Raymarine®



DOCKSENSE® CONTROL

AVENTICS™

Operation instructions

English (en-US)
Date: 11-2021
Document Number: 81398 (Rev 2)
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Check the Raymarine website for the latest software releases for your product.
www.raymarine.com/software

Product documentation

The latest versions of all English and translated documents are available to download in PDF format from the website: www.raymarine.com/manuals.
Please check the website to ensure you have the latest documentation.

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English (en-US)
Document number: 81398 (Rev 2)
AB;26075;2021-11-19T18:14:00

Contents

Chapter 1 Important information 7

Cleaning the camera 8
Disclaimer 9
Warranty registration 9
Product disposal 9
IMO and SOLAS 9
Technical accuracy 9

Chapter 2 Document and product information 11

2.1 Product documentation 12
DockSense® Control documentation 12
Applicable products 13
Additional system components 13
Additional system components (Aventics) 14
Document illustrations 14
Document conventions 14
2.2 Product overview 15
DockSense® Control 15
2.3 Compatible multifunction displays 16
Multifunction display software requirements 16

Chapter 3 Operation 17

3.1 First time operation 18
LightHouse 3 software 18
Add DockSense to LightHouse Homescreen 18
3.2 Open DockSense app 19
3.3 Homescreen 20
3.4 DockSense features 21
Camera feeds 21
Map 22
Alerts 22
3.5 Settings 24
3.6 Auto mode 28
Temporary Override 30
3.7 Virtual Arena 32
Activate Virtual Arena 32
3.8 Using DockSense 33
Prerequisites 33
Docking maneuver (Manual Control mode) 33
Docking maneuver (Auto mode) 34

Chapter 4 Troubleshooting 37

4.1 Troubleshooting 38
4.2 Diagnostics 38
4.3 Power up troubleshooting 38
4.4 GNSS (GPS) troubleshooting 39
4.5 Camera troubleshooting 40
4.6 Alarms list 42
4.7 LED diagnostics 46
Processor module 46
AR250 / AR270 47
Chapter 5 Maintenance 49
5.1 Routine equipment checks 50
5.2 Product cleaning 50
5.3 Cleaning the camera 50
Chapter 6 Technical support 51
6.1 Raymarine product support and servicing 52
6.2 Learning resources 53
Chapter 7 NMEA Support 55
7.1 AR250 / AR270 supported NMEA 2000 PGNs 56

Chapter 1: Important information

Warning: System requirements of use

THE DOCKSENSE® SYSTEM IS NOT DESIGNED TO OPERATE AUTONOMOUSLY.

The Raymarine DockSense® Control System ("System") is designed as an aid to assist in docking only; the user ("Captain") understands and agrees before engaging that the "System requirements of use" and "System limitations" contained in this publication apply.

At ALL times while the DockSense® System is engaged, the user ("Captain") MUST:

- Remain at the helm whilst the System is engaged, or the vessel is underway
- Maintain awareness of the boat's speed, position, direction of travel as well as the proximity of other vessels and objects in the proximity of the vessel
- Remain in full control of the boat, its movements and is responsible for maintaining a safe distance to prevent the vessel from collision
- Only use the System for its intended purpose (assist with a docking manoeuvre)
- Ensure there is enough space to undertake a safe docking manoeuvre
- Ensure that there are no people in the water within the proximity of the boat during the docking manoeuvre
- Remain responsible for the safety of all passengers onboard.

Warning: System limitations

- The DockSense® System ("System") is designed as an aid to awareness only
- The System is designed to assist in a docking manoeuvre, aiding the Captain to avoid colliding their boat with a System-detected object
- During adverse conditions, the Boat's propulsion System may not be able to control the boat due to limitations in boat dynamics
- The System must be maintained:
  - Cameras cannot be obscured
  - Cameras must be cleaned regularly
- The System uses an optical camera system
  - Minimal levels of light and visibility are required for the System to function
  - Rain, fog, dusk or night will limit the System performance
  - Without appropriate light/visibility the System will not function correctly and should not be engaged
- The DockSense® System has been designed for the detection of solid pontoons or docking structures, caution should be taken as the System may not detect objects with small cross-sectional areas such as ropes or poles
- The System requires an object to protrude more than 400 mm / 16 in. above the water plane in order to be classified as an object
- The System will only identify objects that are above the water surface
- The System relies on movement of the boat to generate a view of the area around the boat
  - If the boat remains static, the System may experience blind spots
- While the System is engaged, system data is stored on the System's hard drive
  - The Data collected can only be accessed by Raymarine authorized personnel
  - Data retrieval will only be done in order to analyse the performance of a System.

