SIMRAD

Operation Manual

Simrad NSO
Multi-function Display

English

Preface

Disclaimer

As Navico is continuously improving this product, we retain the right to make changes to the product at any time which may not be reflected in this version of the manual. Please contact your nearest distributor if you require any further assistance.

It is the owner's sole responsibility to install and use the instrument and transducers in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing safe boating practices.

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Warranty

The warranty card is supplied as a separate document.

In case of any queries, refer to the brand web site of your display or system:

www.simrad-yachting.com

Declarations and conformance

This equipment is intended for use in international waters as well as coastal sea areas administered by countries of the E.U. and E.E.A. For more information refer to the separate NSO Installation manual.

About this manual

This manual is a reference guide for operating the Simrad NSO systems. It assumes that all equipment is installed and configured, and that the system is ready to use.

The manual assumes that the user has basic knowledge of navigation, nautical terminology and practices.

The manual does not cover basic background information about how equipment such as radars, echo sounders and AIS work. Such information is available from our web site: www.simrad-yachting.com/en/Support/Library/.

Important text that requires special attention from the reader is emphasized as follows:

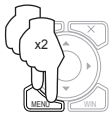
Used to draw the reader's attention to a comment or some important information.

Used when it is necessary to warn personnel that they should proceed carefully to prevent risk of injury and/or damage to equipment/personnel.

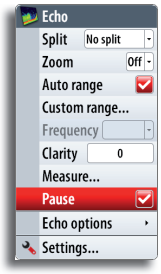
In this manual you will see few direct text references to keys, menus and menu entries, and few step-by-step descriptions. By using graphics we will guide you to the key and the required menu selections.

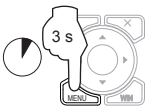
In the illustrations throughout the manual the following symbols are used:

Single short press on illustrated key

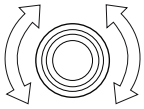


Press twice on illustrated key





Press and hold on illustrated key with time indication



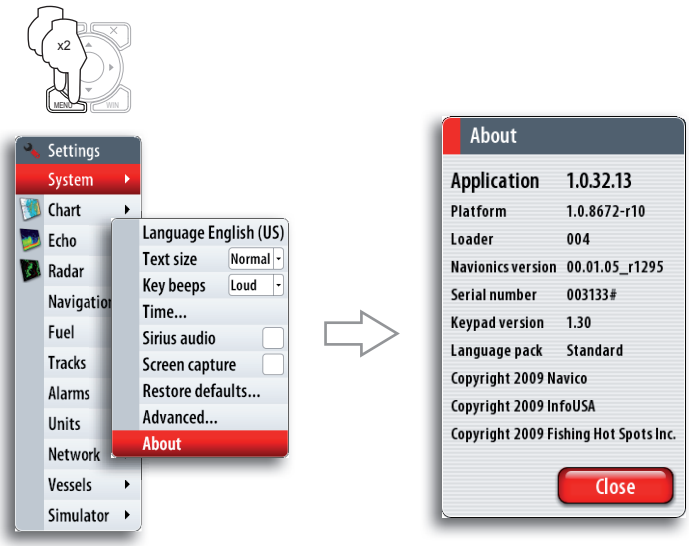
Rotate rotary knob

Single short press on rotary knob

References to keys on the operator panel are written in boldface, e.g. **WIN** key.

The software

This manual is written for Simrad NSO Release to Market 1 (RTM1). Please check web site for details on release version.



The About dialog above is an example only and may not match the sw installed on your unit!

The manual will be continuously updated to match new sw releases. The latest available manual version can be downloaded from www.simrad-yachting.com.

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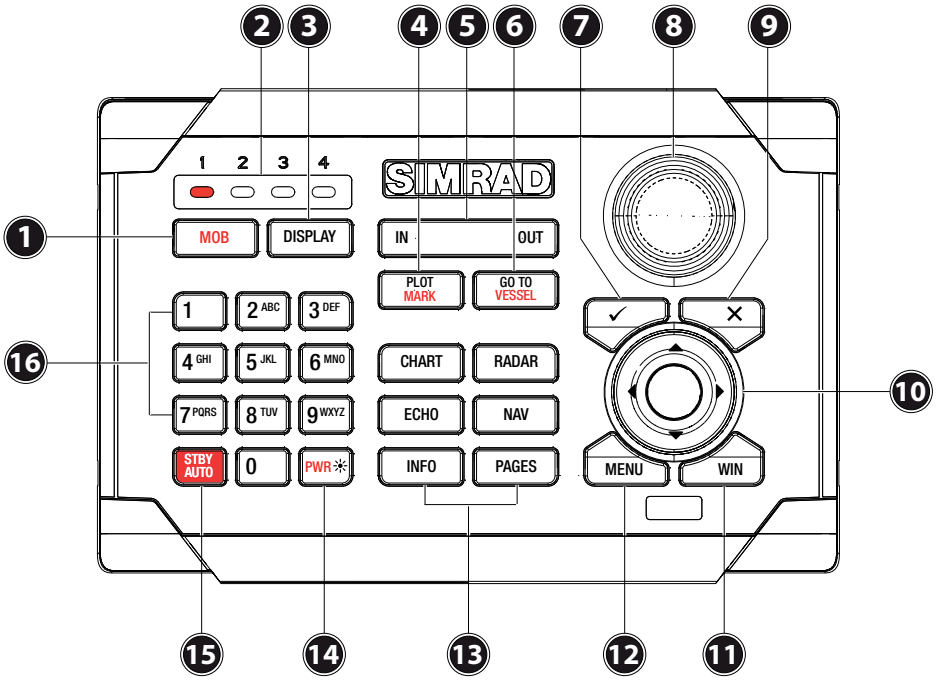
1 Overview

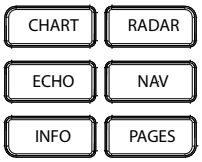
OP40 Controller



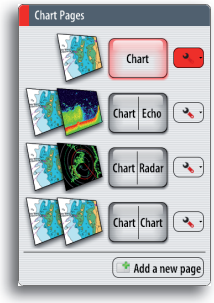
Key	Description
1	MOB (Man Overboard). A long press will position a Man Over Board (MOB) waypoint at the vessel's current position
2	Display Under Command LEDs. Indicates which display the OP40 is controlling.
3	DISPLAY: Change which display the OP40 is controlling
4	PLOT/MARK key. A short press activates the Plot menu, a long press positions a waypoint at the vessel position
5	Zoom IN zoom OUT buttons for radar, echosounder and chart pages
6	GOTO/VESSEL key. A short press activates the Goto menu, a long press centers the chart to vessel position
7	✓ key — Activates/confirms current selection
8	Rotary knob. The function of the knob is depending on active context
9	X key cancels changes and returns to previous menu level
10	Cursor keypad used to move the cursor on the display, and to maneuver in the menu system
11	WIN key, used on multiple panels pages. A short press toggles between the panels, a long press expands active panel to a full page panel and back again
12	MENU key. Used to display the context menu for the active panel/overlay, and for selecting options in edit mode. 2 x MENU for accessing system settings menu
13	Direct Access Keys (DAK). Provide direct access to a page. Repeated presses of each DAK cycles through several different pages that relate to the DAK
14	Long press (two seconds) used to turn on active Processor/Display Short press during operation used to bring up the active displays power control and brightness dialog (and Radar STBY if applicable) Extended press (five seconds) to enter OP40 setup mode
15	STBY AUTO: Autopilot Auto steer / Stand-By
16	Alpha numeric keypad used for entering numbers and text in dialog boxes

The NSO screen structure

Pages and page groups



The NSO screen is comprised of page groups, accessed by pressing one of the Direct Access Keys (DAK). A single press will open the page previously viewed from this DAK. A second press will give the page group and edit options. Repeated press will toggle through the pages available.



Each page group (except the Pages panel) may include 5 pages. The first page in a page group will always be a full screen panel.

The system comes pre-configured with some commonly used pages, and you can also define your own pages. Refer the ***Customizing your system*** section.

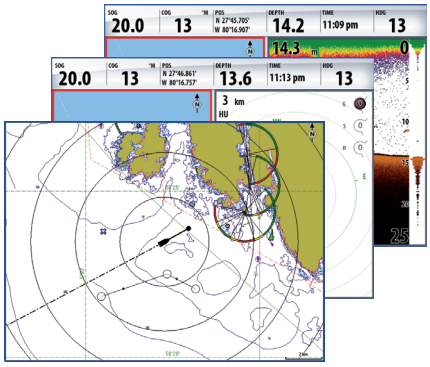
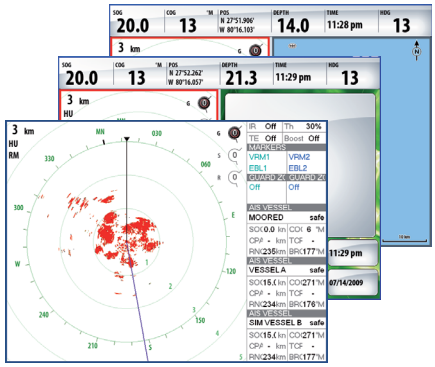


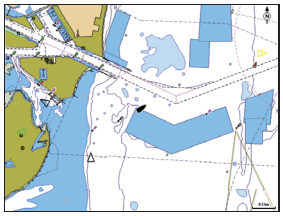
Chart page group example



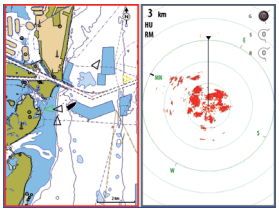
Radar page group example

Panels

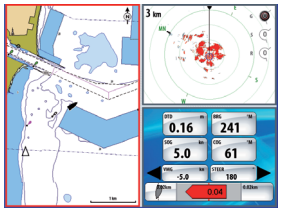
Each application connected to the NSO system is presented on panels, and you can have up to 4 panels per page.



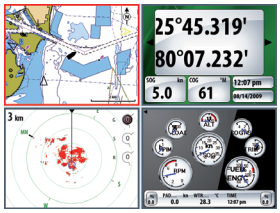
1-panel page



2-panels page



3-panels page



4-panels page

The following panels are available:

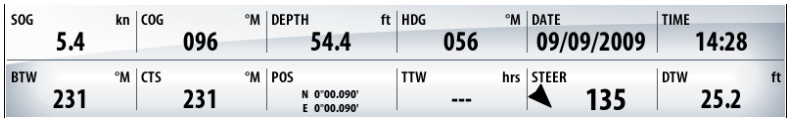
Panel	Description
Chart	Marine chart. Can be displayed as 2D or 3D (Navionics charts)
Radar	Radar PPI (Position Plan Indicator)
Echo	Echosounder
Instruments	Configurable set of screens representing live data from the vessel. Shown as digits analog/linear gauges
Steer	Navigation information
Video	Live video
Position	GPS Position, SOG/COG and time

In addition to these panels the following applications can be connected and displayed on other panels:

Application	Description
AIS	AIS information as overlay on chart and radar panels
Weather	Weather graphics and data as overlay on chart panel. Sirius Weather application is available in North America only.
Audio	Satellite radio functions as a panel along the bottom of a page. Sirius Audio application is available in North America only.

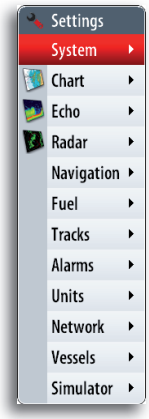
Instrument bar

Sensors connected to the system can be viewed in an instrument bar on top of your screen.



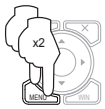
Several display options are available for this bar; refer ***Customizing your system*** section.

Communicating with the NSO unit



The NSO system communicates with the user by using menus and dialogs.

Settings menu

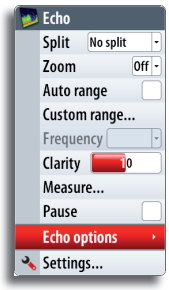


The system includes one Settings menu, accessed by pressing the **MENU** key twice. It provides access to system settings, advanced settings for each function and for vessel specific settings.

Context menus

A context menu contains items that are relevant to the current context. A context menu is accessed by pressing the **MENU** key.

Each panel has its own context menu which gives access to basic functions for that panel.



Plot menu

Used for creating new waypoints, routes and tracks, and for accessing the waypoints, routes and tracks library.

The menu can be accessed independent on which panel that is active. When the **PLOT** key is pressed any other menu action will be interrupted.

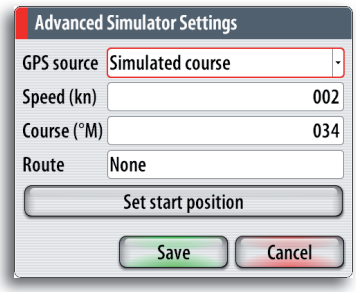
Goto menu

Used to start the navigating function.

When the vessel is navigating the menu will be expanded to include options to stop or change navigation.

The menu can be accessed independent on which panel that is active. When the **GOTO** key is pressed any other menu action will be interrupted.

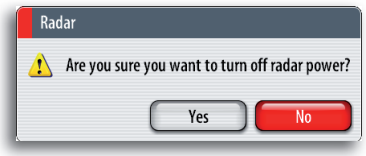
Dialogs



Dialogs are used for entering user input or for presenting information to the user.

A dialog may be presented in full-screen, or as a popup dialog in the centre of the screen.

Depending on type of information or entry, different keys are used to confirm, cancel and close the dialog.



Alarm messages

The NSO system will continually check for dangerous situations and system faults while the system is running.

When an alarm situation occurs, the Alarm window will pop up.

If you have enabled the siren, an audible alarm will be activated when any alarm situation occurs.

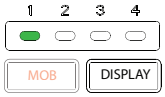
Refer to ***The alarm system*** section for further information.

2 Basic operation

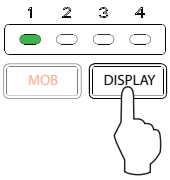
Selecting which processor to control

Before an OP40 can be used it must be configured and assigned to the processor. Refer to the separate NSO Installation manual for more information.

The following color codes are used on the OP40's DISPLAY LED;

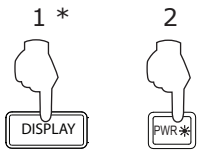
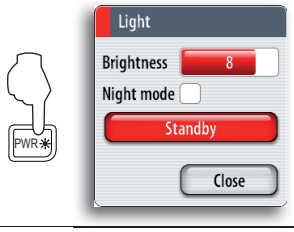


Color/Status	Description
Red	Processor is OFF
Green - Flashing	Processor powering up
Green	Processor is ON



To take control of the next display press the DISPLAY key. Short presses of the DISPLAY key will toggle control through LED positions that have been assigned.

Turning the unit on/off

POWER ON	STAND BY	POWER OFF
		

** On multiple processor systems the processor to power up must be selected prior to pressing the* **PWR** *key.*

There is 5 second delay before an image will appear on the screen.

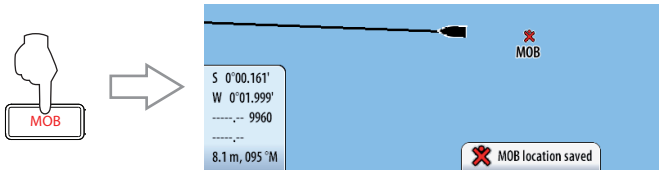
If the radar is running you can turn it to standby mode from within the Light dialog.

Positioning a Man Over Board mark

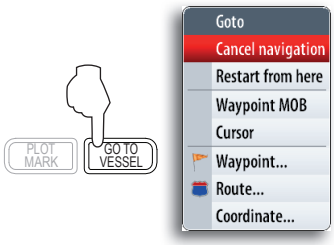
If an emergency situation should occur, you can position a Man Over Board waypoint at the vessel's current position by pressing and holding the **MOB** key.

When you activate the MOB function the following actions are automatically performed:

- a MOB waypoint is positioned at the vessel's position
- the display switches to a zoomed Chart panel, centered on vessel position
- the vessel starts navigating towards the MOB waypoint

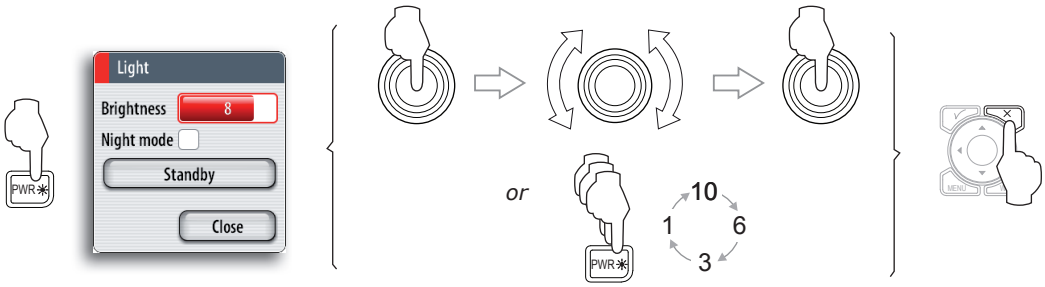


The vessel will continue navigating towards the MOB point until the waypoint is reached or until you select to stop this navigation.



Adjusting the backlight

The backlight for LCD and keys can be adjusted at any time independent of what is on the screen.



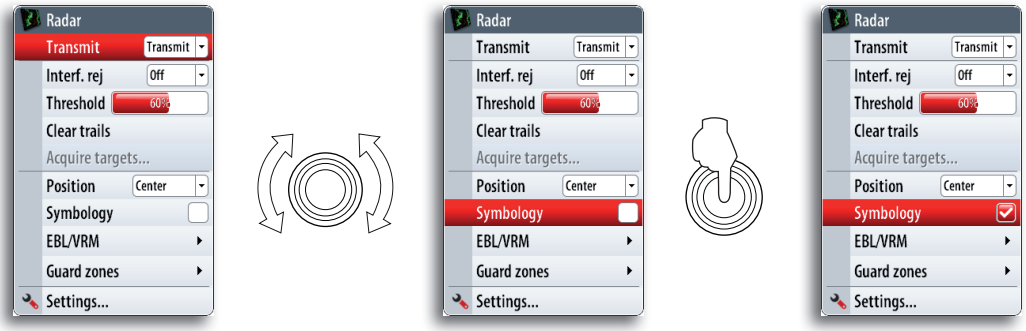
A night mode is included and optimized for low light conditions.

Details on the chart may be less visible when the Night mode is selected!

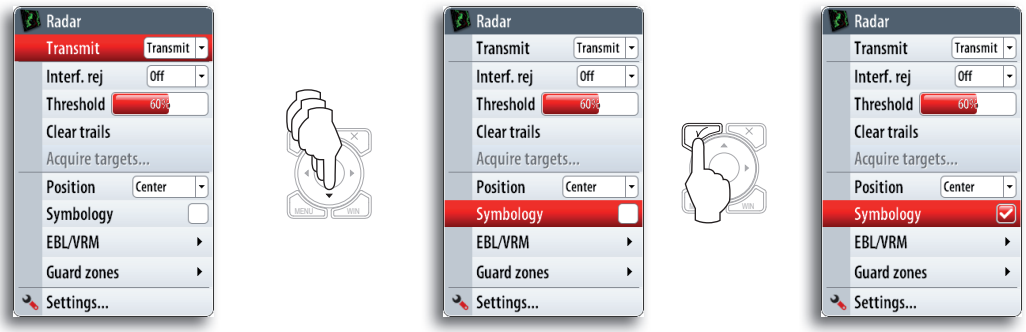
Operating the menu system

Selecting menu item and confirming selection

You operate a menu by using the rotary knob to select menu item, and then pressing the knob to confirm your selection.



You can also operate the menu by using the arrow keypad to select an item, and then the **Tick** key to confirm a selection.

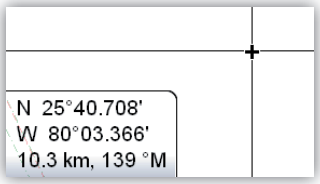


The illustrations for menu operation throughout this manual will refer to the rotary knob!

Exiting the menu

By pressing the **X** key the menu will return to previous menu level, and then exit.

Using the cursor



The cursor is by default not shown on any panel.

When you use one of the arrow keys on a Chart, Radar or Echosounder panel the cursor will become visible. The cursor information window will show position coordinates at the cursor position, and range and bearing to the vessel.

On an Echosounder panel the cursor information window will include the depth at cursor position.

Further use of the cursor is described in the Chart, Radar and Echosounder sections.

To remove the cursor and cursor elements from the panel, press the **X** key.

Adding entries in dialog boxes

Selecting entry field

You switch between the entry fields and keys in a dialog box by using the rotary knob or the arrow keys.

You can enter information by pressing the rotary knob or the **Tick** key when a field is highlighted.

Adjusting values

You adjust a numeric value in a field by using the keypad, the arrow keys or the rotary knob.

You need to press the rotary knob first to change the function from selecting fields to editing the slider.

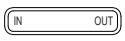
Entering text

The alpha numeric keypad is used for entering digits and text in dialog boxes.

If digit entries are required the keyboard will input digits only.

If both digits and letters are accepted in a dialog repeated short presses on the key will cycle through the letters for that key, while a long press will enter the respective digit.

KEY	1st press	2nd press	3rd press	4th press/or press and hold
2 ABC	A	B	C	2

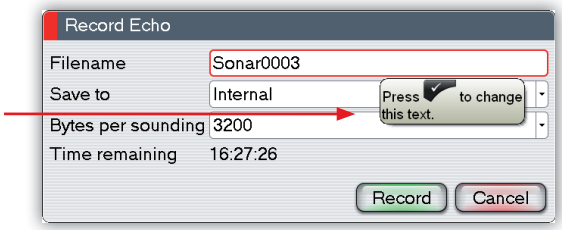


Press the **IN** key for uppercase letters and the **OUT** key for lowercase.

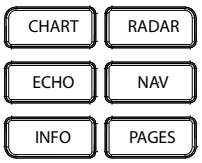
Depending on type of information or entry different keys are used to confirm the entries. When confirmed or cancelled the dialog box will close.

Context help in the dialog boxes

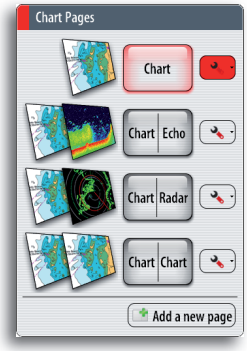
When you select an input field, a context help for that field will be shown.



Working with pages and panels



Selecting pages



You access a page group by pressing the corresponding DAK (Direct Access Key).

When you press a DAK for the first time, the default page for that group is displayed. When you later switch between the page groups, the last active page in each group will be displayed.

If you repress a page group's DAK a list of available pages for that group will be displayed.

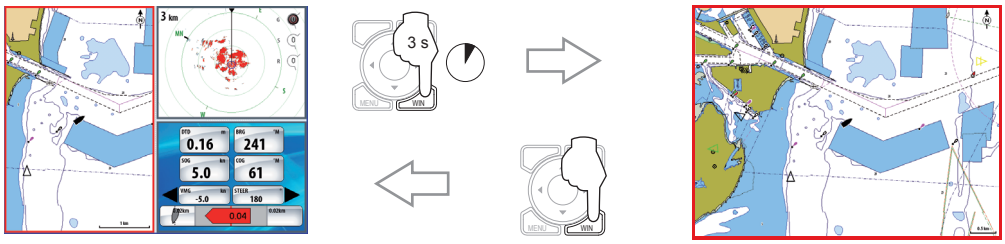
Selecting active panel

In a split screen you can have multiple panels, but only one panel can be active at a time. You will only be able to access the context menu of the active panel. The active panel is outlined with a red border.

You can switch between active panels by pressing the **WIN** key.

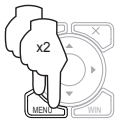
Maximizing active panel

You press and hold the **WIN** key to maximize the selected panel. By repressing the **WIN** key the panel will return to the previous split screen view.



Editing a page

You can edit any page in a page group except the first page. You can also define your own pages for each DAK as described in the ***Customizing your system*** section.



3 Using the simulator

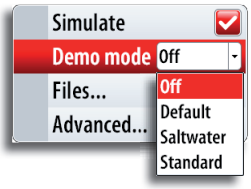
Simulator mode

The simulation feature main data sources, so you can see how the unit works without being connected to echosounder, radar, GPS etc.

You can use the simulator to help you become familiar with your unit before using it out on the water.

When the simulator is toggled on this is indicated in the lower part of the display.

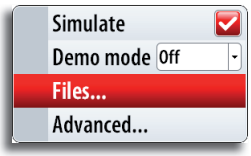
Demonstration mode



In this mode the unit automatically runs through the main features of the product; it changes pages automatically, adjusts settings, opens menus etc.

If you press a key when demo mode is running, the demonstration will pause. After a time-out period, demo mode will resume again.

Selecting simulator source files

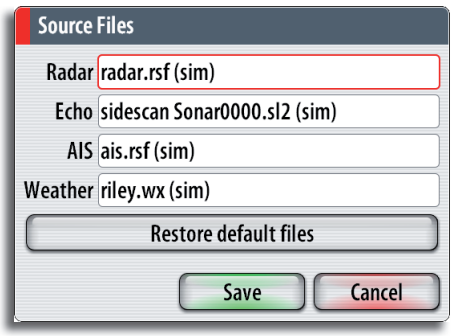


You can select which data files to be used by the simulator.

A set of source files is included in your system, and you can import files by using an SD card inserted into the units card reader. Refer to ***Pages*** section.

You can also use your own recorded echosounder files in the simulator.

For how to record echosounder files, refer to the ***Using the echosounder*** section.

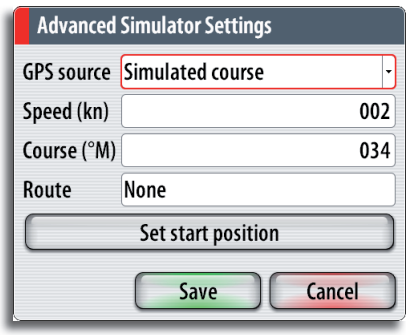


Advanced simulator settings

The advanced simulator settings allow you to define how to run the simulator. When the settings are saved these will be used as default when starting the simulator mode.

GPS source

Selects where the GPS data is generated from.



Speed, Course and Route

Used for manually enter values when GPS source is set to **Simulated course** or **Simulated route**. Otherwise, GPS data including speed and course comes from the selected echosounder or radar files.

Set start position

Moves the vessel to current cursor position.

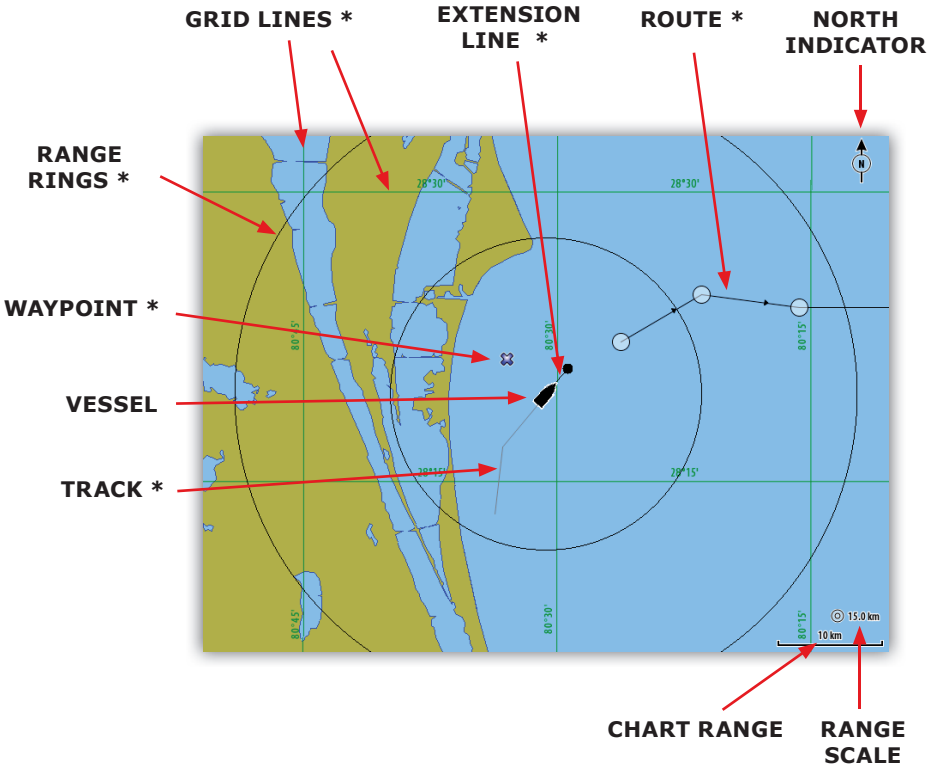
Blank page

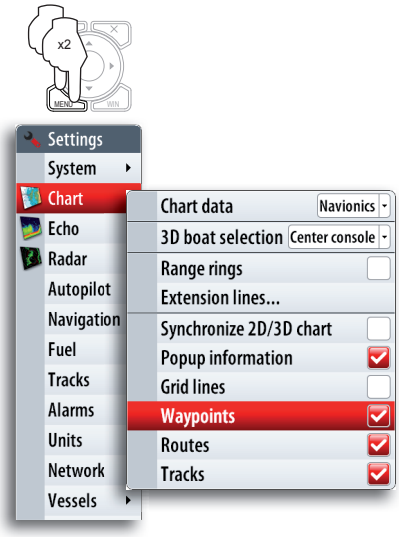
4 Charts

On the chart panel you can determine your vessel's position in relation to land. You can use the chart display for planning routes and sailing along a predefined route.

The chart function can also display your vessel's position relative to other chart objects, plan and navigate routes, create waypoints; overlay a radar image and display AIS targets and weather information.

The chart panel





** Optional chart image items*

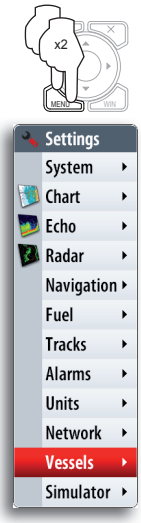
You turn the optional images on/off individually.

The vessel symbol

When a GPS and a suitable compass sensor is connected to the system, the vessel symbol indicates vessel position and heading. Without a heading sensor fitted, the vessel icon will orientate itself using COG (Course over Ground).

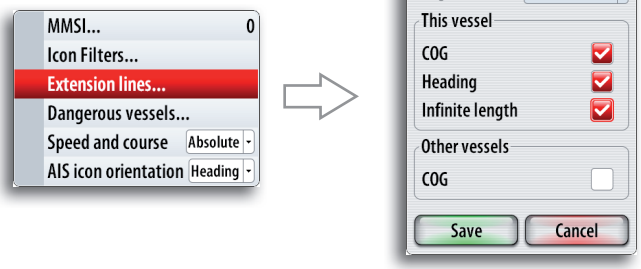
If no GPS is available the vessel symbol will include a question mark.

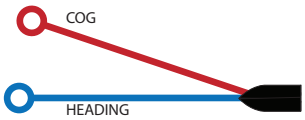
Extension Lines



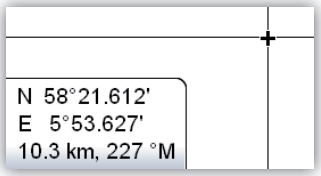
The vessel's extension lines can be activated to show course over ground (COG), heading or both. The length of the line can be set to fixed length or to indicate the distance that the vessel will travel at the current speed in selected time period.

Selecting Infinite length will project a continuous extension line.





Using the cursor on chart panel



The cursor by default is not shown on the chart panel.

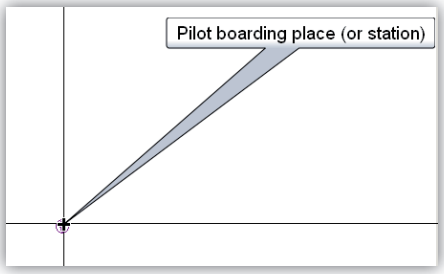
When you press one of the arrow keys the cursor will become visible, and the cursor position window will be activated.

When you are in cursor mode, the chart will not pan or rotate to follow the vessel.

Pressing the **X** key will toggle the chart position between the vessel and the previous cursor position.

To remove the cursor and cursor elements from the panel, press the **X** key.

Selecting objects



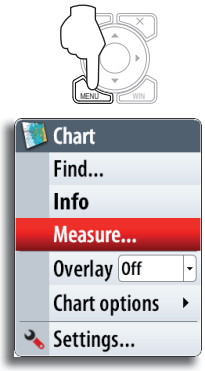
When you rest the cursor over a chart item, a waypoint, a route or a target, basic information for the selected item will be displayed.

