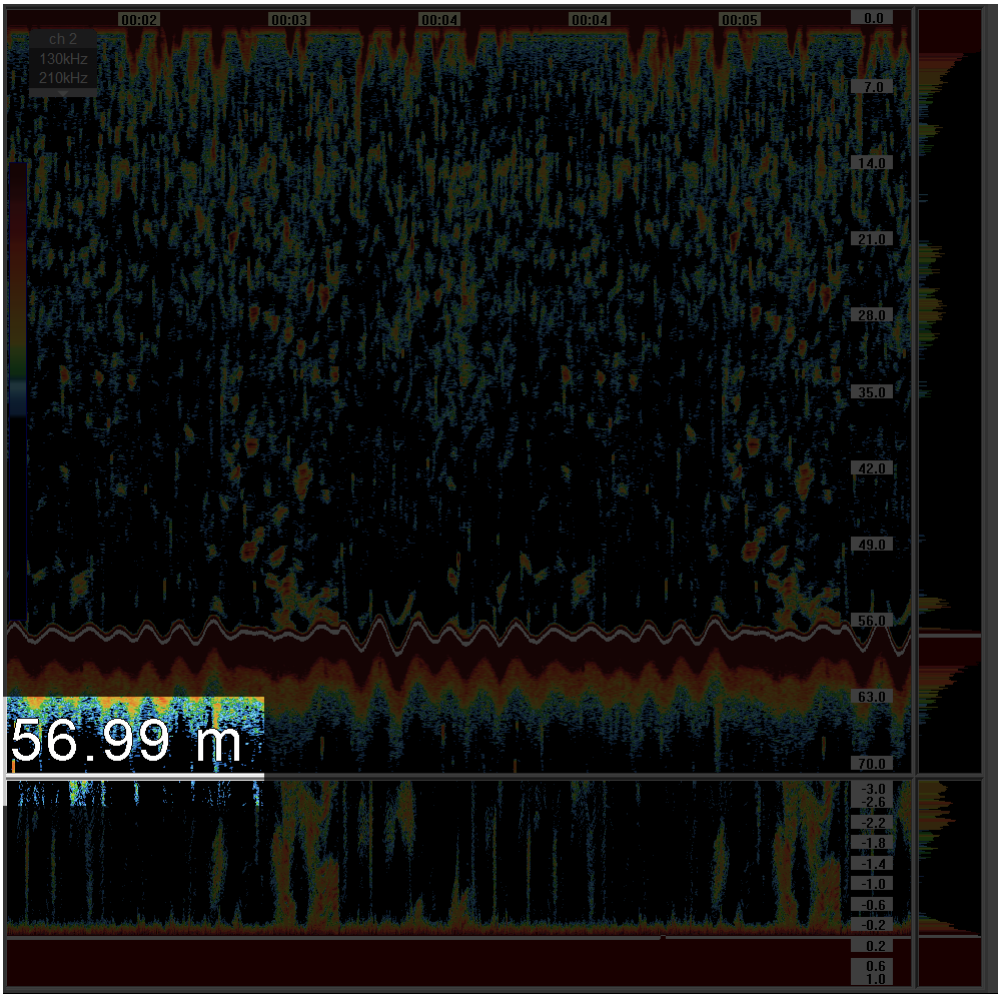



Figure 73: Depth indicator visualization

In the lower left corner of the window of the echosounder, the depth indicator can be seen. It indicates with a number, if the white line is properly adjusted on the bottom (see section 1.3.1), or the letter “E” if the white line is not on the bottom. The units of measurement correspond to the settings in the menu of the echosounder (see section 1.8.1).

**Note: the size of the indicator can be set by clicking on it with the cursor.**

# 9 Color palette indicator

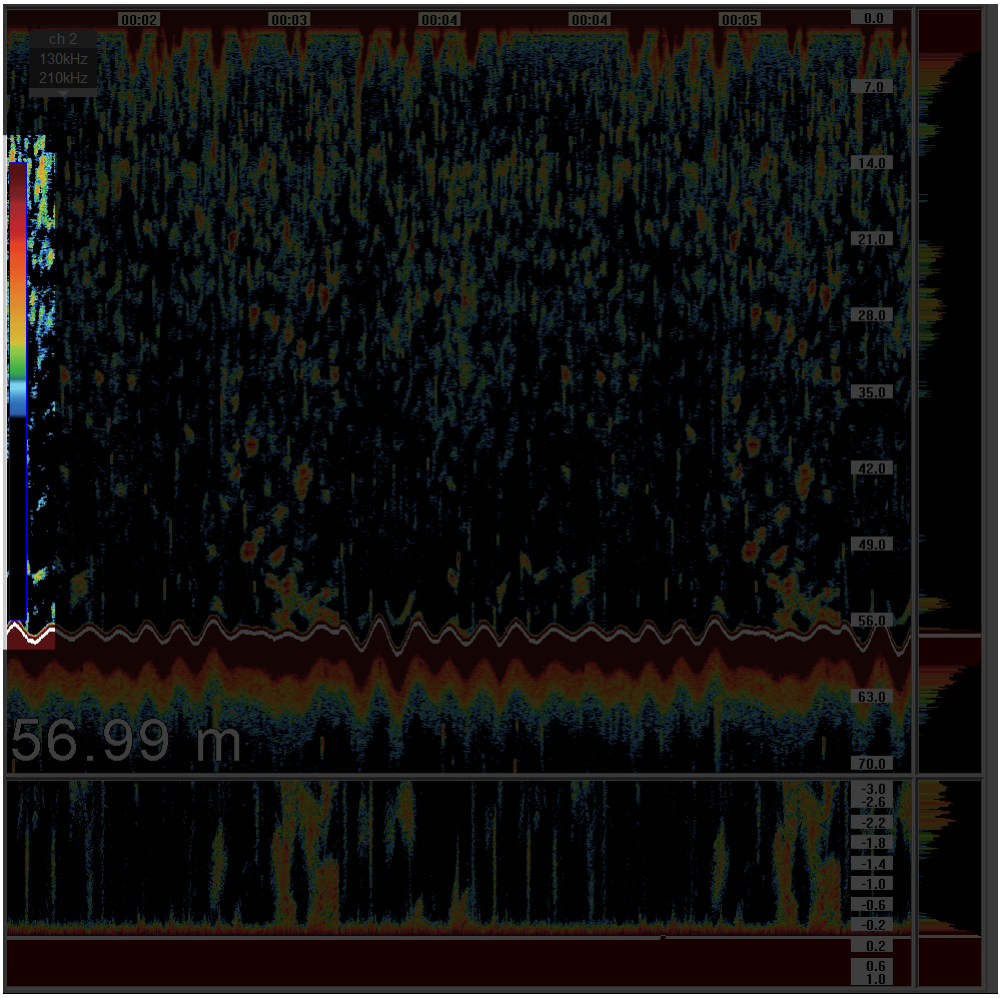



Figure 74: Color palette indicator visualization

On the left side of the echosounder window, a column shows the colors that are being used. This color palette can be changed using the control palette on the menu of the echosounder (see section 1.4.1).
By removing the colors with the clutter (see section 1.4.2), they disappear from the palette by becoming transparent.
The size of the indicator corresponds to the maximum amount of information that can be displayed (42 dB). By changing the palettes, the content will change, indicating the amount of information that can display in each one.

# 10 Time stamps

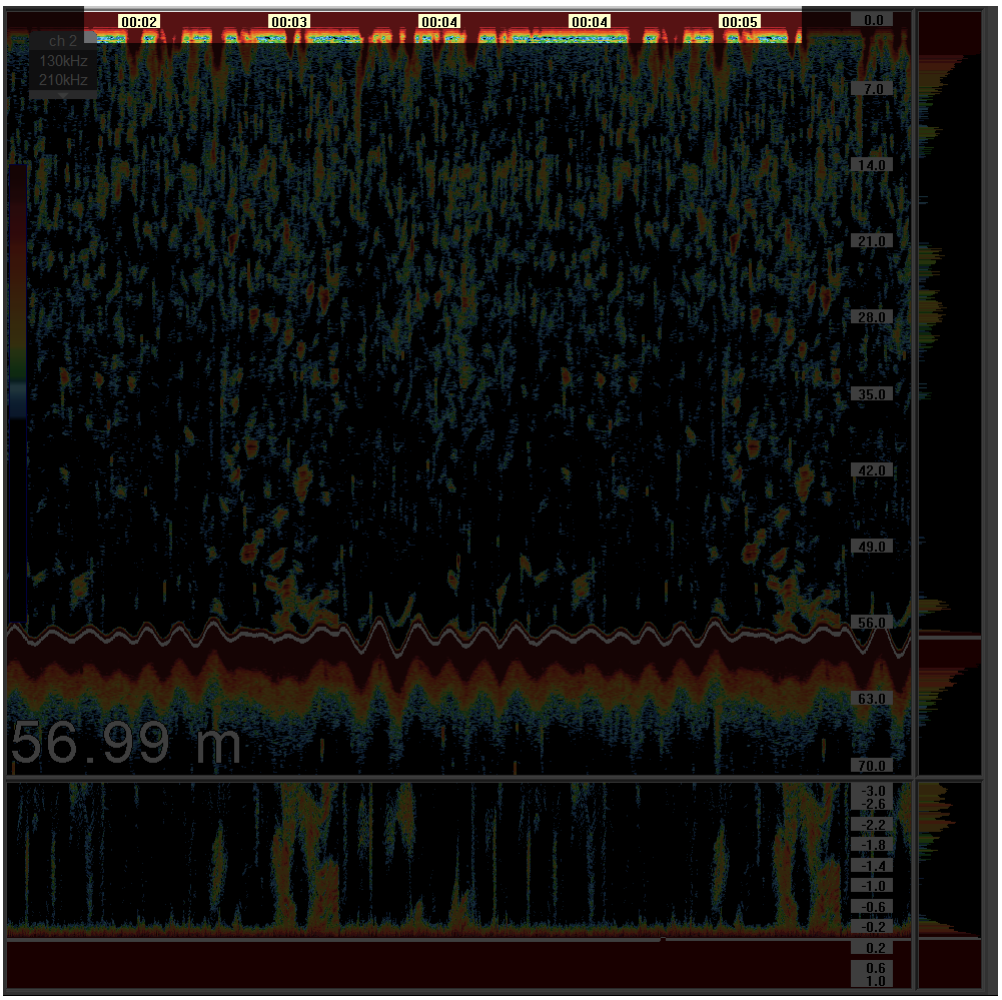



Figure 75: Timestamps visualization

On top of the echosounder window, time stamps are shown. They correspond to the receiving echo time. This allows the user to determine the time difference between events. The user can also add the vertical reference marks (see section 2), thus helping to determine better the exact time of an event on the screen.
Transparency of these indicators can be set in the general settings menu (see section 16.2).

# Top toolbar




Figure 76: Top Toolbar visualization

The top tool bar of the program interface contains all the buttons to access the various general features of the equipment.
They are detailed below in order of appearance from left to right.

## 11 Available echosounders

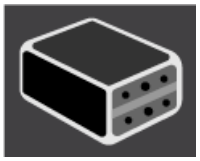


Figure 77: Available echosounders button

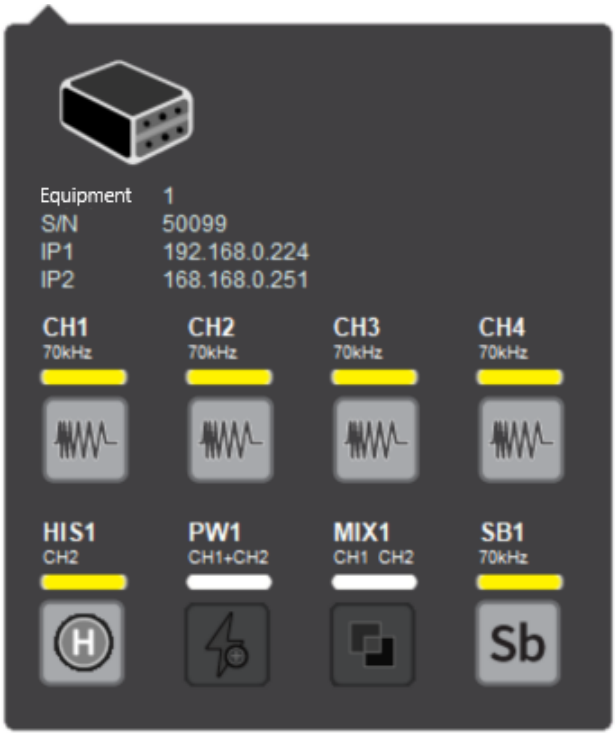



Figure 78: Available echosounders menu

These buttons indicate, according to its color, which echosounders are installed in each channel. Its operational status and if they are enabled by license. The echosounder channel icon that appear can be physical, meaning that the channel is connected to a transducer, (showing the information of a determined transducer) or virtual (showing the information of two or more combined transducers through a post-processing algorithm). This echosounders are set up and licensed on the initial adjustment of installation.

1. **Green:** it is a channel with active echosounder. It can be displayed on the screen and it is currently in use
2. **Yellow:** it is a channel with an available echosounder but it is currently inactive. It does not transmit, it is hidden and cannot be displayed on the screen
3. **White:** it is an echosounder that is not licensed or the power test was not done
4. **Red:** it is a channel with an available echosounder, but due to an error, it was disabled by the system

To enable a channel from the echosounder, the user must click on the button that identifies it (see Figure 78).