Warning: Ensure safe navigation

This product is intended only as an aid to navigation and must never be used in preference to sound navigational judgment. Only official government charts and notices to mariners contain all the current information needed for safe navigation, and the captain is responsible for their prudent use. It is the user's responsibility to use official government charts, notices to mariners, caution and proper navigational skill when operating this or any other Raymarine product.

Warning: Risk of false object detection

Environmental conditions such as strong reflected light can cause false object detection on the DockSense® system. Always maintain a permanent watch of your vessel's surroundings; this will allow you to recognise false warnings and respond to situations as they develop. Failure to maintain a permanent watch puts yourself, your vessel and others at serious risk of harm.

Warning: Moving objects

The DockSense® system is designed to detect large static objects when performing docking maneuvers. Detecting small moving objects (such as kayaks) is not always guaranteed. Always maintain a visual watch of your vessel's surroundings. Failure to maintain a permanent watch puts yourself, your vessel and others at serious risk of harm.

Warning: Only use system when vessel engine is running

The vessel's engine must be running at ALL times while the DockSense system is in use. Loss of power to the system compromises system safety and potentially puts yourself, your crew and your vessel at risk of harm.

Warning: Ensure system power source is charged by vessel's engine under normal operation

The power source for the system MUST be one that is charged by the vessel's engine (under normal operation). Failure to ensure a constant source of power to the system potentially puts yourself, your crew and your vessel at risk of harm.

Warning: Privacy

DockSense® systems are compliant with applicable Data Protection and Privacy laws. DockSense® systems do NOT store recorded footage from the cameras.

Cleaning the camera

The camera housing and lens require regular cleaning. You should clean the lens when system performance appears to deviate from its usual level, or when excessive contaminant buildup is seen on the lens. You should also ensure that the camera's protective cover is also unobstructed and operating correctly.

When cleaning this product:

- Do NOT wipe the lens window with a dry cloth, or with abrasive materials such as paper or scrub brushes, as this could scratch the coating.
- Do NOT use acid or ammonia based products.
- Do NOT pressure wash.

Particular care should be taken when cleaning the lens window, as this has a protective anti-reflective coating which may be damaged by improper cleaning.

1. Switch off the power to the unit.
2. Clean the camera body with a clean, soft cotton cloth. You can moisten the cloth and use a mild detergent if required.

3. Clean the camera lens.
   - Rinse the lens with fresh water to remove all dirt particles and salt deposits, and allow to dry naturally.
   - If any spots or smears remain, very gently wipe the lens window with a clean microfibre cloth or soft cotton cloth.
   - If necessary, use isopropyl alcohol (IPA) or a mild detergent to remove any remaining spots, marks, or salt deposits.

Disclaimer

Raymarine® does not warrant that this product is error-free or that it is compatible with products manufactured by any person or entity other than Raymarine®.

Raymarine® is not responsible for damages or injuries caused by your use or inability to use the product, by the interaction of the product with products manufactured by others, or by errors in information utilized by the product supplied by third parties.

Warranty registration

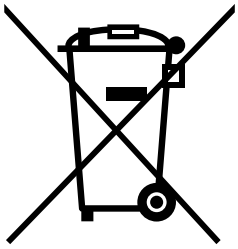
To register your Raymarine product ownership, please visit www.raymarine.com and register online.

It is important that you register your product to receive full warranty benefits. Your unit package includes a bar code label indicating the serial number of the unit. You will need this serial number when registering your product online. You should retain the label for future reference.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment which contains materials, components and substances that may be hazardous and present a risk to human health and the environment when WEEE is not handled correctly.