By pressing the rotary knob or the tick key when a chart item is selected all available information about that item will be shown.

Popup information has to be enabled.

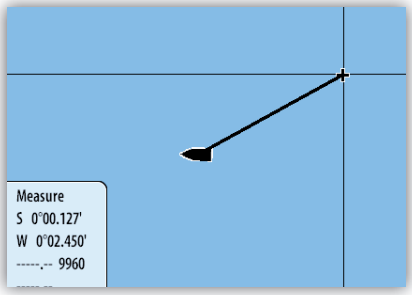
Creating waypoints and routes

You can use the cursor to position waypoints and routes as described in ***Waypoints, Routes and Tracks*** section.



Measuring distance

The cursor can be used to measure the distance between your vessel and a position or between 2 points on the chart panel.



Use the following process to measure a distance.

1. Start the Measure function
2. Move the cursor towards the second measuring point
   - A line will be drawn from the vessel center to the cursor position, and the distance will be listed in the Cursor Information window

You can reset the measurement and start measuring from cursor position by pressing the **Tick** key.

You terminate the measuring function by pressing the **X** key.

Chart scale

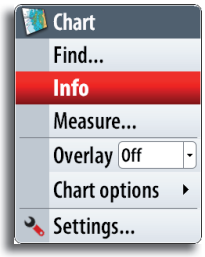
You zoom in and out in the chart by using the **IN**/**OUT** keys or by using the rotary knob.

Chart scale will be shown in the lower right corner of the chart panel.

Searching for chart objects

The chart context menu includes a search function used to find and display chart objects.

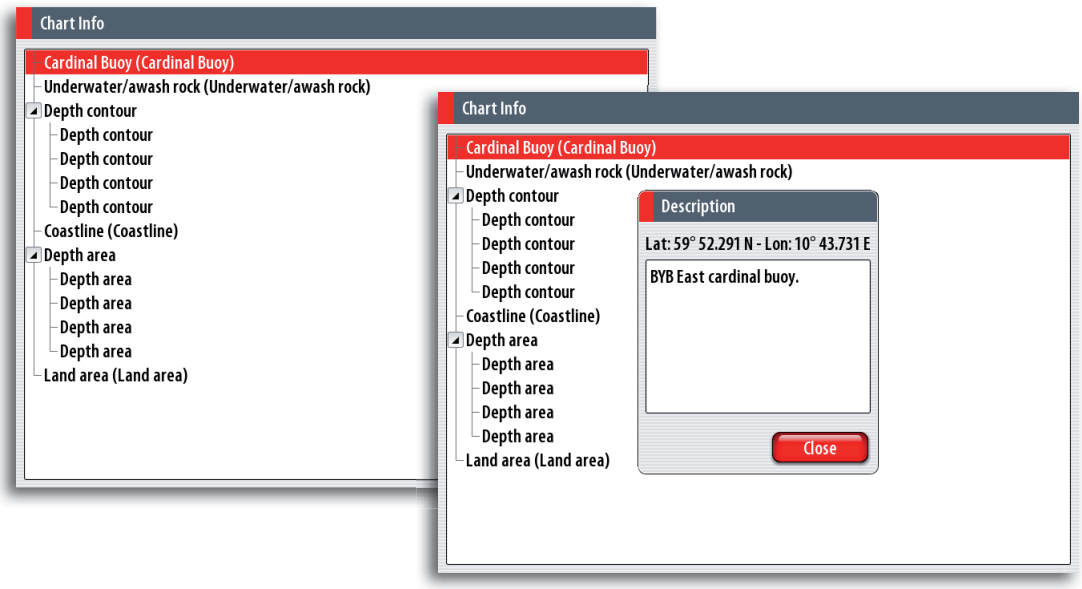
This function is also available from the ***Pages*** panel.



Displaying chart information

You can display available information for the chart and chart items in cursor or vessel position.

You can select further details about a selected item by pressing the rotary knob or the **Tick** key.



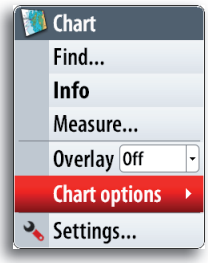
Positioning the chart on the panel

Selecting chart center

When the cursor is active on the panel, the chart will be centered around the cursor position (cursor mode).

Pressing **X** key will remove the cursor, and the chart center will be positioned at the vessel (vessel mode).

You can toggle between cursor mode and vessel mode by pressing the **X** key .

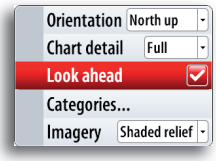


Panning

By moving the cursor to the edge of the panel, the chart will be panned in the cursor's direction.

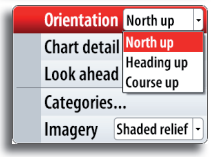
Look ahead

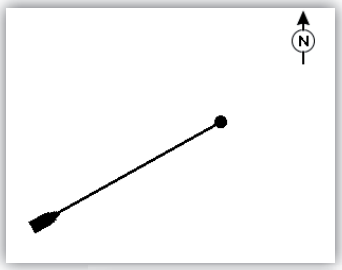
This option centres the chart slightly forward of your vessel so that you can maximize your view ahead.



Setting the chart orientation

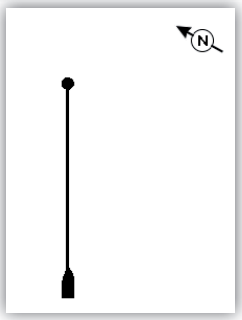
Several options are available for how the chart is rotated in the panel. The chart orientation symbol in the panel's upper right corner indicates the north direction.





North up

Displays the chart with the north direction upward. Corresponds to the usual orientation of nautical charts.



Heading up

Displays the chart with the vessel's heading directly up on the chart image.

Heading information is received from a compass. If heading is not available, then the COG from the GPS will be used.

Course up

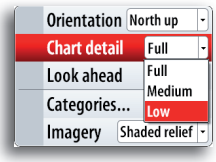
Rotates the chart in the direction of the next waypoint when in navigation mode.

This option works only when there's an active route. If no route is active the heading up orientation will be used until a route is made active.

Selecting chart detail level

Low

This is the basic level of information that cannot be removed, and includes information that is required in all geographic areas. It is not intended to be sufficient for safe navigation.



Medium

This is the minimum information sufficient for navigation.

Full

This is all available information for the chart in use.

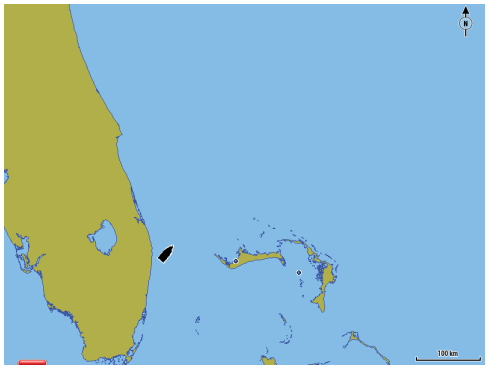
Chart categories

This option enables you to select which chart categories you want to display on your chart.

Chart imagery style

The charts can be displayed in two different imagery styles.

2D presents chart information in a basic mapping mode, while the shaded relief option presents chart including terrain information.



2D

Shaded relief

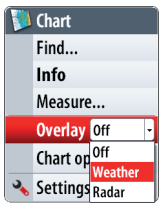
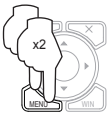


Chart overlay

Radar and weather information can be displayed as overlay on your chart panel.

When one of the overlay options are selected the chart context menu will be expanded to include basic function for the selected overlay.

Radar and weather functions are described in separate sections in this manual.



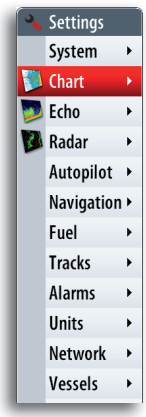
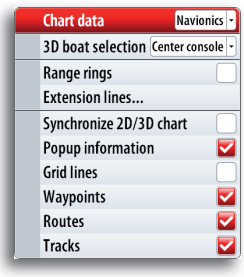


Chart data

The NSO system can use Simrad and Navionics chart databases.

The Navionics chart includes options that not are available in the Simrad database. Navionics options are described in the following sections.



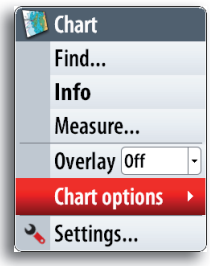
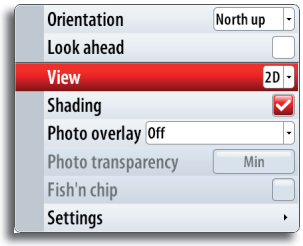


Chart options in Navionics chart database

Chart view



The Navionics chart database provides you with 2D and 3D view options.

2D presents chart information in a basic mapping mode, but with Navionics Platinum details.

3D provides a three dimensional graphical view of land and sea contours.

3D Zooming

You zoom the 3D chart by using the **IN**/**OUT** keys.

Viewing the chart in 3D

There are two modes available for moving the camera in 3D views; Vessel mode and Cursor mode. You switch between these two modes by pressing the **X** key.

Vessel mode

In this mode the camera follows the vessel. The vessel's position will be in center if not Look ahead option is selected. The camera angle is by default as seen from above and behind the vessel, looking forward. You can tilt the camera by using the up/down arrow keys, but you cannot rotate the camera horizontally.

Cursor mode

This mode includes two different options for moving the camera; Camera Pan and Camera Rotate. You switch between these two camera modes by pressing the rotary knob or the √ key. Active camera mode is shown on top of the panel.

Camera Pan

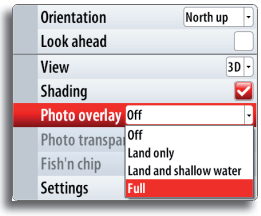
In this mode you move the camera away from the vessel position and around in the chart by using the arrow keys, and rotate horizontally by using the rotating knob.

You can return to vessel position (vessel mode) by pressing the **X** key.

Camera Rotate

In this mode the camera position is fixed, and the camera can only be rotated. You rotate the camera horizontally by using the left/right arrow keys or the rotating knob. You tilt the camera vertically by pressing the up/down arrow keys.

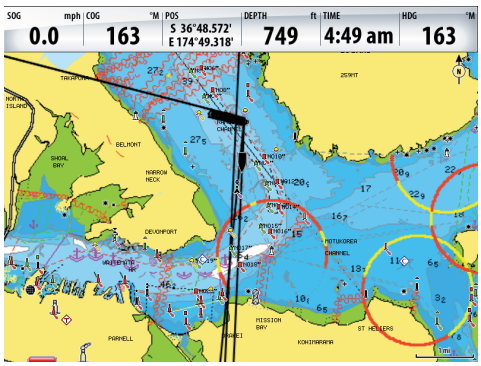
Photo overlay

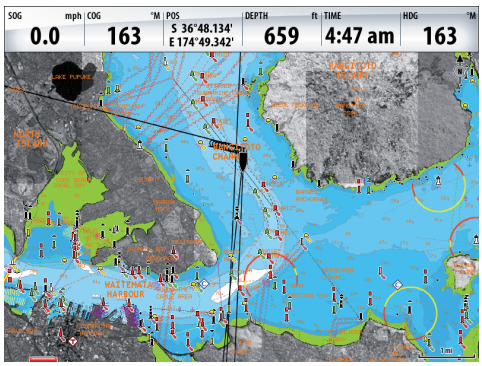


This option enables you to view satellite photo images of an area as an overlay on the chart.

The availability of such photos is limited to certain regions.

You can view photo overlays in either 2D or 3D modes.

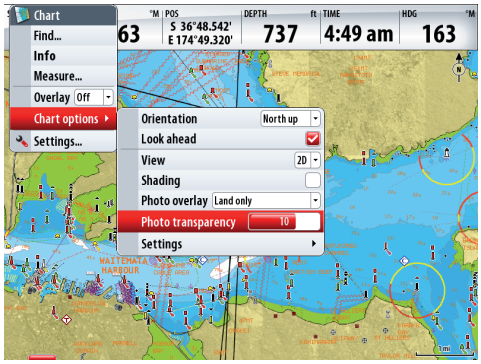


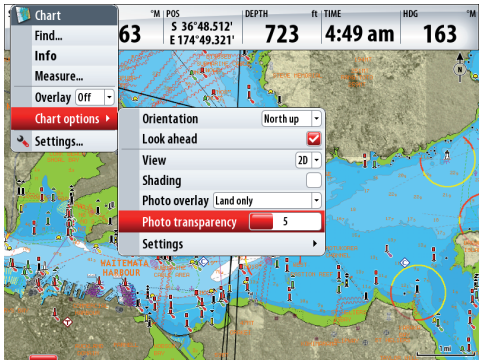


☞ *The Photo overlay function is disabled as you zoom out beyond a certain level.*

Photo transparency

The transparency sets the opaqueness of the photo overlay.





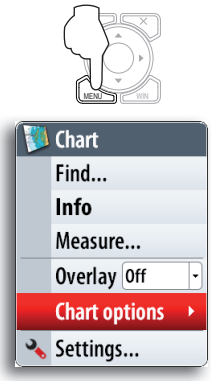
Navionics Fish'n Chip

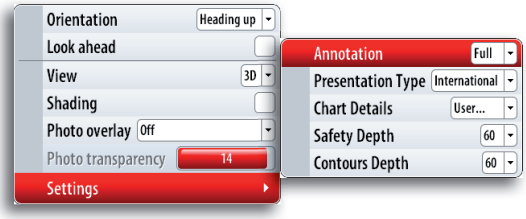
NSO supports Navionics Fish'n Chip (US only). Fish'n Chip provides high resolution bathymetric data.

Fish'n Chip data is standard on Navionics Platinum Plus cards.

☞ *If enabled, you may notice some other chart features disappear and it may clutter the screen.*

Optional settings for Navionics charts





Annotation

Determines what area information— such as names of locations and notes of areas—is available on display.

Presentation type

Provides marine charting information such as symbols, colors of the navigation chart and wording for either International or US presentation types.

Chart details

Provides you with different levels of geographical layer information.

Safety depth

The Navionics charts use different shades of blue to distinguish between shallow and deep water.

The safety depth sets the limit for which depts that shall be drawn without blue shading.

Contours depth

Determines which contours you see on the chart down to the selected contour's depth value.

5 Waypoints, routes & tracks

Waypoints

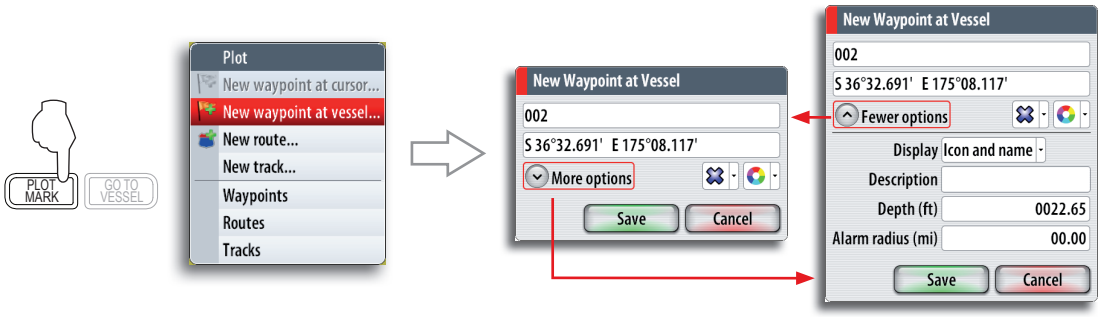
A waypoint is a user generated mark positioned on a chart, on a radar image or on an echosounder image. Each waypoint has an exact position with latitude and longitude coordinates. A waypoint positioned on an echosounder image, will in addition to position information, have a depth value.

A waypoint is used to mark a position you later may want to return to. Two or more waypoints can also be combined to create a route.

Positioning waypoints

You can position a waypoint at the vessel position from any panel by pressing the **PLOT** key:

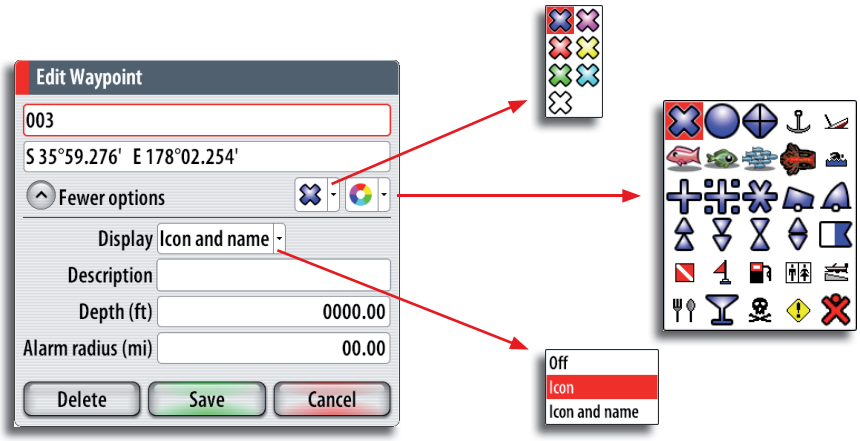
- Short press: activates the Plot menu allowing you to specify waypoint details in the Waypoint dialog
- Press and hold: plots a waypoint at the vessel's current position



You can position a waypoint at the cursor position on a chart, radar and echosounder panel by moving the cursor to selected position and then pressing the **PLOT** key.

The waypoint dialogs

You can enter details for a waypoint in the waypoint dialog, activated by pressing the rotary knob or the Tick key when a waypoint is selected.



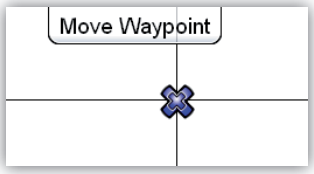
The waypoints dialog can also be activated from the Waypoint list. Refer ***The Waypoints, Route and Tracks library*** later in this section.

Editing waypoints

A waypoint can be edited in the Waypoint dialog. You can also move the waypoint manually by using the cursor;

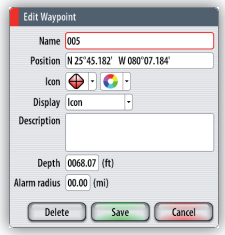
1. Select the waypoint by resting the cursor over it
2. Press the **MENU** key and select the move option
3. Use the arrow keys to move the cursor to a new position
4. Confirm the new position by pressing the rotary knob or the tick key

The moving waypoint mode is indicated on top of the panel.



The waypoints can also be edited from the Waypoint list as described later in this section.

Waypoint alarm settings

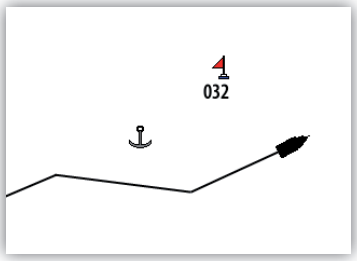


You can set an alarm radius for each individual waypoint you create.

When the waypoint alarm is toggled ON in the alarm panel, an alarm message will be activated when your vessel comes within the defined radius.

If you want to set an alarm radius for a route point this point must first be converted to a waypoint.

Tracks



A track is a graphical presentation of the historical path of the vessel, allowing you to retrace your travel. A track can later be converted to a route in the Tracks dialog described later in this section.

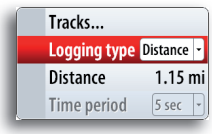
From the factory, the system is set to automatically track the vessel's movement. The system will continue to record the track until the track length reaches the maximum trail point setting, and will then automatically begin overwriting the oldest track points.

The automatic tracking function can be turned off from the Tracks library as described later in this section.

Track settings

The track is made up of a series of track points connected by line segments whose length depends on the frequency of track recording.

You can select to position track points based on time settings, distance, or by letting the NSO system position a waypoint automatically when a course change is registered.

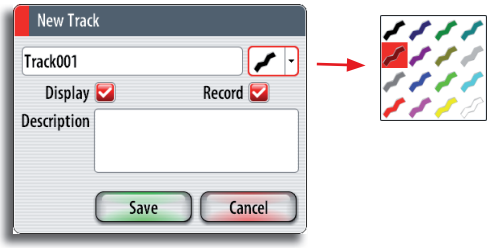


*The Tracks option must also be turned ON in the chart settings to be visible! Refer the **Chart** section.*

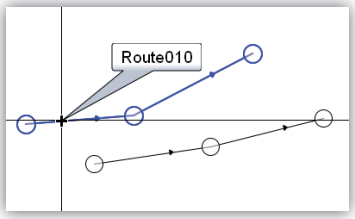
Creating a new track

You define the track settings and start the new track from the Plot menu.

A new track can also be started from the Tracks library described later in this chapter.



Routes



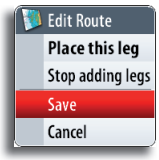
A route consists of a series of waypoints entered in the order that you want to navigate them.

When you rest the cursor over a route, it will turn blue and the route name will be displayed.

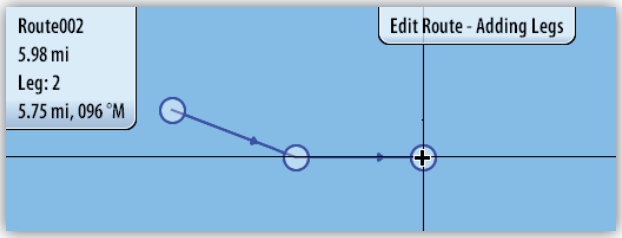
Creating new routes by using the cursor

You can create a new route on the Chart panel as follows:

1. Press the **PLOT** key and select the new route option
2. Use the arrow keys to move the cursor to the position for the first waypoint
3. Confirm the position by pressing the rotary knob
4. Move the cursor to the position for the next waypoints, and confirm the position by pressing the rotary knob again
5. Repeat moving the cursor and pressing the rotary knob until all waypoints in the route are created
6. Press the **MENU** key to save the route

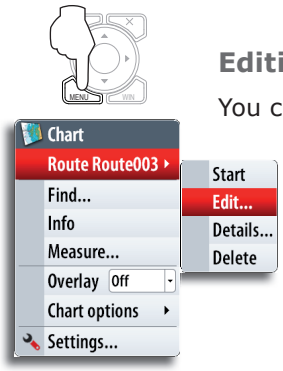


The Edit route mode and route information is indicated on top of the panel until the route is saved.



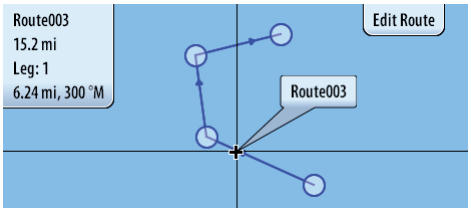
The route can also be created from the Routes list as described later in this section.

Editing a route by using the cursor



You can edit a route on a chart panel by using the cursor;

1. Select the route by resting the cursor over it
   - The route will be highlighted
2. Press the **MENU** key and select the edit option
   - The Edit route mode and route information is indicated on top of the panel



3. Move the cursor to where you want to make the edit; a waypoint or a leg, and press the **MENU** key again to select edit options
   - The options available in the Edit route menu depend on if the cursor is rested over a waypoint or over a leg
4. Use the cursor to add, move or remove any item
5. Press the **MENU** key again and save your edits

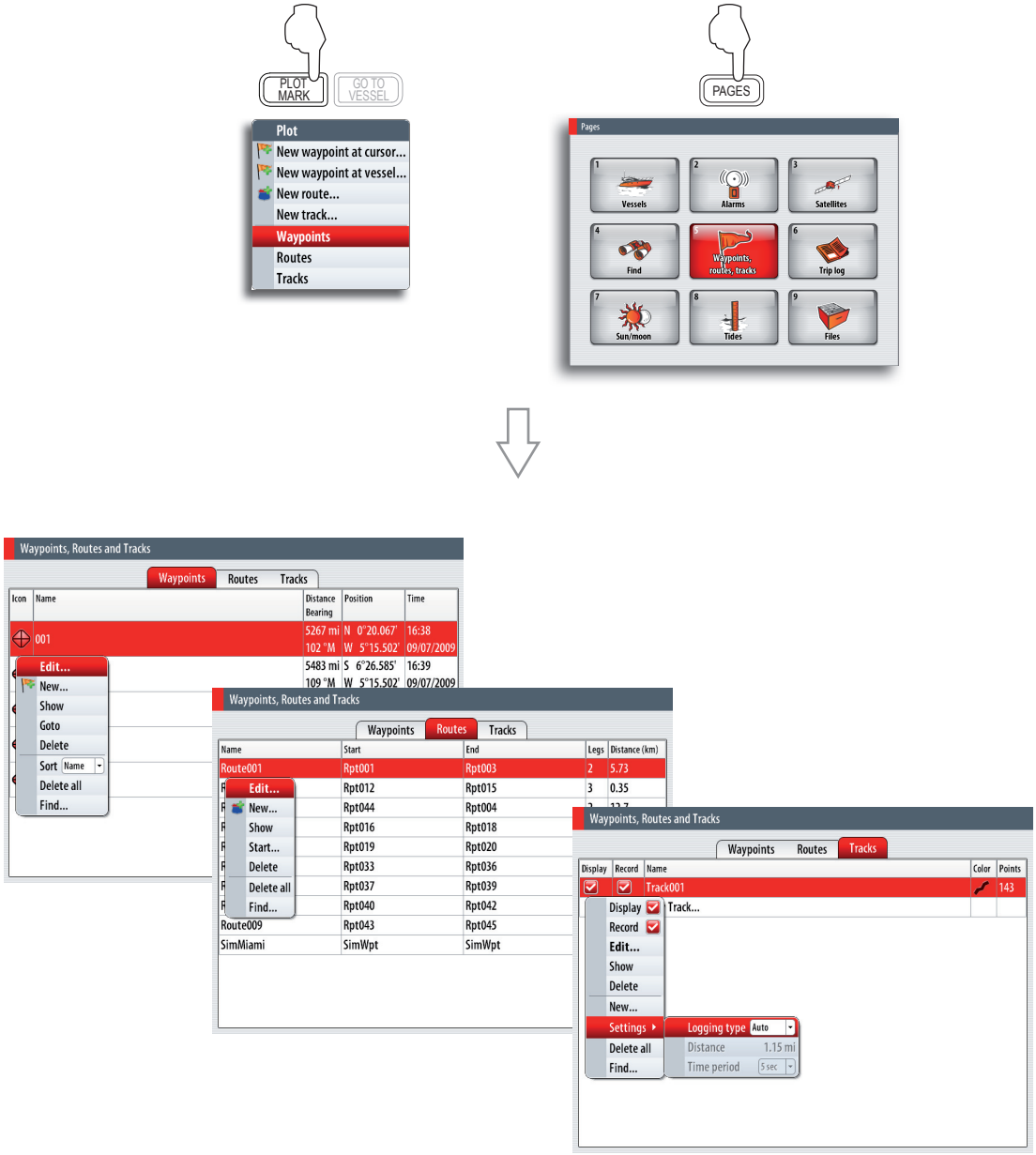
The waypoints, route and tracks page

The ***Pages*** panel includes a Waypoints, Routes and Tracks page. This gives access to advanced edit functions and settings for all these items available on your system.

There are several ways to access the library. A couple of them are illustrated below.

You move between the tabs in the library by using the left/right arrow keys.

The edit and settings options are accessed by pressing the **MENU** key when one of the items is selected.

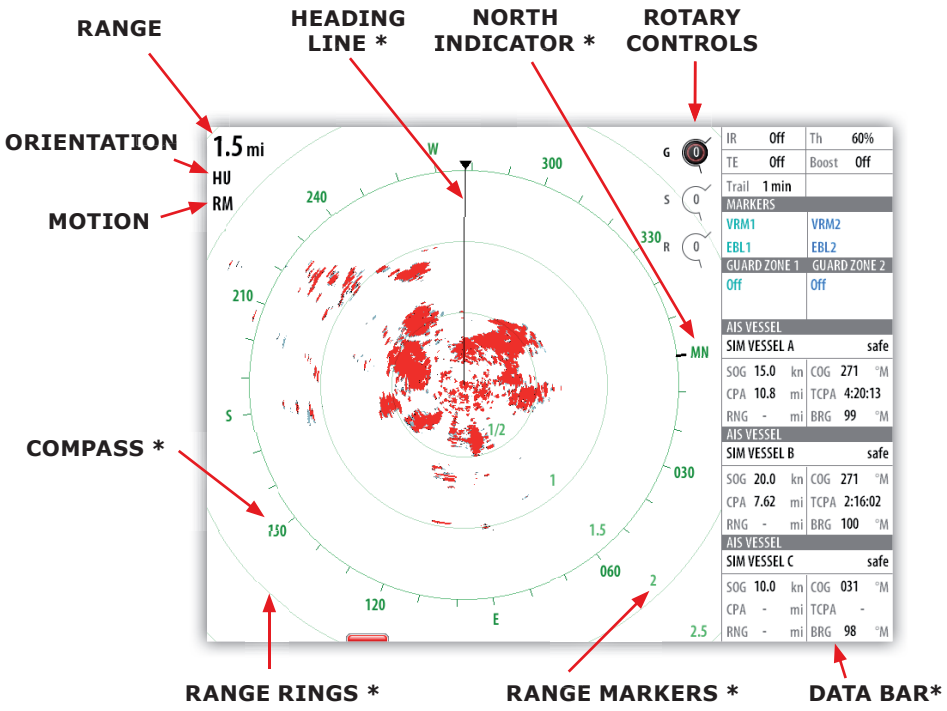


6 Using the radar

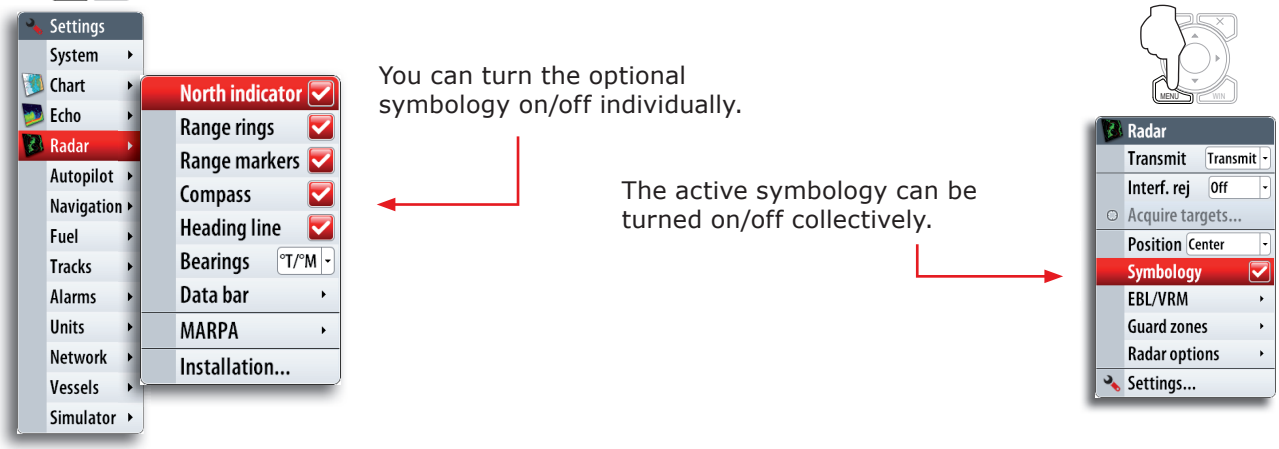
The radar panel can be set up as a full screen view or combined with other panels.

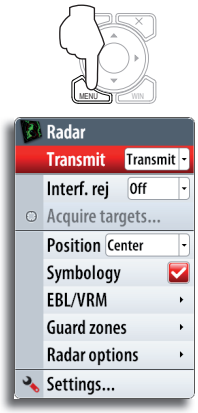
The radar image can also be displayed as an overlay to existing 2D chart views and 3D for Navionics. Refer to the ***Chart*** section.

The radar panel



** Optional radar symbology*





The radar operational modes

The radar's operational modes are controlled from the NSO unit. The following modes are available:

Off

The power to the radar scanner is turned off

Standby

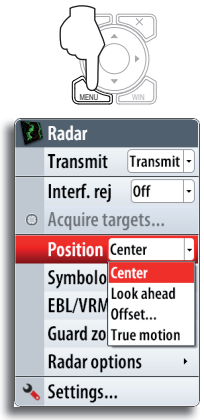
The power to the radar scanner is on, but the radar is not transmitting.