## 11.1 Compensation and CPU

By clicking the icon of Figure 77 a window will open. The user can configure the operation parameters of the board and set up the position and orientation of the echosounder.
To change the IP, Subnet mask and Gateway numbers, the user must click on each box and a numeric keypad will be opened. Then the user must press "Set IP" button, confirm in a pop-up windows and press "Set IP" again. The software will restart in order to make the changes. The master board will have the IP set and the slave board will have the IP set minus one. For example:
**Master board:** 192.168.0.218
**Slave board:** 192.168.0.217

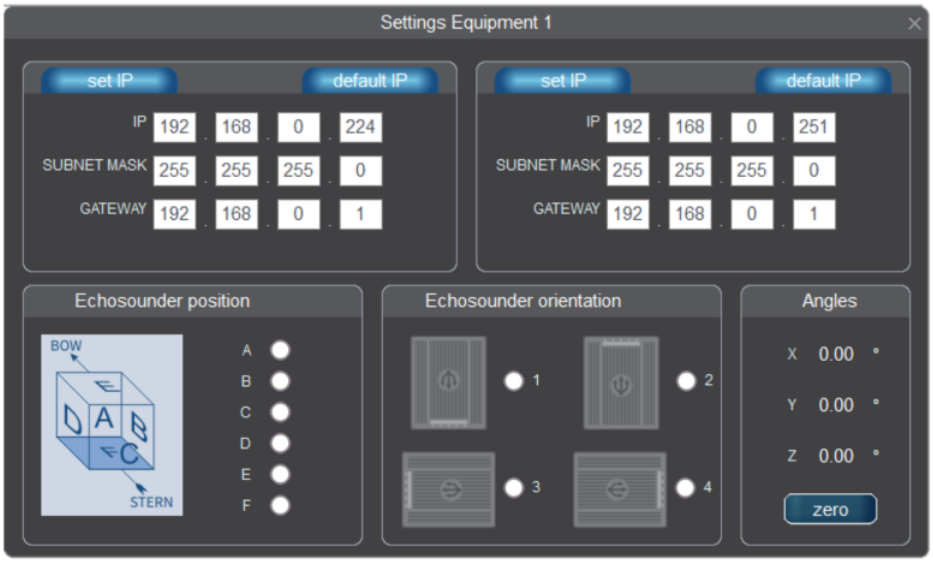



Figure 79: Compensation and CPU menu visualization

The echosounder position and orientation graph is used to adjust the internal accelerometer and thus measures the pitch and roll of the vessel given by surge. Once mounted, the user must press the zero button to correct small angular errors. Equipment orientation options are taken by looking straight ahead at the position in which it was placed.
In case the maximum configured compensation is exceeded, compensation is disabled automatically while notifying the user on the screen. This avoids possible non desired bottom visualization problems. Later, heaving compensation can be configured and enabled again.

# 12 History




Figure 80: History menu visualization

By clicking this button the history settings window is displayed on the screen along with the history graphic window.




Figure 81: History set up visualization

The first step the user should select, is the source of the data (channel-frequency or mixer) and then select from one of the two modes:

- **Images history:** (see section 12.1).
- **Playback history:** (see section 12.2).

**Note: when opening this window, the controls over all other echosounders are disabled. The echosounders will keep transmitting and plotting but they will not be adjusted until the setup history window is not closed.**

## 12.1 Images history




Figure 82: Image history settings window

This playback mode allows the user for a quick view of the stored data by using the settings that were applied at the time of sounding. To move past, the user must click on the left arrow. To move forward, the user must click on the right arrow. The date and time of recording will appear between both controls. If you want to make a chart change, for example: gain (see section 1.1.1), colors (see section 1.4.1), background

(see section 1.4.3), among others, it must be done in the conventional manner and then press the button ”update”.

## 12.2 Playback history




Figure 83: Images history set up window

Playback history allows recreation of a probing by changing all parameters of the echosounder in real time, such as the scale (see section 1.2.2), white line (see section 1.3.1), gain (see section 1.1.1), TVG (see section 1.1.2), etc.
For this purpose, first select the date and time of interest, and then click on the button ”Play” . This mode allows speeding up or slowing playback down , also pausing or stopping it .

### 12.3 History settings

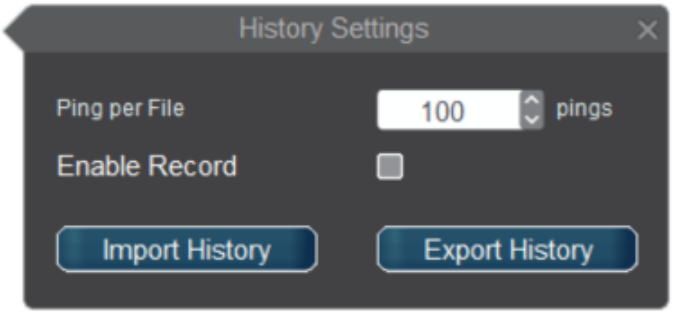



Figure 84: History settings window

Figure 84 shows the history settings window from the echosounder. It is possible to define the ping amount per file to be saved. Additionally, it is possible to define if the history saving function should be deactivated.

## 13 Snapshot



Figure 85: Snapshot button

By clicking on this button, a snapshot of the entire screen will be stored on disk (folder ”Captures”).

## 14 Captured Folder



Figure 86: Captured Images button visualization

To visualize the captured images, the user must click on the button (F), which will open a Windows® Explorer, where all the captured images are.

# 15 Automatic window setting

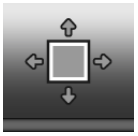


Figure 87: Automatic window setting button

This button performs an automatic adjustment of the echosounder windows that is currently visible, including the mixed ones.
The first time it is pressed, it distributes the windows horizontally, the next time it will distribute it vertically

# 16 Settings

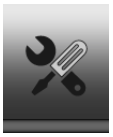


Figure 88: Settings button

By clicking on this button, the following menu will be displayed:

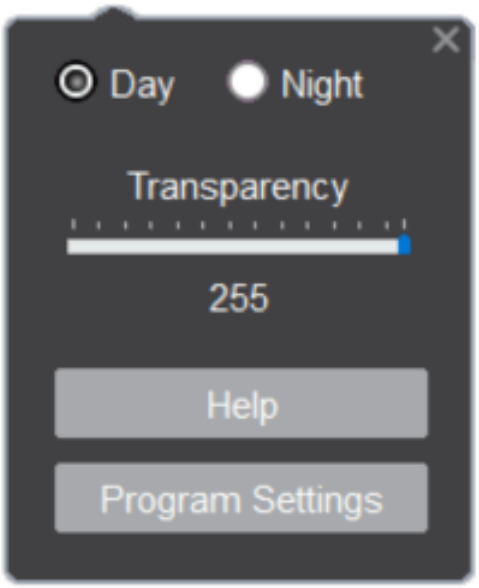



Figure 89: Settings menu window

## 16.1 Display brightness

First menu item lets the user select between two modes of visualization, day or night. It increases or decreases the brightness of the screen and changes dynamically the color and brightness of some icons on screen.

## 16.2 Transparency

This control works on the scales and time stamps of the echosounder, changing its transparency respect to the image moving on the background.

## 16.3 Program settings

Program settings button display a menu that allows to do the most important settings of the equipment.

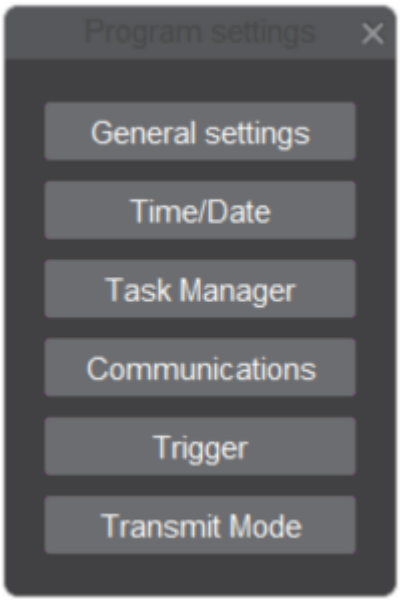



Figure 90: Program settings menu window

### 16.3.1 General settings

By Clicking on this button the program settings window from Figure 90, where the user can set up the following options:

- Language: it defines software language
- Icons size: it allows to select the size of icon to use
- Sound Speed: speed of sound in the water. It depends on salinity, temperature and pressure. (Salt water ≅ 1500 m/s, ≅ 1435 m/s)

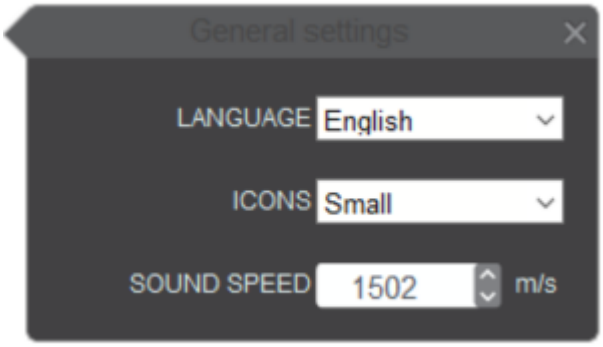



Figure 91: General settings menu window

### 16.3.2 Time and date

By clicking on the time and date submenu seen on Figure 90 the user will select the current time zone and the source for time update. It is possible to use the time of reference from the input of NMEA or from the set up PC.

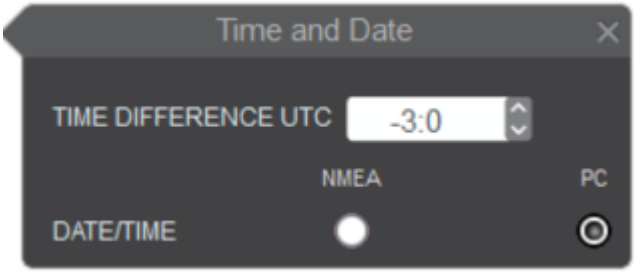



Figure 92: Date and time menu window

### 16.3.3 Task manager

By clicking on the button seen on Figure 90, the Windows® Task Manager opens. To close the echosounder program without turning off the PC, the user must first stop the" Run.exe" process. For this, the user must select it from the process list and then press "End Process". If, for any reason, the technician does not want the software to start with Windows®, the file "Run.exe" located in the folder "Programs\Start" must be erased .

### 16.3.4 Communications

By clicking on the communications button seen on Figure 90 a submenu will be display. This submenu allows the user to select the free COM ports that can be used to

NMEA input and NMEA output.
NMEA input: when the port is selected it is possible to change the following parameters:

- Source: it indicates a reference from the NMEA data source. GPS is defined by default
- Baudrate: it indicates the supported data speed for the data reception. 4800 is defined by default
- Bits: it indicates the number of bits for the data. 8 is defined by default
- Parity: bits amount for parity. N es defined by default
- Stop bits: bits amount for stop. 1 is defined by default

NMEA output: used echosounder to send data for NMEA. If the selected channel is not currently active, data output will be empty.

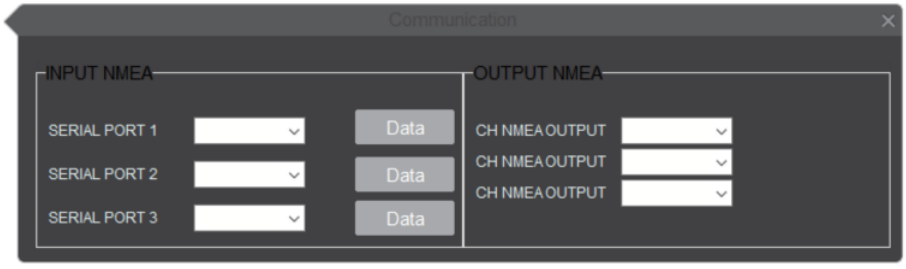



Figure 93: Communications menu window

By clicking on the data button seen on Figure 93 the following window will appear

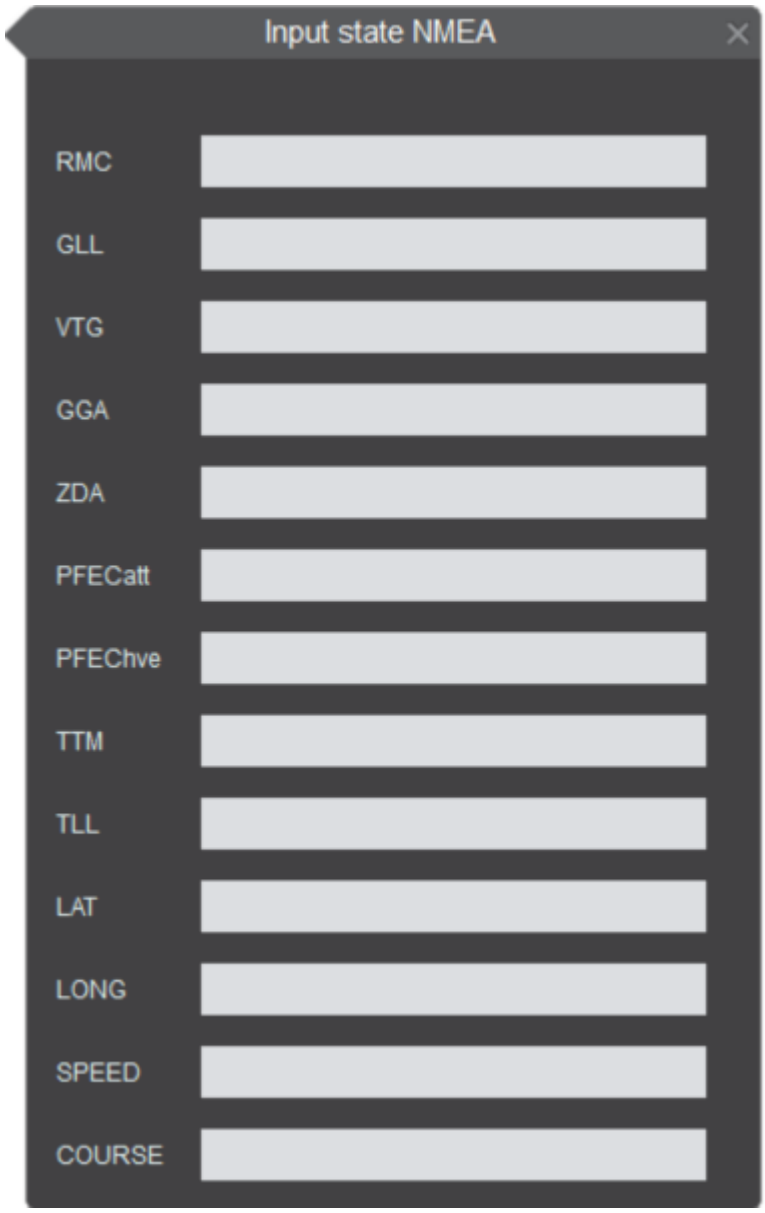



Figure 94: Received sentences menu window

GPS window provides information of incoming data through the serial port of the PC. This allows to determine if incoming data is corrupted or if a sentence is missing. The admitted sentences are RMC, GLL, VTG, GGA, ZDA, PFECatt and PFEChve. The obtained data from these sentences are latitude, longitude, speed and course.