Equipment marked with the crossed-out wheeled bin symbol indicates that the equipment should not be disposed of in unsorted household waste.
Local authorities in many regions have established collection schemes under which residents can dispose of waste electrical and electronic equipment at a recycling center or other collection point.
For more information about suitable collection points for waste electrical and electronic equipment in your region, refer to the Raymarine website: www.raymarine.eu/recycling.

IMO and SOLAS

The equipment described within this document is intended for use on leisure marine boats and workboats NOT covered by International Maritime Organization (IMO) and Safety of Life at Sea (SOLAS) Carriage Regulations.

Technical accuracy

To the best of our knowledge, the information in this document was correct at the time it was produced. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications

without notice. As a result, Raymarine cannot accept liability for any differences between the product and this document. Please check the Raymarine website (www.raymarine.com) to ensure you have the most up-to-date version(s) of the documentation for your product.

Chapter 2: Document and product information

Chapter contents

- 2.1 Product documentation on page 12
- 2.2 Product overview on page 15
- 2.3 Compatible multifunction displays on page 16

2.1 Product documentation

The following documentation is applicable to the DockSense Control System:

- **87418** — DockSense Control Installation instructions
- **81398** — DockSense Control Operation instructions
- **87406** — DockSense Processor Module Mounting template
- **87409** — DockSense AR250 / AR270 Compass Mounting template
- **87412** — DockSense Stereo-Vision Camera Mounting template
- **87298** — Axiom MFD Installation instructions
- **87414** — Axiom+ MFD Installation instructions
- **87319** — Axiom Pro MFD Installation instructions
- **87344** — Axiom XL MFD Installation instructions
- **81370** — LightHouse 3 Advanced Operation instructions

DockSense® Control documentation

The latest versions of all English and any available translated documents are available to view or download on any device with a web browser. **Please check the links provided below to ensure you have the latest documentation.**