The radar can also be turned to standby mode by pressing the **PWR** key.

Transmit

The scanner is on and transmitting. Detected targets will be drawn on the radar PPI (Plan Position Indicator).

Setting up the radar image



Positioning the radar center

You can move the radar PPI center to different positions within the radar panel.

The following options are available:

Center

Default setting. The radar PPI center is centered on the radar panel.

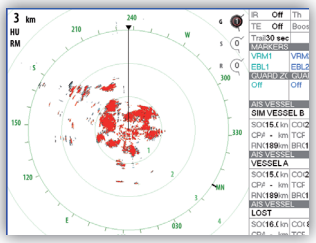
Look Ahead

Moves the radar PPI center to the bottom of the panel to give maximum view ahead.

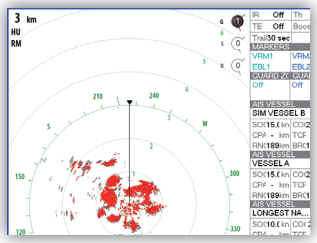
Offset

Allows you to move the PPI center to any location on the radar panel.

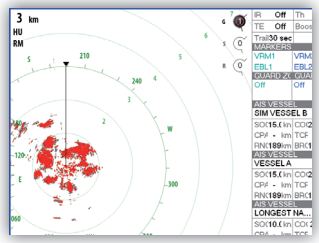
1. Select the offset option
2. Use the arrow keys to position the radar center
3. Confirm the settings with the **Tick** key



Center



Look ahead



Custom

Setting the radar motion

You can select how your vessel symbol moves on the radar image.

The radar motion can only be changed when the radar is transmitting. If there's no heading data or COG, only Relative Motion mode is available.

Relative motion

Your vessel remains in a fixed location on the Radar screen and all other objects move relative to your position. You can choose the position of the fixed location, refer as described in ***Positioning the radar center***.

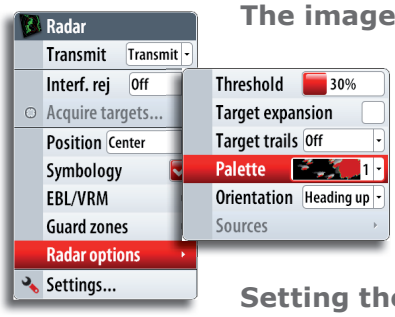
Relative motion is the default setting.

True motion

In True motion your vessel, and moving targets, move across the Radar screen as you travel. All stationary objects remain in a fixed position. When the vessel's symbol reaches the edge of the screen, the radar image will be redrawn with the vessel symbol re-positioned in center of the screen.

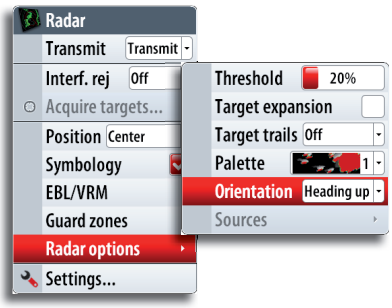
When True motion is selected, the menu will expand to include a reset true motion option. This allows for manually resetting the radar image and vessel symbol to screen center.

The image color



Different colors (palettes) can be used to represent detail on your radar panel.

Setting the radar orientation



Heading up

Rotates the radar image to display the current heading directly up on the radar image.

North up

Rotates the radar image with the north direction upwards.

Course up

Rotates the radar image to display the current navigation course directly up.

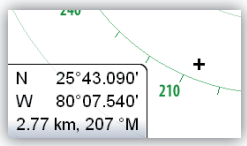
This option works only when the vessel is navigating an active route. If the vessel is not navigating an active route the heading up orientation will be used until the navigation function is started.

Setting the radar threshold

The threshold sets required signal strength for the lowest radar signals. Radar returns below this limit will be filtered and not displayed.

Default value: 30%.

Using the cursor on the radar panel



The cursor is by default not shown on the radar image.

When you press one of the arrow keys the cursor will be visible, the cursor position window will be activated.

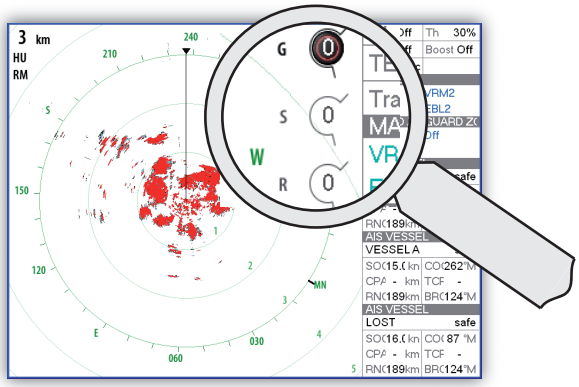
The cursor can be used to measure a distance to a target, and to select targets as described later in this section.

To remove the cursor and cursor elements from the panel, press the **X** key.

Optimizing the radar image

You may be able to improve the radar image by adjusting the radar sensitivity, and by filtering the signals from effect of random echoes from sea and weather conditions.

The parameters are adjusted by using the rotary knob. You select between the control images by pressing the rotary knob. Active control will expand and display its name in full. You can then adjust the value by turning the knob



Gain

The gain controls the sensitivity of the radar receiver.

A higher gain makes the radar more sensitive to radar returns, allowing it to display weaker targets. If the gain is set too high, the image might be cluttered with background noise.

Gain has 2 modes; Auto and Manual. You cycle through the modes by pressing and holding the rotary knob. You can only adjust the gain value by turning the rotary knob when it is in manual mode.

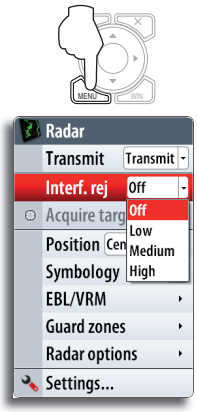
Sea clutter

Sea clutter is used to filter the effect of random echo returns from waves or rough water near the vessel.

When you increase Sea Clutter filtering the on-screen clutter caused by the echoes of waves will be reduced.

Sea clutter has 3 modes: auto harbor, auto offshore and manual. A long-press on the rotary knob will cycle through the modes. You can only adjust the clutter value by turning the rotary knob when it is in manual mode.

Rain Clutter



The Rain clutter is used to reduce the effect of rain, snow or other weather conditions on the radar image.

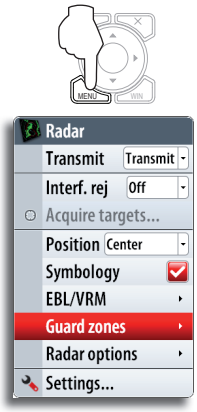
The value should not be increased too much as this may filter out real targets.

Rejecting radar interference

Interference could be caused by radar signals from other radar units operating in the same frequency band.

A high setting will reduce the interference from other radars.

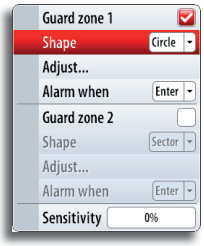
In order to not miss weak targets, the interference rejection should be set low when no interference exists.



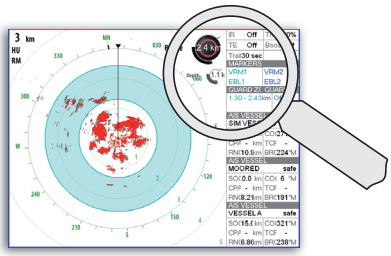
Setting a guard zone around your vessel

A guard zone is a region (either circular or a sector) that you can define on the radar image. You can also define if an alarm is activated when a radar target enters or exits the zone.

Defining a circular zone

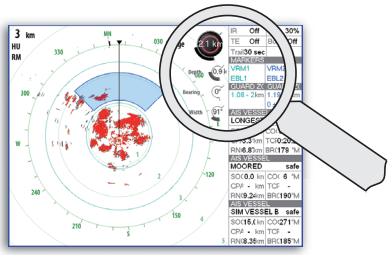


1. Activate one of the guard zones
2. Select circular shape
   - A circular guard zone will now be positioned on the radar image
3. Select the menu option used for adjusting the zone
   - The menu will be removed from the display, and the rotary symbol for range will be enlarged
4. Use the rotary knob to adjust the range and depth.
   - You switch between the range and depth settings by pressing the rotary knob
5. Press the **Menu** key to save the guard zone settings



Defining a sector zone

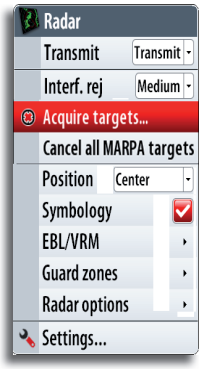
1. Activate one of the guard zones
2. Select a sector shape
   - A sector guard zone will now be positioned on the radar image
3. Select the menu option used for adjusting the zone
   - The menu will be removed from the display, and the rotary symbol for range will be enlarged.
4. Use the rotary knob to adjust the range, depth, bearing and width. You switch between the adjustable settings by pressing the rotary knob
5. Press the **Menu** key to save the guard zone settings



Other vessels on the radar image

Other targets from an AIS receiver (if installed) or tracked using the MARPA function can be displayed on the Radar PPI or on the radar chart overlay . You can also see messages and position for DSC transmitting devices within range.

For more information refer to the ***Other vessels on chart and radar image*** section.



Target tracking

Targets visible on the screen can be tracked by the MARPA function (Mini Automatic Radar Plotting Aid).

NOTE: MARPA requires heading data for both the radar and the NSO.

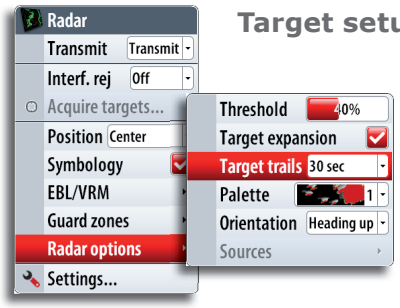
1 Select **Acquire targets** from the menu

2 Position the cursor over the target, and press the tick key to confirm

3 Repeat process for more targets

4 Press the X key once you have finished selecting targets you want to track

Once your targets are identified, it may take up to 10 radar sweeps to acquire and then track the target.



Target setup

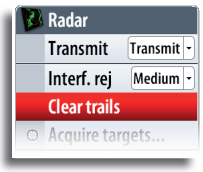
Target expansion

You can select to increase the size for all thin targets on the radar panels.

Target trails

You can define how long time the trail that each target leaves should remain on your radar panel. You can also turn OFF target trails.

NOTE: True motion is recommended for using Target trails.

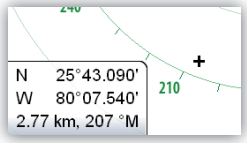


Clearing target trails from the panel

When target trails are displayed on the panel, the menu will be expanded to include an option where you can clear target trails from your radar panel temporarily. The target trails will start to appear again unless you switch them off as described above.

Measuring range and bearing to a target

Using the cursor



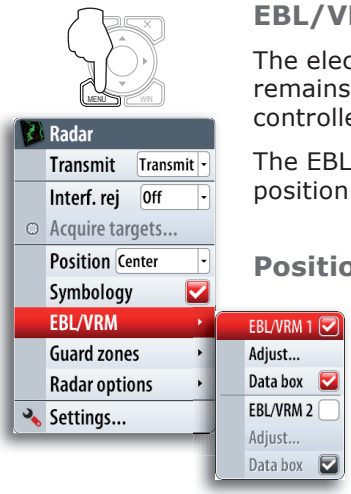
When you move the cursor on a radar panel the cursor information window will be activated.

The cursor window shows range and bearing from your vessel to cursor position.

Range rings

The range rings are displayed at preset distances from the vessel based on the radar range.

You can use the range ring to estimate the distance between a radar echo and your vessel.

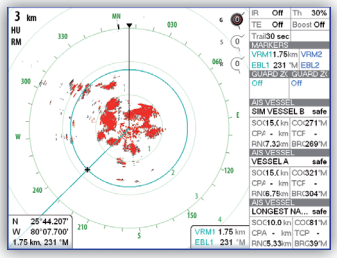


EBL/VRM

The electronic bearing line (EBL) is a line from the center of the vessel. The line's bearing remains constant as the vessel moves. The variable range marker (VRM) is a user-controlled range ring that surrounds the vessel.

The EBL/VRM function is used to measure distance and bearing from the vessel's position to a target. Two different EBL/VRMs can be placed on the radar image.

Positioning an EBL/VRM



1 Move the cursor to a selected object

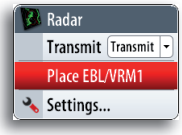
2 Press the **Menu** key

3 Select one of the EBL/VRM options

- The menu will be removed from the display, and the EBL line and the VRM circle will be drawn on the radar image.
- The EBL/VRM information window will display range and bearing from the vessel to the marker

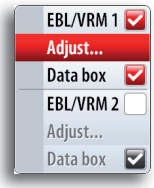
4 If required, use the arrow keys to reposition the marker

5 Press the **Menu** key again to save the position



You can reposition a fixed EBL/VRM, turn Off the EBL/VRM info window and remove the marker from the same menu.

When you reposition the EBL/VRM marker you use the cursor and save the position as described above.



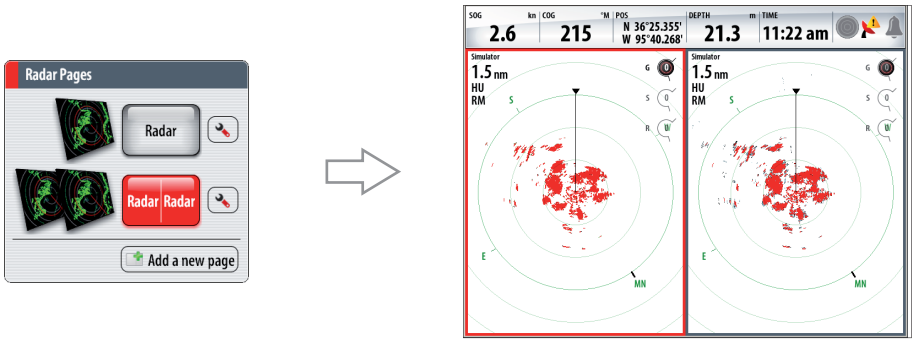
Dual Radar

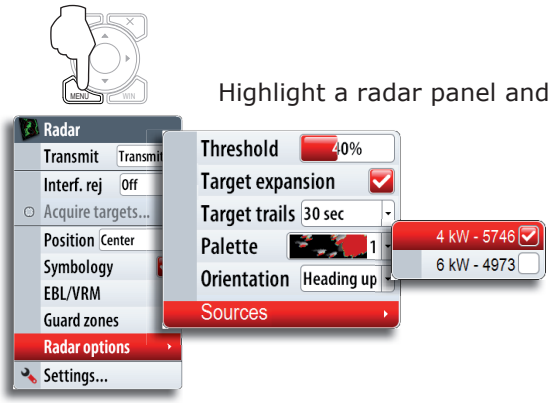
With dual radar capability in NSO it is possible for two radar sources to be displayed simultaneously. Connect either two Broadband Radars or two Pulse Radars and see both radar images at the same time.

Interference while using BR24 on most ranges will be seen when a pulse radar and a BR24 are transmitting at the same time on the same boat. It is Navico's recommendation to only transmit one radar at a time: e.g. BR24 for typical navigational usage, or pulse radar to locate weather cells, defined coastlines at a distance, and to trigger Racons.

Selecting Dual Radar

Set the radar screen to show two radar panels.





Highlight a radar panel and select which radar you require from the source select option.

Radar overlay

You can overlay the Radar image on the Chart. This can help you to easily interpret the radar image by correlating the radar targets with charted objects.

When the radar overlay is selected, basic radar operational functions are available from the Chart page's context menu.

More information on Radar Overlay is available in the ***Chart*** section of this manual.

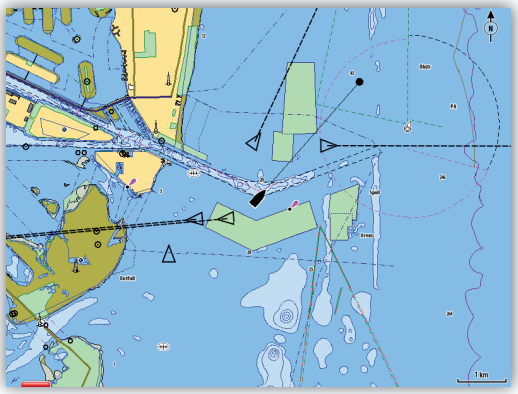
7 Other vessels on chart and radar image

If the NSO includes a heading sensor, the MARPA function (Mini Automatic Radar Plotting Aid) can be used to track radar targets.

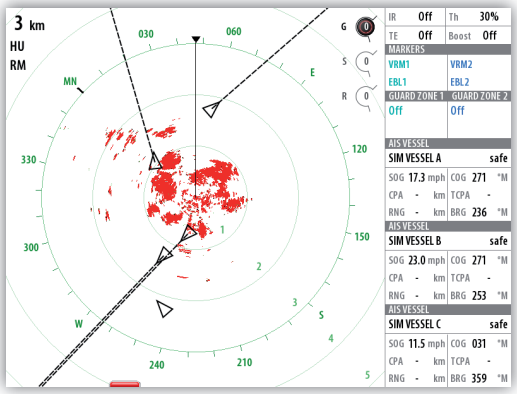
If an AIS device is connected, any targets detected by this devises can be displayed and tracked. You can also see messages and position for DSC transmitting devices within range.

AIS targets can be displayed as overlay on radar and chart images, and both features are important tools for safe travelling and collision avoidance.

You can define alarms to notify you if a target gets too close or if the target is lost.



AIS vessels on a chart panel



AIS vessels on a radar panel

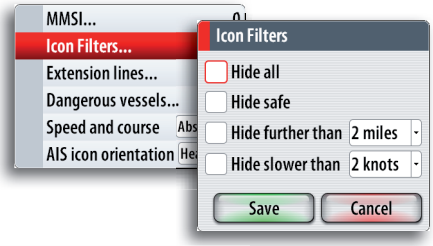
Target symbols

The NSO system use the target symbols shown below:

Symbol	Description	
	Sleeping AIS target (not moving or at anchor).	
	Moving and safe AIS target with course extension line.	
	Acquiring MARPA target. Typically it takes up to 10 full rotations of scanner	
	Tracking MARPA target, not moving or at anchor.	
	Tracking and safe MARPA target with extension lines.	
	Dangerous AIS target, illustrated with bold line.	A target is defined as dangerous based on the CPA, TCPA and AIS Range settings. Refer ***Defining alarm limits*** later in this section.
	Dangerous MARPA target	
	Lost AIS target.	When no signals have been received within a time limit a target will be defined as lost. The target symbol represents the last valid position of the target before the reception of data was lost.
	Lost MARPA target	
	Selected AIS target, activated by positioning the cursor over a target symbol.	The target will return to default target symbol when the cursor is moved.
	Selected MARPA target	

How to display other vessels

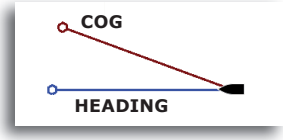
Selects which targets to display.

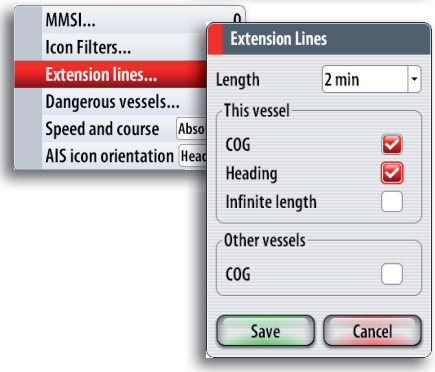


Sets the length of the extension lines for your vessel and for other vessels.

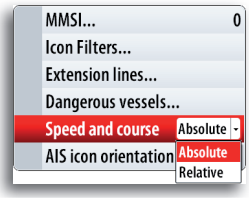
Heading information is read from active heading sensor, and COG information is as received from the active GPS.

The length of the extension lines can be set to a fixed length or to indicate the distance the vessel will move in a selected time period.

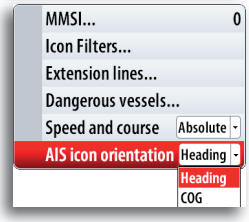




Selects how to use the extension line to indicate speed and course for targets; either as true motion in the chart or relative to your vessel.



Sets the orientation of the AIS icon; either based on heading or COG information.



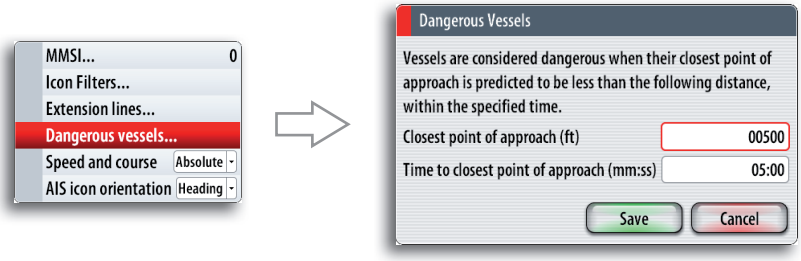
Receiving MMSI messages

You need to have your own MMSI number entered in the NSO system to be able to receive addressed messages from AIS and DSC vessels.

The Vessel message option in the alarm settings must be toggled on if any MMSI message shall be displayed, refer to next page.

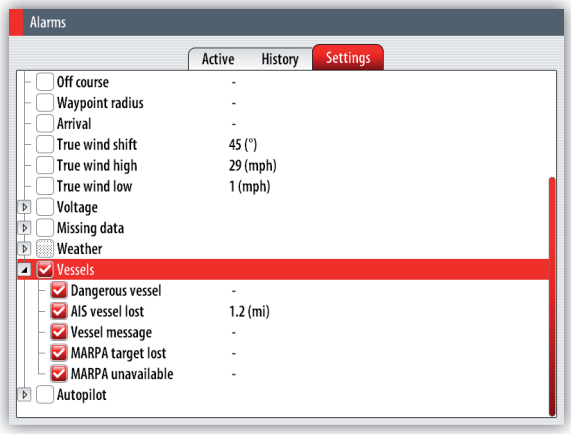
Defining a guard zone around you vessel

You can define an invisible guard zone around your vessel. When a target comes within this distance from your vessel, the symbol will change to the "dangerous" target symbol. An alarm will be triggered if activated in the Alarm settings panel.



Target alarm settings

You can define several alarms to alert you if a target comes within predefined range limits, or if a previously identified target is lost.



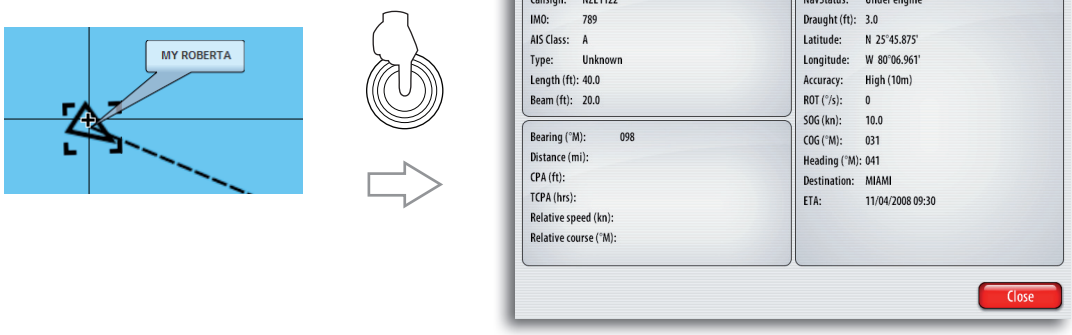
The following alarms can be set:

Alarm ID	Description
Dangerous vessel	Controls whether an alarm shall be activated when a vessel comes within the predefined guard zone. *The check box controls whether the alarm pop-up box is displayed and if the siren will sound. The guard zone defines when a vessel is dangerous regardless of the enabled/disabled state.*
AIS vessel lost	Sets the range for lost vessels. If a vessel is lost within this range this will trigger an alarm
Vessel message	Controls whether an alarm shall be activated when a message is received from an AIS target
MARPA target lost	Controls whether an alarm shall be activated when a MARPA target is lost
MARPA unavailable	Controls whether an alarm shall be activated if you do not have the required inputs for MARPA to work (valid GPS position and heading sensor connected to the radar server)

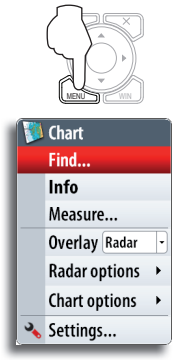
Viewing information about targets

When you select a vessel on the chart the symbol will change to Selected target symbol, and the vessel name will be displayed.

You can display detailed information for a selected target by pressing the rotary knob or the **MENU** key.



You can also display information about other vessels from the ***Vessels page*** as described in the ***Pages*** section.



Finding other AIS vessels

You can search for other vessels equipped with suitable AIS devices from your chart menu or from the ***Find*** or ***Vessels*** feature in the Pages panel (refer to the ***Pages*** section).

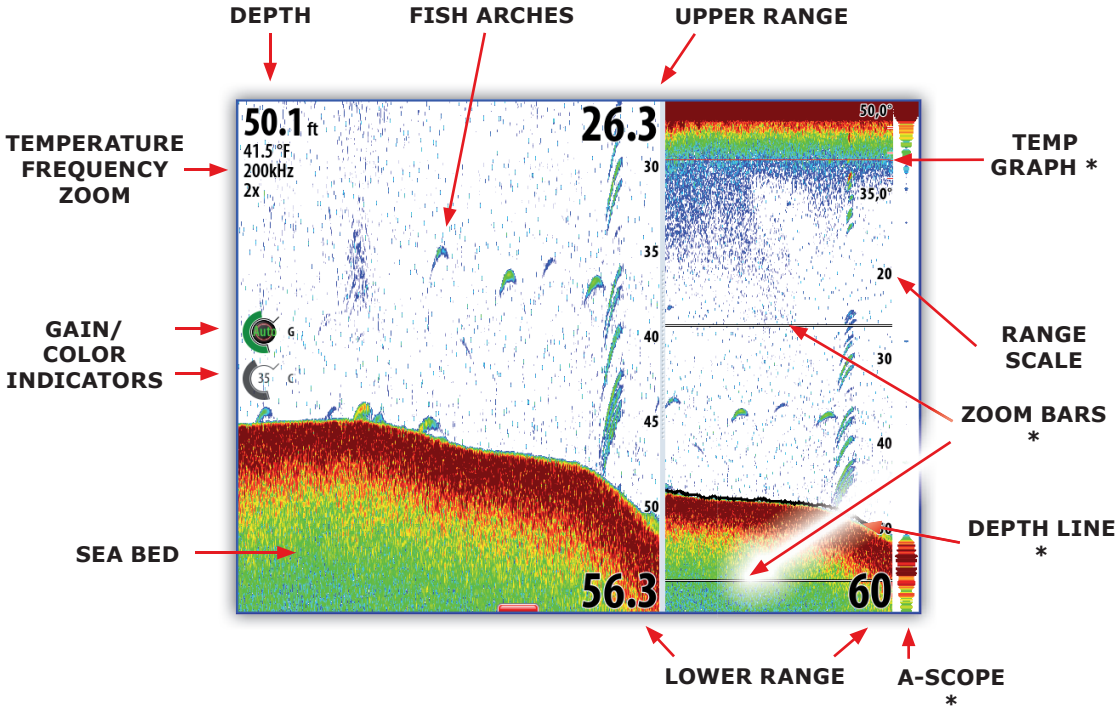
8 The echosounder

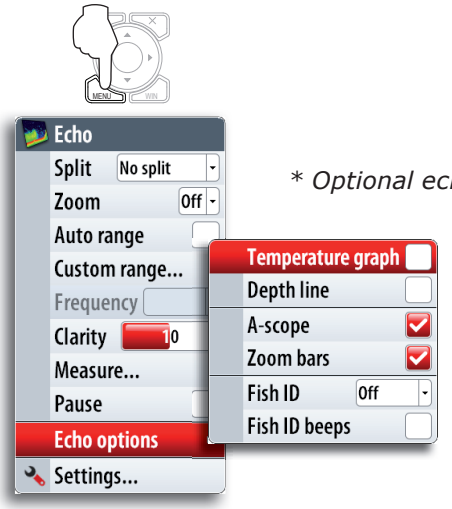
The Echosounder function provides a view of the water and bottom beneath your vessel, allowing you to detect fish and examine the structure of the sea floor.

The echosounder image

The echosounder displays the water column moving from right to left on the panel.

You can select between single panel view and several split views as described later in this chapter.



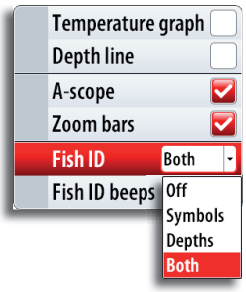


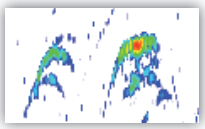
** Optional echosounder image items*

You turn the optional echosounder images on/off individually.

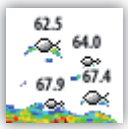
The fish echoes

You can select how you want the echoes to appear on the echosounder image.

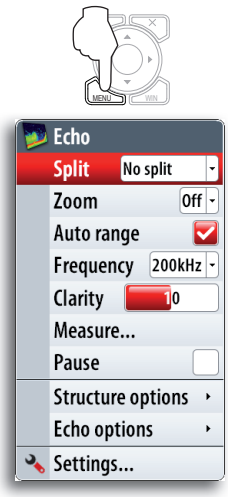




TRADITIONAL FISH ECHOES



FISH SYMBOLS AND DEPTH INDICATION



Setting up the Eshosounder panel

The echosounder panel can be setup as a single view, or with split view where the left and the right side presents different images.

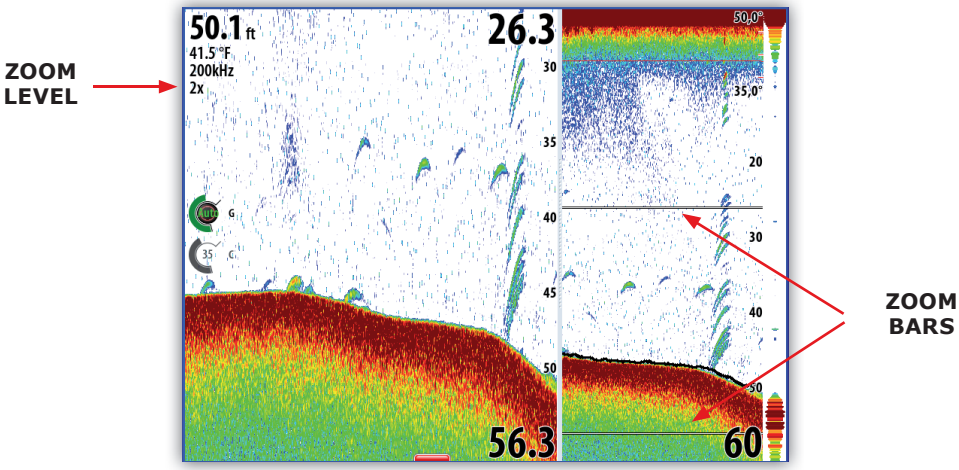
Split screen options

Zoom

The **Zoom** mode presents a magnified view of the sounder image on the left side of the panel.

By default the zoom level is set to 2x. You can select up to 8x zoom from the drop-down menu.

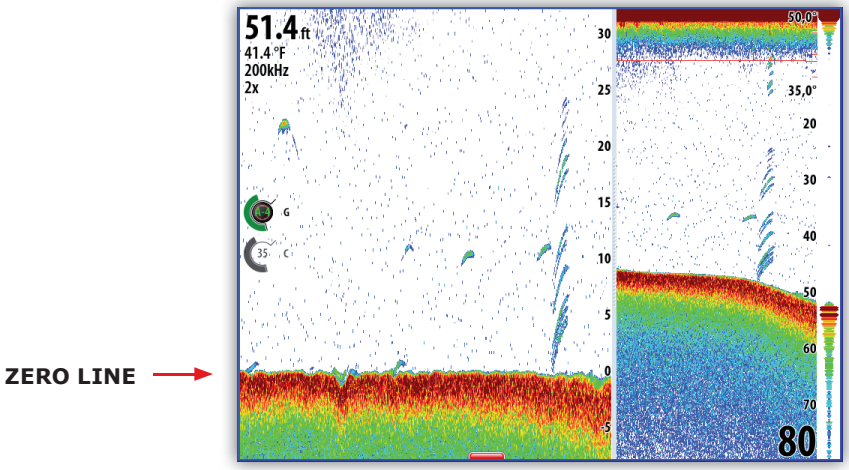
The range zoom bars on the right side of the display shows the range that is magnified. If you increase the zooming factor the range will be reduced. You will see this as reduced distance between the zoom bars.



