Radar

App Guide

English

Software version: 2.1

NSS® 4 | Zeus® SR

NSX® | Zeus® S

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Warranty

This product's warranty is supplied as a separate document.

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This product's safety, disclaimer and compliance statements are supplied as a separate document.

Internet usage

Some features in this product use an internet connection to perform data downloads and uploads. Internet usage via a connected mobile/cell phone internet connection or a pay-per-MB type internet connection may require large data usage. Your service provider may charge you based on the amount of data you transfer. If you are unsure, contact your service provider to confirm rates and restrictions.

More information

Document version: 001

This document was prepared using software version 2.1.

Features described in this document may vary from your unit due to connected devices, settings, brand, and continuous software development.

For the latest version of this document in supported languages, and other related documentation, visit **www.simrad-yachting.com/downloads** or **www.bandg.com/downloads**.

Contact us

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OVERVIEW

A radar system consists of a transmitter that produces radio waves, a transmitting and receiving antenna, and a receiver and signal processor. Radio signals (pulsed or continuous) from the transmitter reflect off an object and return to the receiver, giving information about the object's location, direction, and speed.

Objects may be at or above water level (including vessels, markers, and weather patterns) and these objects are displayed relative to your current location.

REQUIREMENTS

To use the Radar app, a radar must be connected to the system.

This guide describes features and options for a variety of supported radars. The features and options available on your display vary based on the connected radar.

The following features require a good-quality (10 Hz) position and heading sensor connected to the NMEA 2000® network:

- AutoTrack
- ZoneTrack
- VelocityTrack
- Watched targets (MARPA)
- North up orientation
- Radar overlay function for charts

Legacy Simrad® HD radars

This functionality applies to Simrad® devices only.

Simrad® HD magnetron radars, including the 6 kW, 10 kW, and 25 kW models operated by WinCE processor boxes, are supported.

Tuning

If a Simrad® HD magnetron radar is connected, tuning it occurs during the sea trial (in the Setup guide). Automatic tuning will work well in most installations. Manual tuning is used if it is required to adjust the result from an automatic tuning.

➔ ***Note:*** *For further details, refer to the installation manual for your radar.*

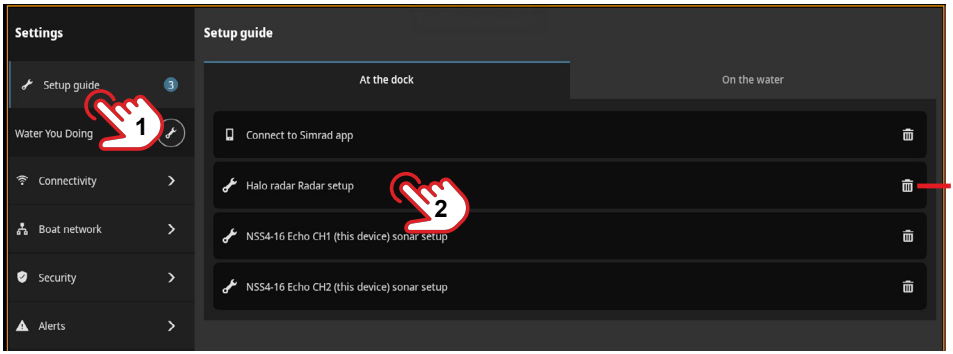
RADAR SENSOR SETUP

When you first connect a radar to the system, a pop-up gives you access to the **Setup guide**. Select the pop-up to start setting up your radar sensor.

Alternatively, select on the home screen to open the **Settings** menu, then select **Setup guide** (**1**). Select your radar from the list of setup tasks (**2**).

➔ ***Note:*** *Select the trashcan icon (**A**) to dismiss a task from the **Setup guide**.*

➔ ***Note:*** *The **Setup guide** disappears from the **Settings** menu when all setup tasks are complete or dismissed. To change your settings at a different time, navigate to **Boat network > Devices** and select your radar from the list of devices.*



At the dock

Allow approximately 5 minutes to complete the **At the dock** settings for the radar.

From the **At the dock** menu, select **Radar setup** (**2** above). Follow the steps on screen to:

- Give the radar a name.
- Input the antenna length, height, park angle, and accent light brightness level.

➔ ***Note:*** *The settings presented depend on your radar model. Antenna length and park angle settings are for open array radars only.*

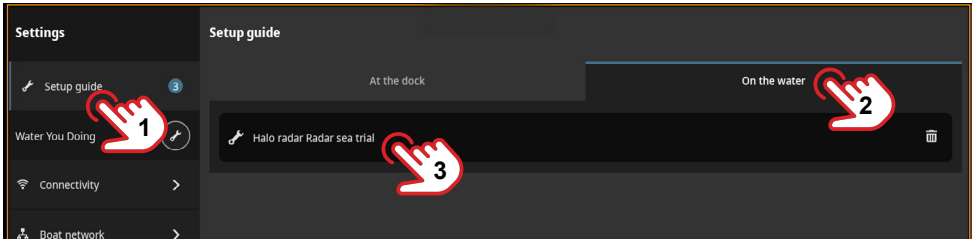
➔ ***Note:*** *The radar accent lighting may require approval for use from your local boating authority.*

Select **Finish** to save the settings and unlock the **On the water** settings.

On the water

➔ *Note: The **On the water** section is grayed out (and cannot be selected) until all the radar's **At the dock** settings are completed.*

In the **Settings** menu, select **Setup guide** (**1**) **> On the water** (**2**) and open the sea trial (**3**).



Allow approximately 10 minutes to complete the **On the water** settings for the radar. You will be on your boat with the radar operating.

This sea trial must be performed in calm conditions at a safe distance from traffic, however, you will need a visible long straight wall or jetty to set the range offset, and a stationary landmark or buoy to set the bearing alignment.

When you open the sea trial, your MFD will guide you through the list of settings below.

Sector blanking

The sector blanking feature stops the radar from transmitting in the direction of a structure on the boat such as a mast that could cause unwanted reflections or interference on the radar screen.

For more information, refer to **Blind sectors** on page 49.

➔ *Note: Apply sector blanking carefully, so you don't reduce the radar's usefulness in identifying valid targets.*

Set the range offset

Folllow the instructions on screen to point your vessel toward a long straight jetty or wall. Move the range offset slider up or down until the straight wall appears as a straight line on the radar screen.

Set the bearing alignment

Bearing alignment aligns the heading marker on the radar screen to your vessel's center line, accounting for small misalignments of the radar antenna. Follow the instructions on screen to move the bearing alignment slider up or down, until the bearing marker on the radar screen lines up with the target you selected.

Set sidelobe suppression

Increase sidelobe supression to reduce false returns.

For more information, refer to **Sidelobe echoes** on page 49.

➔ *Note: Apply suppression carefully, because setting suppression too high could hide real targets.*

Tune the radar

➔ *Note: Tuning applies for Simrad® HD magnetron radars only.*

Set local interference rejection

Follow the instructions on screen to increase this setting if you suspect an on-board source is interfering with the radar (this could appear as a large target on screen that remains in the same relative bearing even when your vessel changes direction).

When all settings are completed, select **Finish** to apply the installation settings and exit the setup guide.

View or change installation settings

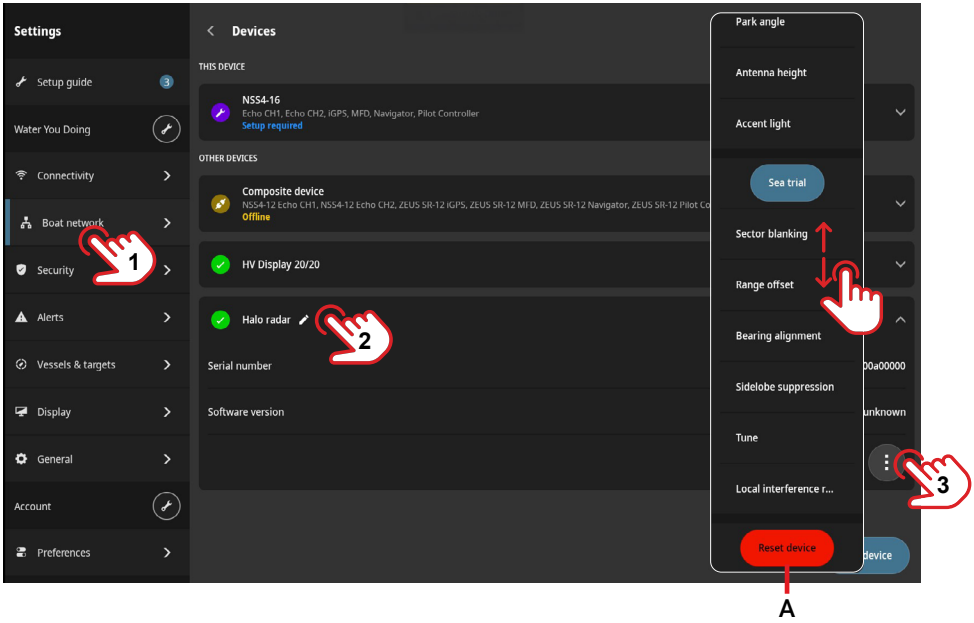
To access any of the radar's installation settings, navigate to **Settings > Boat network** (**1**) **> Devices**, and select your radar's name (**2**) from the list of devices.

Select the more button (**3**) to open the list of installation settings.

Choose the setting you want to reconfigure.

Reset the radar

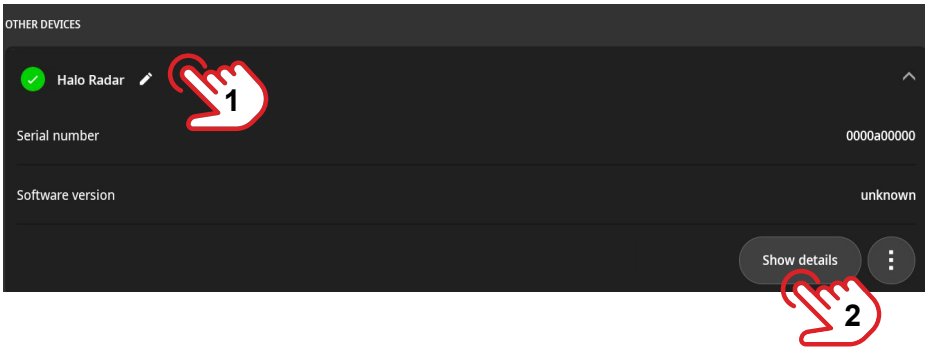
To clear all the radar's settings, select **Reset device** (**A**, below) at the bottom of the installation settings menu.



View radar status

To see status messages for the radar, and information about the radar software, navigate to **Settings > Boat network > Devices**, and select your your radar's name (**1**) from the list of devices.