Digital manuals

https://tinyurl.com/3knccpam



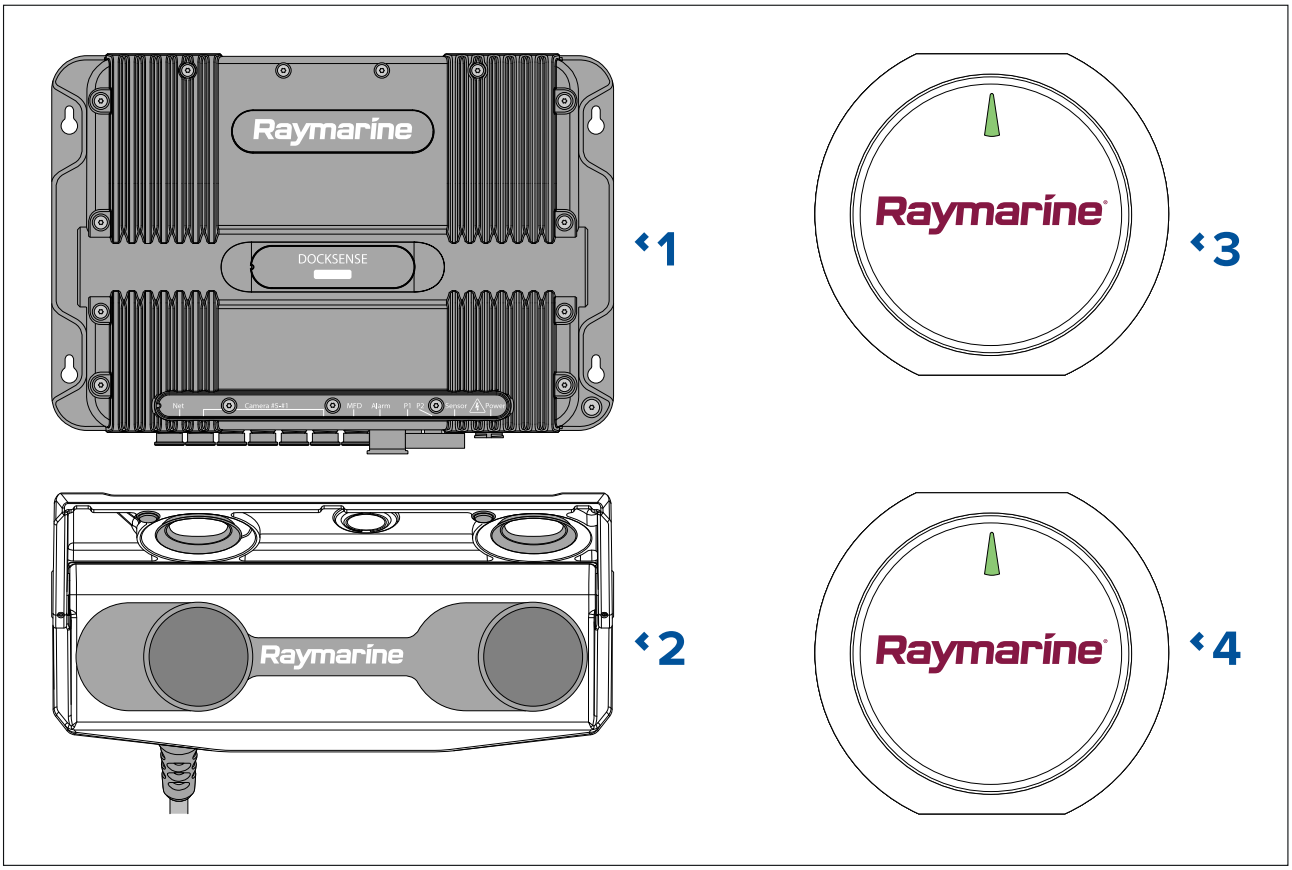
Printed manuals

https://tinyurl.com/y5gbvpny

Raymarine, in conjunction with Lulu.com, offers a print-on-demand service allowing you to purchase a printed manual delivered directly to an address of your choosing.

Applicable products

This document is applicable to the following products:



1. **DockSense® Control Processor Module** (E70603) — The DockSense® Control Processor Module receives data from the DockSense® Stereo-Vision Cameras and AR250 / AR270 Sensors. This data is processed and transmitted to a connected Multifunction Display (MFD).
2. **DockSense® Stereo-Vision Camera** (E70602) — Built with dual stereo lenses, DockSense® cameras are capable of distinguishing solid objects from the water and measuring your vessel's distance from the dock, using advanced depth perception technology.
3. **DockSense® AR250 GPS Compass** (E70615) — DockSense® AR250 Compass provides GPS data to the system.
4. **DockSense® AR270 AHRS Compass** (E70641) — DockSense® AR270 AHRS (Attitude Heading Reference Sensor) is the master compass and heading sensor in the system. It provides stabilization data to the system.