### 16.3.5 Ping rate

Button seen on Figure 90 enables the following window:

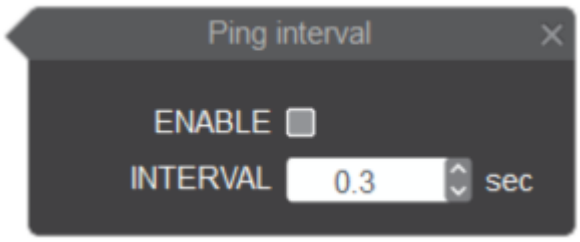



Figure 95: Ping rate setting window

The echosounder can be configured for a determined pulse transmission rate defined by time. It is important to analyze that this time considers as minimum value the sound propagation time from the pulse in the transmission medium (propagation time is defined by the set scale divided the propagation speed).
If the checkbox is set, the configured time is considered between pings. Maximum possible time between pings is 60 seconds.
It is important to understand the physical limitation by the acoustic principle: the transmission pulse from the echosounder travels trough the water at its corresponding speed considering the maximum set scale in both go and back directions. Finally, time between pings is defined by the maximum time between the configured one and the propagation time. Propagation time is proportional to the set scale.

### 16.3.6 Trigger

This menu allows to select an internal or external trigger of the echosounder. If the external trigger is selected it must be indicated if the equipment will expect a high or low level on the input, for a maximum of 2 seconds. If the time passes and the trigger signal is not received, the echosounder transmits anyway. If trigger pulses stop entering, the error is reported in the alert window.
By enabling the internal trigger function, the echosounder acts as master and it must be indicated if a high or low level will be sent to its trigger ouput.

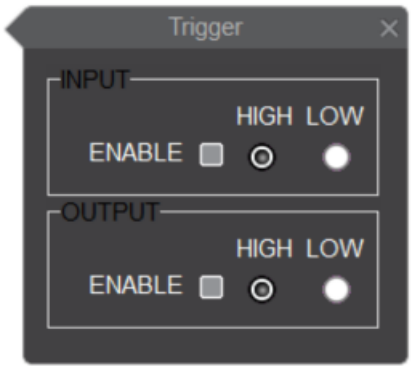



Figure 96: Trigger menu window

# 17 Help

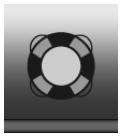


Figure 97: Help button

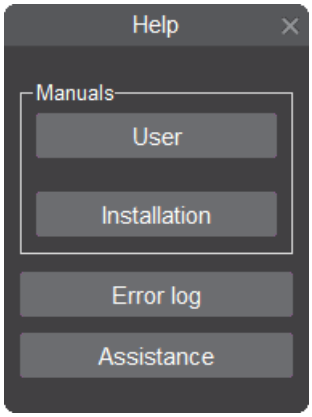



Figure 98: Help window

By clicking on any manual, it will open in PDF format. For this purpose, you must have a pdf reader installed, such as Adobe® Acrobat® Reader®, Foxit® Reader®, or similar.

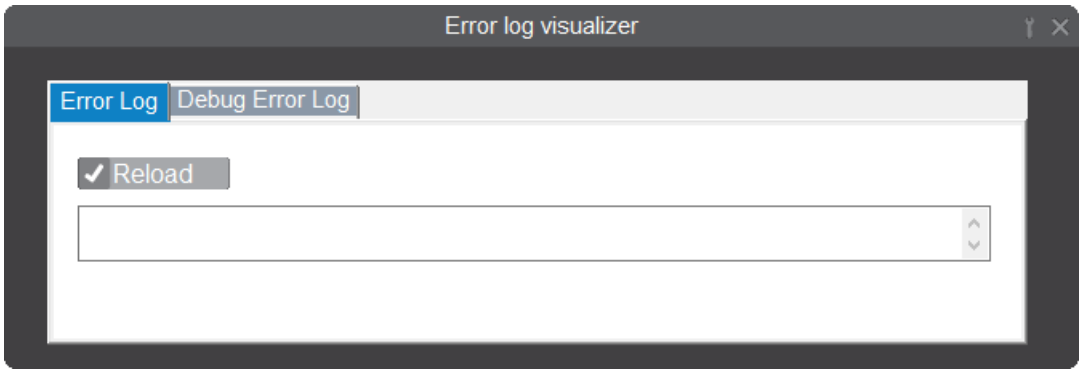



Figure 99: Error log window

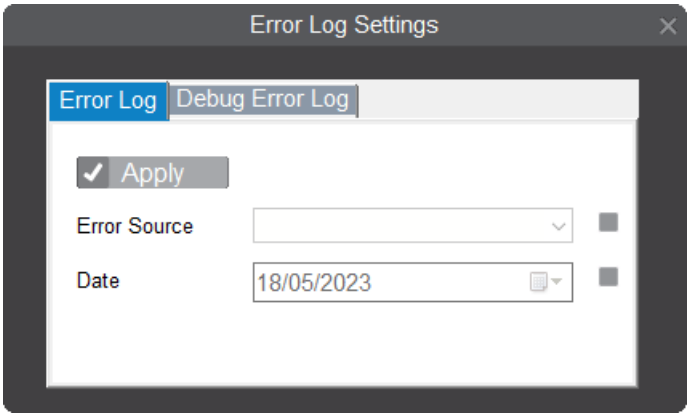



Figure 100: Error log settings window

# 18 Users



Figure 101: User‘s selector button

The user’s system allows to preconfigured different modes or fishing scenarios to avoid the need to reconfigured the equipment. It is only needed to save the user when it is set up and then load it.

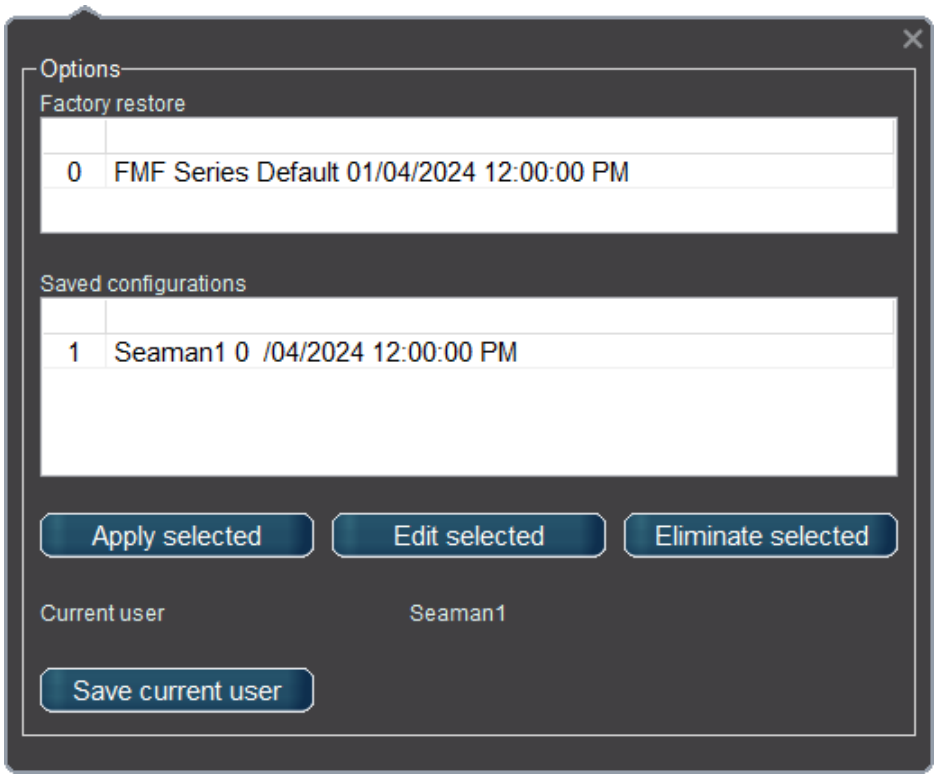



Figure 102: User's menu

# 19 Error indicator



Figure 103: Error indicator window

This button appears only if an error in the echosounder was detected and disappears if it is solved. Errors appear in descending order of priority as they occur.

# 20 Minimize button



Figure 104: Echosounder minimize button

By clicking this button, the sounder can be minimized and can access to the Windows® desktop. By doing this the echo sounder will not stop, and if Windows® is closed in this condition recent changes will be lost.

# 21 Close button



Figure 105: Echosounder close button

By pressing this button, the sounder will close in an orderly way and the Windows® will shut down.

**NOTE: We recommend always shutting down the equipment in this way**

# Bottom Toolbar




## 22 Position and date

The bottom toolbar contains information of the current events of position and date. Starting from the left to the right, the user will find the following indicators:

- **Latitude**
- **Longitude**
- **Speed**
- **Course**
- **Temperature of water**

If they do not contain the navigation data, it will indicate the following error codes:

1. **No FIX:** GPS does not correct the position
2. **Bad NMEA:** NMEA data is present but the data is corrupted
3. **No NMEA:** the port was opened, but no data is entering
4. **Com Error:** the communication port, which is being used, cannot be opened because it does not exist or other application is using it. The user must choose another port in the program settings window (see section 16.3.4)

Besides the navigation indicators, there is an area where minimized windows can be added and finally the date and time are also added. The data for these indicators will be taken from the date and time of the PC, if the GPS does not correct it or there is no NMEA input (see section 16.3.4). The time difference can be configured in the program settings window (see section 16.3.2). If the GPS fix it, the date and time of the PC will be automatically updated.

# Mixer

## 23 Features

The echosounder mixer is a channel that results from the combination of different frequencies or different range of frequencies. This sounder helps the user to interpret the reflected echoes allowing the observation on different frequencies.

To enabled to the echosounder mixer the corresponding license is needed. The button to acced to the channel mixer is on the top tool bar (see section 11).



Figure 106: Mixer submenu




Figure 107: Echosounder submenu visualization

Once the echosounder started, an additional submenu will appear on the echosounder adjustment bar. On this submenu the user can select the echosounders to mix by clicking on them.




Figure 108: Mixer channel setting window

On this window the mixes will only appear that are configurated on the initial installation adjustment. After selecting the echosounders that will be mixed the window can be closed.

**Note: after opening this window it is recommendable to click on the button autosize (see section 15) to organize the screen.**

# +Power

## 24 Features

The +Power echosounder is a channel that results from the sum of the transmission of two or more channels. This characteristic is very useful on situations of fishing in big depths or when a big power transducer must be used.

To enabled the +Power channel is necessary to have a +Power license. The button that is used to access to this sounder is in the top tool bar (see section 11).



Figure 109: +Power Submenu




Figure 110: Echosounder submenu visualization

Once the +Power echosounder is enabled, an additional submenu will appear on the adjustments bar of the echosounder. On this submenu the channels that the user wants to add can be selected by clicking on them.

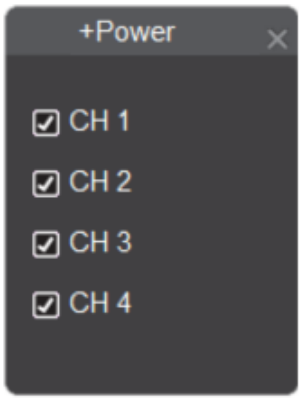



Figure 111: +Power mode configuration window

On this window the channels will only appear that are already set up on the initial installation adjustment. After selecting the channels where the +Power echosounder will be apply, this window can be close.

# Split-Beam

## 25 Features

The split beam channel results from the application of post-processing algorithms for measuring the intensity of the detected echoes. For enabling this echosounder, it is necessary to have a Split Beam license and a properly installed Split Beam transducer.