Select **Show details** (**2**) to show radar information and radar status.



You can access the following information in the **Show details** section for the radar:

- Device name
- Device type
- Device model
- Serial number
- IPv4 address
- Software version
- Operating hours

The radar status section under **Show details** contains the following status information:

- Radar LED status lights
- Heading on radar
- Radar overlay
- Target tracking status
- Heading on network
- GPS on network

OPERATE THE RADAR

> ⚠ **WARNING:** Refer to the documentation for your radar for instructions about safe radar operation. Ensure no one on the boat is beside the radar antenna when the antenna is transmitting (powered on). A radar could be transmitting even if your screen is displaying a different app.

From the home screen on your multi-function device (MFD), select the radar icon to open the radar app.

Simrad®-branded displays

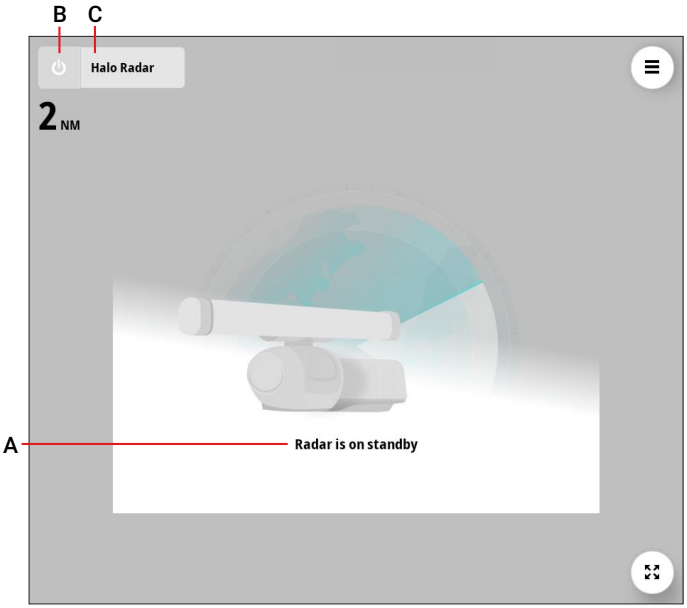
B&G-branded displays

Transmit and standby

When the radar is not transmitting, **Radar is on standby** (**A**) displays.

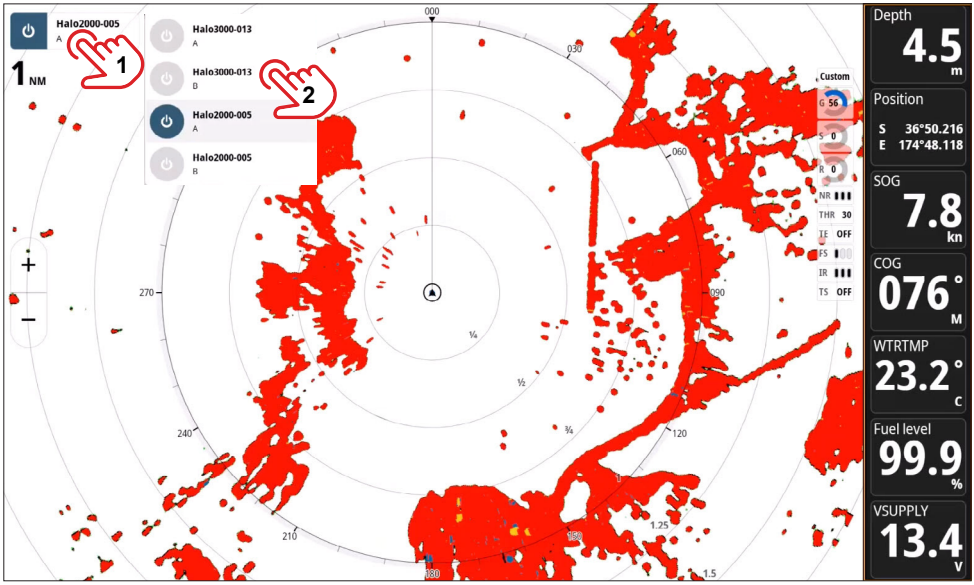
Select the power button (**B**) to toggle the named radar (**C**) between transmit (on) and standby (off) mode.

Touch the name of the radar (**C**) to show the list of other connected radars.



Select radar source

If more than one radar source is available, select the name of the radar currently displayed on the radar screen (**1**) to open the list of radars. Then select the radar whose data you want to display on screen (**2**).



Dual range

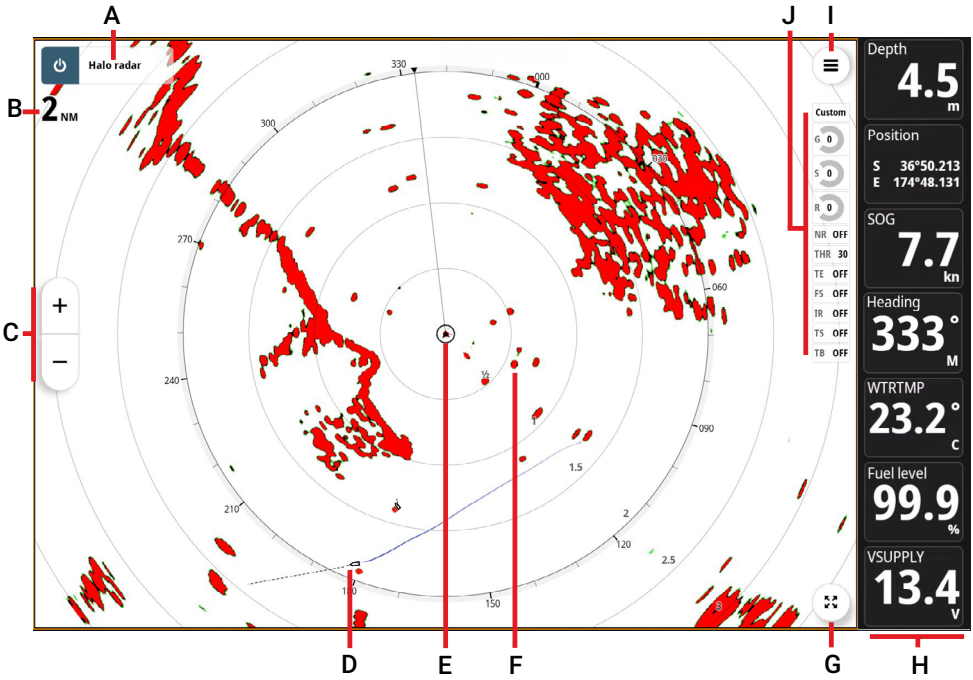
Some radars, such as Halo, Halo 2000/3000, Halo 20+ and Halo 24 can operate on dual range with each range behaving as a radar source.

To display data from two radar sources on the same multi-function display, create a new app group. Select one radar source to display in the first half of the app group, and select another radar source to display in the second half of the same app group.

➔ ***Note:*** *Refer to the System Guide for your MFD for how to set up a new app group.*

➔ ***Note:*** *In some cases, if two radars transmit at the same time on the same vessel, interference will occur.*

NAVIGATING THE RADAR DISPLAY



A Name of radar source.

B Current range on display — the compass ring and bearing markers, if enabled, are drawn on the display at this range.

C Zoom buttons — use **+** to zoom in, and **–** to zoom out.
To zoom you can also:

- use the scroll wheel on the multi-function display;
- pinch-to-zoom on the screen;
- tap-tap-drag with a single finger on screen.

D Example of an AIS target.

E Your vessel.

F Example of a radar target.

G Maximize button — select to maximize the screen. When the screen is maximized, the button changes to a minimize button.

H Instrument bar — refer to the Instrument Bar App Guide for information about how to customize the instrument bar.

I Radar settings button — touch to open the radar settings menu.

J Current mode, and current radar settings.

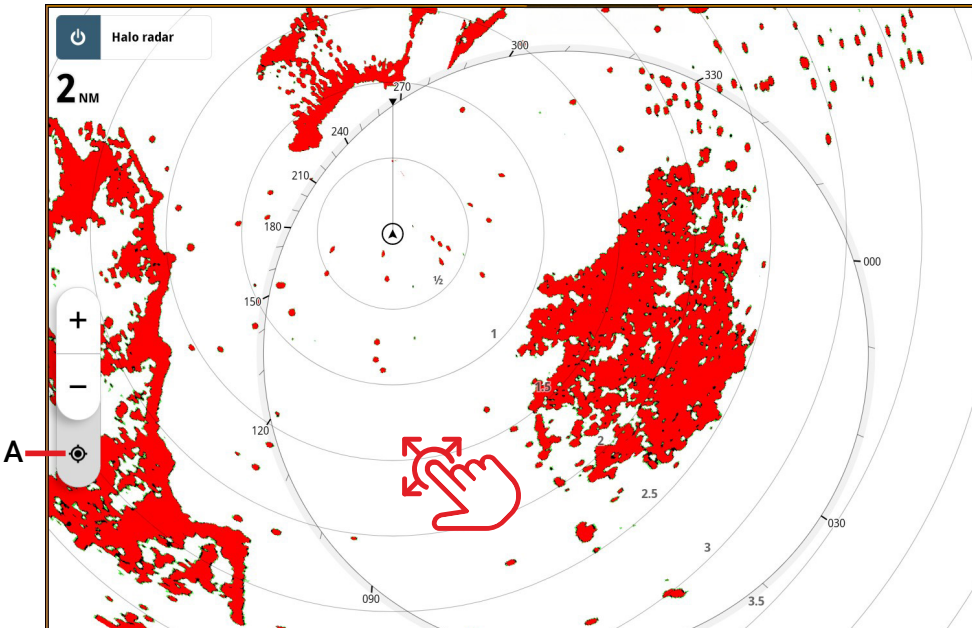
➔ ***Note:*** *After 30 seconds of inactivity, the screen enters declutter mode. In declutter mode the radar settings menu and maximize buttons (**G** and **I**) are hidden, and the zoom buttons (**C**) become transparent. Tap the screen to restore buttons.*

Panning the screen

You can pan (drag) the radar screen in any direction to view in front, behind or to the side of your vessel. However, you cannot pan so your vessel disappears off the screen.

To recenter your vessel on the screen, select the center vessel button (**A**).

➔ *Note: The center vessel button is only visible if your vessel is not already at the center of the display.*



EBL AND VRM

The electronic bearing line (EBL) and variable range marker (VRM) allow measurements of bearing and range to vessels and landmasses within radar range. You can place two EBL/VRMs on the radar screen.