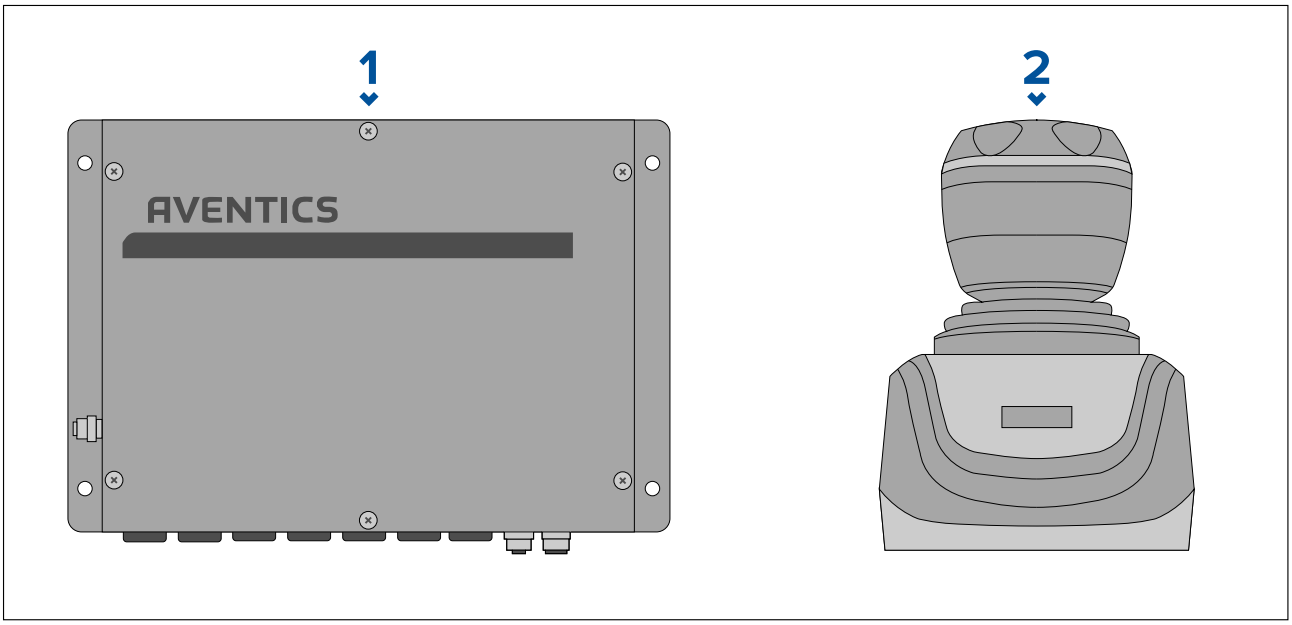
Additional system components

DockSense systems must be used in conjunction with the following items, available separately from Raymarine:

- Axiom / Axiom Pro / Axiom XL / Axiom+ Multifunction Display

Additional system components (Aventics)

DockSense Control systems must be used in conjunction with the following items, available separately from Aventics:



1. Aventics Marex 3D Controller
2. Aventics Marex 3D Joystick

Important:

Docksense is not compatible with the Marex-3D thruster balance feature. When commissioning the joystick, please ensure that thruster balance is disabled (set to 100%). For more information refer to your Aventics agent / Installer.

Document illustrations

Your product and if applicable, its user interface may differ slightly from that shown in the illustrations in this document, depending on product variant and date of manufacture.

All images are provided for illustration purposes only.

Document conventions

The following conventions are used throughout this document:

System conventions:

- **DockSense® System** — Refers to the complete DockSense® system, consisting of a processor module, multiple cameras, and AR250 / AR270 sensors.
- **Processor module** — Refers to the “black box” central processing unit, which processes the data sent by the cameras and AR250 / AR270 sensors, and provides it to the multifunction display (MFD).
- **Stereo-Vision Camera**, or just “camera” — refers to one or many Stereo-Vision cameras, which provide the depth perception information to enable the system to distinguish between the water and solid objects.
- **AR250** / **AR270**, or just “compass” — refers to the stabilization sensors providing compass, attitude and heading data to the system.

User interface conventions:

- **Select** — The term ‘select’ refers to using the **touchscreen** or physical controls of a Raymarine multifunction display (MFD) to select an on-screen item.

2.2 Product overview

DockSense® Control

DockSense® Control is an advanced object recognition and motion sensing system designed to assist you in docking maneuvers.



The DockSense® Control system uses intelligent machine-vision camera technology to analyze real-world imagery and create a “Virtual Bumper” around your vessel, which helps determine your distance from potential hazards. The DockSense® Control system reacts differently to objects that encroach on the Bumper, depending on the **Mode** your system is in:

- **Manual Control Mode** — When you are close to solid objects, the system will trigger visual and audible alerts. The captain retains full throttle control in this mode, via the joystick.
- **Auto Mode** — When you are close to solid objects, the system will trigger visual alerts and automatically adjust the throttle and prevent your vessel from hitting the dock.

Both **Modes** significantly reduce the risks and complexities inherent to maneuvering in tight-quarter environments, taking the stress out of this vital maneuver by creating a safer docking experience.