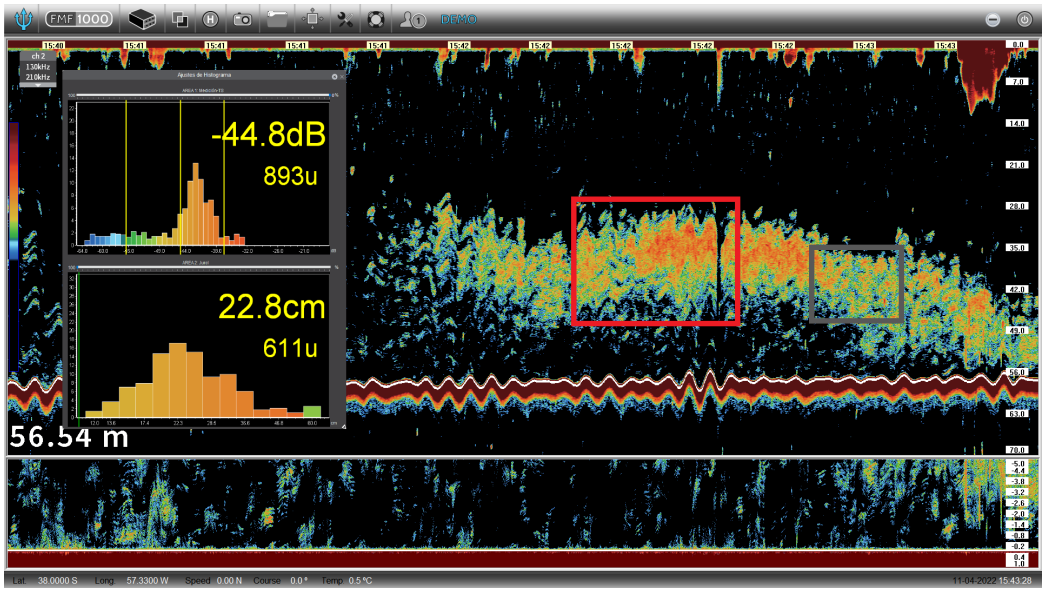



Figure 112: Seaman echosounder on split-beam mode general visualization

The used button to access to the split-beam mode is on the top tool bar (see section 11).
Once the Split-Beam mode echosounder is enable, it an extra submenu will appear on the echosounder adjustments bar. On this submenu the user can enabled, by clicking on the respective icons, the histogram windows (see subsection 25.1), fish position (see subsection 25.3), SB calibration (see subsection 25.2), data output (see subsection 25.5) and acoustic sign (see subsection 25.6)

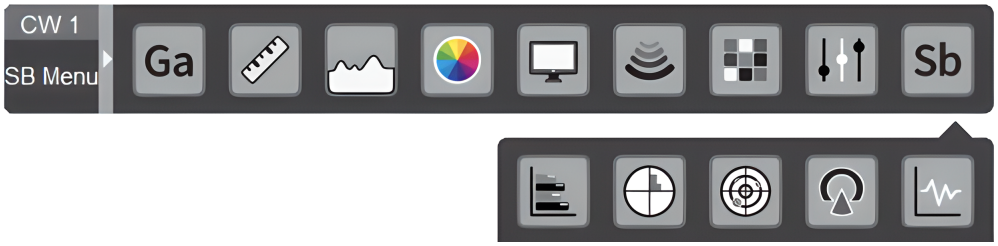



Figure 113: Split-Beam submenu

## 25.1 Histogram



Figure 114: Histogram submenu visualization

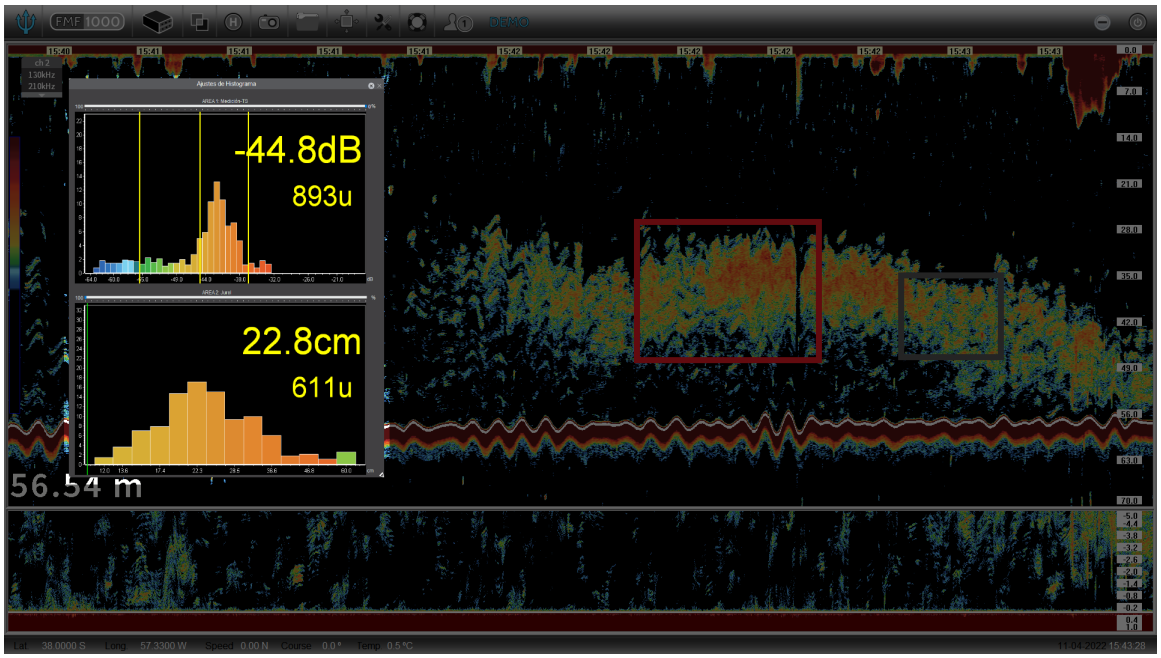



Figure 115: Histogram visualization on screen

This window presents fishes size that can be found in the echosounder window.

Data origin can be configured from the following options:

- The selection area can be activated by clicking the left mouse button over each histogram graphic area (cursor will change the icon ) ) and later by clicking the left mouse button over the screen and moving the mouse. Selection areas can be moved by using the mouse. Keep pressing left mouse click over the selection area and move it to the measurement area of interest.
- Full screen. To change to full screen area selection mode, simply make double click over each histogram graphic area. If an active selection area exists, it will automatically change to full mode for the selected area.

The expander histogram draws all sizes fishes present in it. If the screen is graphically reduced in the horizontal axis or the scale decreases, the used data for the statistics will be lower.

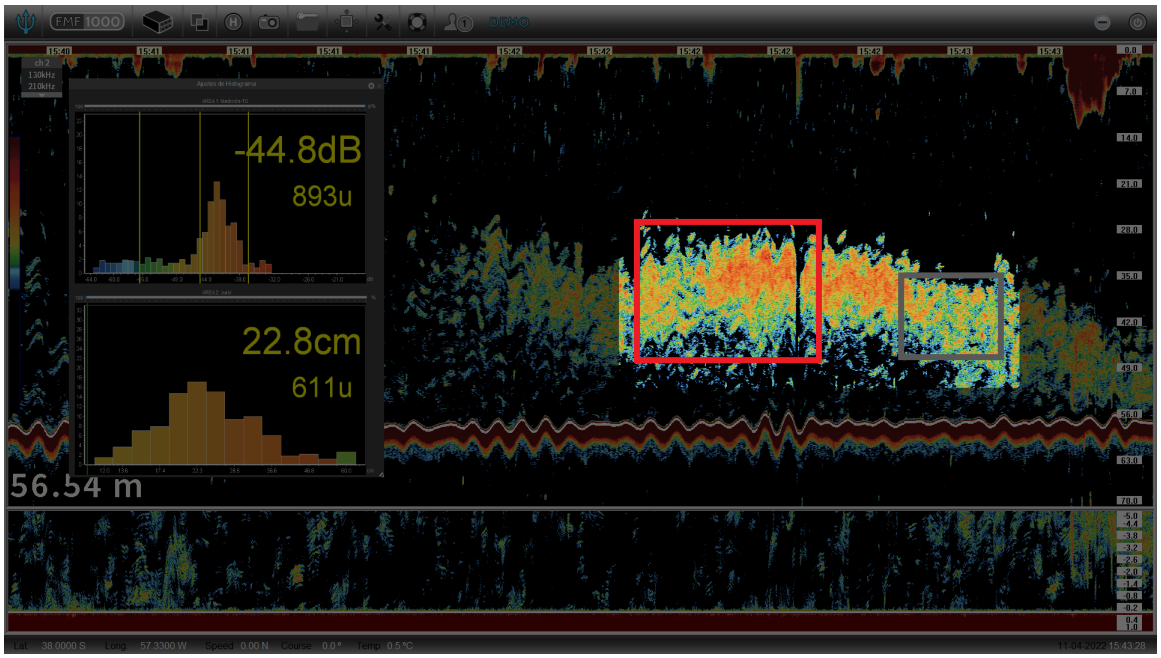



Figure 116: Selection areas

In order to adjust the histogram graphs, the user must open the adjustment menu by clicking on the icon on the upper right corner of the window (see section 25.1.1).

### 25.1.1 Histograms visualization

The histogram visualization window has the capability to display up to three (3) histograms. By default, the histogram for 'AREA 1' is shown, while the ones for 'AREA 2' and 'EXPANDER' are collapsed. (see Figure 117).

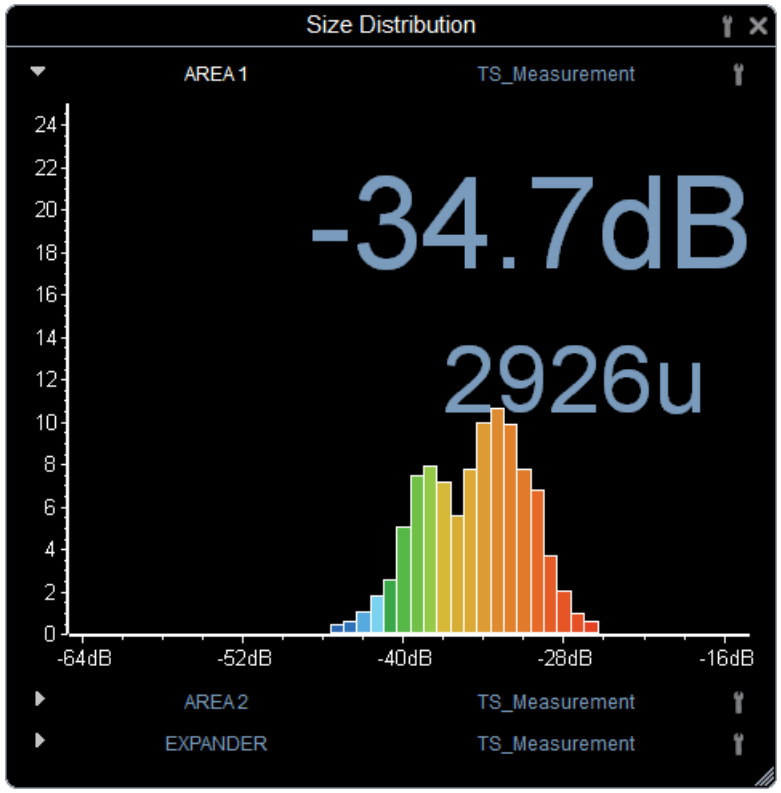



Figure 117: Split Beam histogram window

The 'AREA 2' histogram is not always necessary if the 'AREA 1' histogram is used over the whole echogram. The secondary histogram is mainly used when:

- It is desirable to obtain measurements from two areas of the echogram
- It is desirable to obtain a histogram over the same area for size and TS measurements simultaneously

### 25.1.2 Histogram settings

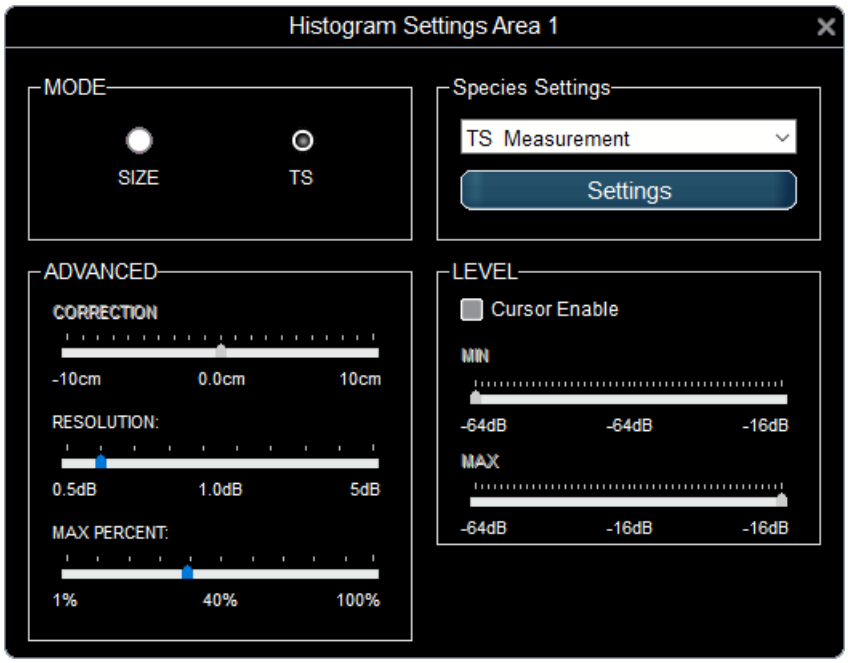



Figure 118: Settings window per histogram

The Figure 118 shows the histogram settings window.

Each histogram has a individual set-up:

- **Mode:** histogram visualization according to the power or size units.
- **Correction:** it calibrates the average value in centimeters of the histogram
- **Resolution:** steps of histogram bars (width of each histogram bar)
- **Max. percent:** it adjusts the maximum value of histogram in horizontal axis
- **Specie:** in case the user uses the size mode, the size conversion is going to be done according to the selected specie.
- **Low level:** lower value of the histogram graph
- **High level:** highest value of the histogram graph

Histogram general settings, for instance, enable the following configuration:

- **Unit of measurement:** if the user uses the size mode, the unit of measurement can be metrical or British.

### 25.1.3 Species adjustments

The echosounder allows to do size measurements for different species. By default, some species can be previously loaded and selected from a dropdown list, for its direct use. It is also possible to edit the conversion formula parameters and create new species through the species editor (see Figure 119).