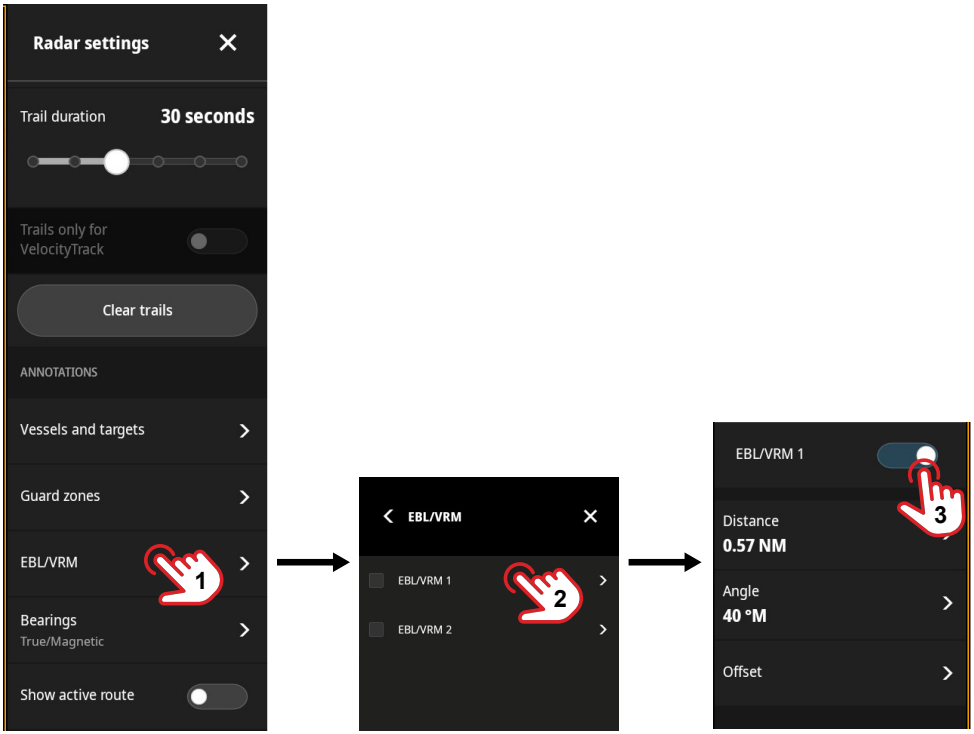
➔ *Note: Touch the radar screen once to display the bearing and range to that cursor position.*

Define an EBL/VRM

Select  on the radar screen to open the **Radar settings** menu.

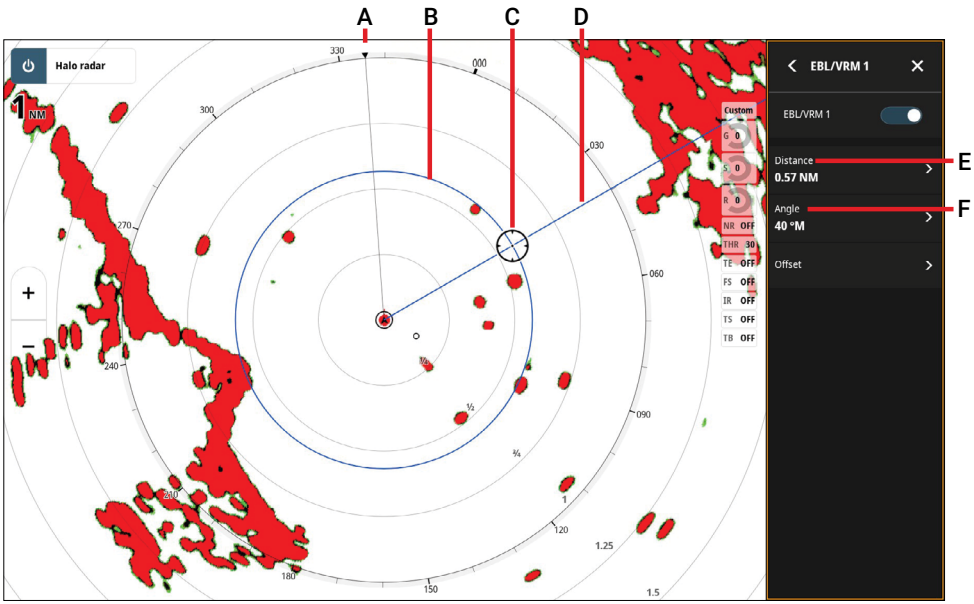
Scroll down and select **EBL/VRM** (**1**).

Select the EBL/VRM you want to edit (**2**) and use the toggle (**3**) to show the EBL and VRM on screen.



Touch the EBL/VRM cursor (**C**) and drag it to any position of interest on screen.

The values for the range (**Distance**, **E**) and bearing (**Angle**, **F**) change as the cursor moves on screen, allowing you to make your readings from the screen.



A Your vessel's course
B Variable range marker (VRM)
C EBL/VRM cursor
D Electronic bearing line (EBL)
E Distance from your vessel to the cursor
F Bearing to the cursor (**M** stands for a magnetic bearing)

To create an EBL and VRM at specific values for the bearing and range, open each of **Distance** (**E**, above) and **Angle** (**F**, above) and adjust their values.

By default, the EBL and VRM are positioned from the center of your vessel. You can offset the reference point to any selected position on the radar screen.

BEARINGS

Bearings displayed on the radar screen can be compass bearings, or relative bearings.

Compass bearings are measured clockwise from true north or magnetic north, depending on your compass.

Relative bearings are measured clockwise from your vessel's heading.

Change bearing display

To change the bearing display on the radar screen:

Select  on the radar screen to open the **Radar settings** menu.

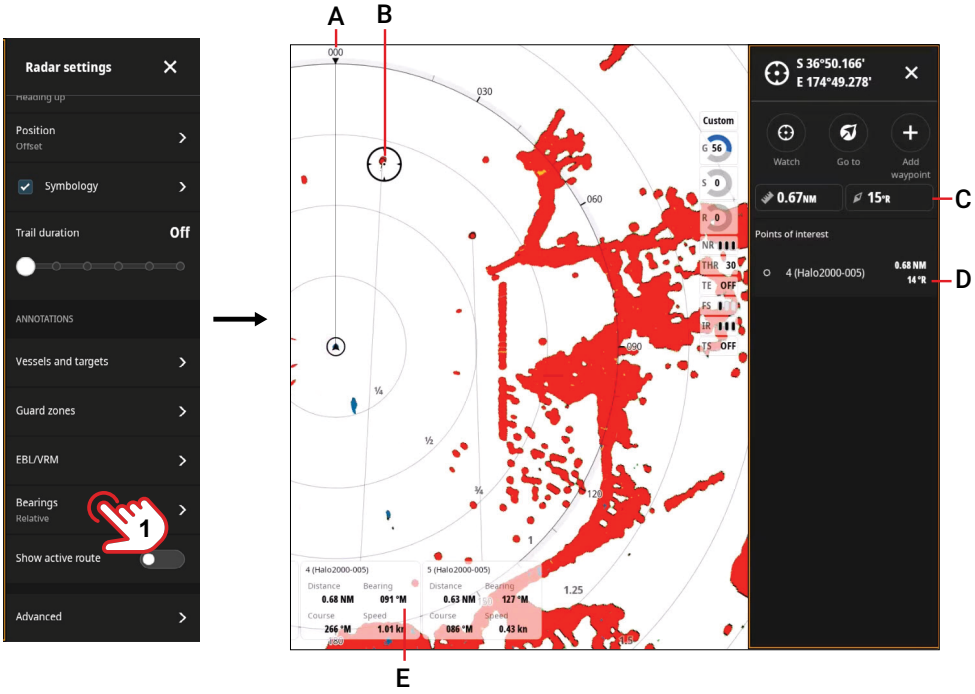
Scroll down and select **Bearings** (**1**), and when the menu opens, choose **True/Magnetic** or **Relative**.

➔ *Note: Data boxes for pinned radar targets always display compass bearings.*

➔ *Note: Changing the bearing displayed in the radar app does not change the bearing displayed in other apps such as Chart or sonar apps.*

When bearings are set to **Relative**, your vessel's heading is 000 on the radar screen (**A**).

When a target is selected for inspection, the bearing of the cursor center (**B**) and the bearings of targets within the cursor (**C**) are given as relative bearings. If you have one or more electronic bearing lines (EBLs) set, these show as a relative bearings too.



A Your vessel's heading displays as 000.
B Target, selected on screen for inspection.
C The center of the cursor is given as a relative bearing.
D The target's bearing is given as a relative bearing.
E Compass bearings to targets are shown on targets' pinned data boxes.

SYMBOLS

Target symbols

A tracked radar target has the symbol below superimposed on the target. If the target is moving, the barb shows the direction of the target's movement.

Refer to **Tracking vessels and targets** on page 23 for information about tracking (watching) targets.

Tracked radar target on screen	Lost target
	

AIS vessels

Automatic Identification System (AIS) information is broadcast from a vessel's AIS transponder, and is independent of your vessel's radar system.

AIS vessel on screen


To display AIS targets on your radar screen:

Select  on the radar screen to open the **Radar settings** menu.

Navigate to **Vessels and targets** > **Adjust target filters**.

Scroll to **Max AIS targets** and select the maximum number of AIS targets to display from the drop down menu.

➔ *Note: AIS vessels also display on your navigation chart in the Chart app.*

Show vessels and targets

To display radar target symbols (including symbols for AIS vessels) on your radar screen:

Select  on the radar screen to open the **Radar settings** menu.

Navigate to **Vessels and targets.**

Use the toggle to enable **Show vessels and targets**.

TARGET ASSOCIATION

The radar return from an AIS vessel may be separate from its AIS symbol on screen, depending on the motion of the vessel and how frequently it broadcasts its AIS updates.

If the system concludes that a radar return and an AIS signal originate from the same object, they will be associated (combined on screen).

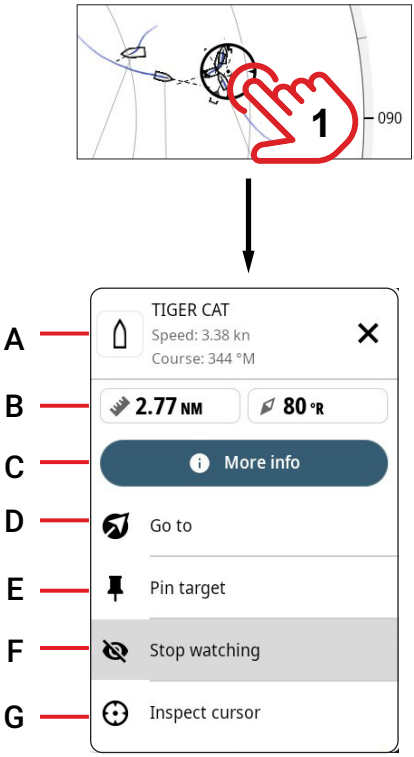
Associated target on screen


INFORMATION AT CURSOR POSITION

To see information about a position or target on the radar screen, touch the screen to place the cursor.