The DockSense® Control system is comprised of 4 core components:

1. **DockSense® Stereo-Vision Cameras** — *DockSense® Cameras are capable of distinguishing solid objects from the water; this allows the DockSense system to measure your vessel’s distance from the dock and other solid objects.*
2. **AR250 / AR270** — *These 2 sensors provide the DockSense® system with GPS and AHRS (stabilization) data.*
3. **DockSense® Control Processor Module** — *Located below deck, Processor Module receives visual data from the cameras, and pitch and roll data from the connected AR250 / AR270 compasses. The Processor Module also receives and transmits data between the Aventics Joystick system. This data is processed and transmitted to the connected multifunction display (MFD) and then displayed in the DockSense® Control app.*
4. **Axiom Multifunction Display (MFD)** — *The MFD displays the DockSense® app, providing audible and visual alerts to help you to safely dock your vessel.*

2.3 Compatible multifunction displays

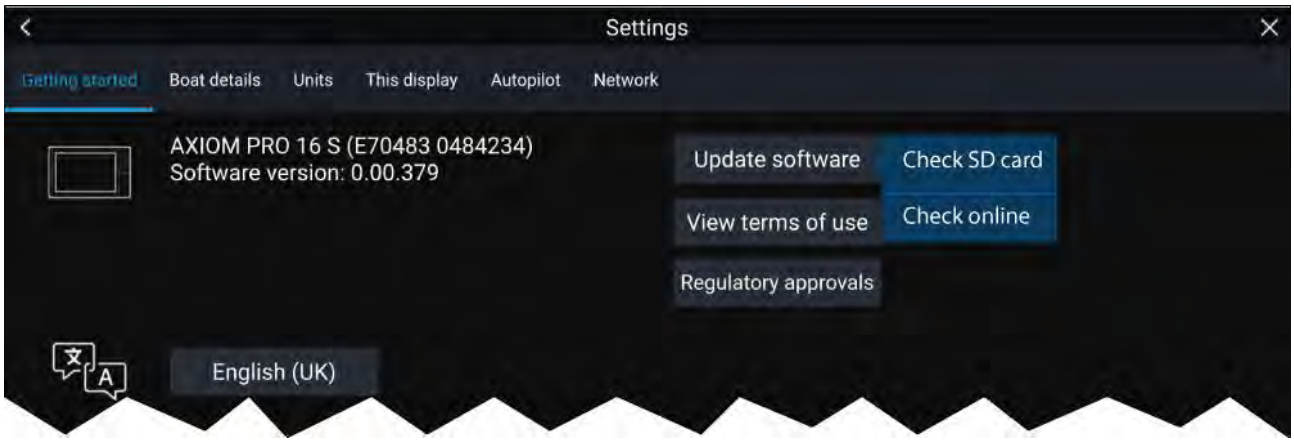
The DockSense® System is only compatible with the following Raymarine® multifunction displays.

- Axiom
- Axiom+
- Axiom Pro
- Axiom XL

Multifunction display software requirements

The DockSense® system requires a Raymarine® multifunction display (MFD) running LightHouse 3, version 3.14 **or later**.

The latest software for your MFD can be obtained by visiting the Raymarine website (www.raymarine.com/software) and downloading to a MicroSD card, or by checking online with an MFD connected to the Internet:



Chapter 3: Operation

Chapter contents

- 3.1 First time operation on page 18
- 3.2 Open DockSense app on page 19
- 3.3 Homescreen on page 20
- 3.4 DockSense features on page 21
- 3.5 Settings on page 24
- 3.6 Auto mode on page 28
- 3.7 Virtual Arena on page 32
- 3.8 Using DockSense on page 33

3.1 First time operation

Before operating your DockSense system for the first time, ensure it has been correctly installed and commissioned in accordance with DockSense Control Installation instructions (87418)

LightHouse 3 software

Important:

Before continuing, ensure you have read the latest version of the LightHouse 3 advanced operation instructions (81370).