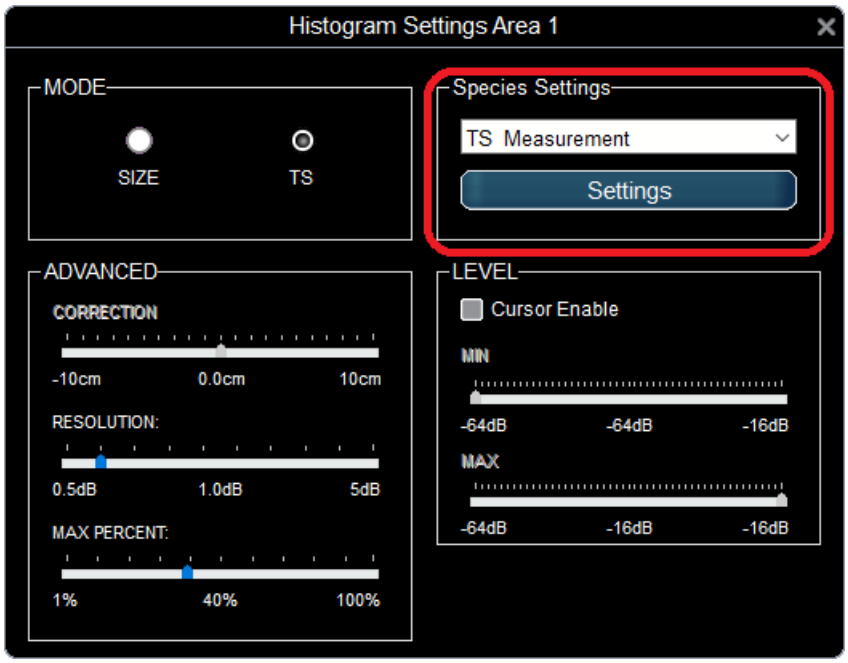



Figure 119: Species settings from histogram configuration window

### 25.1.4 Species creation

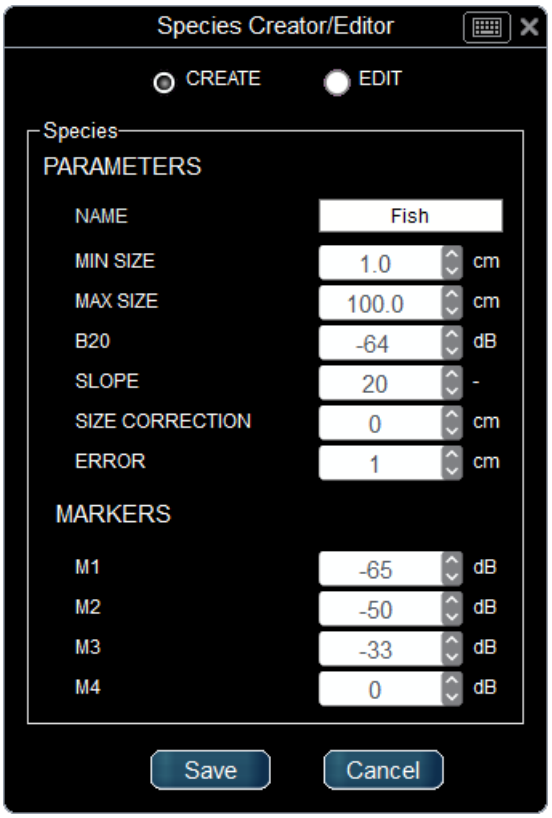



Figure 120: New species creation

The edition and a new species creation consider the following fields:

1. **Name:** species identification in drop-down menu
2. **Minimum size:** minimum allowed value to be measured for the selected species
3. **Maximum size:** maximum allowed value to be measured for the selected species
4. **b20:** conversion constant value for TS power level to size conversion
5. **Slope:** index for conversion formula
6. **Size correction:** correction value in cm from size converted value
7. **Error:** tolerable deviation value from converted sizes respect to its mean value
8. **Markers:** power level values [dB] to be used in histogram

### 25.1.5 Editar y eliminar especies

It is possible to edit the existing species. To access the selection of the species for editing or deletion, press the edit button. Figure 121 shows the species selection window for editing or deletion. To proceed, press the corresponding button.

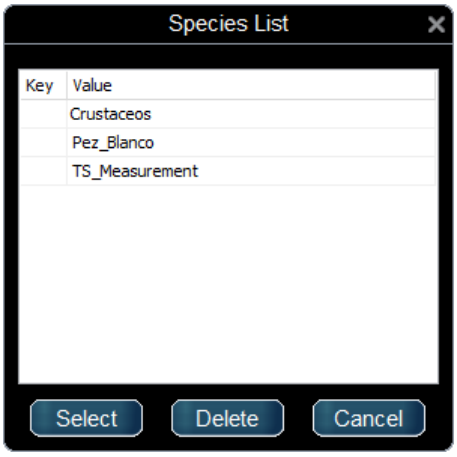



Figure 121: Window for editing or deleting an existing species

## 25.2 Split-beam compensation and calibration



Figure 122: Split-beam calibration visualization

Seaman FMF Series echosounder has a built-in compensated main lobe established by the manufacturer and it is calibrated for Seaman Electronics. In case the transducer is not provided by Seaman Electronics is also possible to generate a theoretical main lobe pattern to make a transducer compensation from a transducer no provided from Seaman Electronics. Measurement errors associated with the transducer manufacturing process and current transducer status can be compensated. In order to do that, a calibration process is defined. This consists in placing a sphere under the transducer main lobe and assigning a proper offset value to the received backscattered echo from the sphere in order to obtain a known value from it which was previously estimated in tables. Sphere visualization under the transducer main lobe during the calibration process is provided under the split beam, this option is on the split-beam submenu.

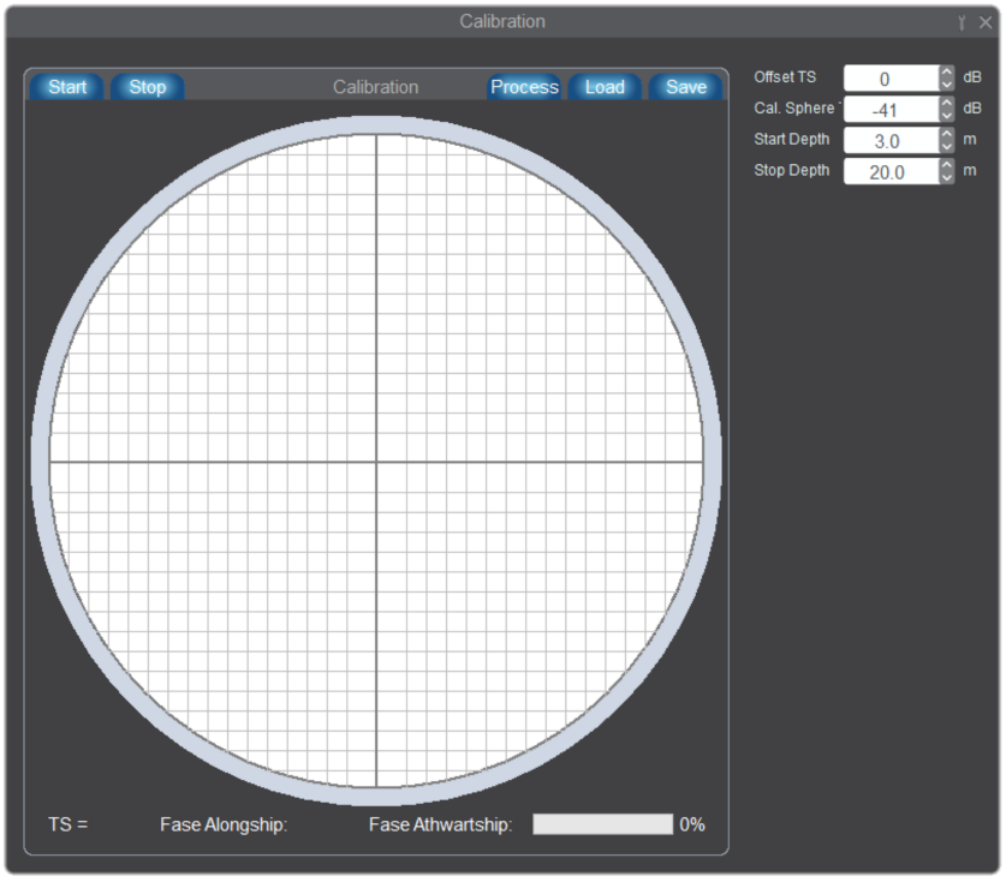



Figure 123: Split beam mode calibration window

### 25.2.1 Previous step to the split beam calibration

Before accessing to the split beam calibration window, it is very important to make some settings on the transducer. Pulse width submenus allow you to define and establish the pulse width to be utilized throughout the calibration processes.

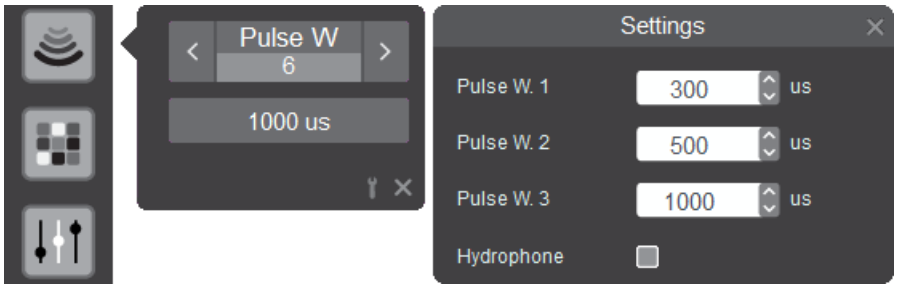



Figure 124: Pulse and pulse settings submenus

Some parameters to be taken into account are detailed in the following description:

- Adjust the three pulse width options according to your preferences (see Figure 124).
- Adjust the scale accordingly to achieve a correct sphere visualization
- Check the echosounder performance and verify the noise level by applying the maximum gain. In case of presence from a significant interference, do not proceed with the calibration until confirm and solve its cause

### 25.2.2 Calibration process

Split beam setting window allows to adjust parameters to determine the geographical location from the sphere and its expected power value. Such adjustments are defined over the right side of the window and are detailed in the following description (see Figure 123 for more details):

- **Offset TS:** it allows to correct a possible error even after calibration. This value will be constant for the whole detection area
- **Cal. Sphere TS:** this value is taken as a reference for calibrating the transducer. For Tungsten carbide calibration spheres of 38.1 mm of diameter and a working frequency of 120 kHz, this value is expected to be -41 dB
- **Start depth-Stop depth:** it defines the depth where the sphere is expected to be and it will be placed at. It allows to exclude all the echoes that can appear on the water during the calibration. This correct setting minimizes the errors.

Additionally, the calibration process is carried out by using the following described buttons:

- **Start:** it allows to start data collection. In case the calibration process has been stopped, it can be used to resume the process.
- **Stop:** it finish or pause the data collection process.

- **Process:** once data collection is finished, this button allows to process them and it generates a preliminary version of the compensated transducer lobe. It can be seen by a full report visualization which will be explained later
- **Load:** this button allows using collected data from a previous calibration process of a compensated transducer made in other opportunity. By using this option, it is ALWAYS necessary to process the data by clicking the previously explained button
- **Save:** once the version from the report is accepted, this collected data should establish the new compensated pattern. This process creates a new file associated to the used transducer. After a software restart, the new calibration patterns loaded and used by the FMF software.

Calibration settings related to the realization place can be inserted by the SB Settings button.

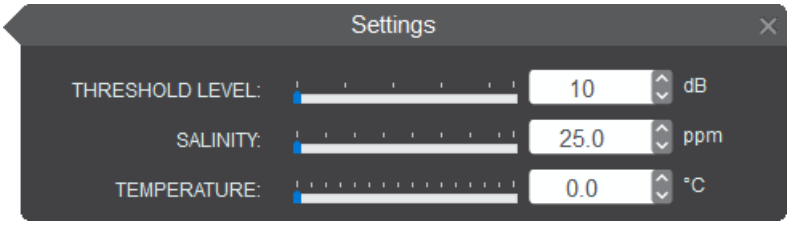



Figure 125: Echosounder properties calibration adjustment window

- **Threshold level:** minimum power threshold value for echo detection to validate a single target [dB]
- **Salinity:** value to define salinity used for internal calculations [ppm] (default value is 35 ppm)
- **Temperature:** water temperature value used for internal calculations [ºC] (default value is 10 ºC)

Finally, in the inferior side of the calibration window it is possible to visualize the TS and additional values:

- **TS:** current TS value from the backscattered echo inside the selected depth range [dB]
- **Alongship phase:** echo position deviation respect to the center in the alongship direction [º]
- **Athwartship phase:** echo position deviation respect to the center in the athwartship direction [º]
- **Progress status:** progress bar that indicates the percentage of captured echoes inside the transducer main lobe

**It is very important to clean the sphere with water and soap and then manipulate it by the usage of proper gloves in order to avoid direct contact. This could avoid the generation of multiple bubbles over its surface that would affect the calibration process.**
To proceed with the calibration, the sphere should be placed under the vessel and needs to be centered under the transducer main lobe at a minimum depth of 10 meters. If the location is different from this, the search range should be modified accordingly in order to be detected.