Mini-inspector

Tap the screen to open the mini-inspector on screen for the current cursor position.

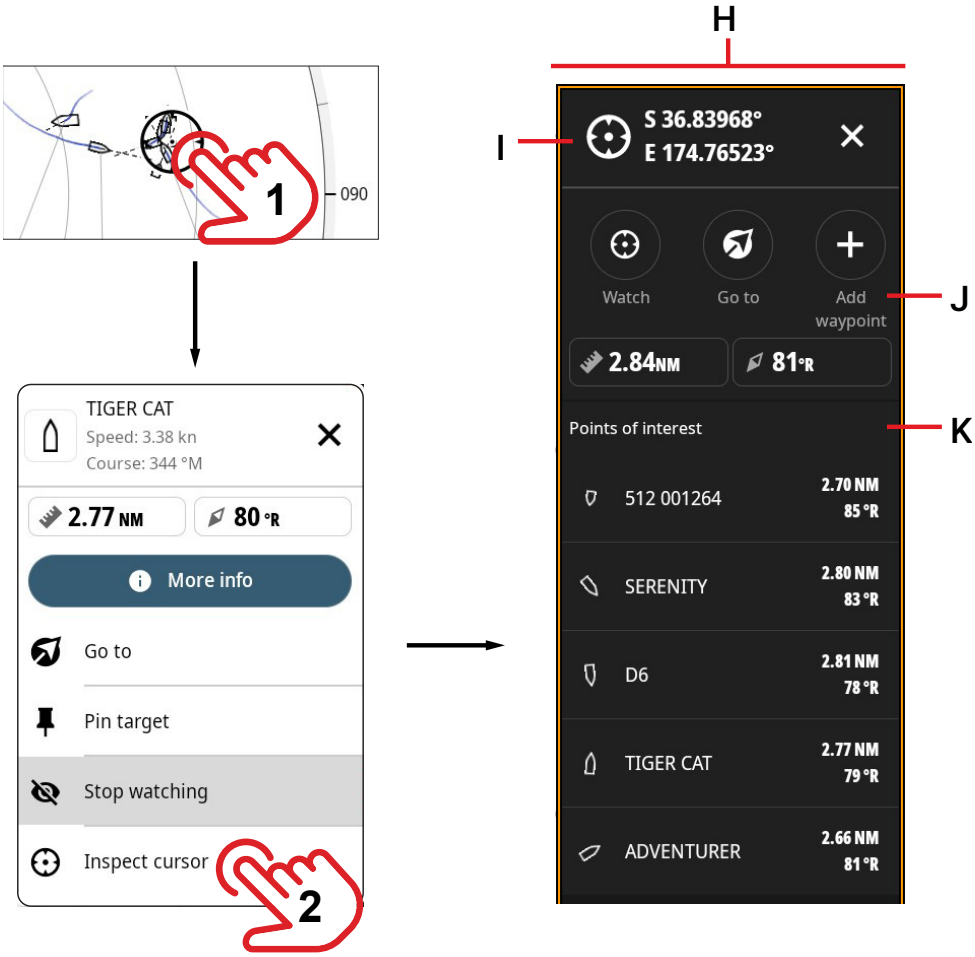


If the cursor (**1**, above) is highlighting a radar target or AIS target, the mini-inspector displays the following information:

A Target ID – for AIS targets, the name of the vessel displays with its speed and course. For watched radar targets, an identification number is used.
B Range and bearing to the cursor center
C More info – for an AIS target, select **More info** to see details for the vessel identified at the top of the mini-inspector (**A**).
D Go to – select **Go to** to prepare a course for navigating your vessel to the cursor position.
E Pin target (or Unpin target)– displays (or stops displaying) information about the target in a data box at the bottom of the radar display. See **Pin a target** on page 26 for more information.
F Stop watching (or Watch) – stop (or start) the radar tracking the target.
G Inspect cursor – opens a list in a panel to the side of the screen, with more information about the targets in the cursor.

Inspect cursor

Select **Inspect cursor** (**2**, below) in the mini-inspector, or use a longer press on screen, to open information about the cursor in a panel to the right of the screen (this avoids the pop-up covering part of your display).



H Inspect cursor panel
I Coordinates of cursor center
J Add waypoint – saves the cursor position as a waypoint
K Points of interest – lists watched radar targets and AIS targets inside the cursor

If the cursor is at a position with no targets, the following information displays:

- Coordinates of cursor center
- Range and bearing to the cursor center
- **Go to** – select **Go to** to prepare a course for navigating your vessel to the cursor position.

TRACKING VESSELS AND TARGETS

Simrad® and B&G radars can track radar targets and inform you about the their current position, current motion, and predicted motion relative to your vessel.

Depending on the radar model, a large number of targets can be tracked simultaneously. They can be selected manually or automatically.

➔ *Note: Target tracking requires active compass and GPS sensors connected to the system.*

Target tracking is combined from multiple ranges and radars, and the tracked vessel and target data is shared across devices on the network.

In addition to the information in this section, see **Target tracking errors** on page 48 for situations that may cause the radar to display inaccurate information.

AutoTrack

AutoTrack tracks targets of interest or potentially dangerous targets automatically, with no interaction needed from the user.

➔ *Note: AutoTrack is available on compatible radars running software version 8.2 or above. 3G, 4G, and Halo 3/4/6 radars do not have the AutoTrack feature.*

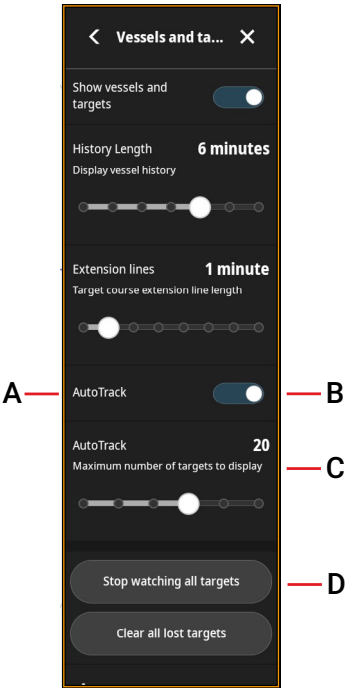
The system selects a target for AutoTrack based on several factors, such as:

- whether the target is dangerous
- how close it is
- its position in relation to your vessel
- how fast it is traveling
- whether it is approaching or diverging

➔ *Note: The region of interest for AutoTrack is related to the dangerous target criteria (see* **Dangerous targets** *on page 27). For best results, use smaller CPA and TCPA values near shore and use larger CPA and TCPA values when offshore.*

Not all targets are tracked automatically when AutoTrack is enabled. For example, a target behind your vessel and moving away from it may not meet the criteria for automatic tracking. You are still able to select a target on screen manually for tracking if you want the system to track the target (see **Manual tracking (Watch target)** on page 25).

To enable AutoTrack, select on the radar screen to open the **Radar settings** menu. Navigate to **Vessels and targets > AutoTrack** (**A**) and enable the setting (**B**).



Move the slider (**C**) to increase the maximum number of automatically tracked targets to display.

Manual tracking (Watch target)

To track a target that is not already tracked, select it on screen and when the mini-inspector opens, select **Watch**.

See **Mini-inspector** on page 21 for information about the mini-inspector.

➔ *Note: When you watch a target, or the system tracks a target using a feature such as ZoneTrack or AutoTrack, a data box can be pinned at the bottom of the radar screen.*

➔ *Note: You cannot watch coordinates if no object is present at those coordinates. You cannot watch AIS targets, because AIS data is received independently of your radar.*

Stop tracking targets

To stop tracking an individual target, select it on screen and when the mini-inspector opens, select **Stop watching**.

To stop tracking all targets, go to **Radar settings > Vessels and targets** and select **Stop watching all targets** (**D**).

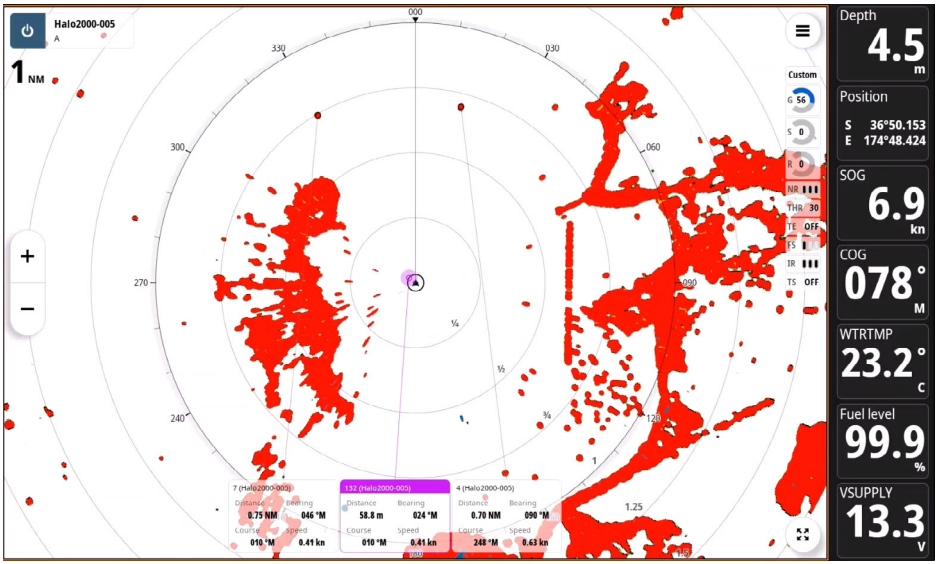
Pin a target

When a radar target or AIS vessel is pinned, information about the object displays in a data box at the base of the screen for easy reference (**A**).

The maximum number of targets pinned depends on the size of your screen. (Targets are prioritized for pinning based on how dangerous they are, with targets you pinned yourself given higher priority.)

The following targets are pinned automatically, but can be unpinned.

- Objects that you are watching
- Objects that are classified dangerous.



Unpin a target

To unpin a target, touch the pinned data box or target on screen, and select **Unpin**.