Bottom lock

The bottom lock mode is useful when you want to view echoes close to the bottom.

In this mode the left side of the panel shows an image where the bottom is flattened. The range scale is changed to measure from the seabed (0) and upwards. The bottom and the zero line will always be shown on the left image, independent on range scale.



The scaling factor for the image on the left side of the panel is adjusted as described for the Zoom option.

The zoom level

You can select different zooming levels for both single and split screens from the drop-down menu.

The echosounder range

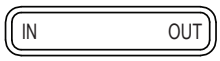
The range setting determines the depth shown on the display.

Auto

If you select **Auto**, the system will automatically display the whole range from the water surface to the bottom.

Auto range will automatically be turned off once you adjust the range manually.

Manually changing the range



You can increase or decrease the range by pressing the zoom keys.

Pressing and holding one of the zoom keys will toggle between auto and manual range. Autorange is resumed by pressing the "0" key.

When manually change the range the lower depth line will be moved upwards or downwards. The upper depth line will always be at the water surface.

This options allows you to focus on echoes at the upper part of the water column.

The echosounder frequency

The NSO unit supports several transducer frequencies. Available frequencies depend on sounder module and which transducer model is connected.

You can view two frequencies at the same time by setting up a dual echosounder split screen.

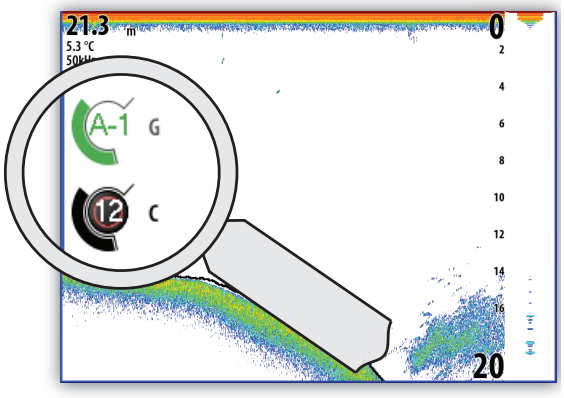
Clarity

Wave action, boat wakes and temperature inversion can cause on-screen clutter near the surface.

The surface clarity option reduces surface clutter by decreasing the sensitivity of the receiver near the surface.

Gain

The gain controls the sensitivity of the echosounder.



The more you increase the gain, the more details will be shown on the image. However, a higher gain setting may introduce more background clutter on the image. Conversely, if the gain is set too low weak echoes may not be displayed.

Auto gain

The Auto gain option will keep the sensitivity at a level that works well under most conditions.

With the gain in auto mode, you can set a positive or negative offset that gets applied to the auto gain. This is indicated as A-40 - A40.

Color

Strong and weak echo signals have different colors to indicate the different signal strengths. The colors used depend on which palette you select.

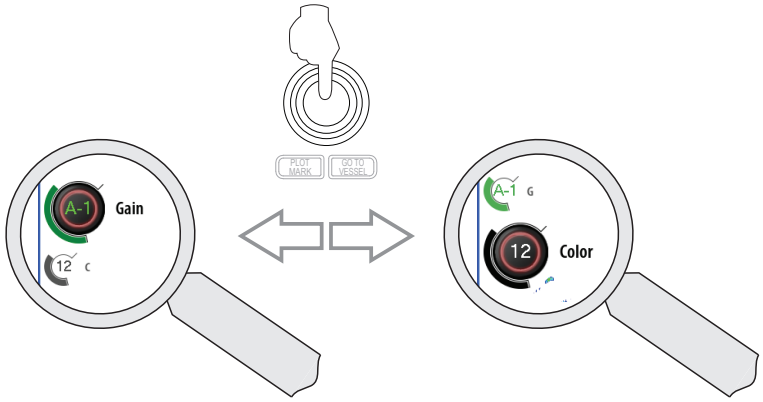
The more you increase the Color setting, the more echoes will be displayed in the color at the strong return end of the scale.

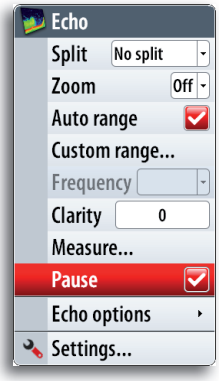
Adjusting the Gain and Color gain settings

Gain and Color are adjustable by using the rotary knob.

You select between Gain and Color by pressing the rotary knob. The active control will expand and display it's name in full. You can then adjust the value by turning the knob.

If you press and hold the rotary knob when Gain is selected, you switch between Auto and Manual gain option.





If no adjustments are made within 3 seconds the controls will return to default size.

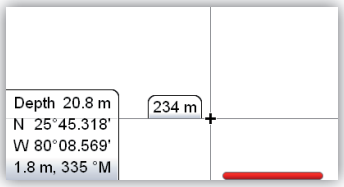
Pausing the Echosounder

You can pause the sounder, allowing you to examine the sounder echoes.

This function is useful when you need to position a waypoint exactly on the echosounder panel, and if you are using the cursor to measure a distance between 2 elements on the image.

Using the cursor on the echosounder panel

The cursor is by default not shown on the sounder image.

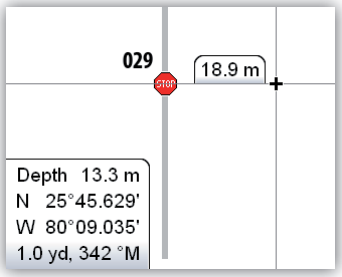


When you press one of the arrow keys the cursor will become visible, the depth at the cursor position will be shown, the information window and the history bar will be activated.

You use the arrow keys to move the cursor in any direction on the display.

To remove the cursor and cursor elements from the panel, press the **X** key.

Using the cursor to position a waypoint



You can position a waypoint at the cursor position by pressing the **PLOT** key as described in the ***Waypoints, routes and tracks*** section.

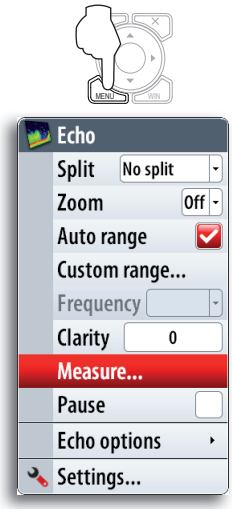
When the key is pressed the waypoint symbol and ID are positioned at the cursor position.

Viewing sounder history

Whenever the cursor is shown on a sounder panel, the red scroll bar is also shown. The scroll bar shows the image you are currently viewing in relation to the total echosounder image history stored.

When the scroll bar is on the far right side it indicates that you are viewing the latest soundings. If you move the cursor to the left side of the screen the history bar will start scrolling towards left, and the automatic scrolling as new soundings are received will be turned off.

To resume echosounder scrolling, move the cursor to the right until the red history bar reaches the right side of the image, or press the **X** key.



Measuring distance

The cursor can be used to measure the distance between the position of two observations on the sounder image. It is easier to use the measure function when the sounder image is paused.

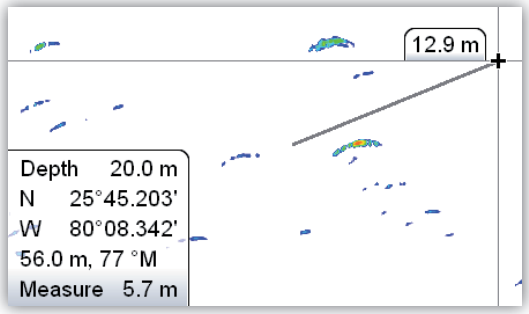
Use the following process to measure a distance:

1 Move the cursor to the first measuring point

2 Start the Measure function

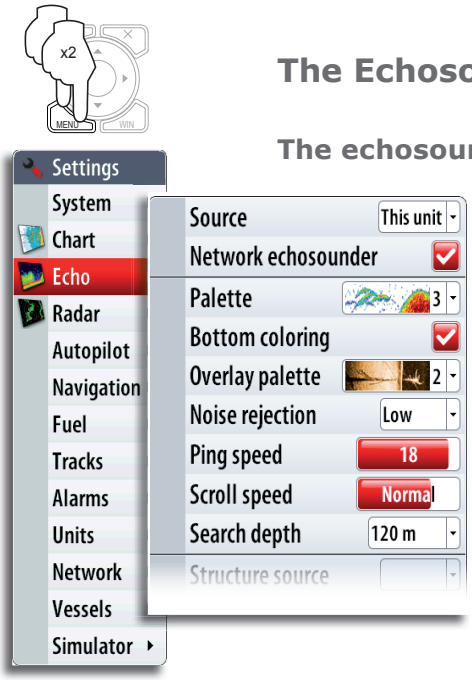
3 Move the cursor towards the second measuring point

- A line will be drawn from the first point to the cursor, and the distance will be listed in the Information window



You can reset the measurement by pressing the **Tick** key.

When you press the **X** key the echosounder will resume to normal scrolling.



The Echosounder image setup

The echosounder source

If you have more than one echosounder on your network, you can select to use your NSO unit to be the preferred echosounder source.

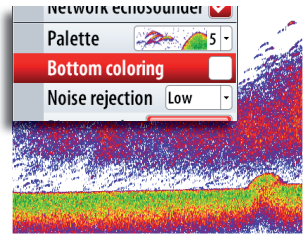
For more information about how to setup sources, refer to the separate NSO Installation manual.

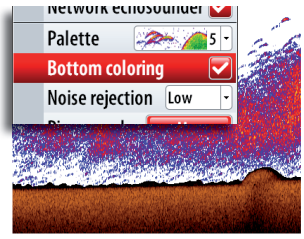
Image palettes

Several display palettes with varying degrees of color and brightness are available.

Bottom coloring

The bottom coloring option colors the entire bottom and hard structure in bottom area in one brown shade. This will clearly separate fish and vegetation from the bottom.





Noise rejection

Signal interference from bilge pumps, engine vibration and air bubbles can clutter the image.

The noise rejection option filters the signal interference and reduces the on-screen clutter.

The ping speed

The Ping Speed controls the rate the transducer transmits into the water. A high ping speed will make the image move fast on the screen, while a low ping speed will present a longer history on the screen. The reverberation potentially caused by too high ping speed can cause interference on the screen.

The scroll speed

You can select the scrolling speed of the echosounder image on the screen. A high scroll speed will update the image fast, while a low scroll speed will present a longer history.

Search depth

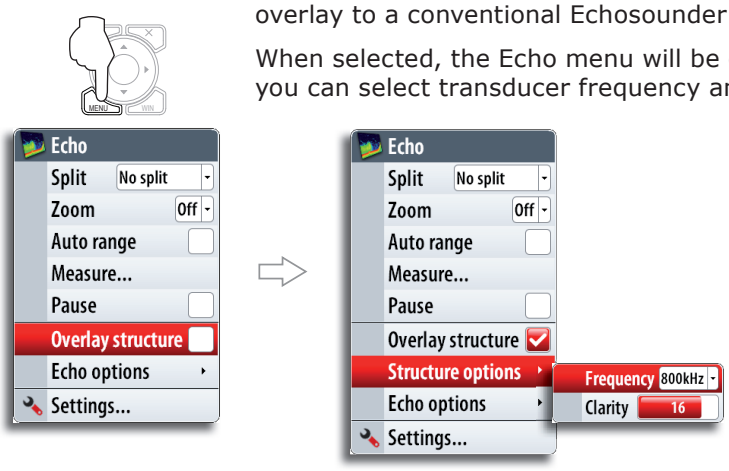
Noise may cause the echosounder to search for unrealistic depths.

By adjusting the search depth you can avoid that such conditions interfer normal echosounder operation.

StructureScan overlay

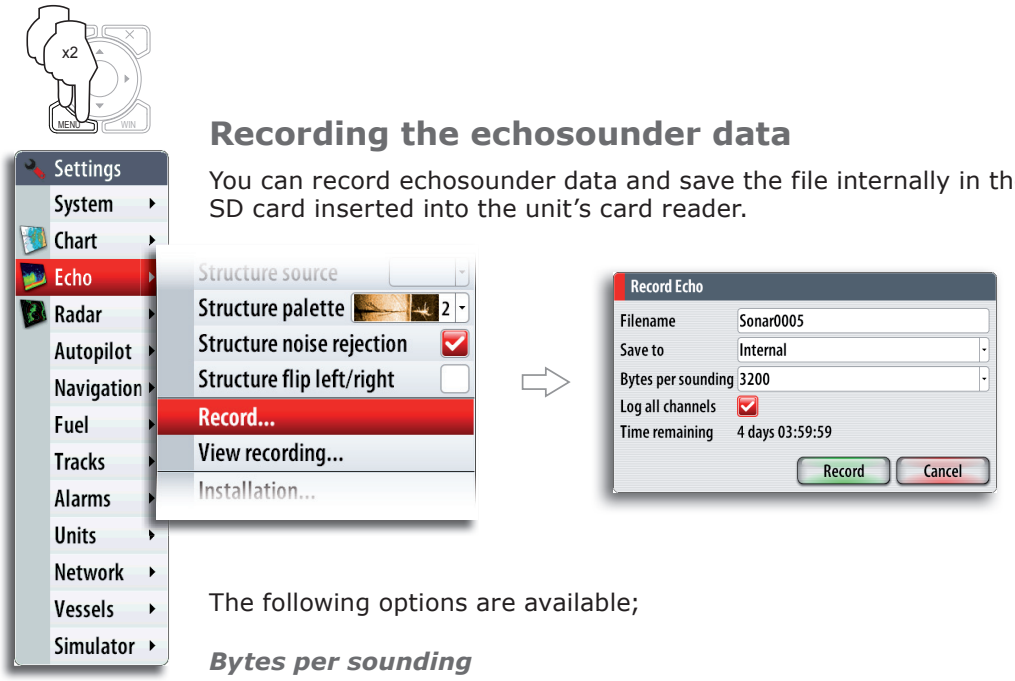
If a StructureScan is detected on the network, you can add the DownScan image as an overlay to a conventional Echosounder image.

When selected, the Echo menu will be expanded to show Structure options from where you can select transducer frequency and clarity.



Recording the echosounder data

You can record echosounder data and save the file internally in the NSO unit, or on to an SD card inserted into the unit's card reader.



The following options are available;

Bytes per sounding

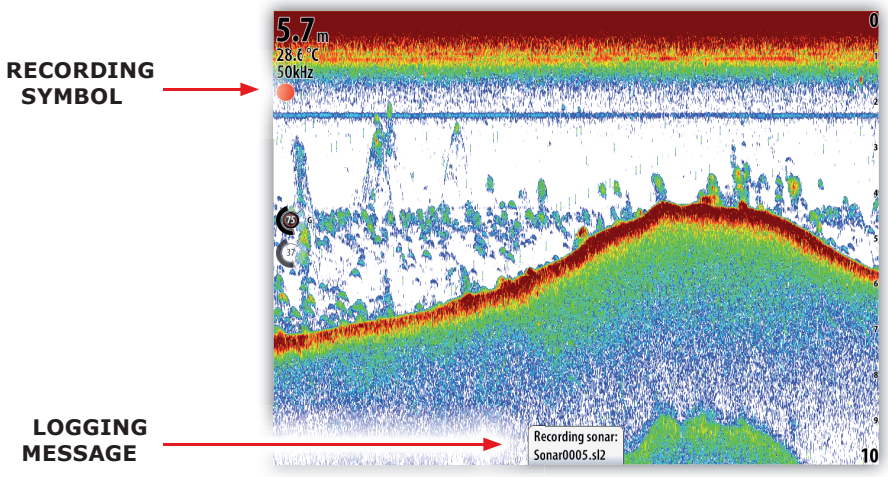
Select how many bytes per seconds that are to be used when saving the log file. More bytes yield better resolution, but will cause the record file to increase in size compared to using lower byte settings.

Log all channels

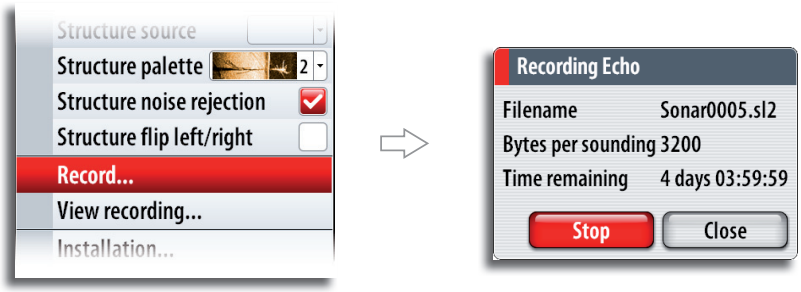
Logs StructureScan data and conventional sonar data simultaneously.

When logging all channels, logs are saved in SL2 format instead of .slg format.

When the echosounder image is being recorded, there will be a flashing red symbol and a message will appear periodically at the bottom of the screen.

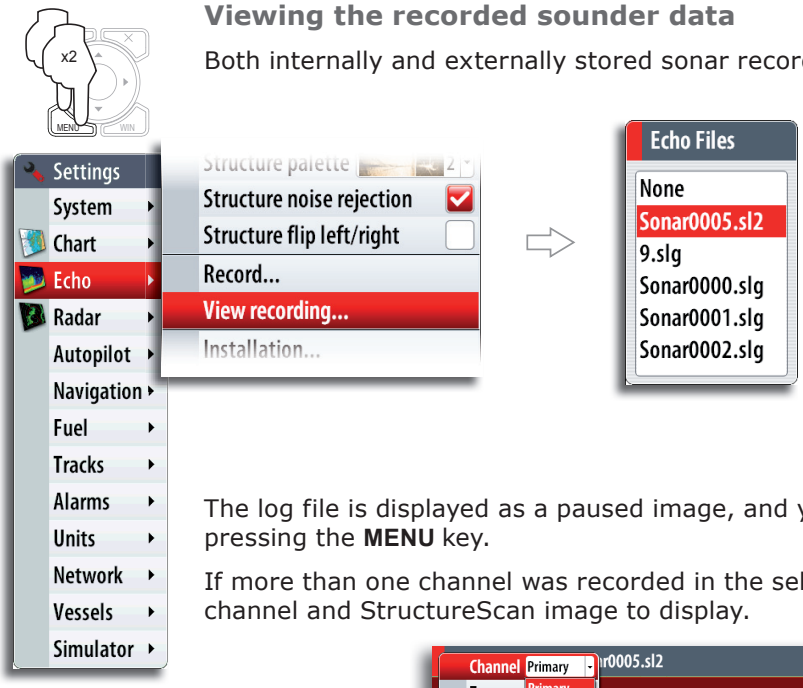


The sounder recording is stopped by repressing the **MENU** key.



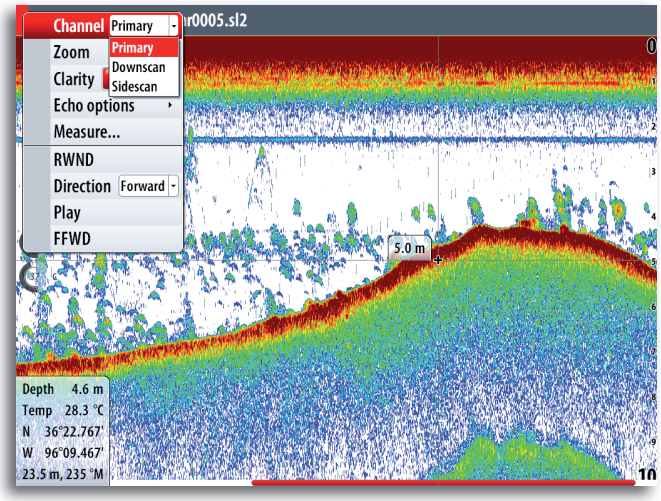
Viewing the recorded sounder data

Both internally and externally stored sonar records may be reviewed when selected.



The log file is displayed as a paused image, and you get access to the replay menu by pressing the **MENU** key.

If more than one channel was recorded in the selected echo file, you can select which channel and StructureScan image to display.

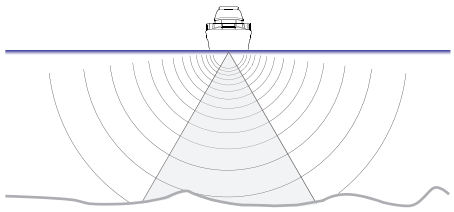


You exit the replay mode by pressing the **X** key.

9 StructureScan™

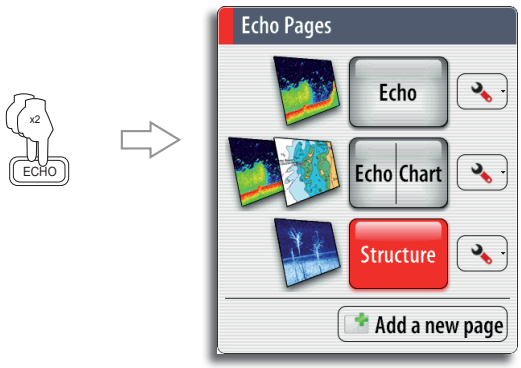
StructureScan™ is an optional hardware module that uses high frequency to provide a High resolution image of the seabed

StructureScan™ provides a 150 m (480 ft) wide coverage in high detail with SideScan, while the DownScan™ provides picture perfect images of structure and fish directly below your boat, down to 90 m (300 ft).

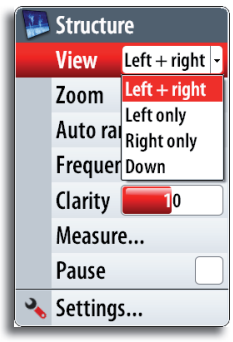


Accessing the StructureScan™ panel

StructureScan is accessed via the ECHO DAK when the StructureScan external box and transducer are fitted.



StructureScan can also be set up in one of the other page groups accessed by the DAK keys. It can be set up as a single panel or as one of the panels in a multi-panel page. Refer to the Customizing your NSO system section.

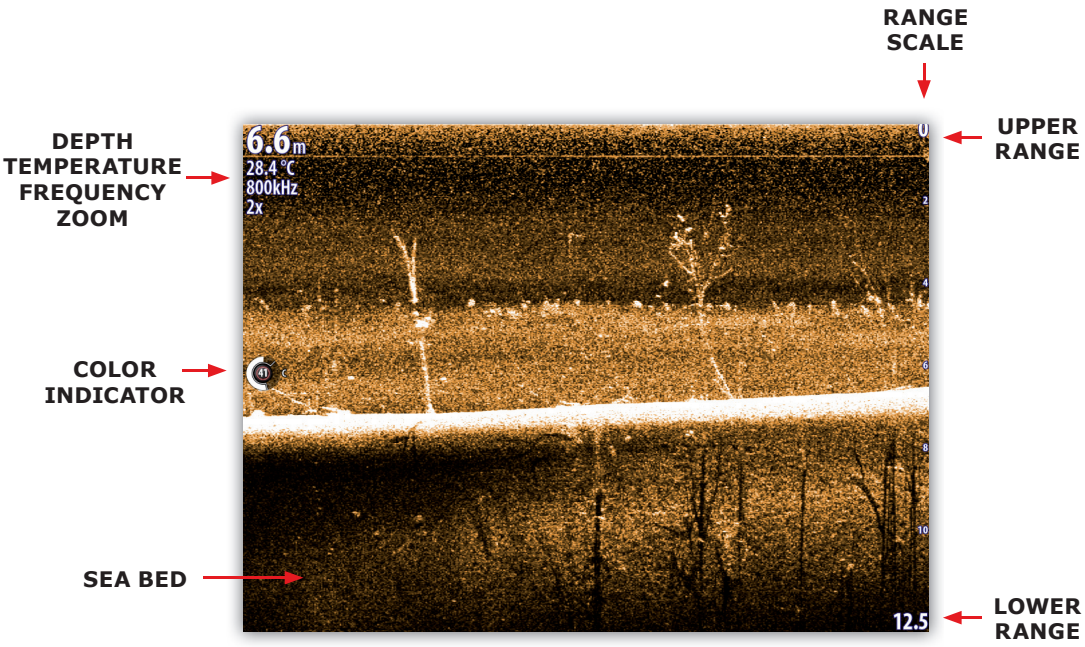


The StructureScan™ images

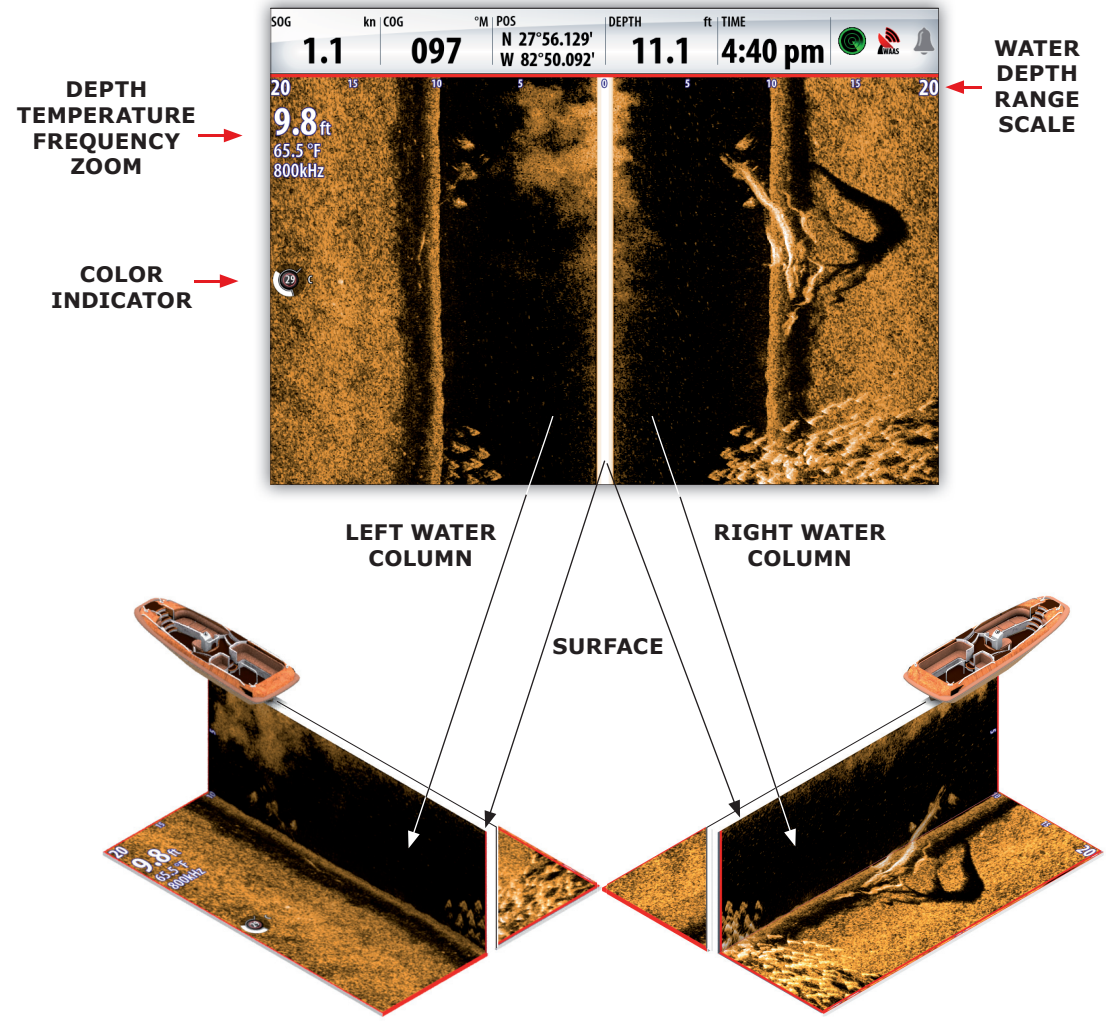
The StructureScan panel can be set up as a traditional downscan image, or showing left/ right side scanning.

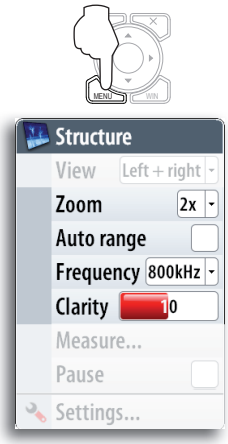
The DownScan image can also be added as an overlay to the traditional Echosounder image. For more information, refer to ***The echosounder*** section.

The DownScan image



The SideScan image



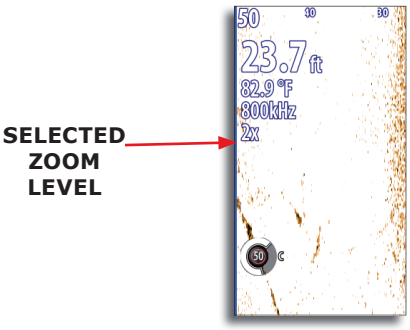


Changing the StructureScan image

Zooming

You can select different zooming levels on the StructureScan image.

By default the zoom level is set to Off.



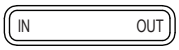
The range

The range setting determines the water depth that is visible on the screen

Auto

Auto mode will automatically set the range depending on the depth of water. Auto range will automatically be turned off once you adjust the range manually.

Manually changing the range



You can increase or decrease the range by pressing the zoom keys.

Pressing and holding one of the zoom keys will toggle between auto and manual range. Autorange is resumed by pressing the "0" key.

When manually changing the range the upper depth line will always be at the water surface. This option allows you to focus on echoes at the upper part of the water column.

The frequency

StructureScan supports two frequencies. 455 kHz is ideal for greater depth penetration, while 800 kHz provides better definition especially at shallower depths.

Clarity

Wave action, boat wakes and temperature inversion can cause on-screen clutter near the surface.

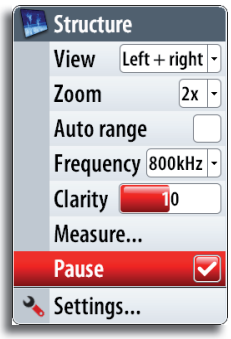
The clarity option reduces surface clutter by decreasing the sensitivity of the receiver near the surface.

Adjusting the color settings

Strong and weak echo signals have different colors to indicate the different signal strengths. The colors used depend on which palette you select.

The more you increase the Color setting, the more echoes will be displayed in the color at the strong return end of the scale.

Color is adjustable by using the rotary knob. When you press the knob the color control image will expand and display it's name in full. You can then adjust the value by turning the knob. If no adjustments are made within 3 seconds the control will return to default size.



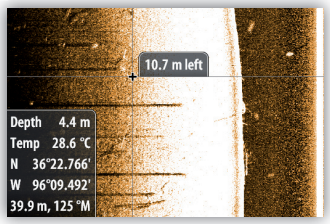
Pausing StructureScan

You can pause the StructureScan, allowing you to examine the structures and other images in more depth and detail.

This function is useful when you need to position a waypoint exactly on the Structurescan image, and if you are using the cursor to measure a distance between 2 elements on the image.

Using the cursor on the StructureScan panel

The cursor is by default not shown on the StructureScan image.

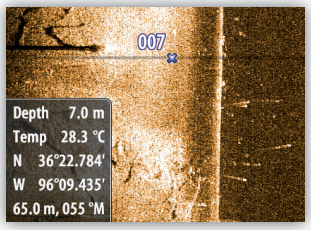


When you press one of the arrow keys the cursor will be visible, the depth at the cursor position will be shown, the information window and the history bar will be activated.

You use the arrow keys to move the cursor in any direction on the display.

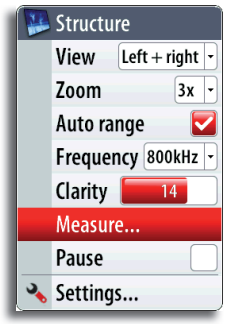
To remove the cursor and cursor elements from the panel, press the X key.

Using the cursor to position a waypoint



You can position a waypoint at the cursor position by pressing the PLOT key as described in the Waypoints, routes and tracks section.

When the key is pressed the waypoint symbol and ID are positioned at the cursor position.



Measuring distance

The cursor can be used to measure the distance between two observations on the StructureScan image. It is easier to use the measure function when the sounder image is paused.