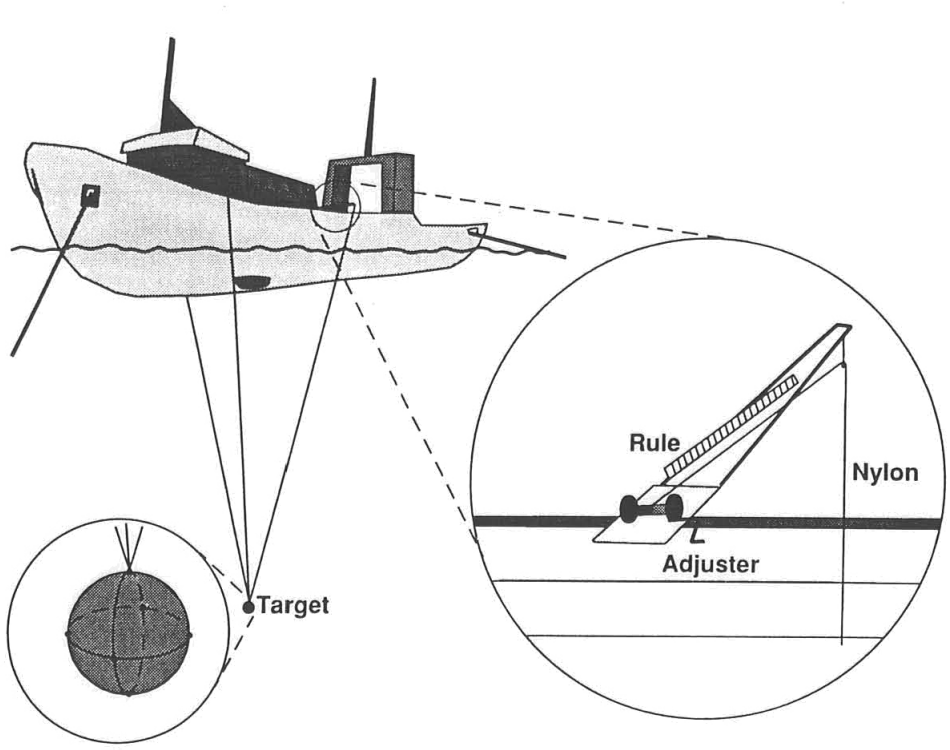



Figure 126: Full setup view from a calibration process exam

Once the sphere is positioned it is necessary to correct its power value by using the Offset TS control until obtaining a value closer to its theoretical expected. Later, it is possible to start the compensation process by making click on the start button and moving the sphere in order to cover all the transducer main lobe surface.

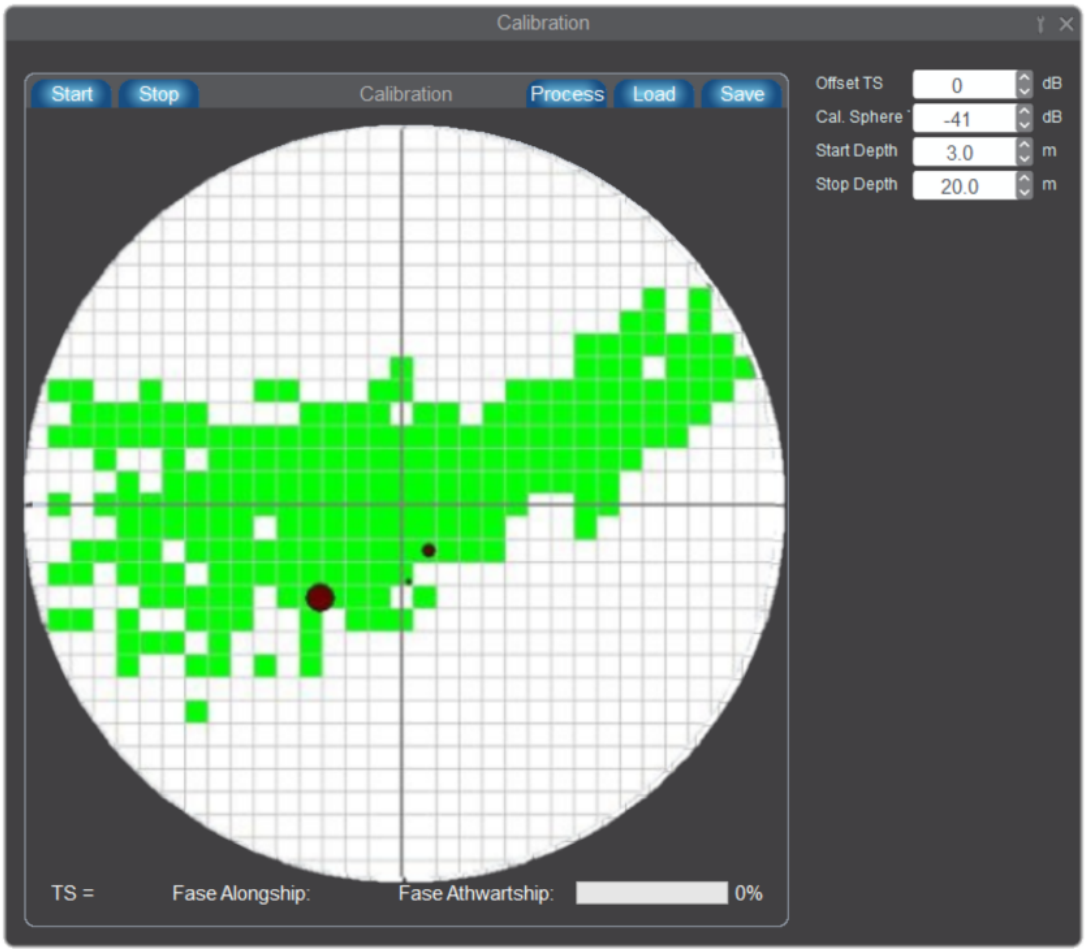



Figure 127: FMF Series calibration window during its process execution

While echoes are being collected, the transducer main lobe area will start being painted by green color indicating which sectors are considered to be compensated (see Figure 127).

Once the minimum established completeness of the process value of 80% has been reached, the stop button should be pressed. Later, click in Process. If any inconvenience during this process happens, it can be stopped and resumed later. After processing the collecting data, a calibration report will be shown in the screen.

### 25.2.3 Calibration report

The calibration report shows information from the echosounder configuration parameters additionally to the calibration result parameters in three detailed pages described as follows:

**Page 1**, see Figure 128.

- **Echosounder:** echosounder model
- **Frequency:** working frequency [Hz]
- **Pulse width:** selected pulse width [us]
- **Power:** used power for the selected transducer [W]
- **Transducer:** selected transducer model
- **Serial number:** referenced to the used echosounder
- **Date:** referenced to the period of the calibration process.
- **Coordinates:** place of realization of the calibration process
- **Athwartship:** maximum angle in the athwartship direction[º]
- **Athwartship offset:** the compensated value applied to the transducer in the athwartship direction [º]
- **Athwartship sensitivity offset:** the relationship between the geometrical and electrical degrees in the athwartship direction
- **Alongship:** maximum angle in the alongship direction [º]
- **Alongship offset:** the compensated value applied to the transducer in the alongship direction [º]
- **Alongship sensitivity offset:** the relationship between the geometrical and electrical degrees in the athwartship direction
- **TS offset:** configured offset value during calibration [dB]
- **Sa correction:**correction value associated to Sa [dB]

**Page 2**, see Figure 129.
Transversal view with above and below points from the theoretical calibration curve. Red color points correspond to measured values above theoretical compensation lobe. Blue color points correspond to measured values below theoretical compensation lobe. Finally, green color points correspond to measured values used for Sa correction and TS offset. From this view, it can be seen if the transducer presents some failure or defect in the athwartship, alongship or diagonal directions. Finally, Partial deviation can be also seen from this view.

**Page 3**, see Figure 130.
Superior view from the calibration considered points inside the transducer main lobe. This view interpretation is important to identify one or more defected sectors in the transducer. Color randomness is an indicator about the current transducer status: the

presence of any predominant color from any of the transducer sectors is an indicator of a possible failure or defect. On the other hand, if colors can be found random distributed is a good indicator that the transducer is in correct performance status.