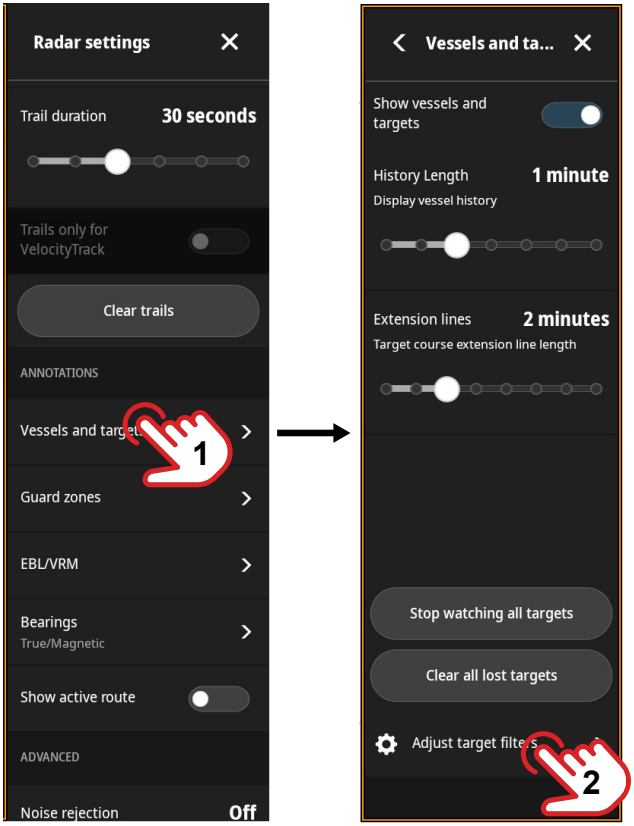
Lost targets

If the radar doesn't receive the anticipated radar return from a target it had been tracking, the target's status changes to lost, and the alert **Tracked target lost** appears on screen.

DANGEROUS TARGETS

To define criteria for dangerous targets:

Select on the radar screen to open the **Radar settings** menu.
Navigate to **Vessels and targets** (**1**) **> Adjust target filters** (**2**).



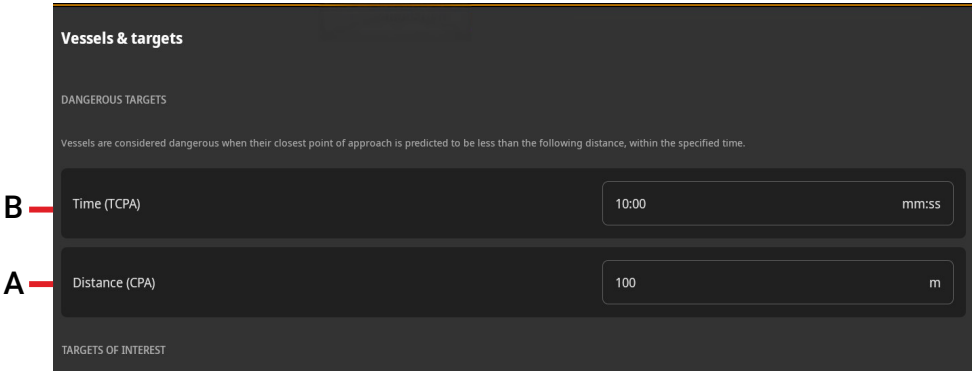
➔ *Note: The **Vessels and targets** menu can also be accessed directly from the main settings menu on your multi-function display.*

Vessels are considered dangerous when:

- their closest point of approach (CPA) is predicted to be smaller than the distance you specify for **Distance (CPA)**, (**A**),

and

- the time until closest point of approach (TCPA) is less than the time you specify for **Time (TCPA)**, (**B**).



➔ *Note: Only targets that are tracked, and AIS vessels, can be monitored for dangerousness. Tracked targets include those that are manually tracked, those that are automatically tracked, and those inside a ZoneTrack zone.*

Dangerous target colors

When a target is classified as dangerous, it is given a color highlight on screen.

The color shown for a dangerous target depends on the palette you've selected for your radar screen (see **Color palettes** on page 35).

Color palette	Red or Green	White	Yellow
Dangerous target highlight	Yellow	Purple	Red

A target's classification may switch between dangerous and not dangerous several times as your vessel and the target move around.

Set system alerts

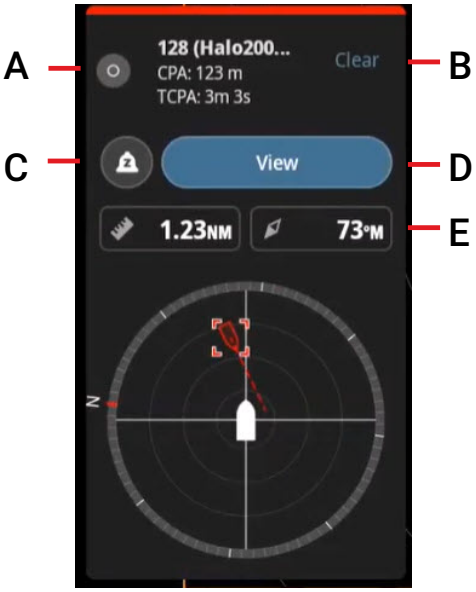
To set a **Dangerous vessel** alert message to appear on screen when a target is classified dangerous:

Select on the home screen to open the main settings menu, and navigate to **Alerts > Add alert**.

➔ *Note: Refer to the System Guide for more information about alerts.*

➔ *Note: The dangerous vessel color highlight, and dangerous vessel automatic pinning, occurs for tracked targets on the radar screen, even if your system alerts are turned off.*

A **Dangerous vessel** alert is shown below:



A Target information

B Clear – select **Clear** to stop an alert.

C Snooze – for situations where you receive many dangerous vessel alerts, such as maneuvering in a marina, select the snooze icon to suspend all dangerous vessel alerts for 5 minutes.

➔ *Note: If a new vessel is classified dangerous during the snooze period, the snoozed system will not raise an alert. After 5 minutes, dangerous vessels that have already triggered a dangerous vessel alert (and continue to meet the dangerous vessel criteria), will raise a new alert.*

D View – select **View** to open the Chart app and see information about the target or vessel that caused the alert.

E Range and bearing to the target or vessel that caused the alert.

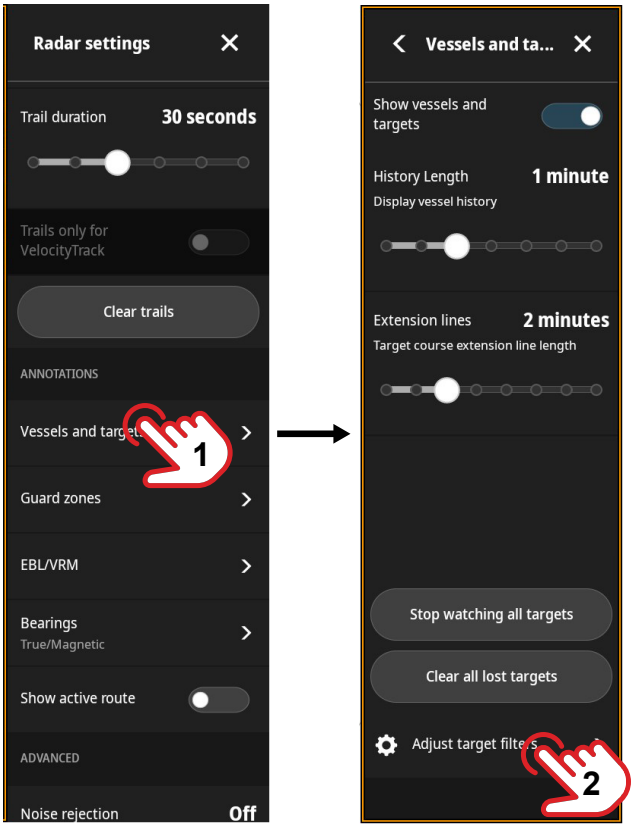
TARGET FILTERS

Use target filters to choose which targets will be displayed on screen, and which will be hidden. For example, you can choose to display only targets within a certain range of your vessel.

Select  on the radar screen to open the **Radar settings** menu.

Navigate to **Vessels and targets** (**1**) **> Adjust target filters** (**2**).

➔ *Note: The **Vessels and targets** menu can also be accessed directly from the main settings menu on your multi-function display.*



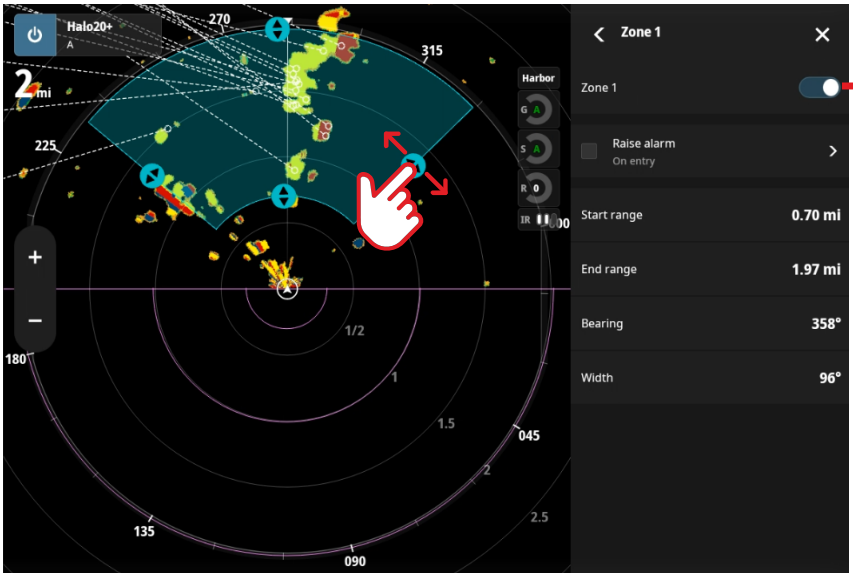
ZONETRACK

ZoneTrack automatically tracks (watches) all targets inside either of two user-defined zones.

To set up zones for ZoneTrack, when a compatible radar is connected to the system, navigate to **Radar settings > ZoneTrack**.

Use the toggle (**A**) to enable or disable ZoneTrack tracking and alarms.

➔ *Note: ZoneTrack is compatible with Halo20+, Halo24, and Halo 2000/3000 radars. 3G, 4G, Halo 3/4/6, and Halo20 radars do not have the ZoneTrack feature.*



- You can set two zones per range.
- Each zone can have independent settings. Alarms for entry and exit can be set up per zone.
- Every target entering a zone is tracked. Tracking stops when the target exits the zone. If you wish to continue tracking a target after it has exited the zone, touch the target on screen to select it, and select **Watch** from the cursor menu.
- A maximum of 50 targets can be tracked per range (whether they are inside a zone or not).