Use the following process to measure a distance:

1. Move the cursor to the first measuring point
2. Start the Measure function
3. Move the cursor towards the second measuring point
   - A line will be drawn from the first point to the cursor, and the distance will be listed in the Information window

You can reset the measurement by pressing the Tick key.

When you press the X key the echosounder will resume to normal scrolling.

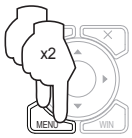
Viewing StructureScan history

Whenever the cursor is shown on a StructureScan panel, the red scroll bar is also shown. The scroll bar shows the image you are currently viewing in relation to the total StructureScan image history stored.

Depending of the view selected, the scroll bar is on the far right side (DownScan) or at the bottom of the screen (SideScan)— all indicates that you are viewing the latest soundings.

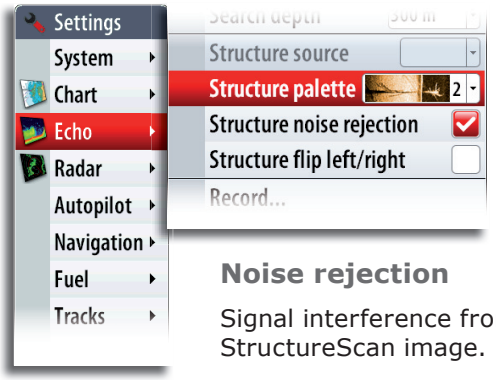
If you move the cursor to the left side of the screen (DownScan mode) the history bar will start scrolling towards left, and the automatic scrolling as new soundings are received will be turned off. If you move the cursor upwards (in SideScan mode) the history bar will start scrolling upwards, and the automatic scrolling as new soundings are received will be turned off.

To resume StructureScan scrolling, move the cursor until the red history bar reaches either the right side of the image (DownScan) or bottom of the image (SidenScan), or press the X key.



The StructureScan image setup

The image palettes



Several display palettes with varying degrees of color and brightness are available.

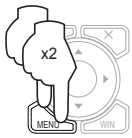
Noise rejection

Signal interference from bilge pumps, engine vibration and air bubbles can clutter the StructureScan image.

The noise rejection option filters the signal interference and reduces the on-screen clutter.

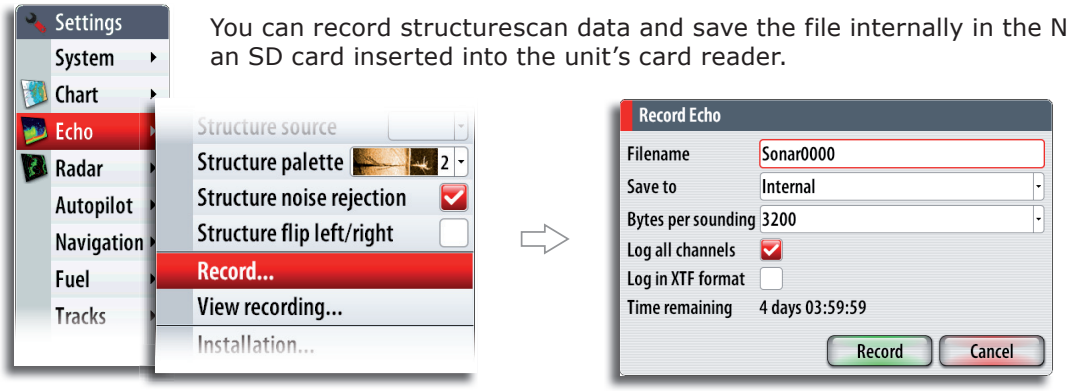
Flipping Left/Right image

If required, the left/right SideScanning images can be flipped to match the corresponding side of you vessel.



Recording the StructureScan data

You can record structurescan data and save the file internally in the NSO unit, or on to an SD card inserted into the unit's card reader.



The following options are available;

Bytes per sounding

Select how many bytes per seconds that are to be used when saving the log file. More bytes yield better resolution, but will cause the record file to increase in size compared to using lower byte settings.

Log all channels

Logs StructureScan data and conventional sonar data into one file.

When logging all channels, logs are saved in SL2 format instead of .slg format. This format can be used by the built in simulator for showing conventional and StructureScan loggings.

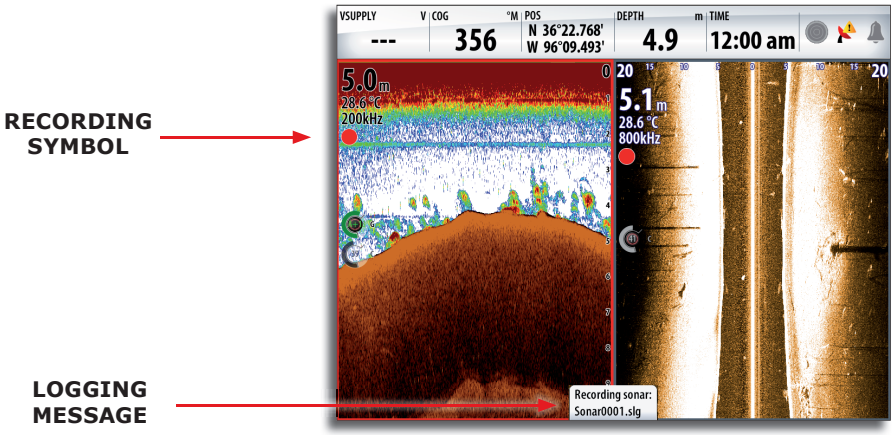
Log in XTF format

Optional logging format for SideScan data.

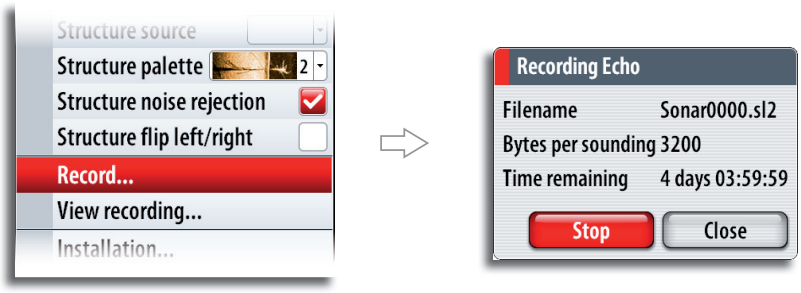
This format does not log all channels into one file. The format is used for third part application support on the PC (like SonarWiz) that need access to the StructureScan data.

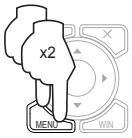
When the StructureScan image is being recorded, there will be a flashing red symbol and a logging message will appear periodically at the bottom of the screen.

The graphics below shows that both conventional echo-sounder and StructureScan data are being logged.



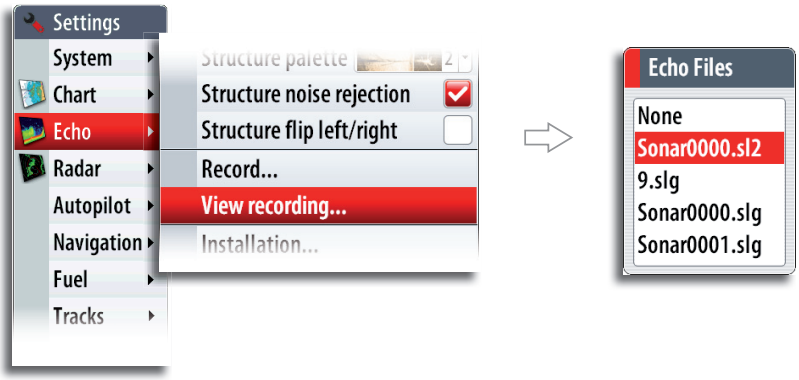
The sounder recording is stopped by repressing the MENU key.





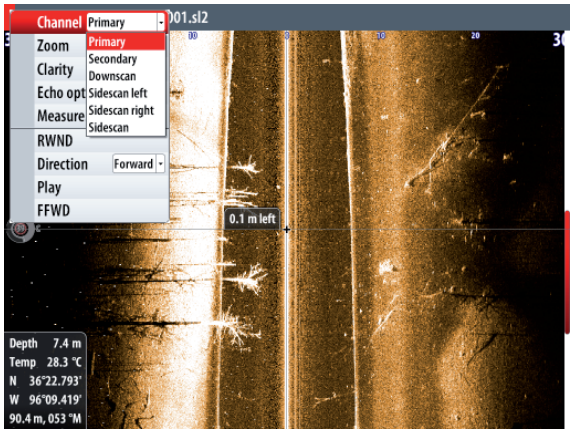
Viewing the recorded sounder data

Both internally and externally stored sonar records may be reviewed when selected.



The log file is displayed as a paused image, and you get access to the replay menu by pressing the MENU key.

If more than one channel was recorded in the selected echo file, you can select which channel and StructureScan image to display.



You exit the replay mode by pressing the X key.

StructureScan overlay

You can add the DownScan image as an overlay to a conventional Echosounder image.

Refer to the description in the Echosounder section.

Blank page

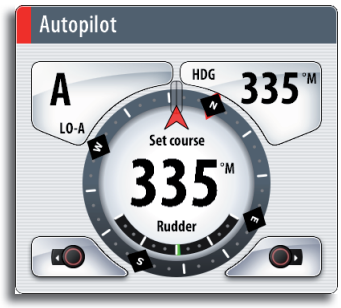
10 Using the autopilot

If an AC12 or AC42 autopilot computer is connected to the NSO system, autopilot functionality will appear in the NSO page system.

The Autopilot feature is designed to maintain an accurate course in various sea conditions with minimal helm movements. As the autopilot steers so accurately, it will save fuel and get you to your destination faster, especially when navigating to a waypoint or following a route.

Autopilot indication on NSO panels

The autopilot pop up

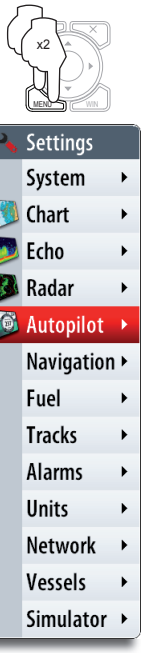


You can only operate the autopilot when the pop up is active.

You use different key presses to activate the pop-up;

- a short press on the **STBY/AUTO** key activates STBY mode and the pop-up
- a long press on the **STBY/AUTO** key activates the pop-up in current mode.

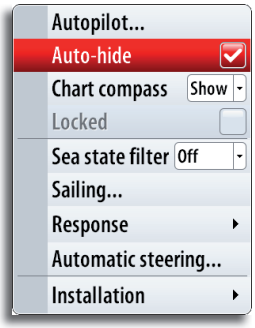
You remove the pop-up from a page by pressing the **X** key.



The autopilot popup shows active mode, heading, rudder and various steering information depending on active autopilot mode.

The pop-up has a fixed position on the page, and it can be shown on all pages except when an Autopilot panel is active.

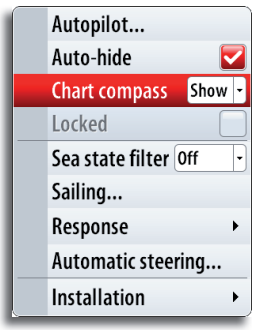
Autopilot mode indication in top of the page



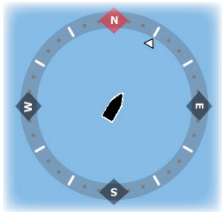
Autopilot information is by default shown in top of the pages when the autopilot is engaged.

You can select to turn this information off.

Compass symbol on the chart panel



You can select to show a compass symbol around you boat on the chart panel. The compass symbol will be removed when the cursor is active on the panel.

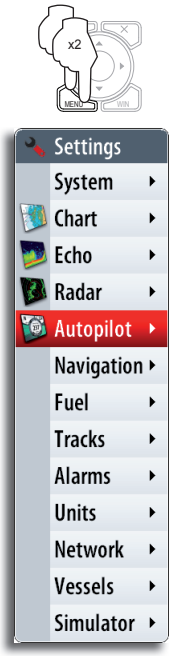


Safe operation with the autopilot

⚠ ***An autopilot is a useful navigational aid, but DOES NOT under any circumstances replace a human navigator.***

Switching from automatic mode to manual operation

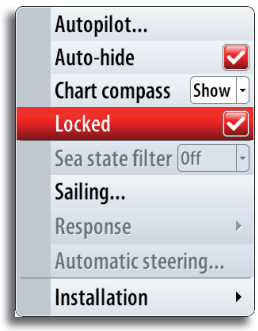
You can switch the autopilot to STBY mode from any automatic operation by a short press on the STBY/AUTO key.

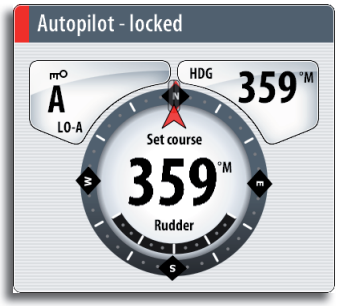


Locking an NSO unit

If several NSO units or AP24/AP28 control units are included in the system, a non-active NSO unit can be locked to prevent unauthorised operation of the autopilot.

When the unit is locked this is indicated with a lock symbol and with text in the pop up.





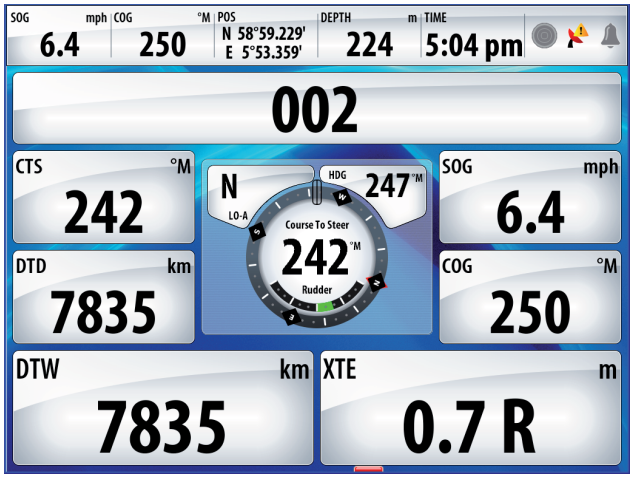
When the lock function is in use, no automatic modes can be selected from the NSO unit.

The lock function is not available on an NSO unit when controlling the pilot!

If the NSO unit is part of an AP24/AP28 system, the unit can be locked from the AP24/AP28 control unit. Refer to ***Locking remote stations*** at the end of this chapter.

The autopilot panel

The autopilot panel can be used to display information when you are navigating. The panel can be added to the NAV page groups or to any other pages groups as described in the ***Customizing your system*** section.



Data fields

The autopilot panel shows destination name, heading and rudder information. The following abbreviations are used:

CTS	Course to steer
DTD	Distance to destination
SOG	Speed over ground
COG	Course over ground
DTW:	Distance to next waypoint
XTE:	Cross track error

Autopilot mode overview

The autopilot has several steering modes. Number of modes and features within the mode depend on boat type and available input as shown below.

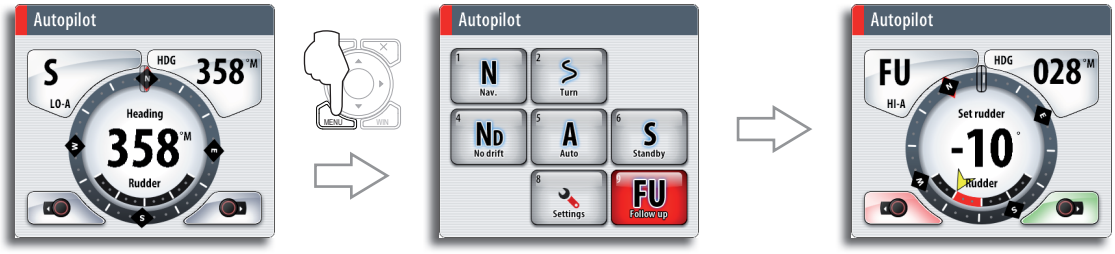
MODE	FEATURE	BOAT TYPE		DESCRIPTION	REQUIRED INPUT
		MOTOR	SAIL		
S Standby				Passive mode used when steering the boat at the helm	
	Power steering (NFU)	x	x	Controls the rudder movement by using the arrow keys	Rudder feedback
FU Follow up		x	x	Sets rudder angle by using the arrow keys	Rudder feedback
A Auto		x	x	Keeps the boat on set heading	Heading, speed
	Heading capture	x	x	Cancels the turn and continues on the heading read from the compass	
	Turn (Pattern)	x		Moves the boat automatically in pre-defined turn steering patterns (Motorboats only)	
	Turn (Tacking)		x	Changes commanded heading with a pre-defined value	
ND No drift		x	x	Keeps the boat on a straight bearing line	Heading, speed, position
	Dodging	x	x	Resumes NoDrift mode after a heading change	
N Nav.		x	x	Steers the boat to a specific waypoint location, or through a route of waypoints	Heading, speed, position, waypoint/ route information
W Wind			x	Steers the boat to maintain the set wind angle	Heading, speed, wind angle
	Tacking		x	Mirrors the set wind angle to the opposite side of the bow	
WN Wind Nav.			x	Steers the boat to a specific waypoint location, or through a route of waypoints	Heading, speed, wind angle, waypoint/route information

Controlling steering performance in automatic modes

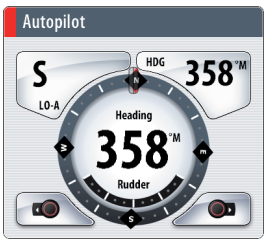
The autopilot should be configured during installation and setup. Some parameters may be adjusted during operation to increase the steering performance. Refer description at the end of this section.

Selecting autopilot modes

You select an automatic mode or a feature from the Autopilot Mode selection menu.



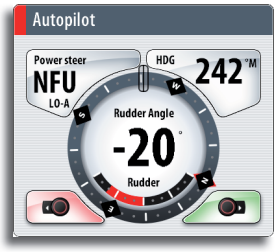
Using the autopilot in Standby mode



The autopilot must be in STBY mode when you steer the boat at the helm.

You can switch the autopilot to STBY mode from any operation by a short press on the **STBY/AUTO** key.

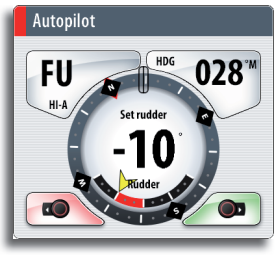
Power steering (NFU)



If you press the arrow keys when the autopilot is in STBY mode, the system will switch to NFU (Non-Follow-Up). You can then use the arrow keys to control the rudder, and the rudder will move as long as the key is pressed.

You return to STBY mode by a short press on the **STBY/AUTO** key.

Follow-up steering (FU)



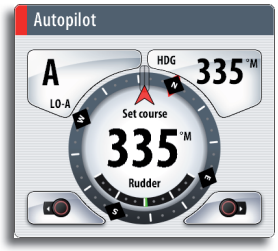
You can select Follow-up steering from the Autopilot menu.

When FU is active you can use the rotary knob to set rudder angle. The rudder will move to the commanded angle and then stop.

While in Follow-up mode you cannot take manual control of the wheel.

You return to STBY mode by a short press on the **STBY/AUTO** key.

AUTO mode (auto compass)



When the AUTO key is pressed, the autopilot selects the current boat heading as the set course.

The autopilot will keep the boat on the set course until a new mode is selected or a new course is set with the course knob or the PORT or STBD keys.

Once the course is changed to a new set course, the boat will automatically turn to the new heading and maintain the new course.

Heading capture

When in AUTO or NoDrift mode the heading capture feature allows you to automatically cancel the turn you are in by an instant press on the rotary knob. The autopilot will cancel the turn to continue on the heading read from the compass the very moment you pressed the rotary knob. This is a useful feature if you are not sure of the exact turn you have to make to steer towards e.g. an inlet or a dock.

Turn pattern steering (power boats)

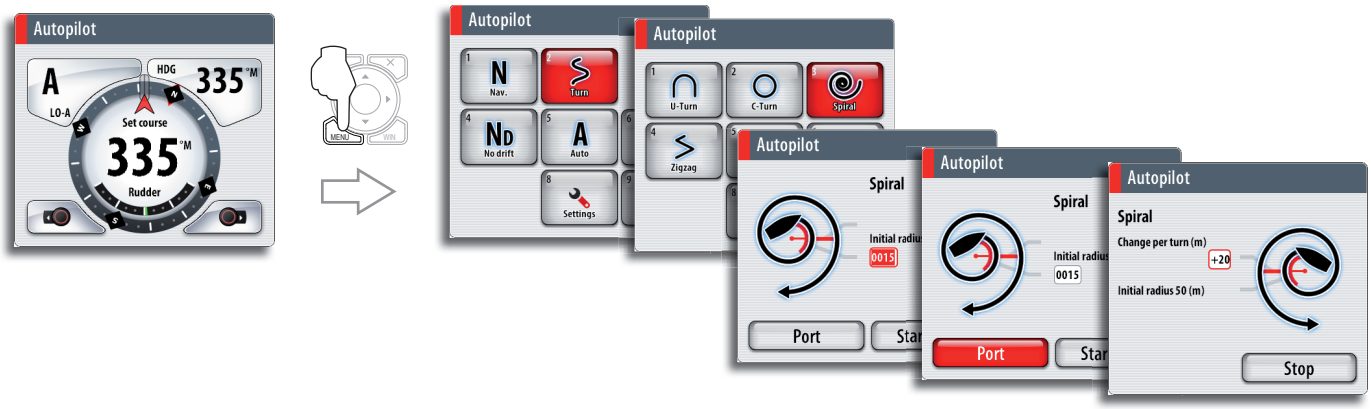
The autopilot includes a number of automatic turn steering features for power boats when the pilot is in AUTO mode.

The turn steering option will not available if the boat type is set to sailboat.

Initiating a turn

The illustration below shows how you start the spiral turn steering from the Autopilot menu.

You select the turn direction and start the turn by using the left or right arrow keys or the rotary knob.



Stopping the turn

You can at any time during a turn press the AUTO/STBD key to return to standby mode and manual steering.

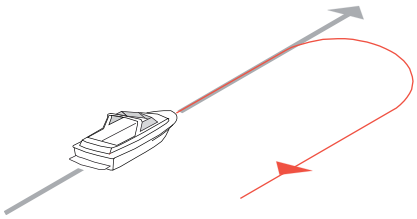
Turn variables

All turn steering options, except the C-turn, have settings that you may adjust before you start a turn and at any time when the boat is in a turn. Refer to the example above.

U-turn

U-Turn changes the current set course to be 180° in the opposite direction.

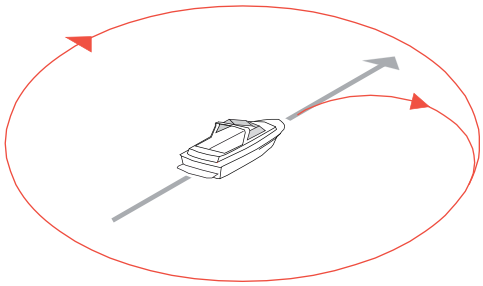
The turn rate is identical to default rate of turn (ROT) setting. This cannot be changed during the turn.



C-turn

C-turn makes the boat turn in a circle.

You can adjust the turn rate (ROT) before the turn is initiated and during the turn. Increasing the turn rate makes the boat to a smaller circle.



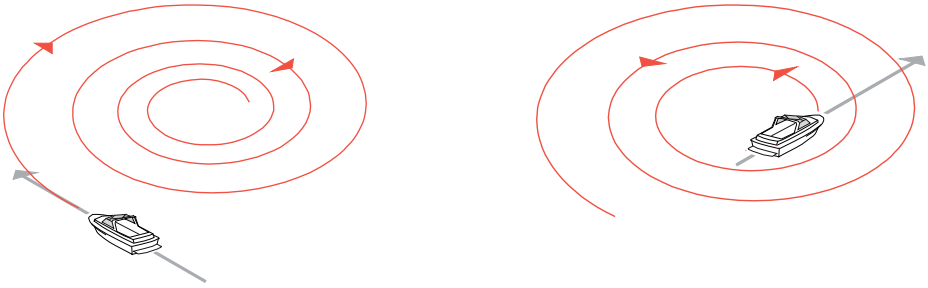
Turn parameter	Range	Change per step	Default	Units
Rate of turn (ROT)	10 - 600	5	90	°/min

Spiral-turn

Spiral-turn makes the boat turn in a spiral with a decreasing or increasing radius. This feature may be used for circling fish or when searching an object on the seabed.

If the Change radius is set to zero, the boat will turn in a circle. Negative values indicate decreasing radius while positive values indicate increasing radius.

Turn parameter	Range	Change per step	Default
Initial radius	33 ft - 3281 ft 10 m - 1000 m	10 10	656 ft 200 m
Change of radius per turn	-164 ft - +164 ft -50 m - +50 m	5 2	66 ft 20 m



Zigzag-turns

While sailing in a zigzag pattern, you set the initial course change before the turn is started.

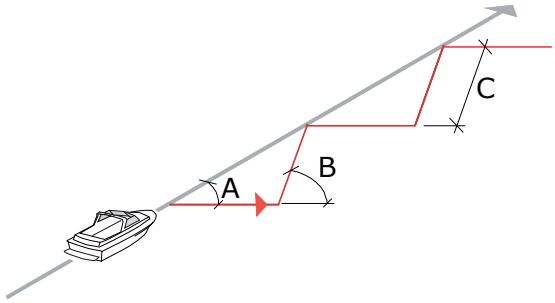
During the turn you can alter the course change and the leg distance.

The main course can be changed by turning the rotary knob.

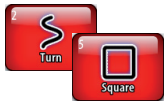
A = Initial course change

B = Course change

C = Leg distance



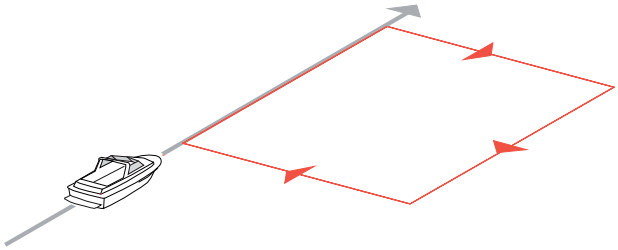
Turn parameter	Range	Change per step	Default
Course change	4° - 140°	4	28°
Leg distance	82 ft - 9843 ft 25 m - 3000 m	50 25	1641 ft 500 m



Square-turn

The square-turn feature makes the boat automatically turn 90° after having travelled a defined leg distance.

You can at any time during the turn change the distance of the leg until the boat makes a new 90° turn. You can also at any time change the main course by turning the rotary knob.



Turn parameter	Range	Change per step	Default
Leg distance	82 ft - 9843 ft 25 m - 3000 m	50 25	1641 ft 500 m

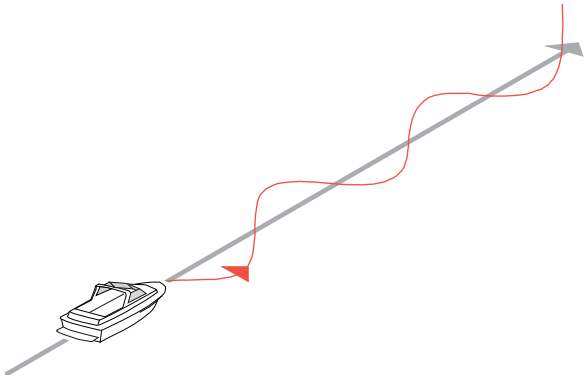
Lazy S-turn

In the lazy-s turn the boat will yaw around the main course.

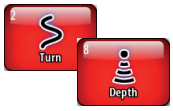
You set the selected course change before the turn is started.

During the turn you can alter the course change and the turn radius.

The main course can be changed by turning the rotary knob.



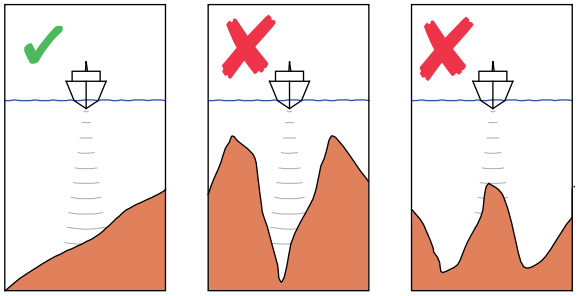
Turn parameter	Range	Change per step	Default
Course change	4° - 160°	4	28°
Radius	16 ft - 1641 ft 5 m – 500 m	5 10	656 ft 200 m



Depth Contour Tracking, DCT ™

If the system has input from an echo sounder, the autopilot can be set to follow a depth contour.

Do not use this feature unless the seabed is suitable. Do not use it in rocky waters where the depth is varying significantly over a small area.



Slope | Narrow channel | Ridge

Use the following process to initiate DCT steering;

1. Ensure that you have depth reading on the NSO unit or on a separate depth instrument
2. Steer the boat to the depth you want to track, and in the direction of the depth contour (main course)
3. Activate AUTO mode, select DCT steering and monitor the depth reading
4. Use the Starboard or Port buttons to initiate the DCT steering depending on if the bottom slopes to starboard or to port

The following parameters are available for DCT steering:

Turn parameter	Range	Change per step	Default
Depth gain	5 - 95	5	5
Contour Cross Angle	0° - 50°	1	0

Depth gain

This parameter determines the ratio between commanded rudder and the deviation from the selected depth contour. The higher depth gain value the more rudder is applied.

If the value is too small it will take a long time to compensate for drifting off the set depth contour, and the autopilot will fail to keep the boat on the selected depth.

If the value is set too high the overshoot will increase and the steering will be unstable.

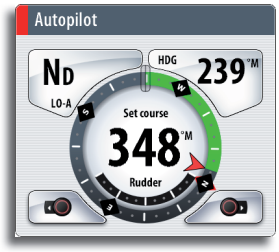
Contour Cross Angle (CCA)

The CCA is an angle that is added to or subtracted from the set course.

With this parameter you can make the boat yaw around the reference depth with lazy-s movements.

The larger the CCA the bigger yawing will be allowed. If you the CCA set to zero there is no S-ing.

NoDrift mode



This mode combines the autopilot and the positioning information from the GPS.

When NoDrift is activated, the autopilot will draw an invisible bearing line based on current heading from the boat's position.

Unlike in AUTO (compass) mode the autopilot will now use the position information to calculate the cross track error, and automatically keep your track straight.

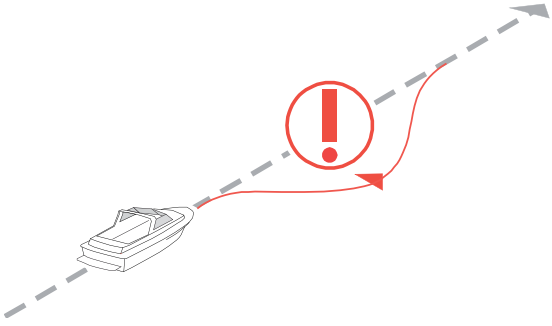
You can use the arrow keys or the rotary knob to reset the bearing line while in NoDrift mode.

Dodging

If you need to avoid an obstacle when using NoDrift mode, you can press STBY and power steer or use the helm until the obstacle is passed.

If you return to NoDrift mode within 60 seconds you can select to continue on previous set bearing line.

If you don't respond the dialog will disappear and the autopilot will go to NoDrift mode with current heading as set bearing line.



If your dodging maneuver takes more than 60 seconds, the autopilot will remain in Standby mode.

Navigating with the NSO

You can use the autopilot feature to automatically steer the boat to a specific waypoint location, or through a route of waypoints. The position information received from the GPS will be used to change the course to steer to keep the boat on the track line and direct to the destination waypoint.

To obtain satisfactory navigation steering, the following points must be fulfilled prior to entering the NAV mode:

- The autosteering must be tested and determined satisfactory
- The GPS must be in full operating mode and transmitting position and navigation data to the NSO

You can start navigation from any panel by pressing the **GOTO** key. The go to cursor option will only be available when the cursor is active on a Chart, Radar or Echosounder panel. For more information about navigating with the NSO refer to the ***Navigating*** section.

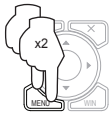
You can also start navigating from the autopilot menu.

When the Navigation mode is initiated, the pilot will automatically keep the vessel on the leg. When your vessel reaches the arrival circle for a waypoint, the pilot will give an audible warning and display an alert screen with the new course information.

If the required course change to the next waypoint is less than the Navigation change limit, the autopilot will automatically change the course. If the required course change to next waypoint in a route is more than the set limit, you are prompted to verify that the upcoming course change is acceptable.