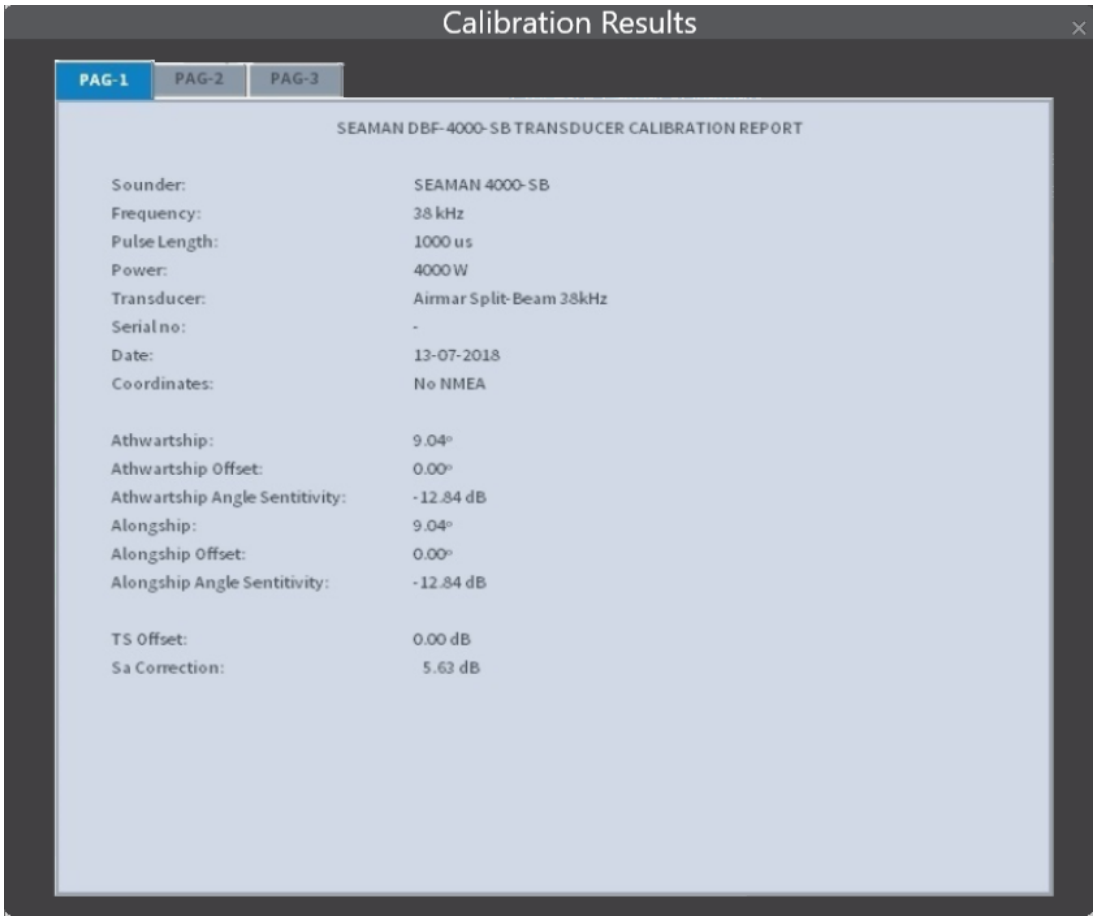



Figure 128: Transducer calibration results preliminary report, page 1

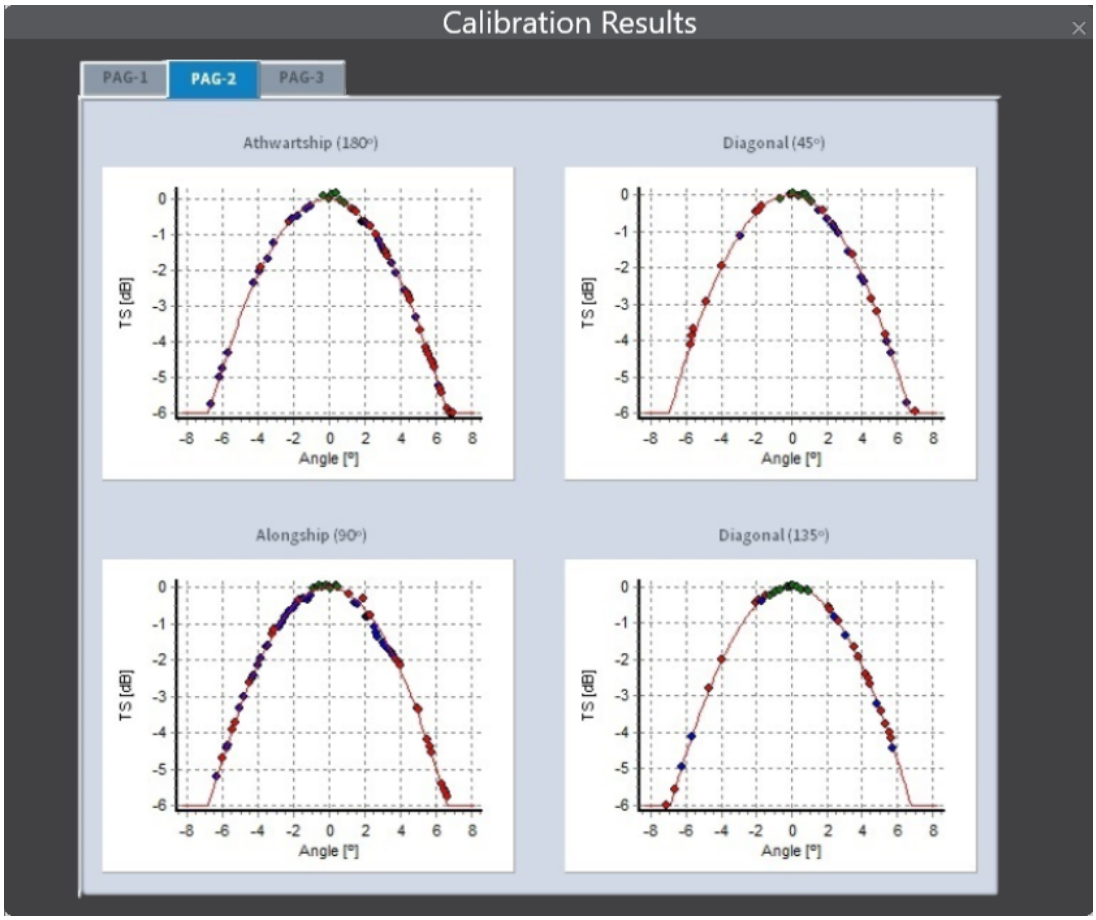



Figure 129: Transducer calibration results preliminary report, page 2

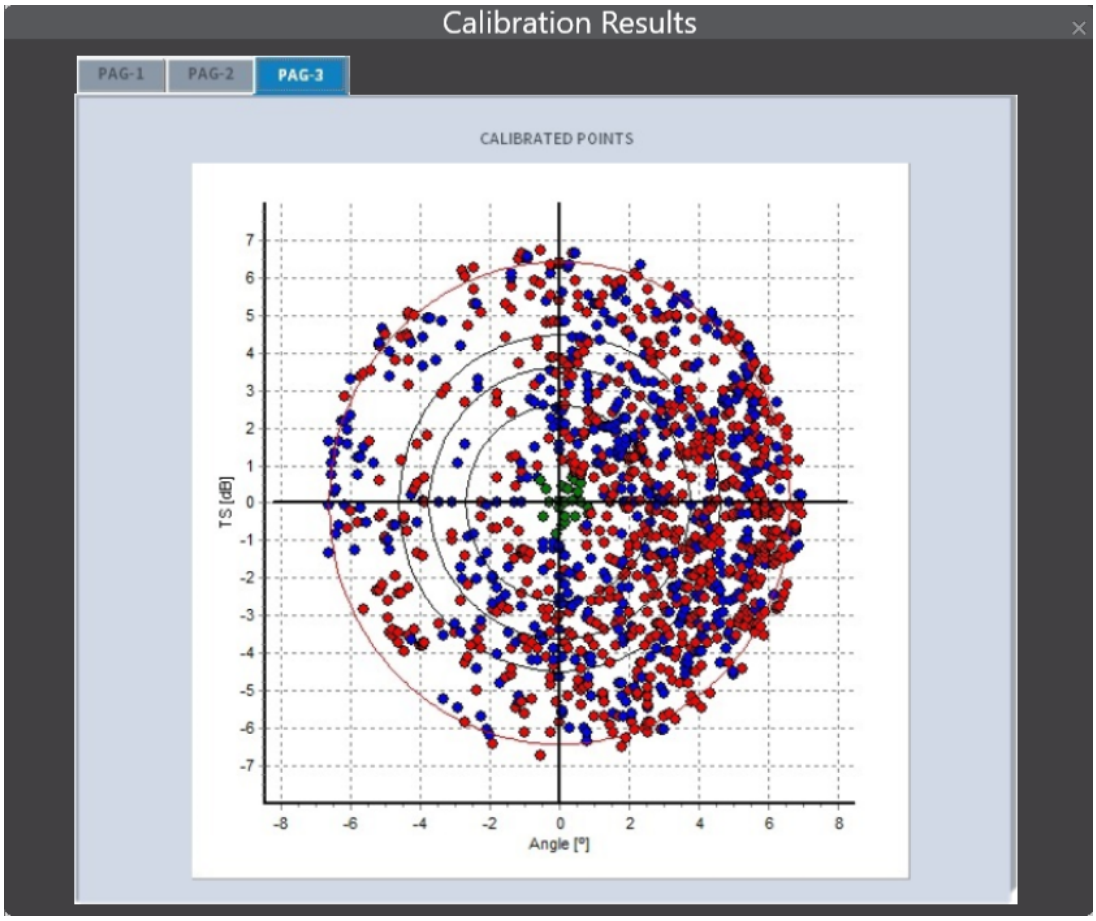



Figure 130: Transducer calibration results preliminary report, page 3

Print the preliminary calibration report result. Previously, it is necessary to have an installed printer in the system.

### 25.2.4 Calibration process final step

In case the calibration report is considered satisfactory, it is possible to end the calibration by placing a confirmation of the main lobe shown in the report. In order to do that, it is necessary to make click over the “Save“ button. This action will generate a new compensated main lobe that will be used after a new software restart. Again, keep in mind that it is necessary to generate a new compensation lobe that at least contains 80% from the total amount of collected data under the transducer main lobe. Otherwise, it is not possible to generate the new transducer compensation lobe. The new created file is saved in the folder “C:\FMFSeries\Configs\Transducer” and contains the following format "Transducer Name frequency”.txt. Restart the system in

order to update all the related modified parameters from the recently made calibration. Once the FMF Series software has restarted, new values from the transducer compensated main lobe will be loaded. It is possible to visualize the results from such calibration in the new transducer generated file. The transducer file can be found in the folder “C:\FMFSeries\Configs\”. First parameter fields from the file are detailed in Figure 131. They correspond to the following features:

- 3 dB angle [º]: transducer angle value corresponding to the 3 dB loss point
- 6 dB angle [º]: transducer angle value corresponding to the 6 dB loss point
- Athwartship angle [º]: transducer angle value corresponding to the athwartship section
- Alongship angle [º]: transducer angle value corresponding to the alongship section
- Athwartship angle offset [º]: transducer angle offset value corresponding to the atwartship section
- Alongship angle offset [º]: transducer angle offset value corresponding to the alongship section
- Gain correction [dB]: gain correction value applied to the transducer
- Sa correction [dB]: it represents the required value to the SV constant for the TS measurements

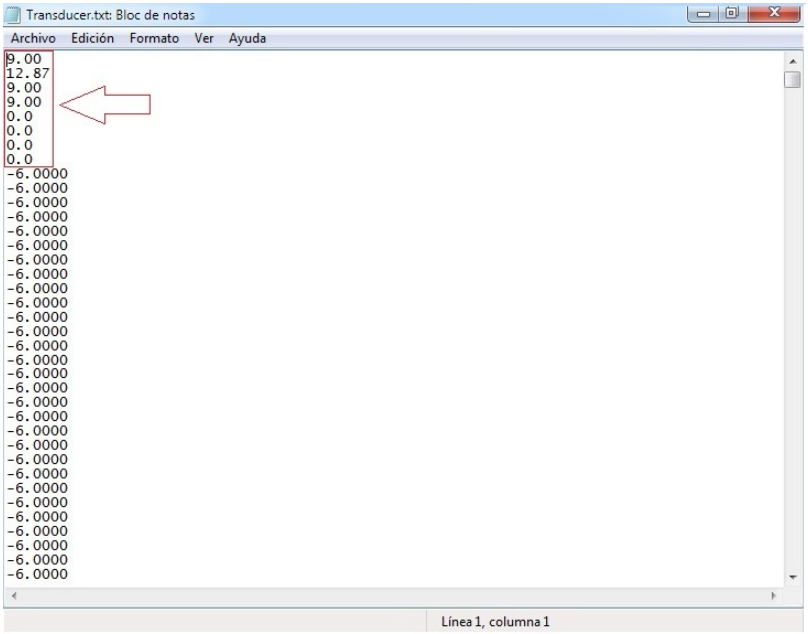



Figure 131: Calibrated parameters identification in calibration result file

To finish the calibration process, it is necessary to place the TS offset in value 0. If a new calibration is needed, it is important not losing the existing files from the performed previous calibrations. In order to do that, a backup folder needs to be created. The following files to be moved are the following (the files are located in "C:\FMFSeries\Configs\Transducer" ):

- Transducer_Cal_Raw.txt: file that contains all the calibration data
- Transducer_Cal_Raw.ch: file that contains the presence or not from data for every point inside the transducer main lobe
- Transducer_Airmar_Split_Beam120kHz.txt: generated file with the new compensated values to be considered inside the transducer main lobe.

It is important to mention that the first two cited files can be renamed, but keeping both with the same name. On the other hand, the last file should keep the same given name in order to be recognized by the FMF software. After these considerations are taken into account, a new calibration process can be executed.
After, if the user wants to use a previous calibration is necessary to go into the Split Beam menu again and press the 'Load' button. Then select the file with the collected data (Transduce_Cal_Raw.txt) and accept.
Once the FMF software is again running, visualize an instantaneous view by making a mouse scroll click over the echogram and placing the cursor over the maximum intensity from the echo corresponding to the calibration sphere. In order to find such a point in the screen, the gain feature can be decreased until the maximum can be visualized in the lowest color from the selected color palette. It is possible to confirm that the calibration was successfully executed, by keep using the calibration sphere under the transducer main lobe. In order to do that, the backscattered signal power coming from the sphere can be monitored from the instantaneous view window (see Figure 132)

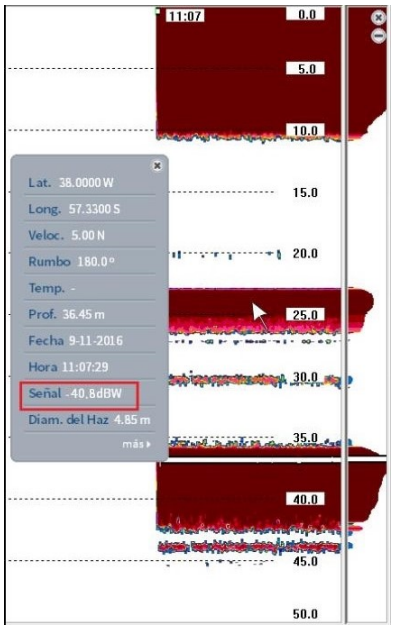



Figure 132: Backscattered echo position from a calibration sphere over the echosounder echogram

## 25.3 Fish position



Figure 133: Fish position submenu visualization

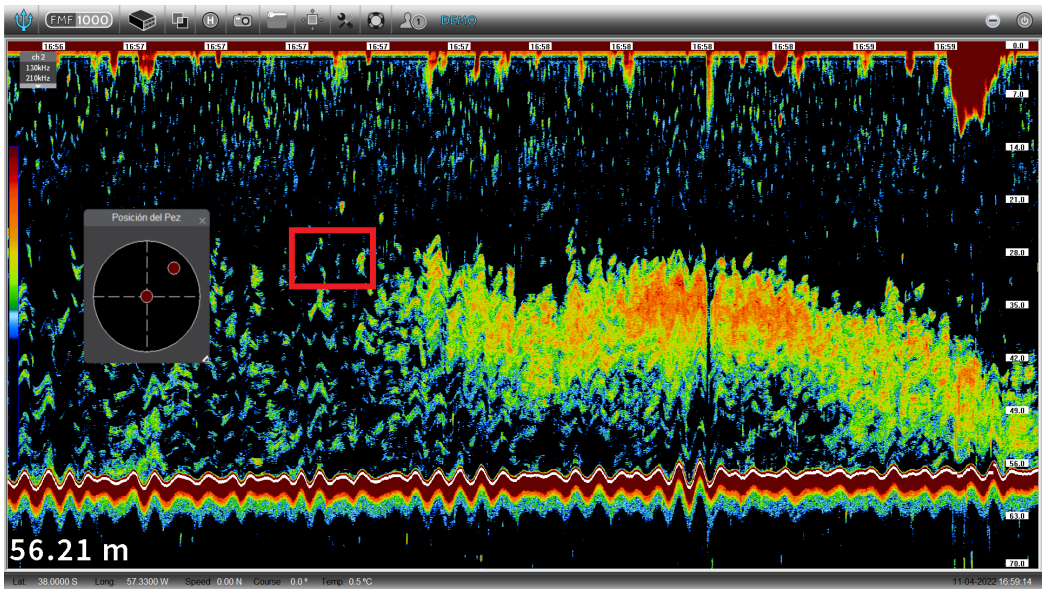



Figure 134: Fish position inside the transducer beam

The echoes position window allows the user to see the fish shoal position with respect to the bow and the moving direction of the vessel. It is also possible to determine the backscattered echoes power by the color intensity.

## 25.4 Color palette settings

The color spheres use always the same selected color palette for the bar histogram chart. In essence, both the histogram and the spheres have the same color palette by default. The power level representation color from both correspond with each other for all cases.
If the color palette from the echogram has changed, the spheres color palette and the histogram change in a way that the color amount from the new selected palette adapts to the shown dynamic range in the histogram.
In case the color bars from the histogram need to be determined, i.e. ignore them from a certain power value, it is possible to define a desired threshold from which a selected color palette can be used. For this purpose, configure the TVG to 40 and adjust the gain value until the desired value. Finally, configure TVG value back to its previous value.
If TVG value is different to 40, the palette color from the spheres and the histogram do not vary.
If TVG value is 40, the palette colors from the spheres and the histogram do not vary.

## 25.5 Data output



Figure 135: Data output submenu visualization

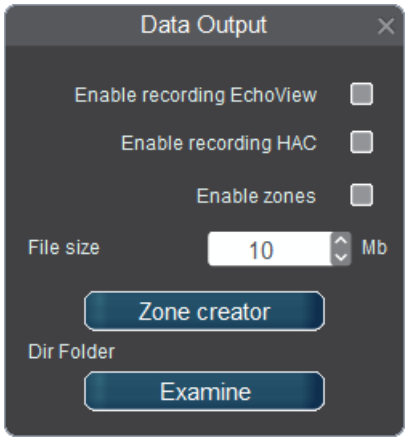



Figure 136: Data output settings window

The echosounder allows the data exportation on split beam mode. By clicking on this button, the data output settings menu will pop up. This data output format is predetermined. The files are compatible with the Echoview®.