ZoneTrack specifications (ideal conditions)

Resolution:

- Up to 3 NM: 4.8 m
- 4-6 NM: 9.6 m
- 8-12 NM: 19.2 m
- ≥ 16 NM: 38.4 m

Range:

Maximum tracking range: 24 NM

Minimum tracking range:

- 19 m for instrumented range ≤ 12 NM
- 38 m for instrumented range ≥ 16 NM

GUARD ZONES

➔ *Note: Guard zones are available on 3G, 4G, Halo 3/4/6, and Halo20 radars. Halo20+, Halo24, and Halo 2000/3000 use ZoneTrack instead.*

A guard zone is a user-defined area on the radar screen. When a guard zone is turned on, you are alerted if a radar target enters or exits the guard zone.

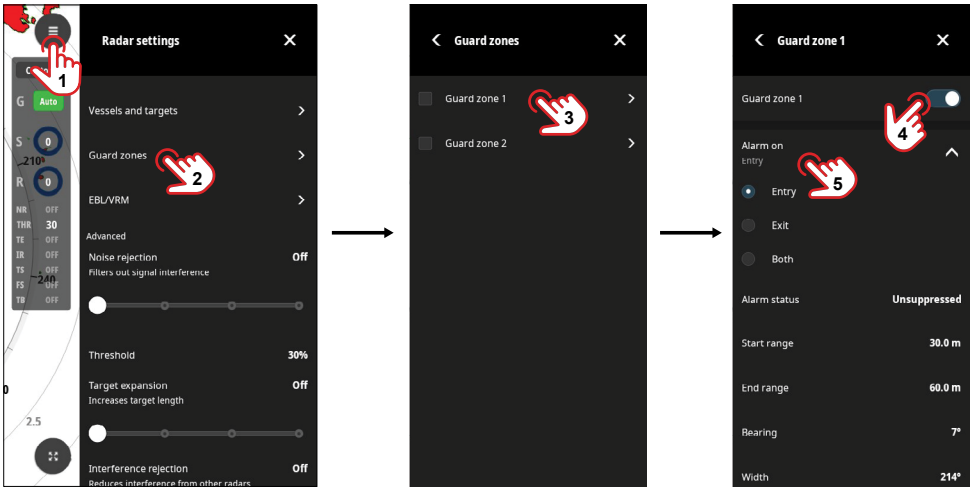
➔ *Note: The guard zone function does not track targets automatically. If you wish to track a target that is inside a guard zone, touch the target on screen to select it, then select **Watch**.*

Define a guard zone

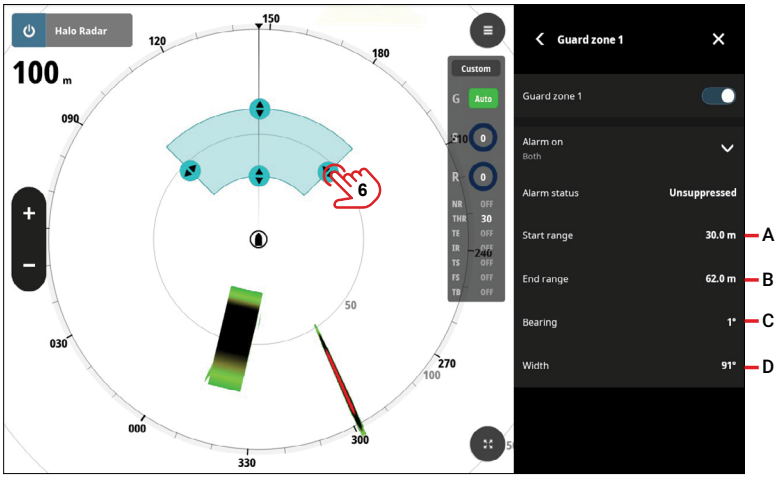
On the **Radar settings** menu, select **Guard zones** (**2**) and then select your zone (**3**).

Use the toggle (**4**) to enable the zone you are configuring.

Select whether the alarm is activated when a target enters or exits the zone, or both (**5**).



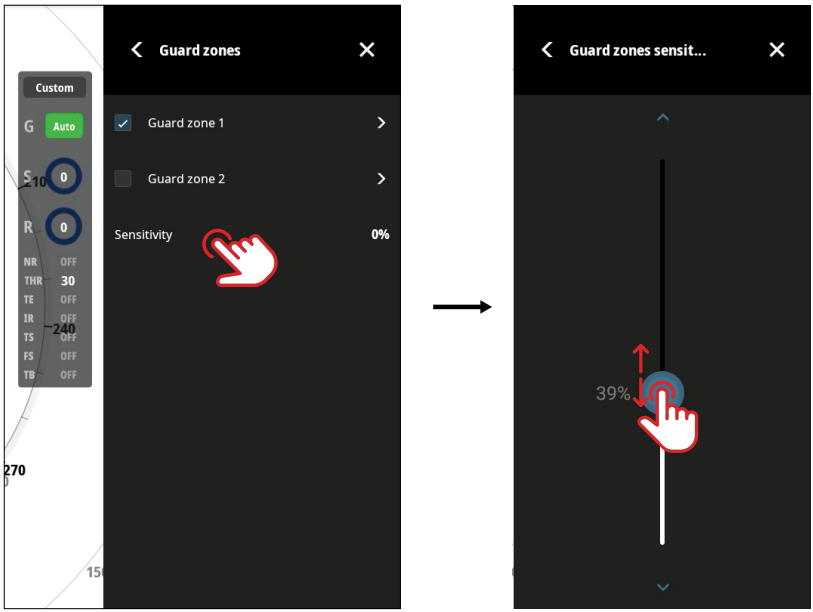
Set the zone area by dragging its boundaries on screen (**6**). Alternatively you can select each of **Start range** (**A**), **End range** (**B**), **Bearing** (**C**), and **Width** (**D**) and set their values.



Sensitivity

Reduce the sensitivity to eliminate alarms for small targets.

➔ *Note: The sensitivity setting is only visible when the guard zone is turned on.*

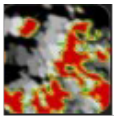
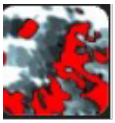
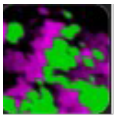
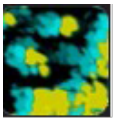


COLOR PALETTES

The palette you select affects the colors of the background, radar features, and symbols on the radar screen.

To change the color palette, select ☰ to open the **Radar settings** menu, then select **Color palette**.

The palettes are **Red**, **White**, **Green**, and **Yellow**.

Color palette	Red	White	Green	Yellow
				
Radar features	red	red	green	yellow
Background	black	white	black	black
Trails (if enabled)	gray	gray	purple	teal
Approaching target (VelocityTrack enabled)	yellow	yellow	red	red
Diverging target (VelocityTrack enabled)	dark blue	dark blue	dark blue	dark blue
Dangerous target highlight	yellow	purple	yellow	red

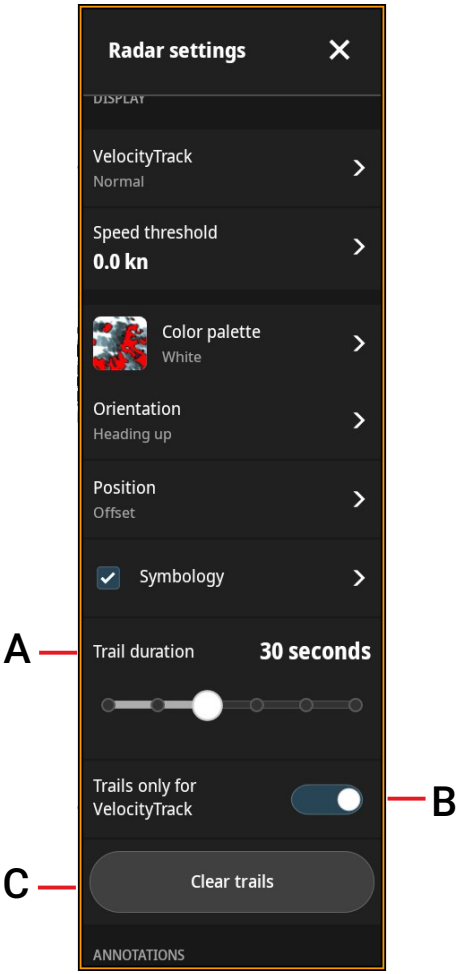
TRAILS

A target trail indicates the target movement by leaving an afterglow, gradually reducing the intensity over time. Target trails show where a target used to be, so the function is useful for assessing the movement of targets relative to your vessel.

To show trails, select ☰ to open the **Radar settings** and move the slider for **Trail duration** (**A**). Trail duration is the time it takes for the trails to fade out.

If VelocityTrack is enabled, the setting **Trails only for VelocityTrack** (**B**) is available. Enable this setting to display trails only for objects VelocityTrack classifies as moving.

Select **Clear trails** (**C**) to remove trails from your radar screen (trails re-form, until you set **Trail duration** to **Off**).



➔ ***Note:*** *Trails are not shown for AIS symbols.*

VESSEL HISTORY AND COURSE EXTENSION

Vessel history and course extension lines can be shown for watched radar targets and AIS vessels.

Vessel history (**A**) is synthesized from tracking data, and shows where a vessel or target has moved in the recent past. A vessel or target moving at speed has a longer history 'tail' on screen compared to a vessel or target moving slowly.

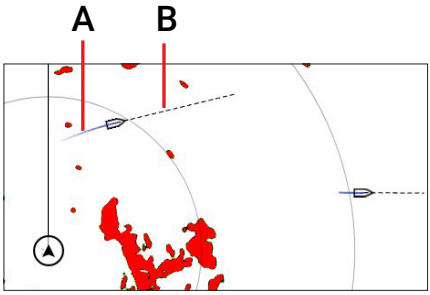
Extension lines (**B**) are projected from tracking data, and show the current course for a vessel or target.

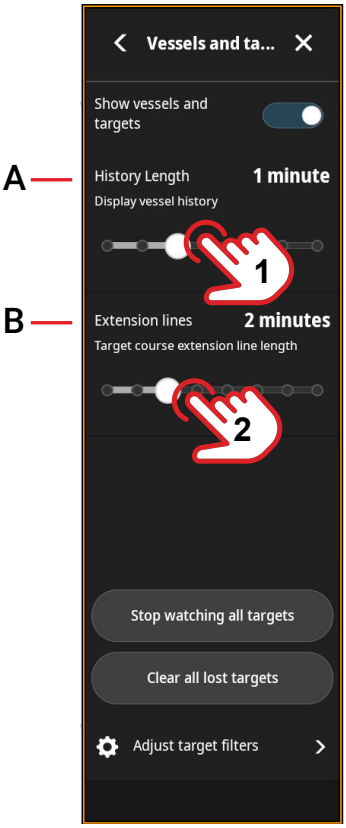
If a vessel or target is classified as dangerous, its extension line changes color with the target symbol, according to the radar color palette.