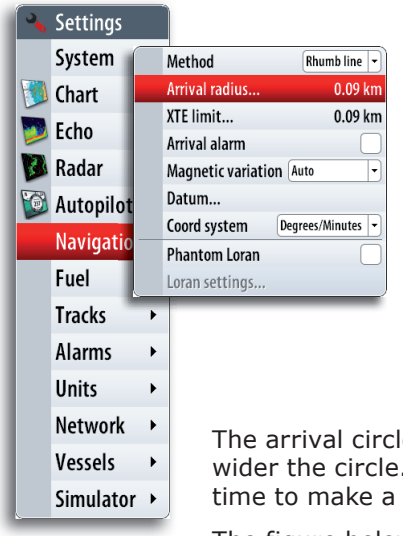
For more information about navigation parameters and how to navigate with the NSO, refer to the Navigation section.

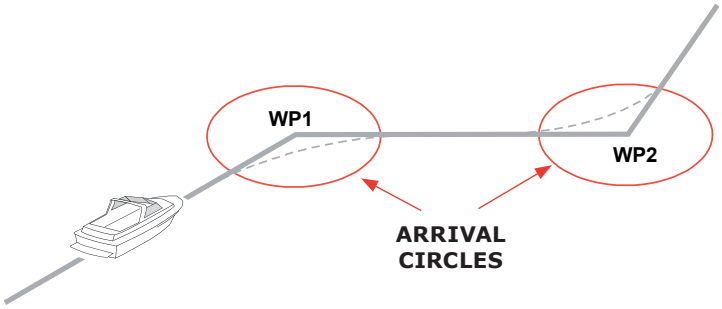
Navigational steering should only be used in open waters. When selecting NAV mode, the pilot maintains the current set course and prompts the user to accept the course change towards the destination waypoint.



The waypoint arrival circle

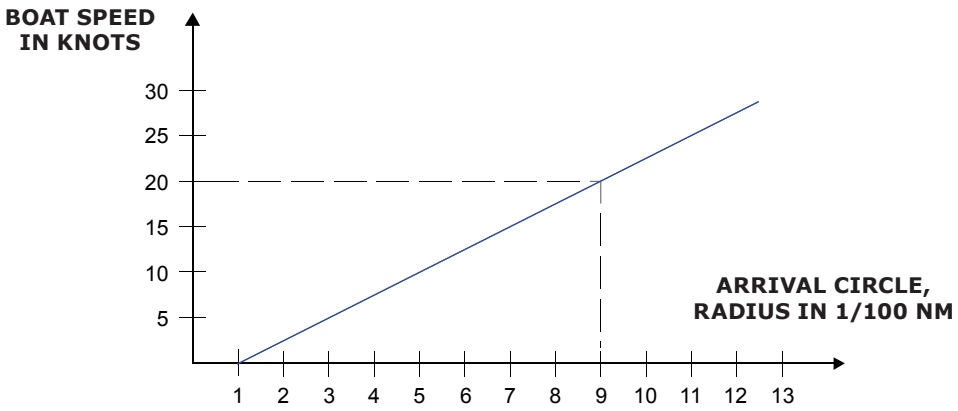
The Arrival radius defines the point at which a turn is initiated when you are navigating a route.





The arrival circle should be adjusted according to boat speed. The higher the speed, the wider the circle. The intention is to make the autopilot start the heading change in due time to make a smooth turn onto the next leg.

The figure below may be used to select the appropriate waypoint circle when creating the route.



Example: With the speed of 20 knots you should use a waypoint circle with radius 0.09 nm.

The distance between any waypoints in a route must not be smaller than the radius of the waypoint arrival circle when using automatic waypoint shift.

Sailing with the autopilot

Several sailing parameter should be defined before entering Wind or WindNav mode. These parameters are described in the separate Autopilot installation section.

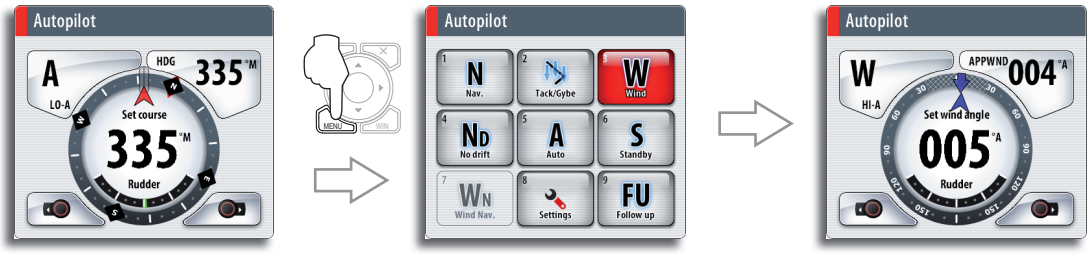
Wind vane steering

The WIND mode is only available if the system has been set up for sailboat in the Autopilot Installation menu.

Before the WIND mode is started it must be verified that valid input from wind transducer is available.

Initiate wind steering as follows;

1. Adjust the boat heading until wind angle is according to the angle you want to maintain
2. Press the **MENU** key, and select Wind



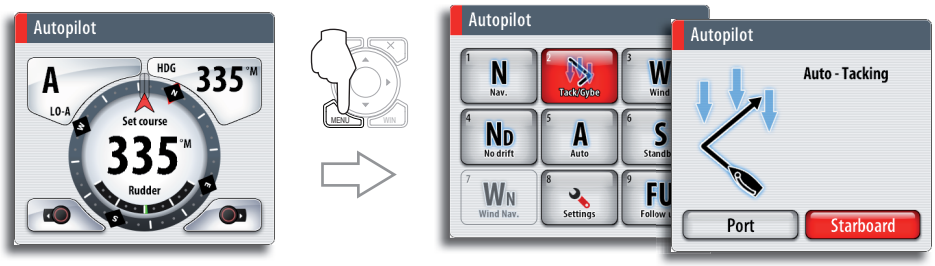
The set course to steer (CTS) and set wind angle are entered from the compass heading and the wind transducer at the moment the WIND mode is selected. From that point the autopilot will change the course to maintain the wind angle as the wind direction may change.

Tacking

The tack function is only available when the system is set up for SAIL boat type.

Tacking should only be performed into the wind and must be tried out in calm sea conditions with light wind to find out how it works on your boat. Due to a wide range of boat characteristics (from cruising to racing boats) the performance of the tack function may vary from boat to boat.

You can initiate the tack function both from AUTO and from WIND mode. The illustration below shows how the function is started from AUTO mode.

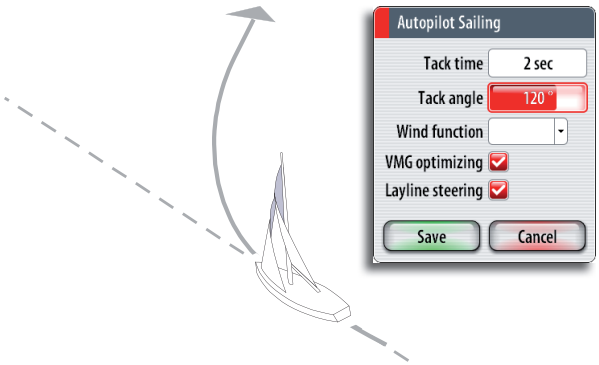


In both modes you can interrupt the tack operation as long as the tack dialog is open by selecting the opposite tacking direction. When interrupted the boat will return to the previous set heading.

Tacking in Auto mode

Tacking in AUTO mode is different from tacking in WIND mode. In AUTO mode the tack angle is fixed and as defined by the user. Refer to the sailing setup description in the separate Autopilot Installation section.

When tacking direction is selected the autopilot changes the current set course according to the set fixed tacking angle.



Tacking in Wind mode

Tacking in WIND mode as compared to AUTO mode can be performed when sailing with apparent or true wind as the reference. The true wind angle should be less than 90 degrees.

The rate of turn during the tack will be given by the Tack time defined in the sailing parameter setup (refer illustration above). The tack time is also controlled by the speed of the boat to prevent loss of speed during a tack.

When you initiate the tacking, the autopilot will immediately mirror the set wind angle to the opposite side of the bow.

Gybing

Gybing is possible when the true wind angle is larger than 120°.

The time to make a gybe is determined by the speed of the boat to make it as quick as possible within control.

Tack and gybe prevent

You should use the autopilot with care when beating and running.

If the sails are unbalanced when beating, yaw forces from the sails can drive the boat into the wind. If the boat is driven beyond the set minimum wind angle, the thrust from the sails will suddenly disappear and reduces the boat speed. The boat will then be more difficult to steer as the rudder will become less effective.

The tack prevent function in WIND mode has been implemented to avoid such situations. It will react immediately when the apparent wind angle becomes 5° less than the set minimum wind angle, and more rudder will be commanded.

When running, it is difficult to steer the boat with waves coming sideways or from behind. The waves may yaw the boat into an unwanted gybe; this can be hazardous for both the crew and the mast.

The gybe prevent function will be activated when the actual apparent wind angle becomes greater than 175° or gets opposite to the set wind angle. More rudder will be commanded to prevent an unwanted gybe.

The tack and gybe prevent functions are not a guarantee against getting into a hazardous situation. If the effect of the rudder and/or drive unit is not adequate, a dangerous situation may occur. Pay particular attention in such situations.

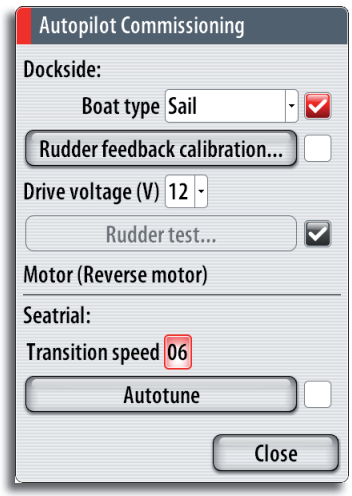
Wind steering and navigation

In Wind Nav the autopilot steers the boat given both wind data and track data from a GPS/chart plotter.

In Wind Nav mode the autopilot calculate the initial course change needed to navigate towards the active waypoint, but the pilot will also utilize the current wind direction in the calculation.

Control of steering performance

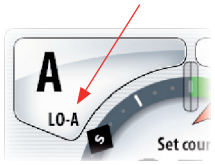
When operating in an automatic mode the pilot utilizes two different sets of steering parameters (HI/LO). The parameters control the response of the boat at different speeds or wind directions. The two parameter sets can be automatically or manually selected, and each set can be manually adjusted.



The speed at which the autopilot automatically changes from LO to HI parameters is determined by the transition speed setting.

At no speed input the autopilot defaults to LO steering parameters when engaging an automatic mode from STBY. This is a safety feature to prevent oversteering.

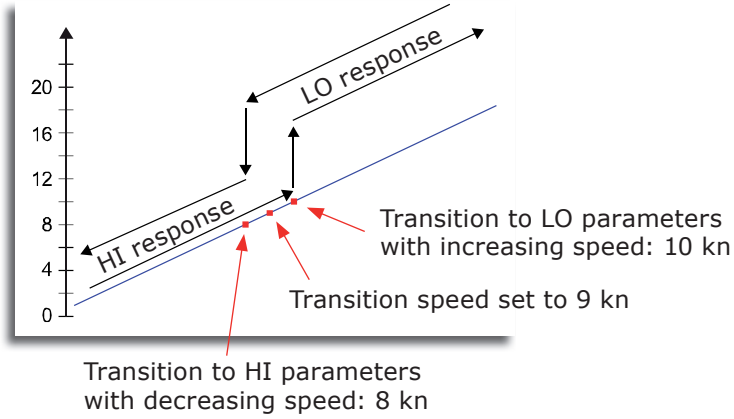
Active response parameter set is shown in the autopilot popup, and the following abbreviations are used:



HI-A	High response parameters set automatically
LO-A	Low response parameters set automatically
HI-M	High response parameters set manually
LO-M	Low response parameter set manually

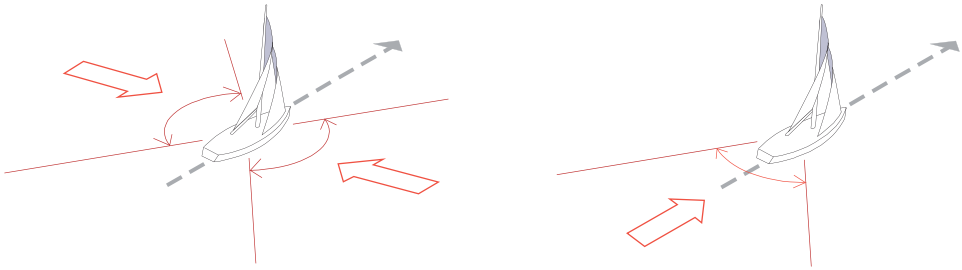
Power boats

On power boats the automatic selection of HI or LO is determined solely by the speed of the boat as shown in the graphics below.



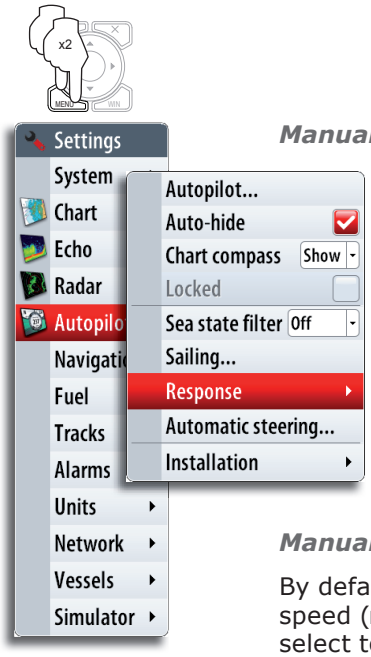
Sailboats

When sailing in WIND mode, the parameter set is determined by the speed of the boat and the direction of the wind as illustrated below. So if you lose too much speed e.g. when tacking, the parameters will change to HI to gain sufficient rudder response. This should be observed when setting the transition speed on sailboats.

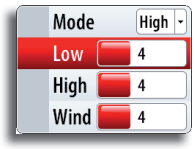


LO parameters

HI parameters



Manually adjusting the response

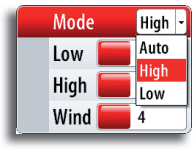


You can manually fine tune each of the two (HI/LO) parameter sets by selecting nine different levels. Level 4 is default with parameter values as set by the autotune function. If no autotune is made (not recommended) the level 4 values are the factory default values.

A low response level reduces the rudder activity and provides a more "loose" steering.

A high response level increases the rudder activity and provides a more "tight" steering. A too high response level will make the boat start S-ing.

Manually selecting parameter set

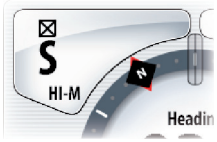


By default the system switches between HI/LO parameter set based on speed (motor boats) or speed and wind (sail boats). You can however select to manually set which parameter set that shall be used.

HI or LO must be selected if no speed input is available.

Using the NSO in an AP24/AP28 system

Command transfer

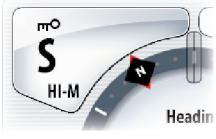


If your NSO unit is connected to an autopilot system including an AP24 or AP28 control unit, only one control unit can be active at the same time. An inactive unit is indicated with an envelope symbol in the display.

You can take command from an inactive NSO unit with active autopilot pop-up by turning the rotary key.

If the pop-up not is displayed you can take command from the NSO unit by pressing and holding the STBD/AUTO key to bring up the mode selection menu, and then confirming active mode.

Locking remote stations



The AP24/AP28 includes a Remote Lock function that will disable all other control units. A locked unit is indicated with a key symbol.

When the remote lock function is enabled on AP24/AP28 no transfer of command to NSO or other AP heads on the system can take place, only the active AP control unit stays in command.

You can only unlock the remote stations from the AP24/AP28 unit in command.

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11 Navigating

The navigation function included in the NSO allows you to navigate towards the cursor position, a position defined by latitude and longitude values, a waypoint or along a predefined route.

For information about positioning waypoints and creating routes, refer the ***Waypoints, Tracks and Routes*** section.

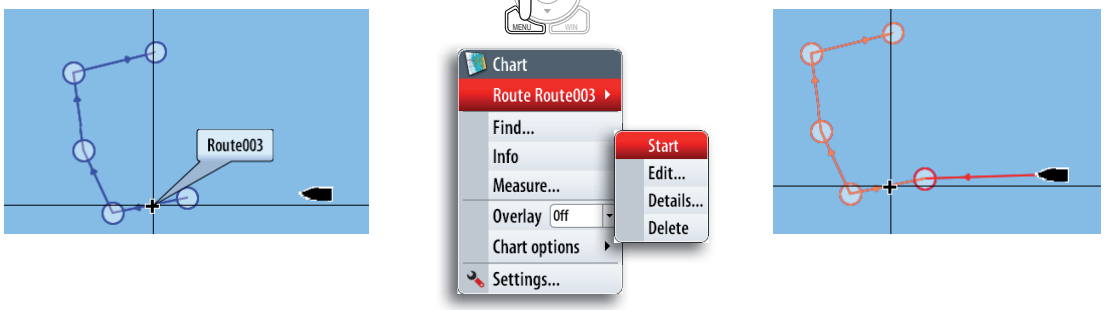
Navigate to cursor position

You can start navigation to cursor position from any panel by moving the cursor to the position you wish to navigate to and pressing the GOTO key.

The go to cursor option will only be available when the cursor is active on a Chart, Radar or Echosounder panel.

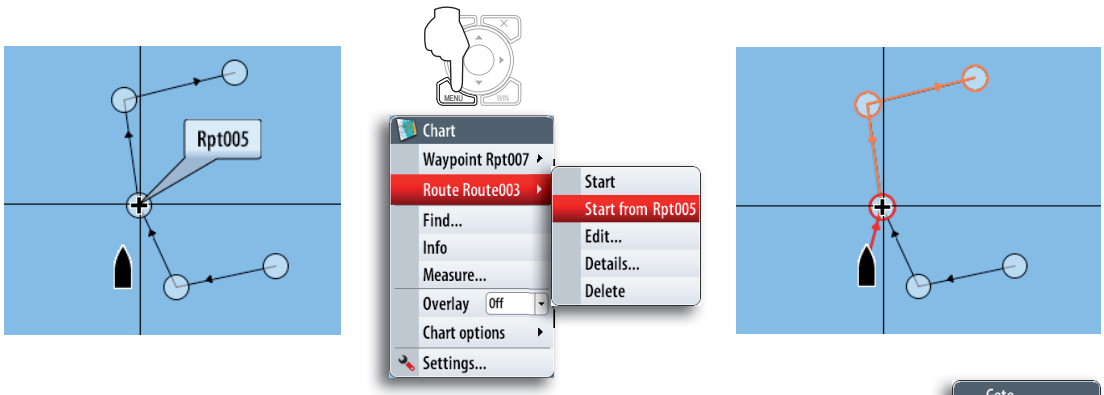
Navigate a route

You can start navigating a route on a chart panel by moving the cursor over the route and then pressing the **MENU** key.



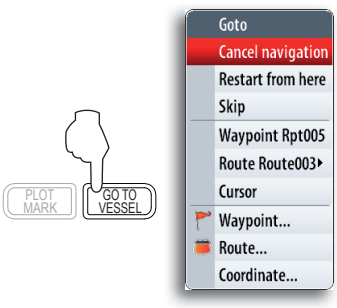
Selecting start point

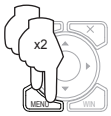
You can navigate a route starting from any waypoint by positioning the cursor over the selected waypoint and pressing the **MENU** key.



Cancel navigation

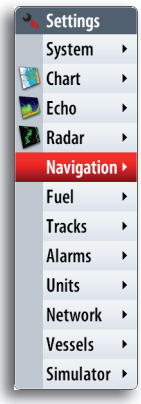
You cancel navigation by pressing the **GOTO** key.



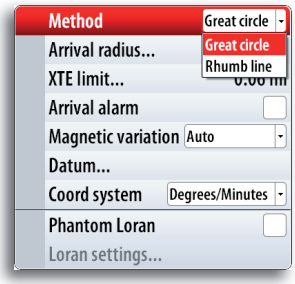


Navigation parameters

Navigation method



Different methods are available for calculating the distance and bearing between any two points on a chart.

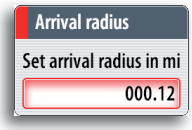


The great-circle route is the shortest path between two points. However, if you are to travel along such a route, it would be difficult to steer manually as the heading would constantly be changing (except in the case of due north, south, or along the equator).

Rhumb lines are tracks of constant bearing. It is possible to travel between two locations using Rhumb line computation, but the distance would usually be greater than if Great circle is used.

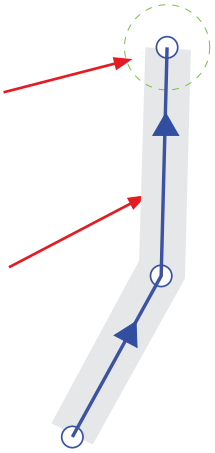
Steering alarm limits

Arrival radius

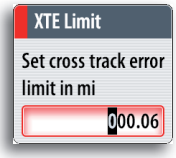


Sets an invisible radius around the destination waypoint.

When the arrival alarm is activated, an alarm will appear when the vessel is within this radius.



Off course limit



This parameter defines the vessel's accepted offset distance from the leg. If the vessel goes beyond this limit an alarm will be activated.

Off course alarm must be enabled/disabled in the alarm panel.

Magnetic variation

Converts magnetic north data to true north to match chart orientation.

Auto automatically converts magnetic north to true north from in-built table. When using manual mode, you will have to input the local magnetic variance.

Datum

Most paper charts are done by using the WGS84 format, which also is used by the NSO system.

If your paper charts are made by using a different format, you can change the settings accordingly on the NSO system to match your paper charts.

Coordinate system

Controls the format for lat./lon coordinates displayed on the panels.

Phantom Loran

Enables phantom loran, for waypoint entry, vessel and cursor position display.

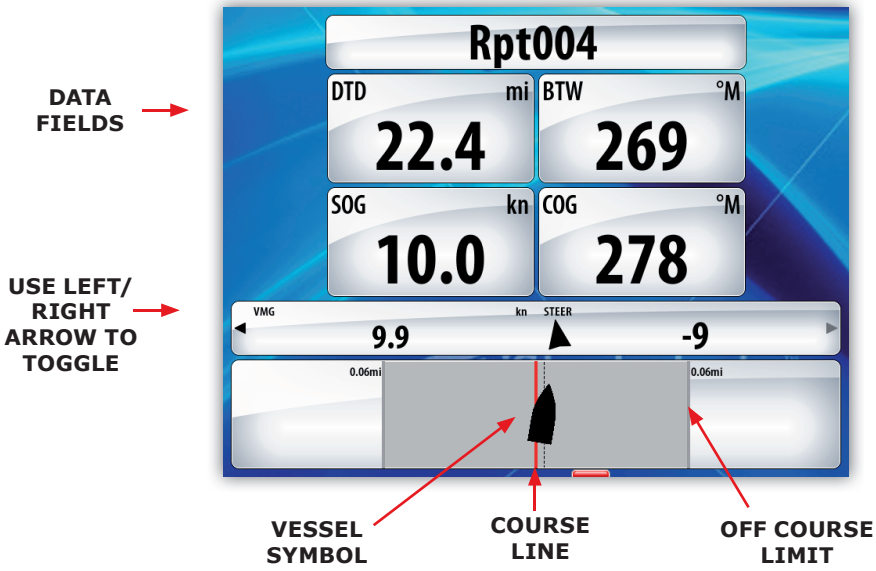
Loran settings

Allows setting of GRI and preferred TD pairs for vessel and cursor position display.

Navigation panels

The Steer and Position panels can be used to display information when you are navigating.

The Steer panel



Data fields

The Steer panel offers the following information:

DTD	Distance to destination
BTW	Bearing to waypoint
SOG	Speed over ground
COG	Course over ground
TTD:	Time to destination
ETA:	Estimated time of arrival at next waypoint
VMG:	Velocity Made Good towards next waypoint.
STEER:	Course to steer towards next waypoint

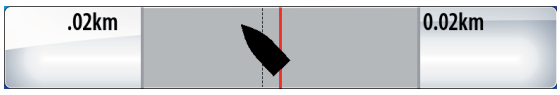
The course line

When travelling on a route the course line shows the intended course from one waypoint towards the next.

When navigating towards a waypoint (cursor position, MOB or an entered lat/lon position), the course line will show the intended course from the point at which navigation was started towards the next waypoint.

Vessel symbol

The vessel symbol indicates distance and bearing relative to the intended course.

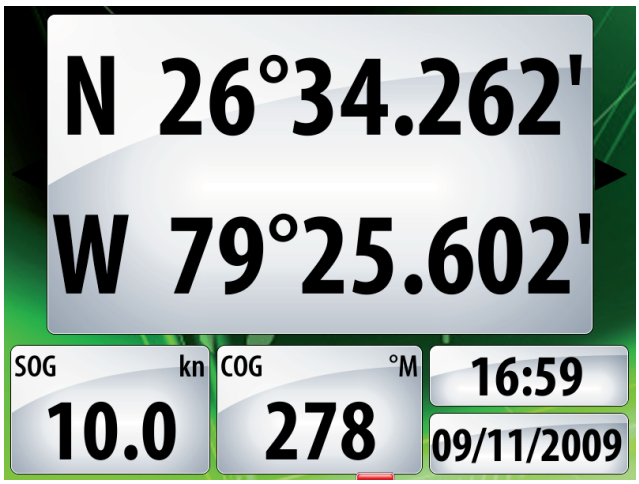


Off course limit

If the XTE exceeds the defined off course limit (Refer to Steering alarm limits), this will be indicated with a red arrow including the distance from the track line

If the off course alarm is enabled, the alarm will activate if the XTE exceeds the defined off course limit.

Position panel



Data fields

Position in lat. and lon.

Time and date

SOG Speed over ground

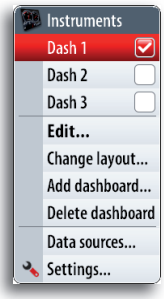
COG Course over ground

12 The Info panels

The INFO page group includes a configurable set of screens representing live data from the vessel.

Instrument panels

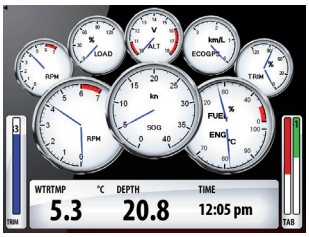
The instrument panels consists of multiple gauges — analog, digital and bar — that can be customized to display selected data. The instrument panel displays data on dashboards, and you can define up to ten dashboards within the instrument panel.



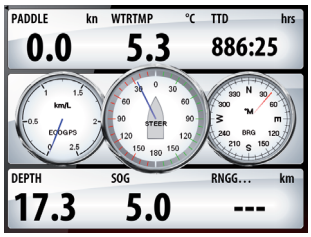
Instrument dashboard styles

Three dashboard layouts are predefined to display gauges showing information about vessel, navigation information and angler requirement.

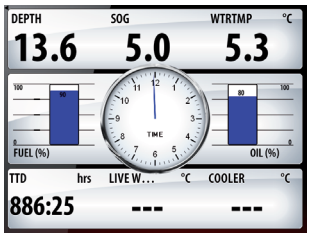
You switch between a panel's dashboards by using the left and right arrow keys or by selecting the dashboard from the menu.



Vessel dashboard

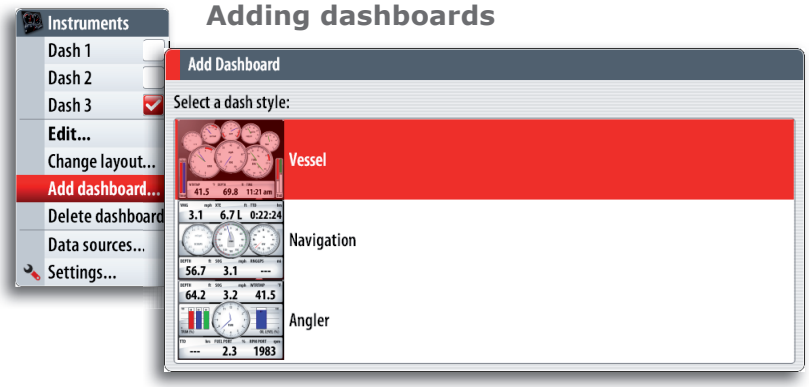


Navigation dashboard



Angler dashboard

Adding dashboards

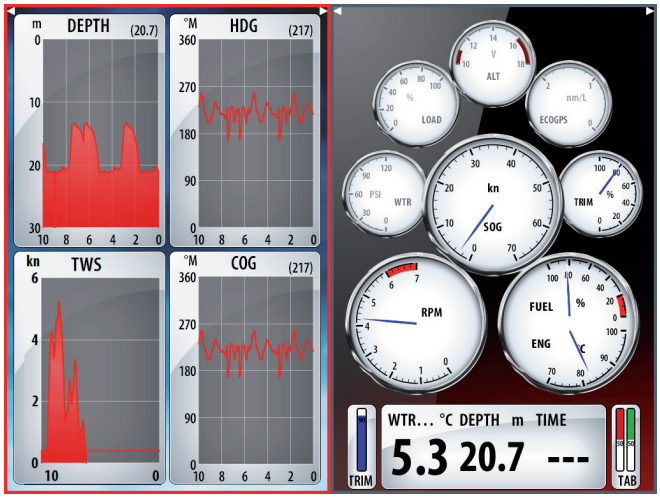


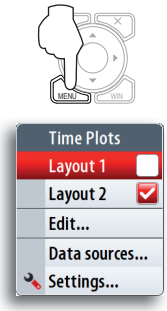
There can be up to 10 dashboards within each instrument panel.
In addition to the 3 predefined dashboards you can design your own based on the predefined dashboard styles.

Time plots

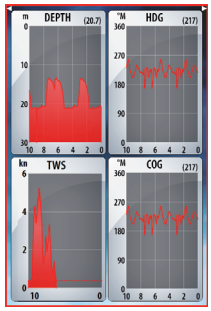
The system can present data history in different plots, and data selection can be defined by the user.

The plots can be set up as single panel layouts, or combined in one panel as shown below.

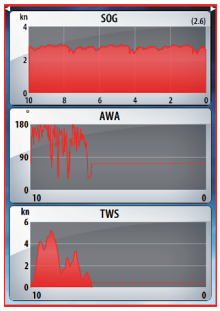




The Time plot panel consists of two predefined layouts. You switch between the layouts by using the left and right arrow keys or by selecting the dashboard from the menu when the Time plot panel is active.



Layout 1, 4 data sets



Layout 2, 3 data sets

Missing Data

If instrument data is unavailable the time plot will turn into a dashed line and flatten out at the point data was lost.

When data becomes available again a dashed line will join up the two points showing an average trend line where the missing data is.

Customizing the info panels

You can customize an instrument dashboards by changing the dashboard style, and by changing the data for each of the gauges in the dashboard. You can also set limits of analog gauges.

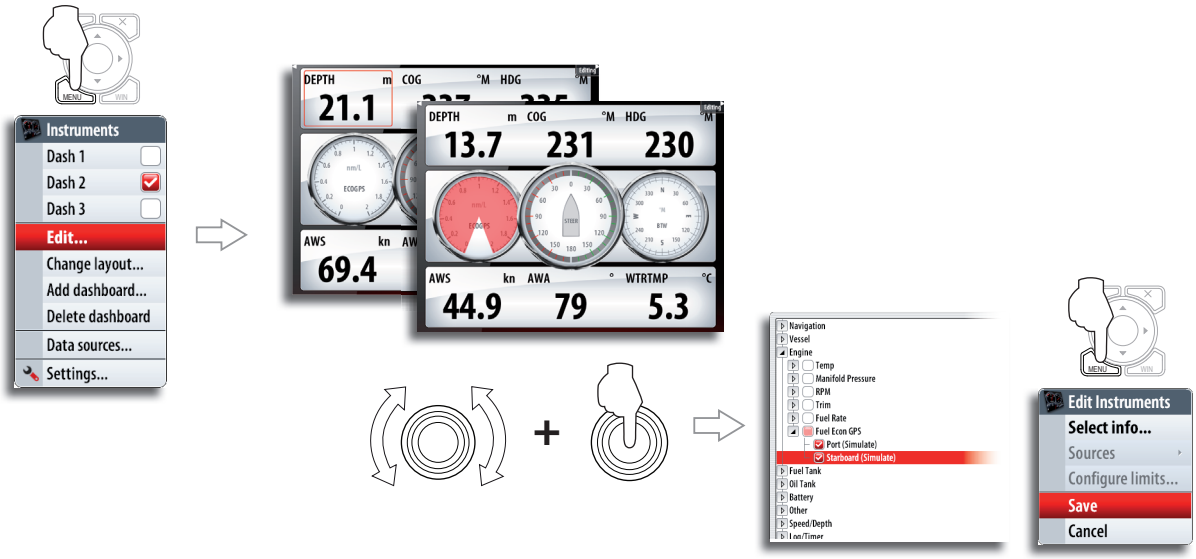
Time plots can be customized by changing data that are displayed, and by changing the time labels.