- Data output files are exported by the enable recording button
- Data output file size can be configured with the corresponding up and down buttons. Minimum file size is 1 MB. Maximum file size is 500 MB. The file size by default is 10 MB
- Data output folder path for the files to be stored. The examine button allows the user to select it and set this feature up. Later, select the destiny folder. It is strictly necessary to assign a folder path for the data output, otherwise, the files will not be saved properly
- Files export can be restricted by the use of geographical zones. It can be set to inside a user-defined zone (or the sum of several zones). Zone settings is done by the zone creator button

### 25.5.1 Zone creator

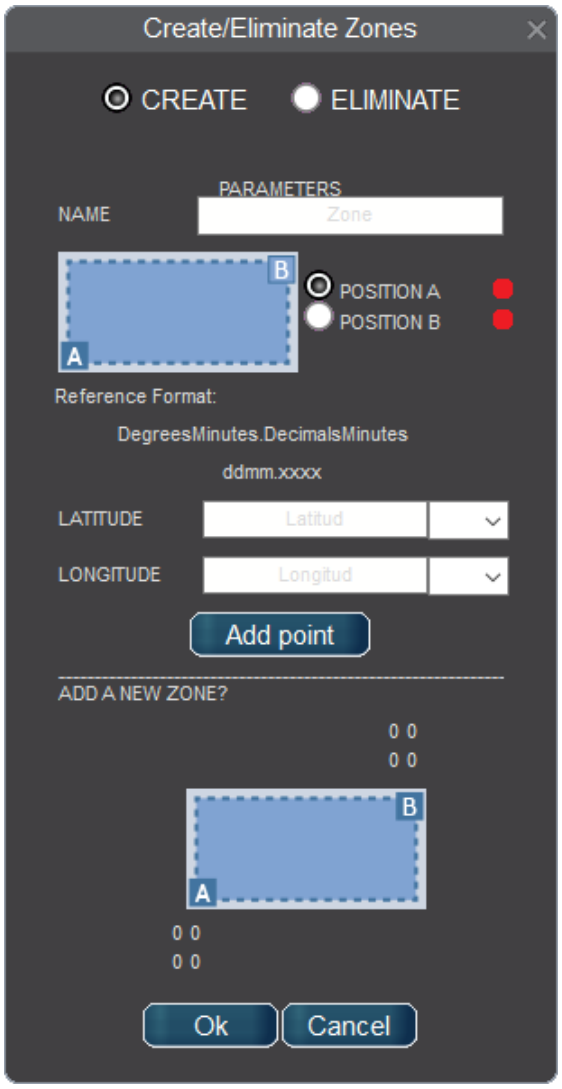



Figure 137: Zone creator and edit window

Creation menu allows to create a new zone entering two reference points as it is shown on Figure 140.
Next it is detailed the steps to follow for a correct creation of a new geographic zone. Repeat the next steps for the reference points A and B:

- Insert the new zone identifier to add

- Select the reference point to add by the use of the corresponding circular button: Position A or Position B
- Insert the corresponding latitude in the indicated format
- Insert the corresponding latitude orientation from the possible formats: N or S
- Insert the corresponding longitude in the indicated format
- Insert the corresponding longitude orientation from the possible formats: E or W
- Once the reference point has been added, add the point by the use of the button add position

Once the reference points A and B were inserted both can be visualized in a previous step to the zone creation. This step can be seen in Figure 139. Note that the correct insert points status are confirmed by the use of an green OK image besides the button position. Once both A and B points were loaded correctly, zone creation is confirmed by the use of OK button. Additionally, every new created zone generates an output file in "ZoneName".hac format. This file can be loaded in software Echoview®. It allows visualizing the created zone in a compatible format with Echoview®. This identifies that the desired data to analyze is delimited inside the interest region. Refer to Figure 138 for an example visualization.

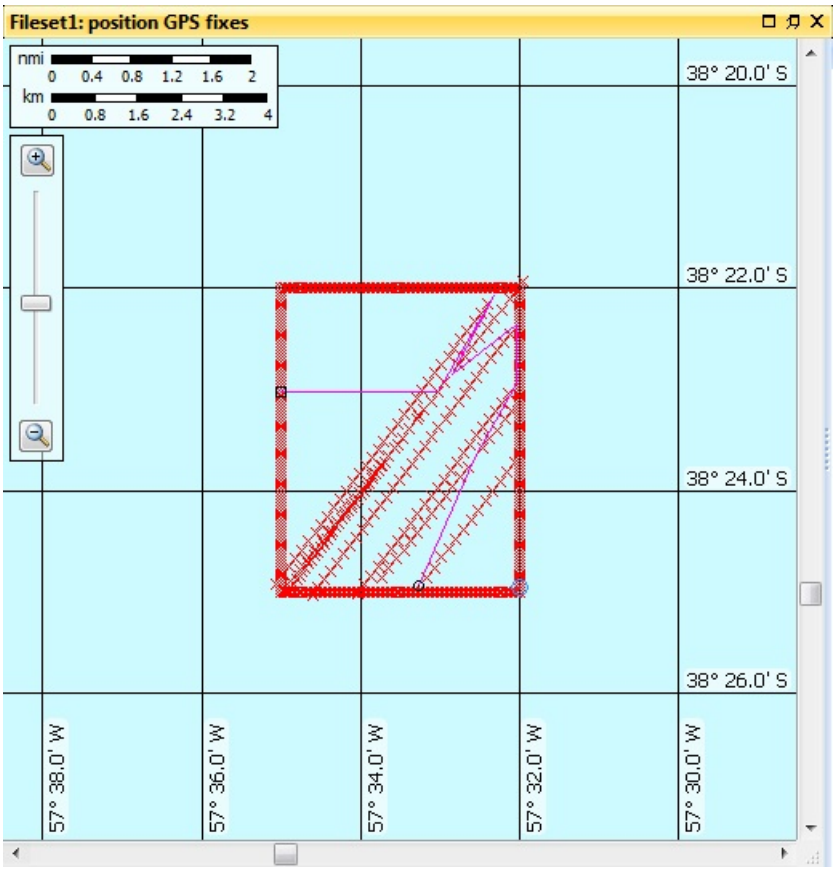



Figure 138: Echoview® imported files visualization and implemented zone of interest

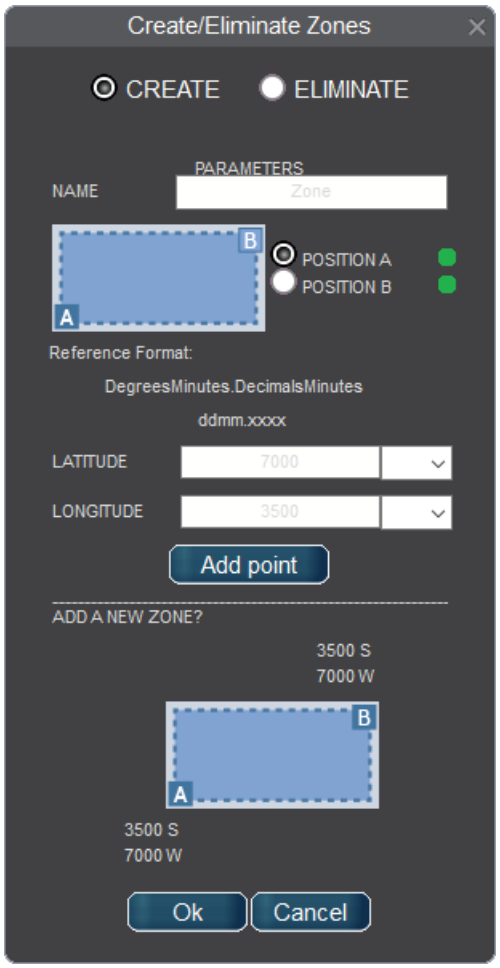



Figure 139: Inserted A and B points visualization. Previous step to zone creation




Figure 140: Zone to insert format: reference points A and B

In order to eliminate a previously loaded zone, press the eliminate button and select the zone to eliminate.

## 25.6 Acoustic Sign



Figure 141: Acoustic sign submenu icon

The backscattering echo level of an object is known as TS or Target Strength. The different TS values for each frequency defines a curve. This curve can be repetitive if there are similar fishes forming a pattern that can be associated to a particular species. This pattern is called Acoustic sign.

On Figure 142 is shown the acoustic sign menu. This window has a graphic of the frequency response of the selected echogram area. This selection is made by the user through a box (See Figure 143). After the area is chosen, the program will compare the different detected echoes curves and if its curves are similar, it will show a standard curve of the selected area.

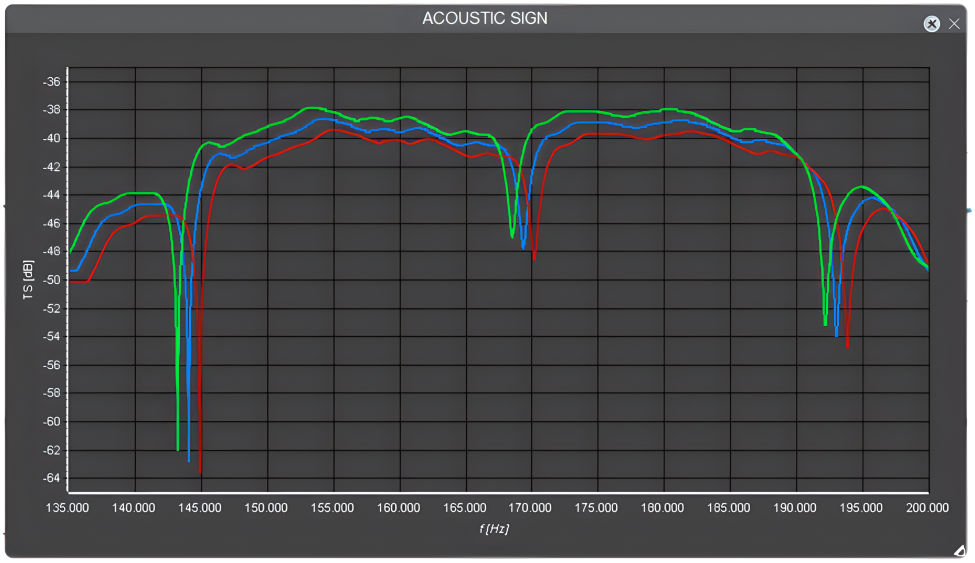



Figure 142: Acoustic sign submenu window

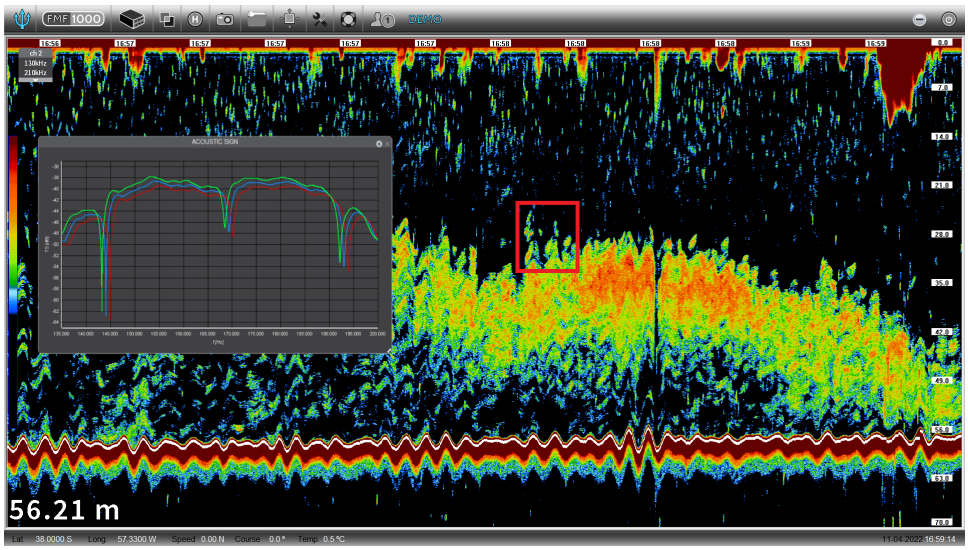



Figure 143: Acoustic sign screen visualization

By clicking on the adjustments button inside the acoustic sign window, the submenu can be found which allows to load acoustic signatures that will be useful as reference patterns to compare with the future results. This way, and combining this information with the echogram, environment data and own experience, an experienced operator will be able to identify a objective specie.

# Features

- Language: SPA / ENG / OTHERS
- Presentation: 1920x1080 Full HD to 3840x2160 4K UltraHD
- Colors: 7/12/15/32/High resolution
- Background: Selectable between five colors
- Echosounder: 1 to 4 channels, mixer, Split Beam, +Power
- Expander: bottom and mid-water
- Echosounder scale: 5-10000 m
- Graphical speed: 10 steps (4/1, 2/1, detenida, 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64) [lines/Tx]
- Image and sound multimedia alarms: fish and bottom
- External trigger: High and low level
- Internal trigger: High and low level
- Biomass
- Hardness and roughness graphic
- Water temperature graphic
- Acoustic sign
- History: images history and playback history
- Compatibility:
  - Speed sensor, Winch, salinity indicator, hull temperature, buoys
  - Marport:
    - Door sensor - Starboard and port
    - Trawl sensor
    - Catch sensor
  - TZ
  - Format NMEA :
    - RMC - Recommended minimum specific GPS / Transit data
    - GLL - Geographic Position, Latitude / Longitude
    - VTG - Track made good and ground speed
    - GGA - Global Positioning System Fix Data
    - ZDA - Time and Date

    - TTM - Tracked Target Message
    - TLL - Target Latitude and Longitude
    - MTW - Temperature of the water
    - DBT - Depth below transducer
    - ROXANN - Parameters of roughness and hardness
  - Echoview special output

# Contact information


- Seaman Electronics


- All rights reserved

- Software version 4.10.2.15
- Firmware FPGA version 5.1
- Firmware PIC version 6.4 // Firmware Bootloader version 2.5

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- September 2026