To enable vessel history or course extension, select  to open the **Radar settings** menu and open **Vessels and targets**.

Set **History length** by moving the slider (**1**).

Set **Extension lines** by moving the slider (**2**).





VELOCITYTRACK

VelocityTrack is a navigation aid that color-codes targets approaching or diverging from your vessel.

VelocityTrack is available on Halo20+, Halo24 and Halo2000/3000 radars.

> ⚠ **WARNING:** VelocityTrack is intended only as an aid to navigation. It is not a substitute for proper training or prudent seamanship, and should never be relied on as the operator's only reference source. The operator is responsible for observing maritime safety practices and maintaining situational awareness at all times.

VelocityTrack color-codes targets when:

- The target's relative speed is greater than the VelocityTrack speed threshold.
- The target is not geostationary (for example, marker buoys or land will not be color-coded).

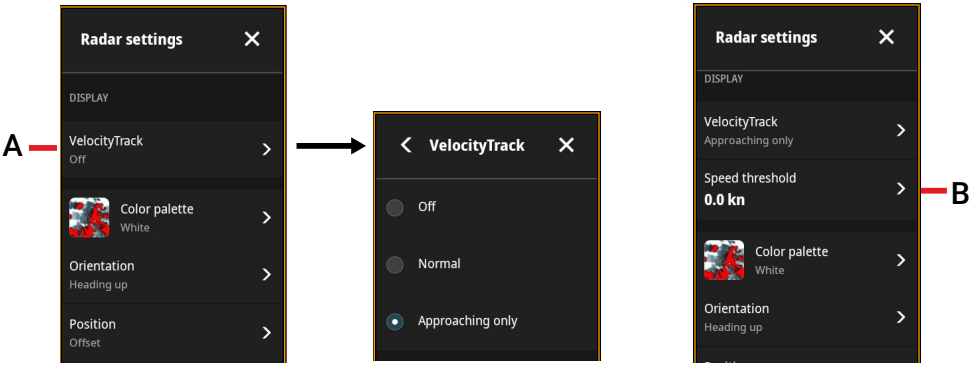
➔ ***Note:*** *VelocityTrack does not color-code AIS vessels.*

VelocityTrack settings

To turn on VelocityTrack, select ☰ on the radar screen to open the **Radar settings** menu.

Scroll down to **VelocityTrack** (**A**) and select an option:

- **Off** — turns off VelocityTrack.
- **Normal** — approaching targets and diverging targets are color-coded.
- **Approaching only** — only approaching targets are color-coded.



The **Speed threshold** setting (**B**, above) is visible when VelocityTrack is enabled. The speed threshold sets the speed above which moving radar targets will be colored. If the radial component of the target's relative velocity is smaller than the **Speed threshold**, the target will not be colored.

The colors used for approaching and diverging targets depend on the current image palette.

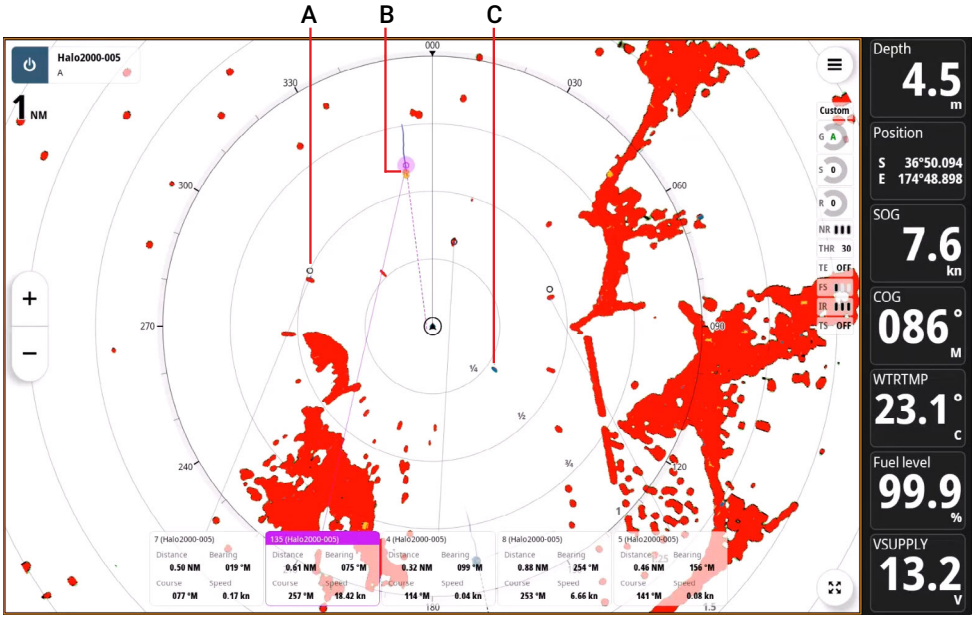
Color palette	Red	White	Green	Yellow
Color for approaching targets	yellow	yellow	red	red
Color for diverging targets	dark blue	dark blue	dark blue	dark blue
Color for approaching targets, radar overlay on charts	yellow	yellow	yellow	yellow
Color for diverging targets, radar overlay on charts	dark gray	dark gray	dark gray	dark gray

VelocityTrack examples

The screen below has VelocityTrack enabled.

➔ ***Note:*** *The colors described below correspond to the* ***White*** *radar palette.*

Some of the targets are pinned, which allows you to read their speed on screen.



A This target is not color-coded, so appears stationary. (Its pinned information shows it is moving, but with a very small speed of 0.17 kn, which is less than the VelocityTrack speed threshold in this case.)

B This target has been colored yellow, showing it is moving towards your vessel. (In addition it has a purple highlight, showing it is classified dangerous.)

C This target is colored blue, showing it is moving away from your vessel.

> ⚠ **WARNING:** Approaching or diverging targets may be indicated as stationary (not colored) in some circumstances when they are actually moving. You should be aware of these situations to safely use VelocityTrack as an aid for collision avoidance.

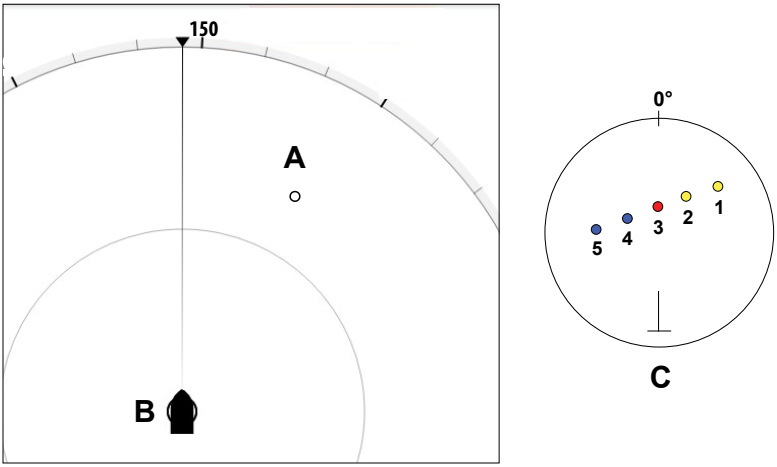
A moving radar target may be indicated stationary on screen while it is:

- crossing your vessel's course perpendicularly, at the position where it is in line with your vessel
- traveling alongside your vessel in the same direction and at the same speed as your vessel
- overtaking your vessel (or your vessel is overtaking the radar target), at any point where geometry makes the vessels' relative velocity zero

One example of how VelocityTrack behaves in a navigation scenario is in the following illustration.

The illustration shows a target (**A**) crossing your vessel's (**B**) path with a constant speed and constant COG (course over ground).

The points 1—5 on radar screen **C** are the target symbols on five radar scans, with the display set to white color palette and relative bearings.



Although the speeds of the individual vessels are constant, the target's velocity relative to your vessel changes as both vessels move.

➔ *Note: The colors in the example above apply for the red or white radar palettes.*

In scans 1 and 2 the target is colored yellow, indicating it is approaching your vessel. The target's velocity relative to your vessel at that point is greater than the VelocityTrack speed threshold.

In scan 3 the target is colored red (stationary on the red or white palette). It is temporarily stationary because its velocity relative to yours at that point is less than the VelocityTrack speed threshold.

In scans 4 and 5 the target is colored blue, indicating it is diverging from your vessel. The target's velocity relative to your vessel at that point is once again greater than the VelocityTrack speed threshold.

RADAR OVERLAY ON A CHART

You can overlay the radar image on the chart to help relate radar targets to objects on the chart.

➔ ***Note:*** *A heading sensor must be connected to the system, and your radar must be transmitting, for the overlay to work.*

From the home screen on your multi-function device (MFD), select the Chart icon to open the Chart app.

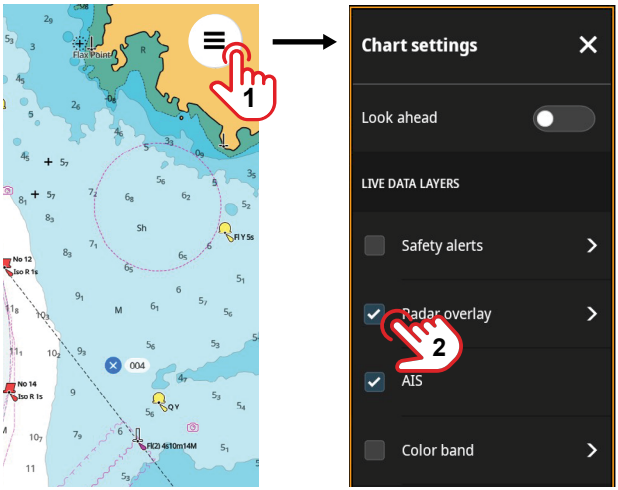
Simrad®-branded displays

B&G-branded displays

Select  on the Chart screen (**1**) to open the **Chart settings** menu.

Check the box beside **Radar overlay** (**2**) to superimpose the radar sweep and radar targets on the chart.

Select the arrow to the right of **Radar overlay** to display the **Radar** menu from inside the Chart app.