Available editing options will depend on which data sources that are connected to your system.

Saving the changes will return you to the dashboard or layout panel, displaying the new configuration. You can cancel the changes at anytime before you save.

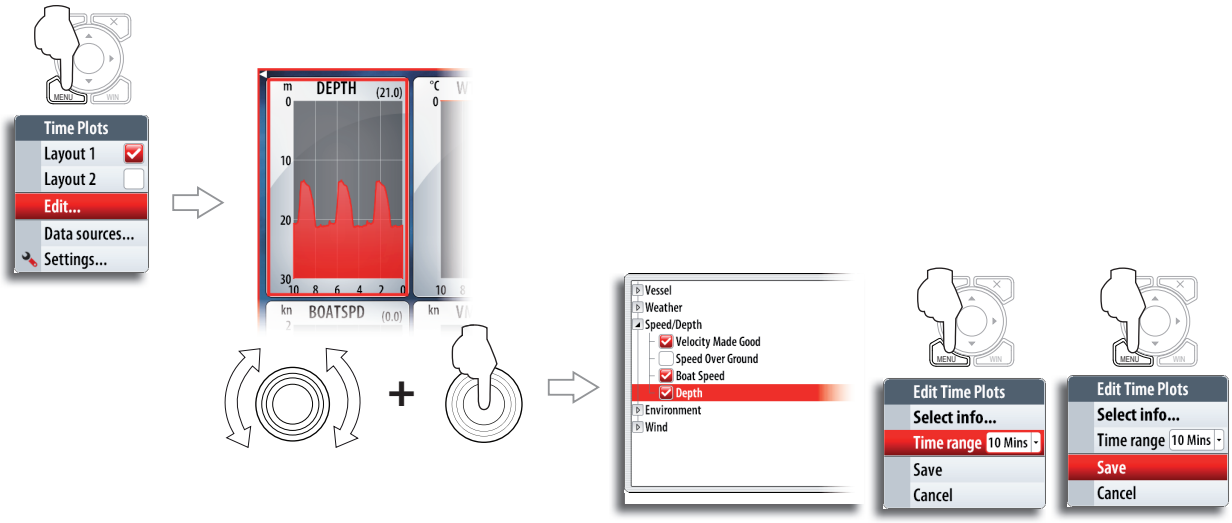
Edit an Instrument dashboard

Select the dashboard you want to edit, then;



Edit a Time plot layout

Select the time plot layout you want to edit, then;



Blank page

13 The Pages panel

The Pages panel includes options and tools that are not specific to any panel.

These pages act different to the chart, radar, echo etc. They are always full screen, and you cannot use them in a split page with any other panels.

A Page panel will open on top of your previous page. When you close a dialog in one of the Pages the function will close and the display will return to last active page.

The Pages panel are accessed and operated as for normal menu operation.

You switch between different tabs in a page by using the arrow keys. You can also access a page by using the numeric key as indicated on each icon.

Any listing in the Pages panels has a context menu, giving access to available options for the selected item. The context menu is displayed by pressing the **MENU** key.

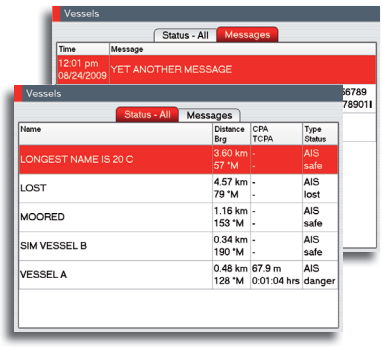
Vessels

Status listing

List of all AIS, MARPA, and DSC vessels with available information.

Message listing

List of all messages received from other AIS vessels with time stamp.



Alarms

Active alarms

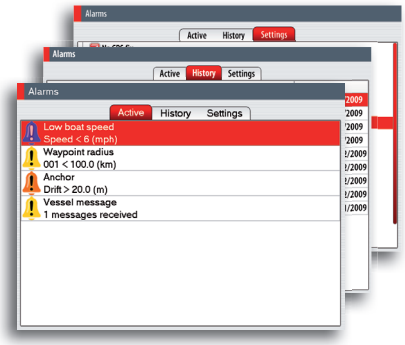
List of active alarms.

Alarm history

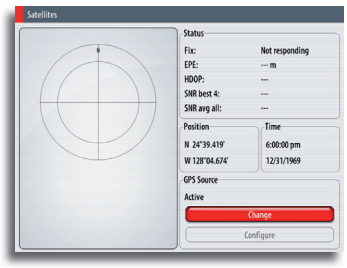
List of all alarms with time stamp.

Alarm settings

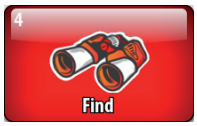
List of all available alarm options in the system, with current settings.



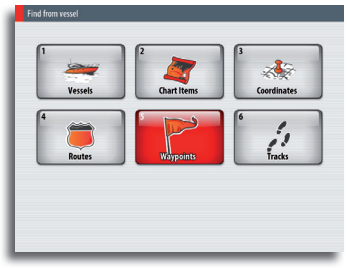
Satellites



Status page for active satellites.



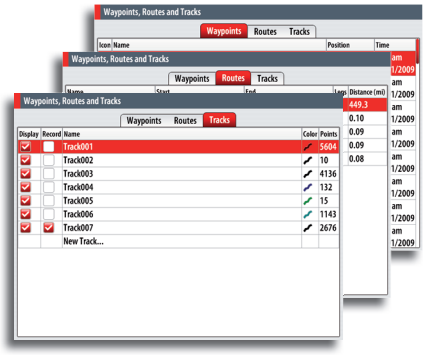
Find



Search function for several chart items.

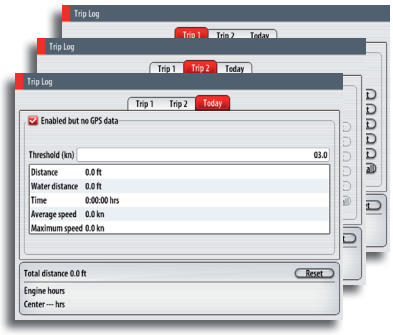
By pressing the **MENU** key you get access to available options for the selected item.

Waypoints/routes/tracks



List of waypoints, routes and tracks with details.

Trip Log



Trip 1 / Trip 2

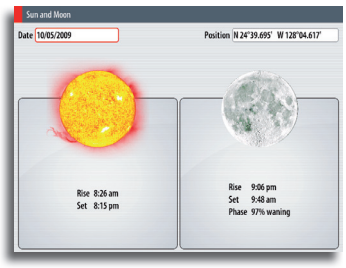
Displays voyage and engine information, with reset option for all data fields.

Today

Displays voyage and engine information for current date. All data fields will be automatically reset when the date changes.

Sun/moon

Displays sunrise, sunset, moonrise and moonset for a position based on entered date and the position's latitude/longitude

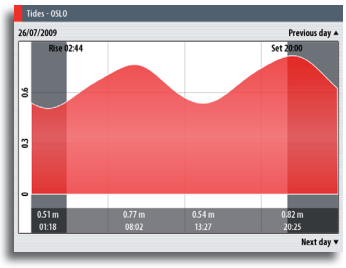


Tides

Displays tide information for the tide station nearest to your vessel.

You can use the arrow keys to page to selected date.

Available tide stations can be selected by using the **MENU** key.



Files

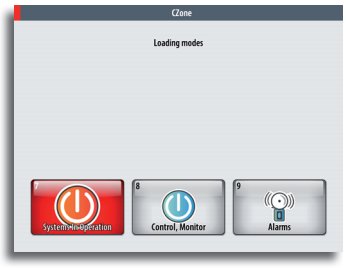
File management system for files, waypoints, routes, tracks and settings.

By pressing the **MENU** key you get access to available options for the different file types.

CZone

CZone will appear when the system is connected to a CZone system.

This allows for accesses control, monitoring and alarms associated with Czone circuits. It also allows selection of custom operational modes if these have been configured.



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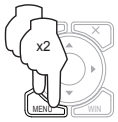
14 Audio

When the NSO is connected to a SonicHub server you can use your unit to control audio playback from iPod, iPhone, USB mass storage device (mp3), satellite (SIRIUS™) and AM/FM radio. Before playing FM radio through the SonicHub, you must purchase a marine-grade AM/FM antenna.

When connected to a WM-2 Satellite module you can subscribe and include Sirius™ audio on your NSO system. Sirius™ audio and weather service covers inland US waters and coastal areas into the Atlantic and Pacific oceans, Gulf of Mexico and the Caribbean Sea. The Sirius™ audio products received vary depending on your selected subscription package. For more information refer to www.sirius.com.



Before you can start using your equipment, it must be installed according to the Installation manual included with the unit.

Enabling Audio

You must enable Audio to control audio on your NSO unit.

When audio is enabled, the media bar will appear at the bottom of the screen on all pages. The media bar varies from one audio source to another.

You switch focus between other panels and the media bar by pressing the WIN key.

Selecting the audio source (SonicHub only)

You switch between available audio sources from the audio menu.

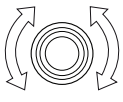
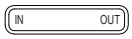
When the audio is re-started it will start with the settings that was active when turned off.

NOTE: The **Mic** *source selects a high voltage level input allowing you to broadcast loud hailer messages over the audio system.*

Operating the audio source

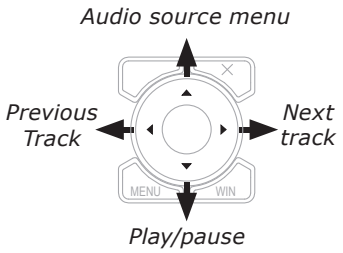
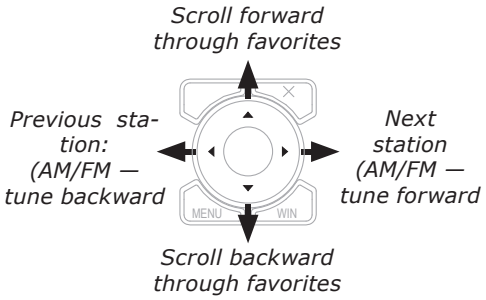
You operate the audio devices by using the function keys, the keypad and the audio menu.

Function keys

Descrase/increase volume  or 

Mute or

Keypad

iPod, iPhone, USB Mass Storage	SIRIUS, AM/FM radio
	

When listening to AM/FM radio, press and hold the keypad left or right to switch from tune mode to seek mode.

When playing audio from an iPod or USB storage device, press and hold the keypad left or right to rewind or fast forward through a track.

The audio menus

When the media panel is the active panel, press the Menu key to access the audio menu.

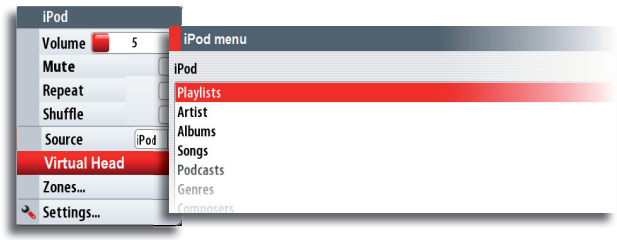
The menu differs from one audio source to another as shown in the examples below.

iPod menu

FM Radio menu

The Virtual Head

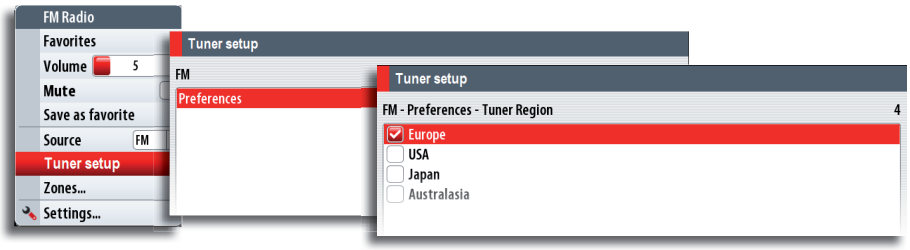
The audi menu includes a Virtual Head option that gives access to the source's native menu or file structure. Virtual Head is used for selecting options and setting up the audio source.



Using the FM/AM radio

Selecting AM/FM tuner region

Before playing FM or AM radio, you must select the appropriate AM and FM tuner regions for your location.



Tuning in to a radio channel

Use the keypad Left/Right keys to search for a AM/FM radio channel.

Then the channel is tuned in, you can add the stations to your favorite list from the audio menu.

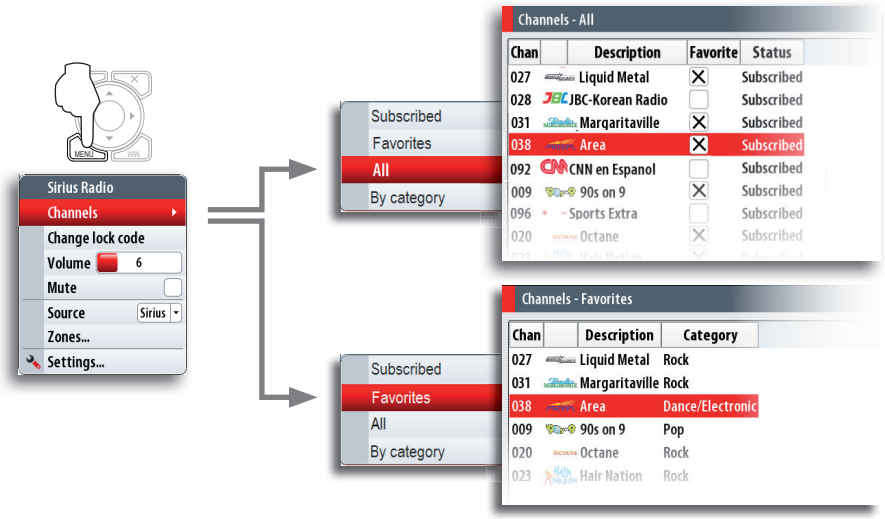
You use the keypad Up/Down keys to scroll through favorite channels.

Using the Sirius radio

The channels list displays all available Sirius channels, whether or not you have a subscription for the channel.

You can create of list of your favorite Sirius channels from within the channels list. You will not be able to add unsubscribed channels.

When a favorite list is available, you page through this list using the arrow keys.



Locking channels

You can lock selected channels from being broadcast unless an unlock code is entered.

When the function is activated, a 4 digit code must be entered before the locking is activated.

The same code must be entered before a locked channel can be released.

Setting up the SonicHub speakers

Speaker zones

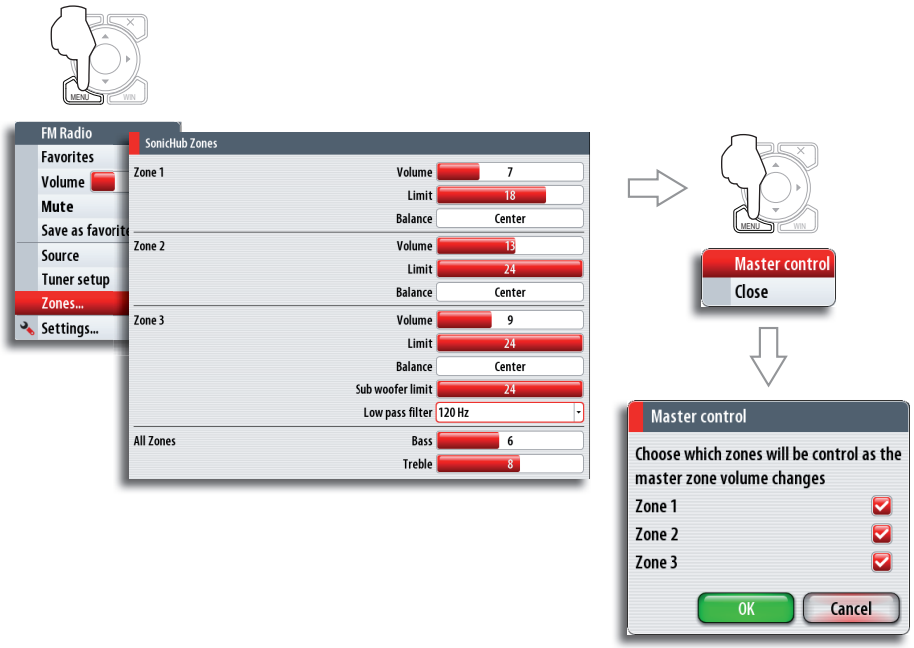
Your unit has four on-board amplified channels for directly driving speakers. There are also two low level channels (stereo) for supplying signal to an external amplifier, plus two mono channels for amplified subwoofer(s).

The audio outputs are organized in 3 zones. You can adjust balance, volume and volume limit settings independently for each zone. Adjustments to the bass and treble settings will alter all zones. Refer graphics below.

Zone 1	Left/Right speakers
Zone 2	Left/Right speakers
Zone 3	Amplifier output, Subwoofer output

Master volume control

You can select which zones that shall be adjusted by the master volume control. When the audio bar is active, the volume in all selected zones will be altered when you increase/descrease the volume from the OP40 unit.



15 Weather

GRIB Weather

GRIB is the format used by the meteorological institutes of the world to transport and manipulate weather data. You can import GRIB files via an SD card inserted into the card reader, and overlay the information onto your charts.

GRIB Symbols explained

Zero knots / Indeterminate wind direction

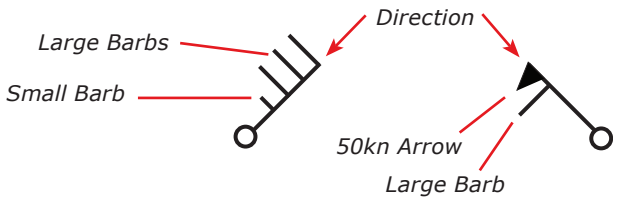
Wind direction ↙ Small Barb value = 5 knots

Wind Direction ↘ Large Barb value = 10 knots

Wind direction ↙ Arrow Barb value = 50 knots

Wind Direction ↙ 2 x Large Barbs 1 x Small Barb = 25 knots

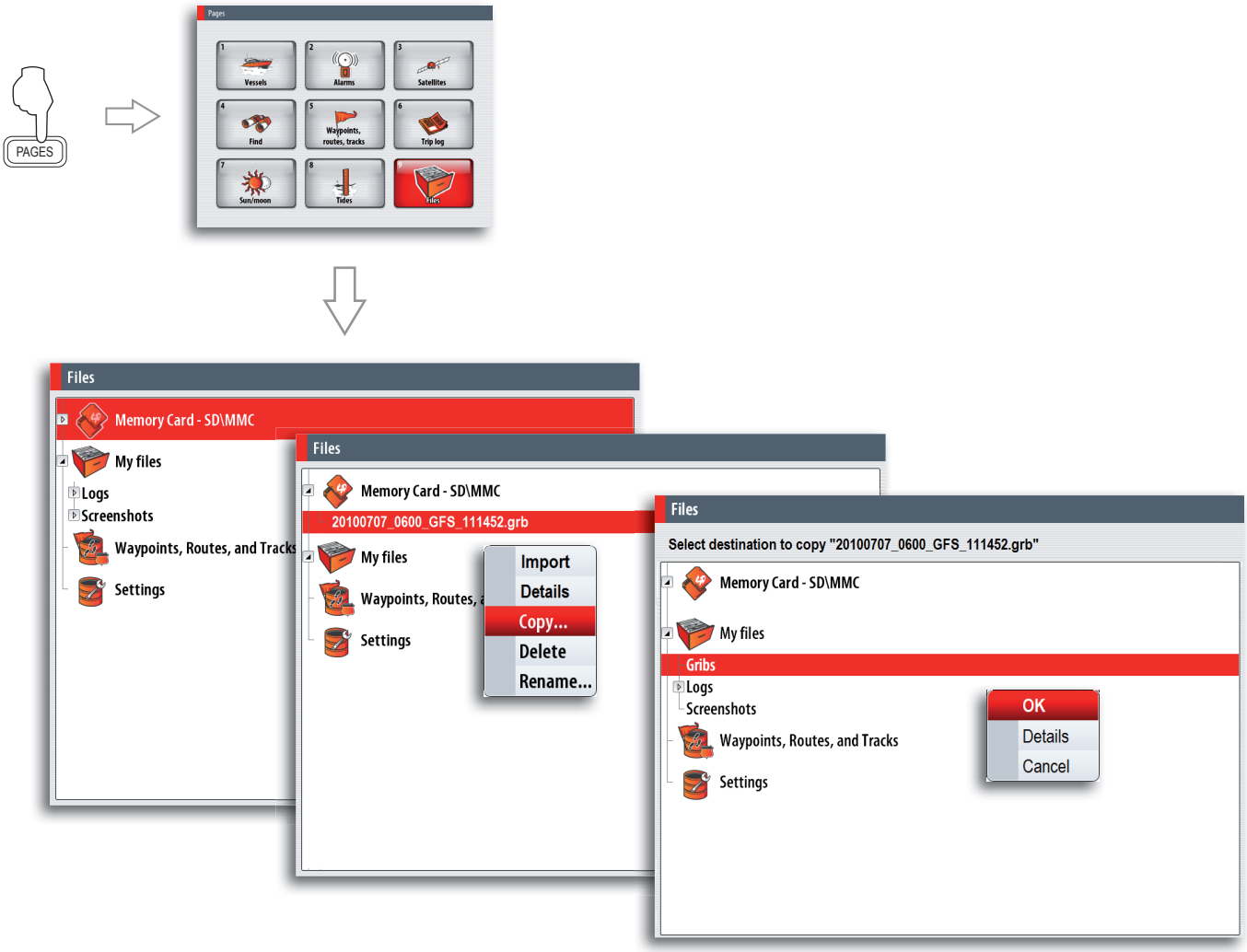
The wind tail indicates the relative wind direction from 0 to 359º. Wind speed is indicated by a combination of small and large barbs at the end of the wind tail. If a combination of 5 and 10 knot barbs are shown on a tail then these will need to be added together to give you the total wind speed. The example below left shows 3 x large barb + 1 x small barb = 35 knots. Below right shows 60 knots in a different direction, 1 x 50kn arrow + 1 x Large barb.



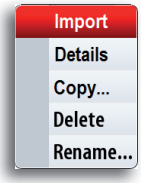
Loading a GRIB file to Memory

NSO does not come pre loaded with any GRIB files.

To load a GRIB file onto your system, insert an SD card that contains a GRIB file into the SD card reader. Then use the procedure illustrated below to copy the files to the Gribs directory on your NSO system.



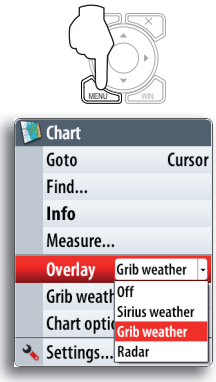
The GRIB file will now appear in the Gribs directory.



Importing a GRIB File

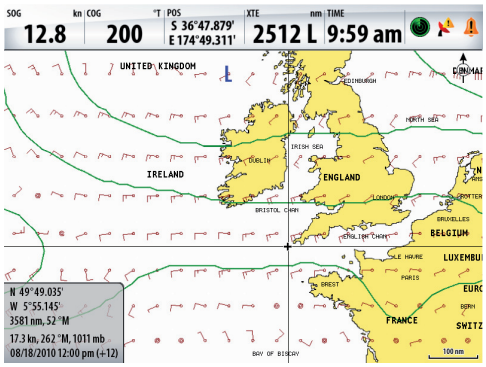
A Grib file can be imported directly into active memory from your portable memory device. If a GRIB file has been loaded previously a warning box will appear and ask if you wish to overwrite.

GRIB files that are imported directly from portable memory will not be saved to the Gribs directory and will be lost when a new GRIB file is imported.



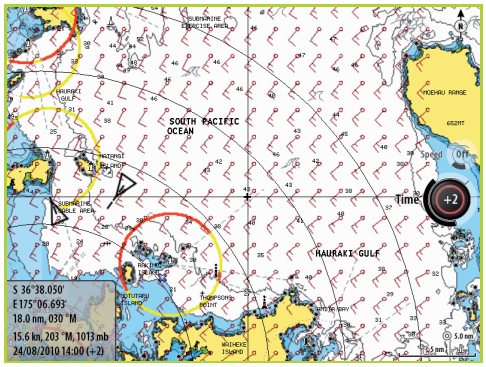
Switching GRIB Overlay On

Once a GRIB file is imported, that GRIB data can be switched on and will overlay GRIB information on the relevant area of the chart.



Selecting GRIB Forecast Time

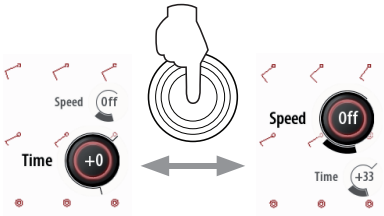
The GRIB file contains forecast information for a set number of days. It is possible to animate the weather data and move forward in time to see the predicted forecast for a specific time and date. These time scales vary depending on the file you are using.



Once Animate is selected, time and speed dials will appear on the right hand side of the screen.

Press the rotary knob to change between the time and speed dials.

Press the enter key to close animation and return to the chart.



Time Dial

The time dial enables you to manually change the time and date of the GRIB overlay and see the predicted forecast for that specific time. The time increments may vary depending on the GRIB file.

Once Animate has been selected, turn the rotary knob to adjust the time dial. This will change the time and date of the overlay.

The time shift shown in the time dial will be relative to the current time as provided by a GPS unit connected to the NSO system.

As a GRIB file ages it will be possible to see the historic data represented in minus hours until the file becomes outdated. Once it is outdated it reverts to the time frame being relative to the earliest forecast in the file.

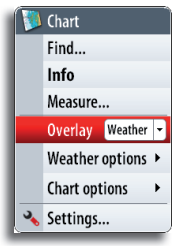
If no current time is provided via GPS then the GRIB file time is only relative to the earliest forecast in the file and will not show a real time weather representation.

Sirius weather (North America only)

When connected to a Navico Weather Module MKII, you can subscribe and include Sirius audio and Sirius Marine Weather Service on your NSO system.

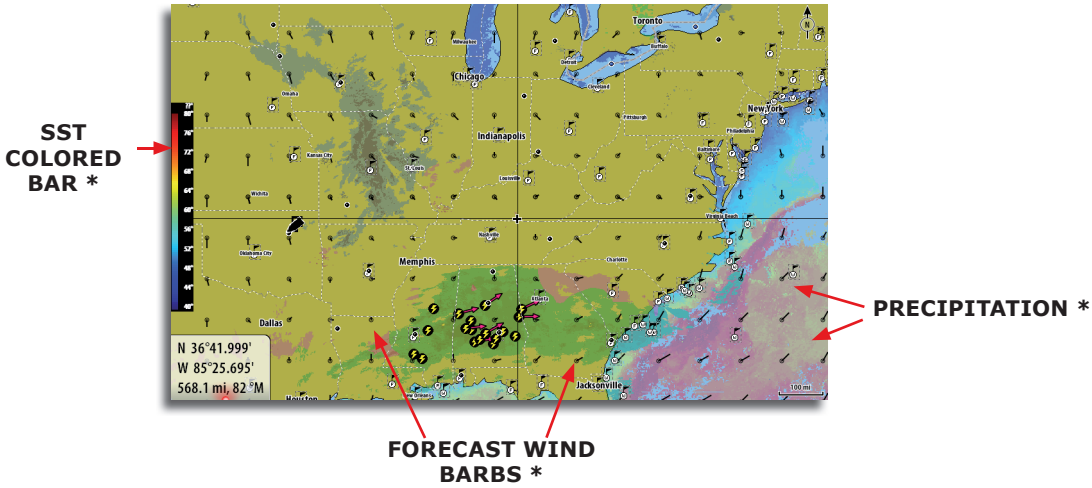
Sirius audio and weather service covers inland US waters and coastal areas into the Atlantic and Pacific oceans, Gulf of Mexico and the Caribbean Sea.

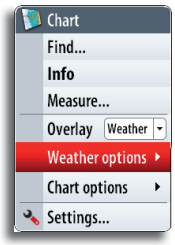
The audio and weather products received vary depending on your selected subscription package. For more information refer to www.sirius.com.



The Sirius weather option can be displayed as overlay to your chart panel.

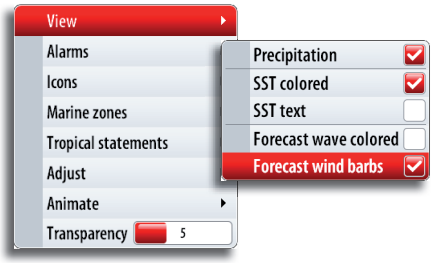
When activated, weather options become available in the Chart menu.





** Optional weather image items*

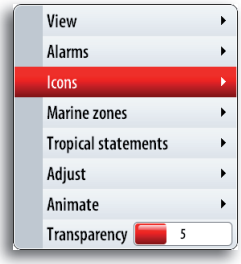
You turn the optional weather graphics on/off individually.



Setting up the Sirius weather image

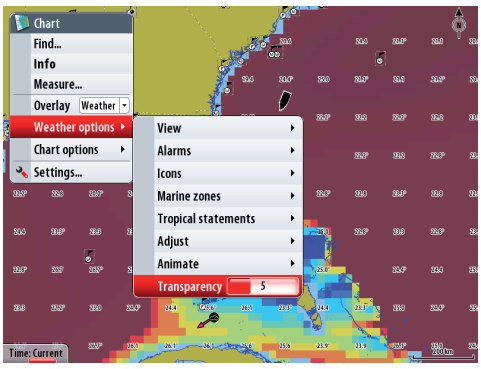
Weather icons

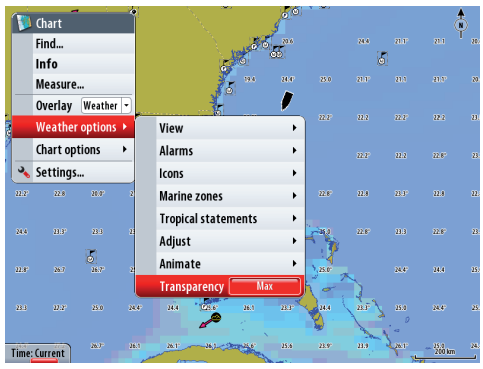
The NSO system use different icons to present weather conditions. The weather icons can be turned on/off individually.



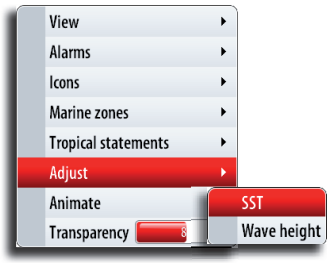
Weather overlay transparency

The transparency sets the opaqueness of the weather overlay.





Color codes



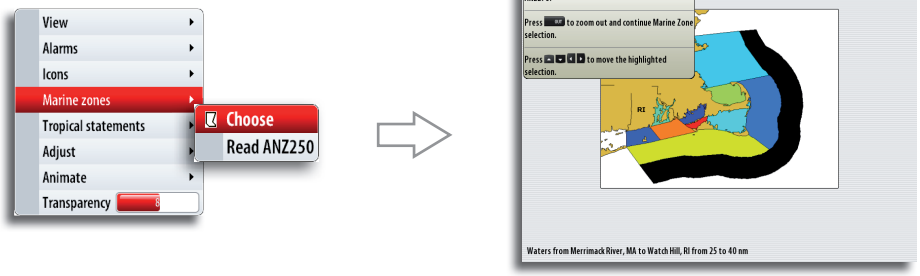
The system uses shades of color on the weather image to indicate sea surface temperature (SST), and also for indicating wave height.

By adjusting these limits you can select how the system uses the color scheme to separate between warm/cool water and minimum/maximum wave height.

Sirius Weather forecast

Selecting a marine forecast zone

You can setup the system to read the forecast for a selected area.