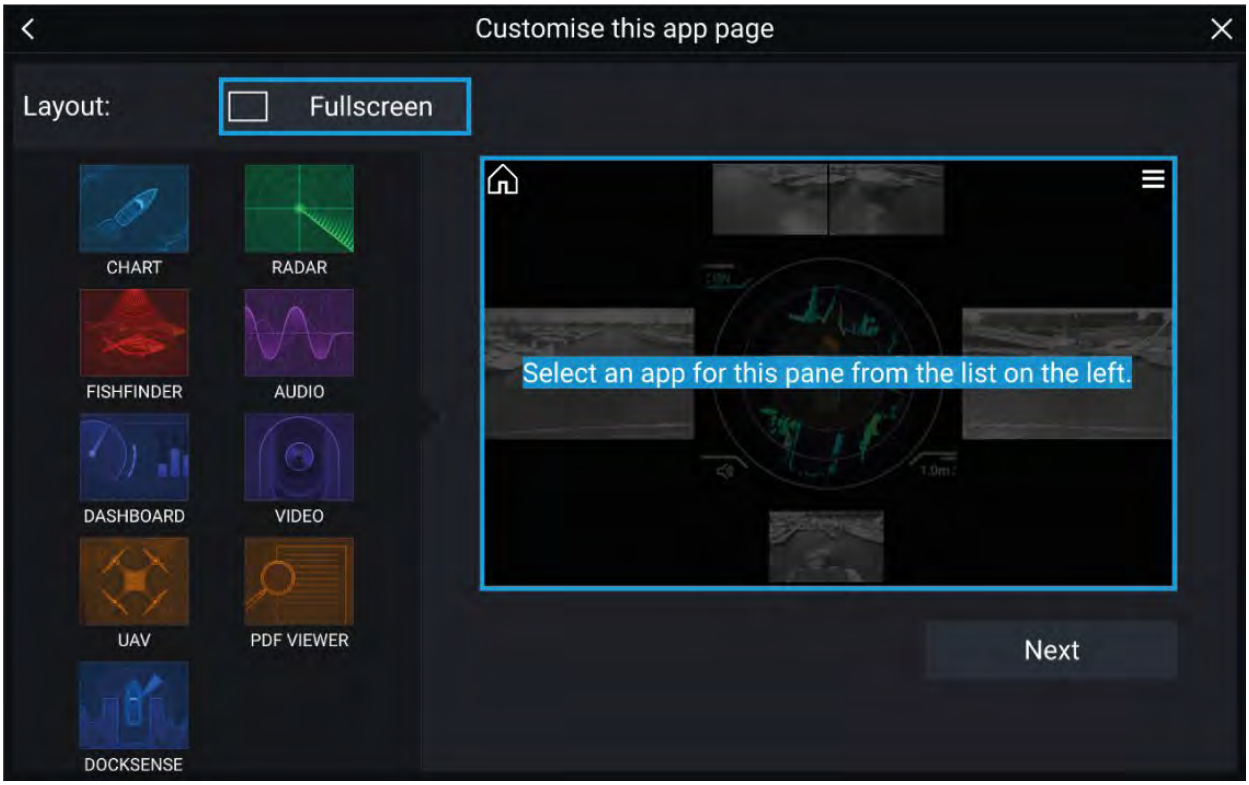
Add DockSense to LightHouse Homescreen

Before you can access the DockSense app on your multifunction display, you must first add the DockSense app to your Homescreen.

Note:

Additional information on how to create and customize LightHouse 3 apps can be found in the **LightHouse 3 Advanced Operation instructions (81370)**.

1. Select and hold an existing App icon on the Homescreen to display the pop-over options.
2. Select **Customize**.
3. To create a new app page for DockSense, press and hold on a blank space on the Homescreen.
4. Select the **Layout** option to change the page layout.
5. From the list of available apps, select **DockSense**.