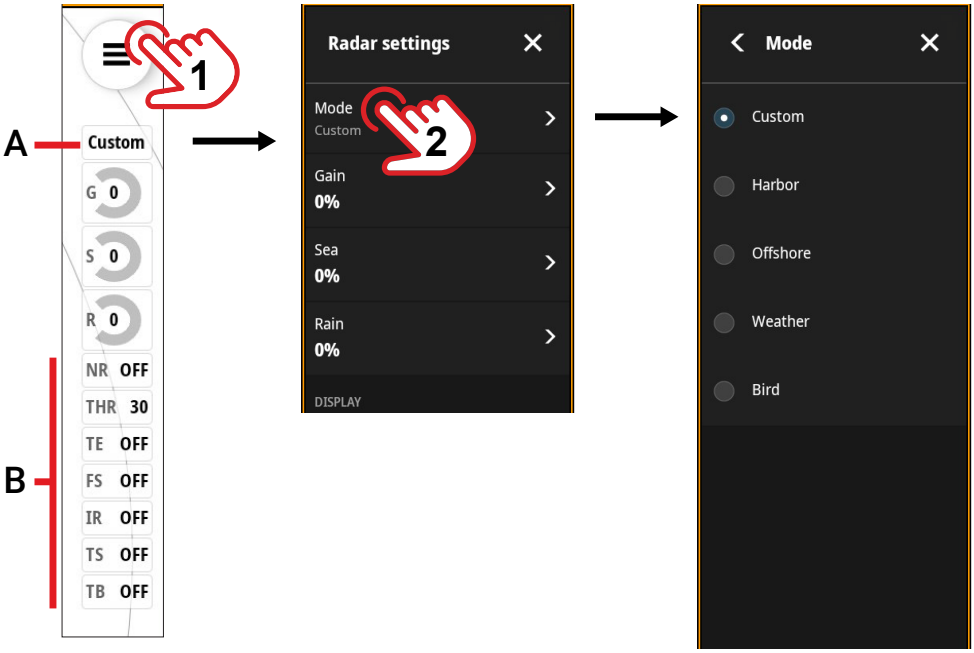
RADAR MODES

Radar modes with preset settings are available for different environments.

The name of the current mode, and its settings, are displayed in the mode settings panel on screen (**A**).

To change mode, select ☰ on the radar screen (**1**) to open the **Radar settings** menu, and select **Mode** (**2**) to open the list of modes.

➔ *Note: You can also enter the radar settings by touching the name of the mode (**A**) at the top of the mode settings panel.*



➔ *Note: The modes available depend on the radar model connected to your system.*

➔ *Note: Bird+ mode is only available on the Halo 3000 radar. If a secondary virtual range is currently in use, selecting Bird+ mode will set this to standby.*

Radar modes

Custom

All radar settings can be adjusted. By default, settings are for general purpose use.

Harbor

The radar settings are optimized for areas such as busy waterways and large structures where good target discrimination and rapid image updates are needed.

Offshore

The radar settings are optimized for offshore sea conditions, making isolated targets larger and easier to see.

Weather

The radar settings are optimized for best detection and presentation of rain clutter. The image update rate is slowed and color depth is increased.

Bird

The radar settings are optimized for best detection of birds. The radar is set up for maximum sensitivity.

Bird+

Bird+ mode optimizes the transmitted burst scheme and receiver so that it is capable of detecting birds at up to 50% greater range than bird mode. For this reason it is not possible to run dual range when in Bird+ mode.

➔ *Notes:*

- Bird+ detection range depends on the height of the antenna, and the height and size of a flock of birds.
- Bird+ mode is only available on the Halo 3000 radar, when secondary radar ranges are disabled.
- Bird mode and Bird+ mode are not recommended for use in busy harbor environments.

RADAR SETTINGS

The Radar settings menu contains options and settings related to the radar display.

Select  on the radar screen to open the **Radar settings** menu.

Scroll the menu to see more items.

➔ ***Note:*** *To configure the radar's installation settings, or see radar status, press*  *to open the multi-function display's main settings menu, and look for your radar under* ***Boat network > Devices****.*

Mode

Refer to **Radar modes** on page 43.

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 manual and automatic modes.

Auto gain automatically adjusts the signal returns to optimal levels.

Use manual gain to decrease or increase clutter and detect details.

Sea

Sea clutter filters the effect of random signal returns from waves or rough water near the vessel.

Sea clutter can also be set in **Auto** which provides directional adaptive clutter rejection. To allow fine tuning in **Auto**, the setting can be offset above and below the auto setting. The system includes predefined sea clutter settings for harbor and offshore conditions when set in respective modes.

When you increase sea clutter, you reduce the filtering of on-screen clutter caused by the signal returns of waves.

Rain

Rain clutter reduces the effect of rain, snow or other weather conditions on the radar image. The value should not be increased too much as this might filter out real targets.

VelocityTrack

Refer to **VelocityTrack** on page 38.

Color palette

Refer to **Color palettes** on page 35.

Orientation

Use to select radar screen orientation.

Choose between **Heading up**, **North up** or **Course up**.

Position

Select where you would like to see your vessel on the radar screen. Choose between **Center**, **Look-ahead** or **Offset**. Alternatively, select a custom position by simply selecting and dragging anywhere on the radar screen.

Symbology

The following radar screen marks can be turned on or off:

- Compass ring
- Compass markers
- North indicator
- Heading indicator
- Range rings
- Range markers
- Heading line

Trail duration

Refer to **Trails** on page 36.

Vessels and targets

For information about items in the **Vessels and targets** sub-menu, refer to:

- **AutoTrack** on page 24
- **Dangerous targets** on page 27
- **Target filters** on page 30

Guard zones

Refer to **Guard zones** on page 33.

ZoneTrack

ZoneTrack is only visible in the radar settings menu if a compatible radar is connected.

Refer to **ZoneTrack** on page 31.

EBL/VRM

Refer to **EBL and VRM** on page 15.

Bearings

Refer to **Bearings** on page 17.

Show active route

Enable this option to show the route to the next waypoint (when navigation is active).

Advanced settings

To access advanced settings, select  on the radar screen to open the **Radar settings** menu and scroll down to **Advanced settings**.

Noise rejection

Use the slider to set the amount of noise filtering applied by the radar. Target sensitivity is increased at longer ranges when this control is set to high, but this does cause some loss of target discrimination.

➔ *Note: Noise rejection can only be adjusted in Custom mode. In other modes, it is preset and cannot be changed.*

➔ *Note: To get maximum range performance from the radar, transmit on one range only. In Custom mode set the noise rejection control to high and the threshold as low as possible. The default is 30% for less clutter on the screen. In areas of extreme high interference, turn off noise rejection for the best radar image.*

Threshold

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

➔ *Note: Threshold can only be adjusted in Custom mode. In other modes, it is preset and cannot be changed.*

Target expansion

Adjust the target expansion slider to increase the length of targets in range, making them easier to see.

➔ *Note: Target expansion can only be adjusted in Custom mode. In other modes, it is preset and cannot be changed.*

Interference rejection

Adjust the interference rejection slider to reduce the interference be caused by radar signals from other radars operating on the same frequency. A high setting reduces the interference from other radars. Where no interference exists, a low setting helps you detect weak targets.

➔ *Note: To avoid missing weak targets, the interference rejection should be set to OFF when no interference exists.*

Target separation

Adjust the target separation slider to control the target discrimination of the radar (the separation between objects is more prominent).

➔ *Note: Target separation can only be adjusted in Custom mode. In other modes, it is preset and cannot be changed.*

Fast scan

Move the slider to set the speed of the radar antenna rotation. Higher speed gives faster target updates.

➔ *Note: Fast scan can only be adjusted in Custom mode. In other modes, it is preset and cannot be changed.*

➔ *Note: Maximum speed might be limited by the radar's settings, mode and range. The radar rotates as fast as the control settings allow.*

Target boost

The target boost control increases pulse length or reduces radar bandwidth to increase radar sensitivity and make targets appear larger.

➔ *Note: Target boost is not available on Halo radars.*

TARGET TRACKING ERRORS

Some factors can generate tracking errors or make the radar image difficult to read, and therefore reduce target detection capability:

- Sea, rain, snow and low cloud returns
- Radar interference
- Sidelobe echoes
- Blind sectors
- Low signal-to-noise ratio and signal-to-clutter ratio.

⚠ **WARNING:** The speed and course of a radar target are obtained by consecutive measurements of the echo position. The data is then filtered to reach the required precision. This means, that every abrupt change of speed and direction will be recognized with a certain delay to reach absolute certainty that the target is moving in a different way. The confirmation delay is about five scans and after that some additional time is needed to reach the same data precision as from before the maneuver.

Sea, rain, snow and low cloud returns

Radar echoes in sea, rain or weather clutter areas may be masked by the clutter. The effects of such errors appear as continuous big changes of the target course and speed vectors. Sometimes the symbol of a target that has been acquired at high speed can slip away from the real target position after a certain time, and this might generate the lost target alarm. These errors can be avoided or at least minimized by proper manual adjustments of sea and rain controls, or by selecting the automatic control option.

Radar interference

Other radars operating in the same frequency band can generate interference. Normally this is seen on the radar screen as a series of spirals. When the interference falls on the tracked target, it can cause a deformation of the size of the echo, and potentially an error in the target's course and speed values. For more information, see **Interference rejection** on page 47.

Second trace echo

A second trace echo is an echo received from a distant target after the following pulse has been transmitted. Second trace echoes are present only under abnormal atmospheric conditions, or when there is super-refraction.

These echoes display at their correct bearing, but at a wrong range. Second trace echoes can be recognized by their irregular shape. Since the period between two subsequent transmitted pulses is subject to small variations, the second trace echo appears undefined and hazy. Second trace echoes are automatically suppressed by the radar when interference rejection is turned on.

Sidelobe echoes

Radar antennas have a radiation pattern consisting of a main lobe and several very small sidelobes. Most of the energy transmitted by the radar is radiated and received back on the main lobe, and a very small part on the sidelobes.

This has no effect in case of distant or small targets, but the returns from a large target at short range (less than 3 NM) can generate (on both sides of the main echo and at the same range) arcs or a series of small echoes. These effects, when they are an extension of the main echo, can cause momentary errors for the tracking, and course and speed values given by the tracking can become unstable. The problem can usually be eliminated or strongly reduced by adjusting the sidelobe suppression in the sea trial menu. Normally, setting this to **Automatic** will give the best results.

Blind sectors

Funnels, masts or other obstructions, when located near the radar antenna, may cause blind or shadow sectors, where the target visibility may be completely lost or strongly reduced. Targets remaining in these sectors for a long time (more than 10 antenna revolutions) are considered lost, and the lost target alert is triggered.

Use the sector blanking feature to stop the radar from transmitting on up to four sectors in the image.

Low SNR and SCR

In situations where the signal-to-noise ratio (SNR) or the signal-to-clutter ratio (SCR) of the radar echoes is low (small vessels in heavy sea or rain clutter, or big vessels close to the radar horizon), target detection is poor and the tracking will not detect the target at each antenna revolution. This will cause errors in the tracking, and it can range from missed information and up to complete loss of the target when it is missed for 10 consecutive antenna revolutions.