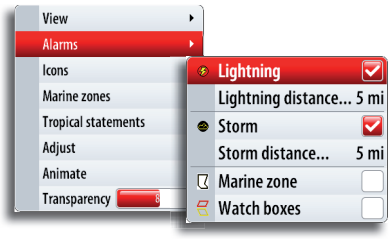
The context help in the dialog shows how to use the keys to select marine zone.

If no area is selected the system will read the forecast for your current vessel position.

Tropical statements

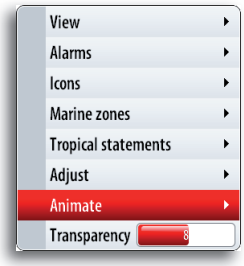
You can read tropical statements including information about tropical weather conditions. These statements are available only for specific areas.

Sirius weather alarm settings



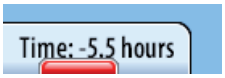
You can define several alarms to warn you when severe weather forecast is received within the specified range of your vessel, within your selected marine zone or within a specific range from your vessel (watch box).

Animating Sirius weather graphics



The animated weather options gives you a graphic overview of how the weather conditions changed for a selected period. This can be used as a guide to potential fishing and sailing conditions in the immediate future.

When activated the time for the current graphic animation will be displayed in the lower left corner of the chart panel.



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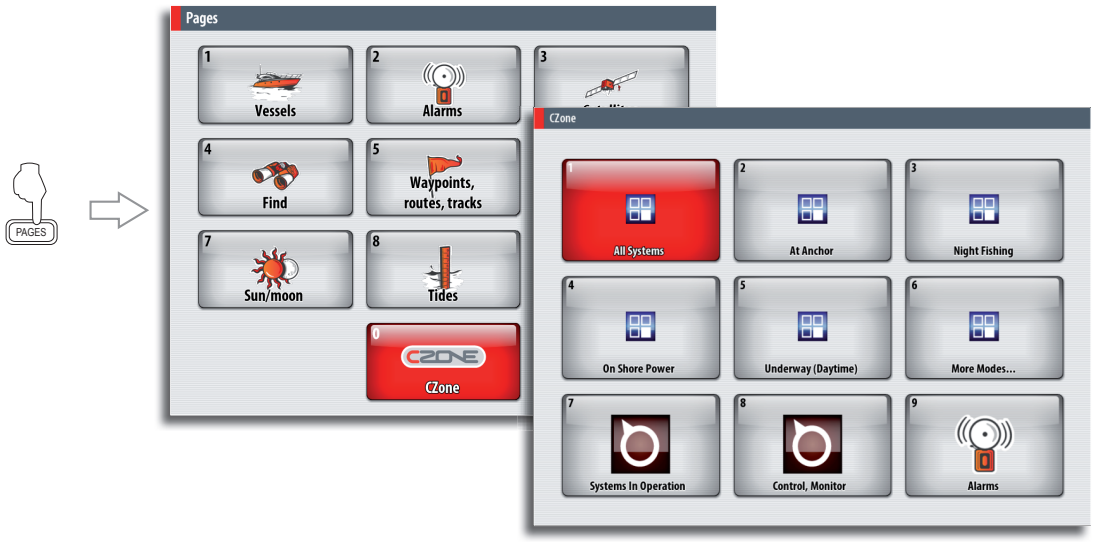
16 BEP CZone

The NSO system intergrate with BEP's CZone system used for controlling and monitoring a distributed power system on your vessel.

A separate manual will be provided with your CZone system. Refer to this documentation and to the NSO Installation manual for how to install and configure the CZone system.

The BEP CZone panel

When the CZone system is connected and configured, the CZone icon will be available on the Pages panel. This icon gives access to the CZone panel, providing icons for ZCone modes and system overview.



CZone modes

The CZone modes provide a one press functionality that allows multiple circuits to be controlled efficiently. The modes are configured during installation of the system.

All available modes will be displayed on the CZone panel.

If there are more than 6 modes configured on screen the rest of the modes will move to a page shown under the More Modes option.

CZone system overview options

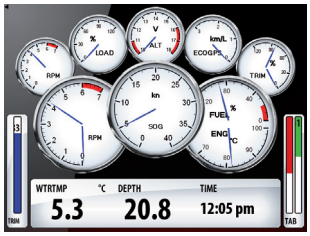
Enables you to monitor all on board parameters including tank levels displayed in graphical, percentage and volume remaining formats.

Shows control options and monitoring information.

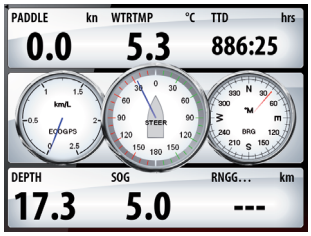
Displays visual and audible alarms that can be set for high and low levels.

The BEP CZone info panel

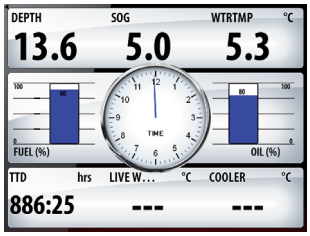
When the CZone is installed and configured, an additional CZone dashboard will be added to the Instrument panels.



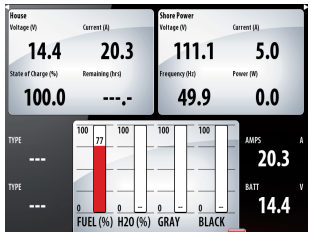
Vessel dashboard



Navigation dashboard



Angler dashboard



CZone dashboard

You switch between a panel's dashboards by using the left and right arrow keys or by selecting the dashboard from the menu.

Editing the CZone dashboard

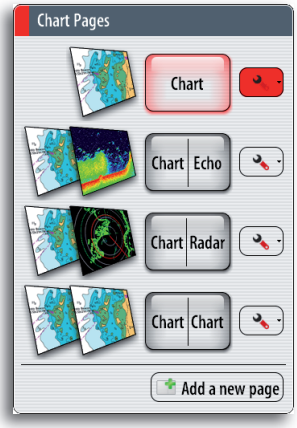
You can customize CZone dashboard by changing the data for each of the gauges. Available editing options will depend on the type of gauge selected for editing, and which data sources are connected to your system. Refer to the Info panel section.

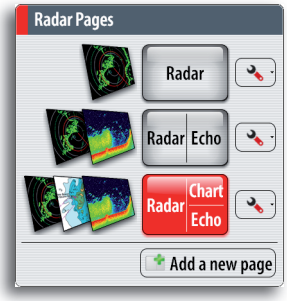
17 Customizing your system

Page setup

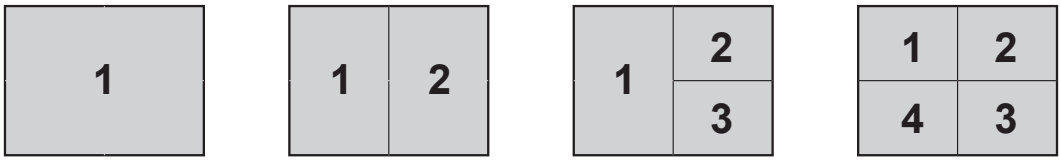
Your NSO system includes a set of predefined pages for each page group accessed by the Direct Access Key (DAK). The list of available pages is displayed when you press the DAK for the active page.

Each page group can have up to 5 pages, organized as single panels or as a combination of panels. The first item in each page list will always be a full size page for the panel related to that page group.





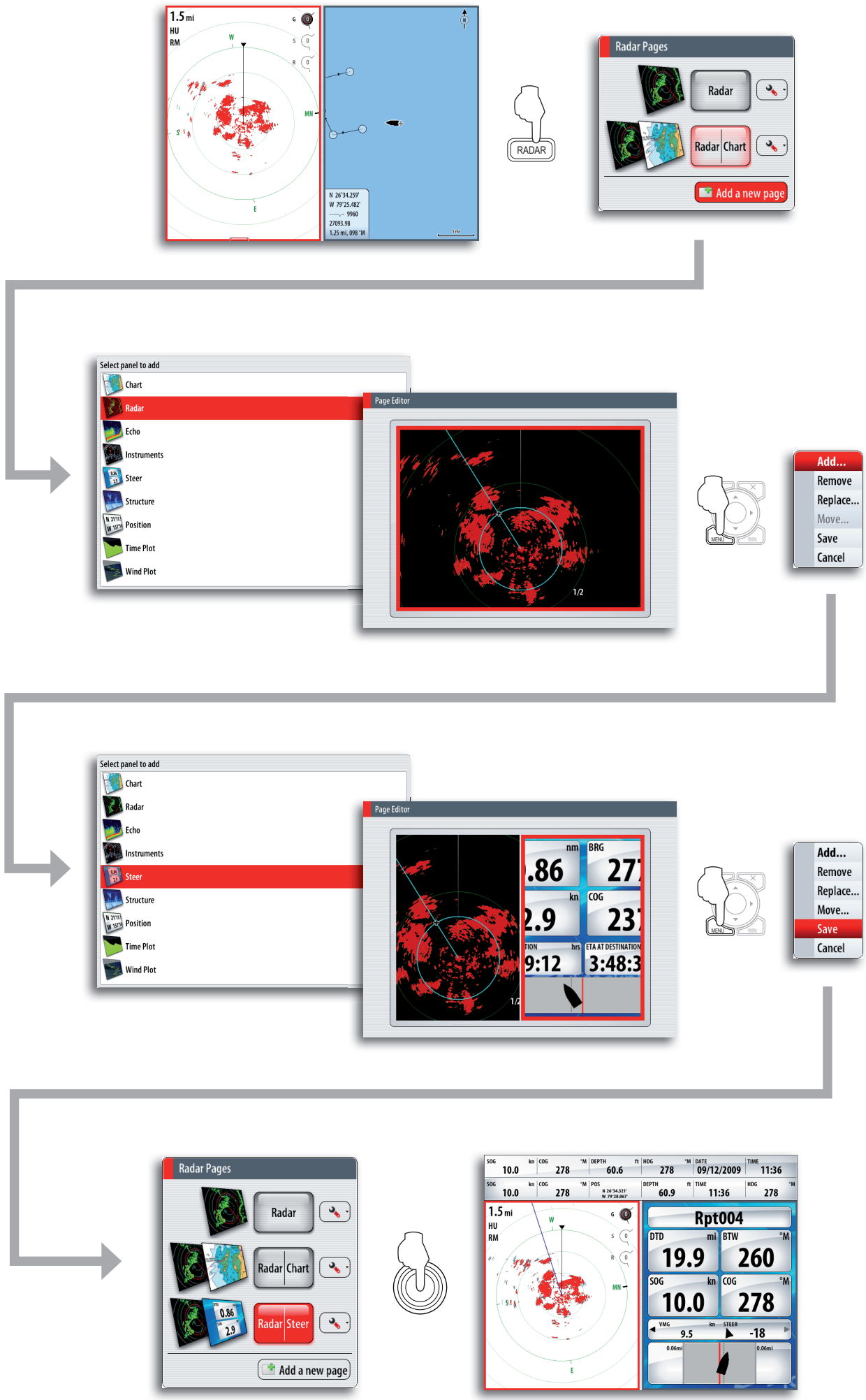
There can be up to 4 panels on each page, and the layout can be arranged as illustrated below. The numbers indicated on each page shows the order in which the panels will be added.



The graphics on the next page illustrates how a page is added and panels defined for the RADAR page group. The process is identical for each page group.

You can add, remove and replace panels from the same menu.

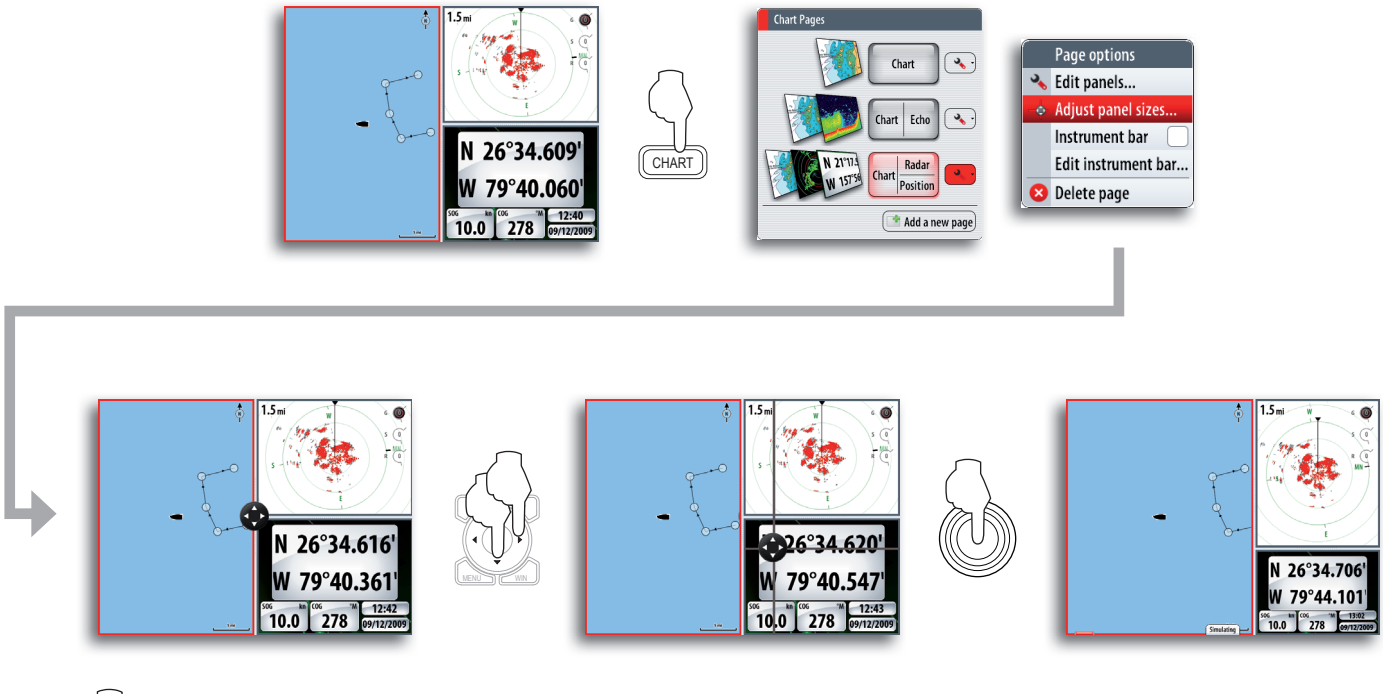
☞ *The illustration does not indicate how you use the rotary knob to maneuver in the menu and confirm a selection. This is described in the **Basic Operation** section.*

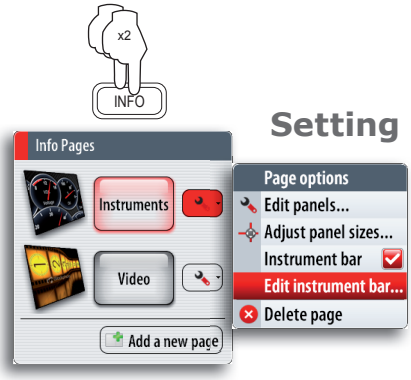

1.5 mi
HU
RM
RADAR
Radar Pages
Radar
Radar | Chart
Add a new page
Select panel to add
Chart
Radar
Echo
Instruments
Steer
Structure
Position
Time Plot
Wind Plot
Page Editor
1/2
Add...
Remove
Replace...
Move...
Save
Cancel
nm
BRG
kn
COG
ETA AT DESTINATION
Radar | Steer
SOG
DEPTH
HDG
DATE
TIME
Rpt004
DTD
BTW
VMG
STEER

Adjusting panel size

You can adjust the size of the panels in a multi panel's page by pressing the page group's DAK.

The illustration below shows how you change the size of a 3-panels Chart page.



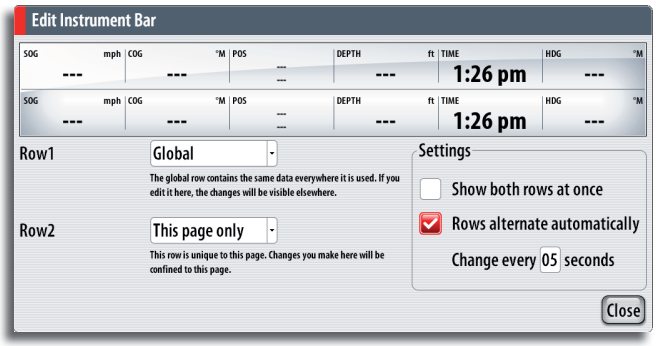


Setting the appearance of the instrument bar

Data sources connected to the system can be viewed in an instrument bar on top of your screen.

You can choose to turn the instrument bar off; display either one or two rows, or set it to alternate the rows automatically.

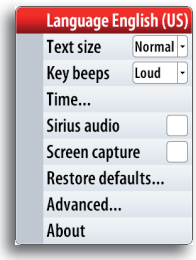
You can also select to show it on a specific page only, or on all pages.



Selecting data sources

1. Turn the rotary knob to highlight the instrument bar on top of the dialog
2. Press the rotary knob to highlight the first instrument field
3. Rotate the knob to select data source, and press the knob to confirm
4. Use the rotary knob to move to next data field
5. Continue using the rotary knob until all data fields are defined
6. Press the **X** key to return to normal operation

Changing system settings



The system settings menu provides access to advanced settings for your NSO system and determines the way your system displays various user interface information on the display.

Selecting language

When you select your desired language; all panels, menus and dialogs will change accordingly.

Text size

Used for adjusting the size of the text on the menus.

Default setting: Normal

Key beeps

A tone (key beep) will sound when any key is pressed on your OP40 unit.

Default settings: On

Time

Allows you to select time format, date format and account for differences in time zone when using the NSO system in a different time zone (Local Offset).

Sirius Audio

Used for activating the Sirius satellite radio function (US only).

Screen capture

Allows you to use the **PWR** key for capturing the screen image.

The image files can be moved or copied to an SD card. Refer to the ***Pages*** section.

Restore defaults

Allows you to restore all settings back to factory default.

Advanced

Contains advanced setup features.

About

Displays your system's current software version.

18 The alarm system

The NSO system will continuously check for dangerous situations and system faults while the system is running. When an alarm situation occurs, an alarm message will pop up on the screen.

If you have enabled the siren, the alarm message will be followed by an audible alarm.

The alarm is recorded in the alarm listing so that you can see the details and take the appropriate corrective action.

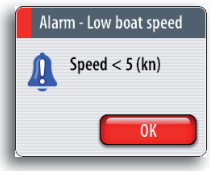
Type of messages

The messages are classified according to how the reported situation will affect your vessel. The following color codes are used:

COLOR	IMPORTANCE
Red	Vital
Orange	Important
Yellow	Standard
Blue	Warning
Green	Light warning

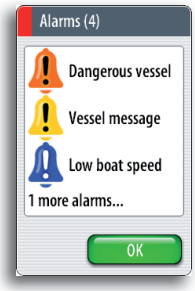
Single alarms

A single alarm is displayed with the name of the alarm as the title, and with details for the alarm.



Multiple alarms

If more than one alarm is activated simultaneously, the alarm message will display a list of up to 3 alarms. The alarms are listed in the order they occur with the alarm activated first at the top. The remaining alarms are available in the Alarm listing. Refer to ***The Pages*** section.



Acknowledging a message

The following options are available in the alarm dialog for acknowledging a message:

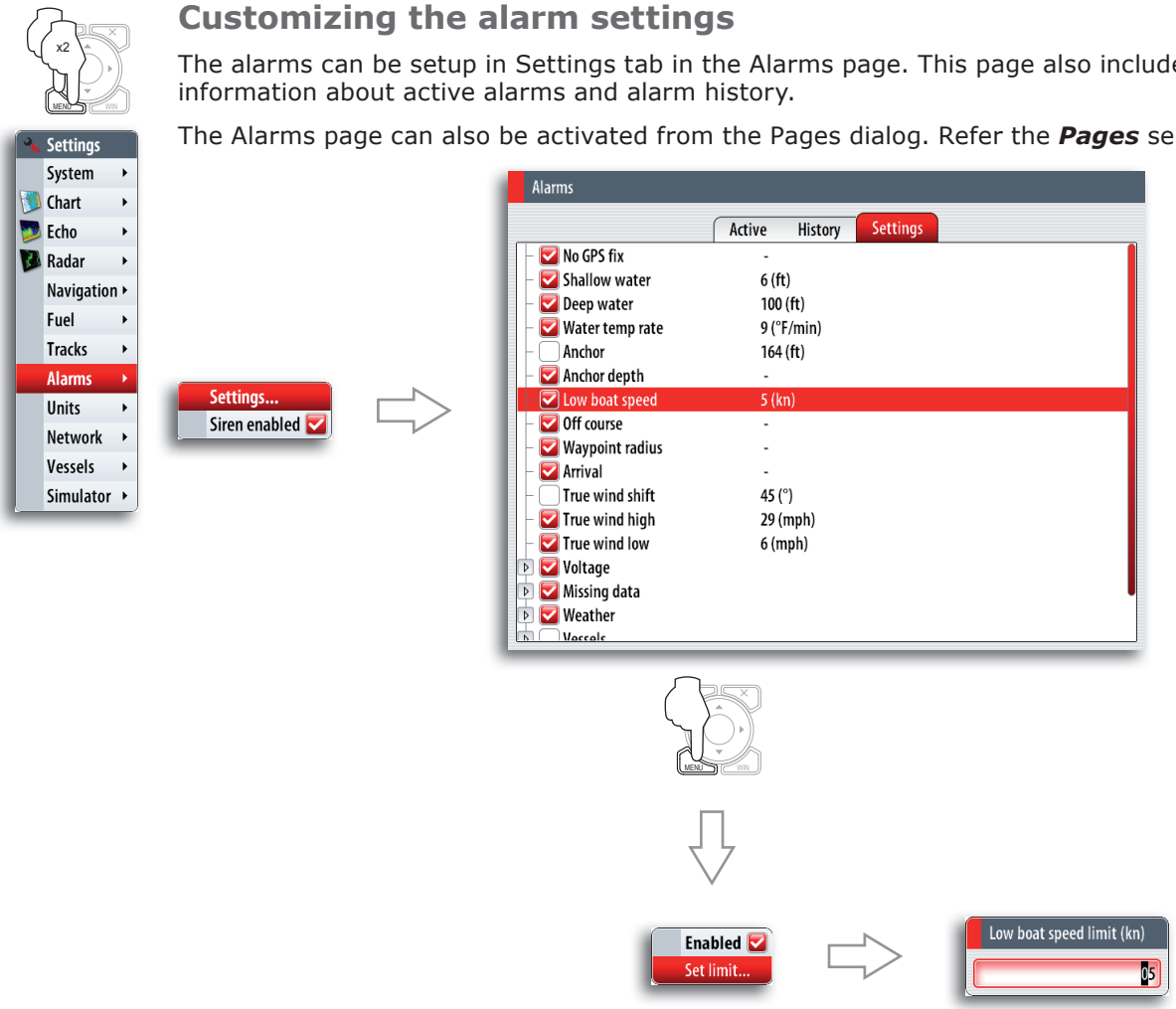
OPTION	RESULT
OK	Sets the alarm state to acknowledged, meaning that you are aware of the alarm condition. The siren / buzzer will stop and the alarm dialog will be removed. The alarm will however remain active in the alarm listing until the reason for the alarm has been removed.
Disable	Disables the current alarm setting. The alarm will not show again unless you turn it back on in the Alarm settings dialog.

There is no time-out on the alarm message or siren. These remain until you acknowledge it or until the reason for the alarm is removed.

Customizing the alarm settings

The alarms can be setup in Settings tab in the Alarms page. This page also includes information about active alarms and alarm history.

The Alarms page can also be activated from the Pages dialog. Refer the ***Pages*** section.



The alarms are described in the chapter describing the corresponding feature. E.g. vessel alarms are described in the ***Tracking other vessel's movement*** section.

19 Maintenance

Preventive maintenance

The NSO unit does not contain any field serviceable components, therefore the operator is required to perform only a very limited amount of preventative maintenance.

It is recommended that you always fit the supplied protective sun cover when the unit not is in use.

Simple maintenance procedures

Cleaning the display unit

Clean the housing and the front glass of the display and OP40 unit with a damp cloth and mild detergent.

Checking the keys

Make sure that no keys are stuck in the down position. However, if one is stuck, wiggle the key to free it back to normal.

Checking the connectors

The connectors should be checked by visual inspection only.

Push the connector plugs into the connector, if the connector plugs are equipped with a lock; ensure that this is in the correct position.

Software upgrades

The latest software for the NSO will be available for download from our website; www.simrad-yaching.com.

Detailed instructions for how to install the software will follow the upgrade files.

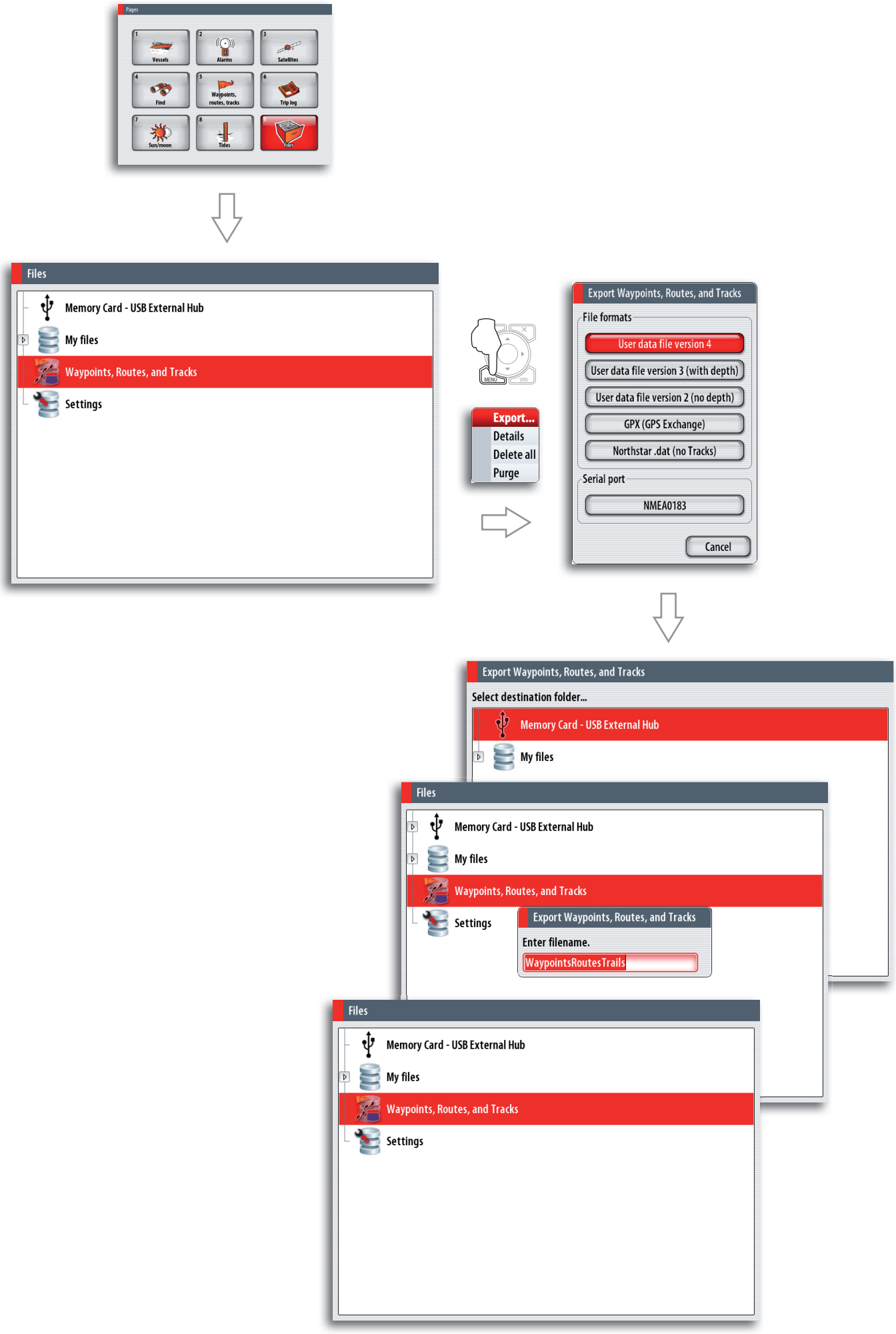
For more details about software upgrades, refer to the separate Installation manual.

Backing up your system data

Waypoints, routes, tracks that you create on your system are filed on your system. It is recommended to regularly export these files and your settings file as part of your back-up routine.

The files are exported to an SD card inserted in the separate card reader.

An illustration on the next page shows the process when exporting waypoints, routes and tracks. Other files are exported by the same process.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2 Alarms
3 Satellites
4 Find
5 Waypoints, routes, tracks
6 Trip log
7 Sun/moon
8 Tides
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Files
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Memory Card - USB External Hub
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Export Waypoints, Routes, and Tracks
Enter filename.
WaypointsRoutesTrails
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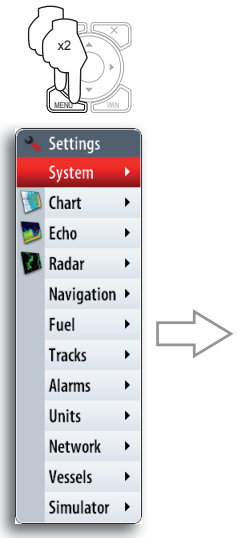
My files
Waypoints, Routes, and Tracks
Settings

20 Menu overview

Settings menus



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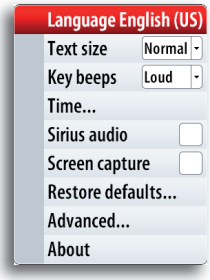
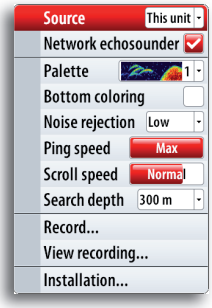
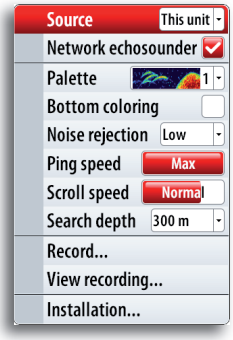


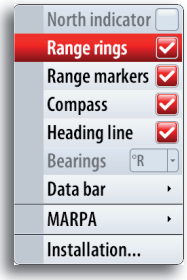
Chart



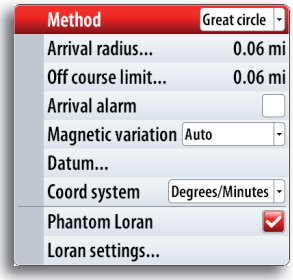
Echo



Radar

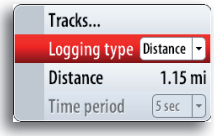


Navigation



Fuel

Tracks



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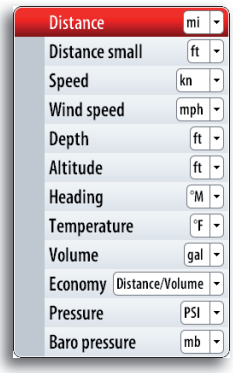
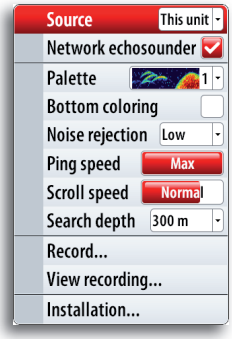
Units



Network

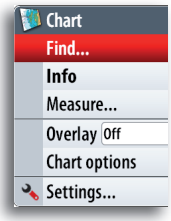


Vessels

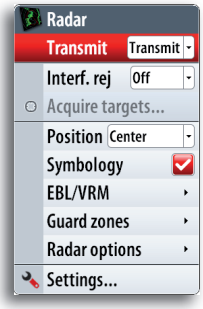
Simulator

Context menus

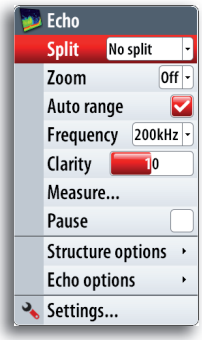
Chart



Radar



Echo



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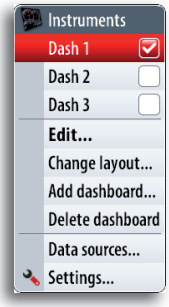
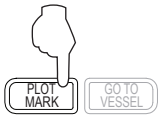


Plot menu



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