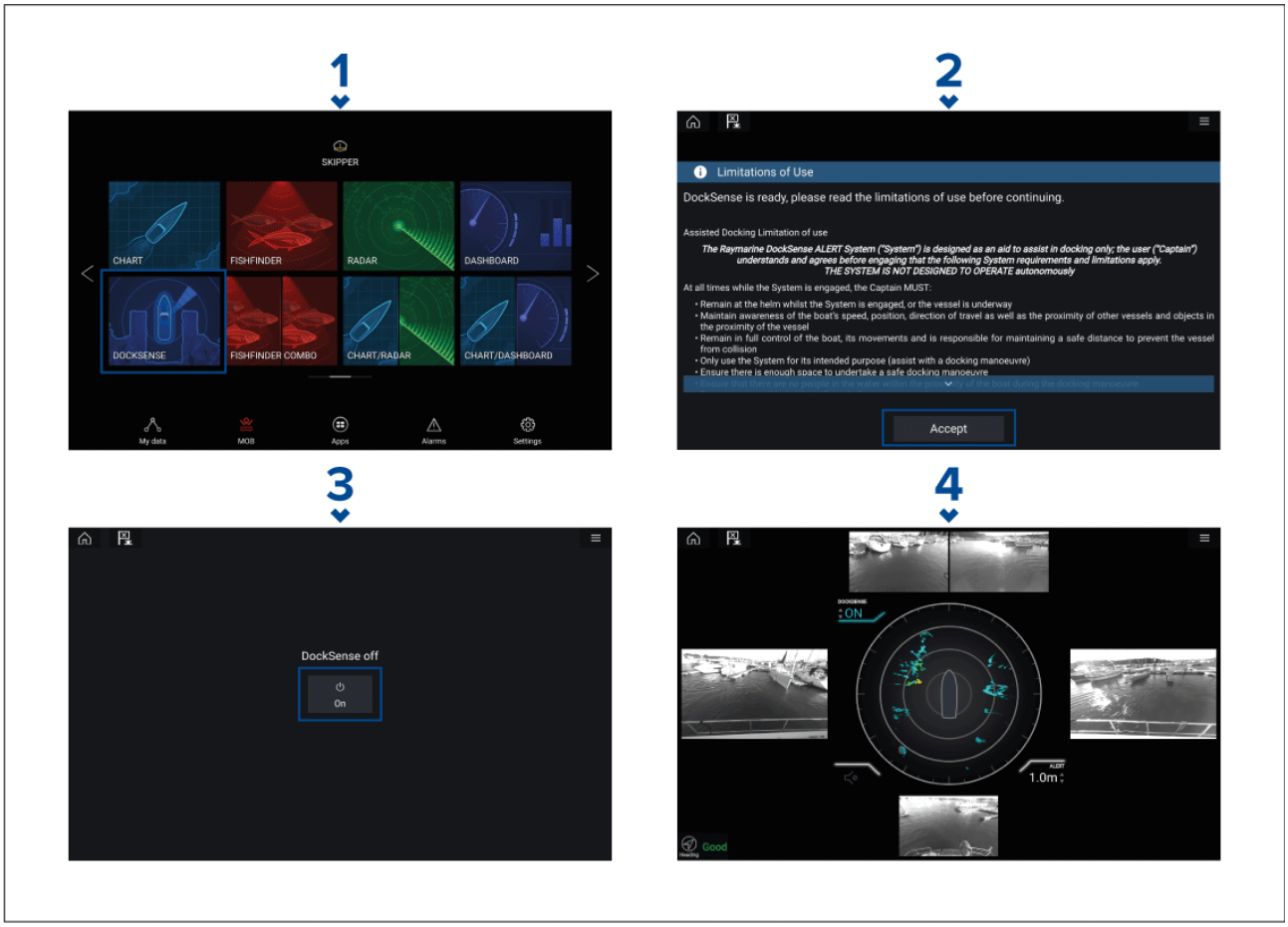


6. Select **Next** and enter a name for the app.
7. Select **Save**.

The DockSense app page icon is now saved and accessible from the LightHouse **Homescreen**.

3.2 Open DockSense app

Start using your DockSense system by opening the **DockSense app**.



1. From the Lighthouse **Homescreen** select the **DockSense app**.
2. Read the **Limitations of Use** and select **Accept** to continue.
3. Select **On** to power on the DockSense system.

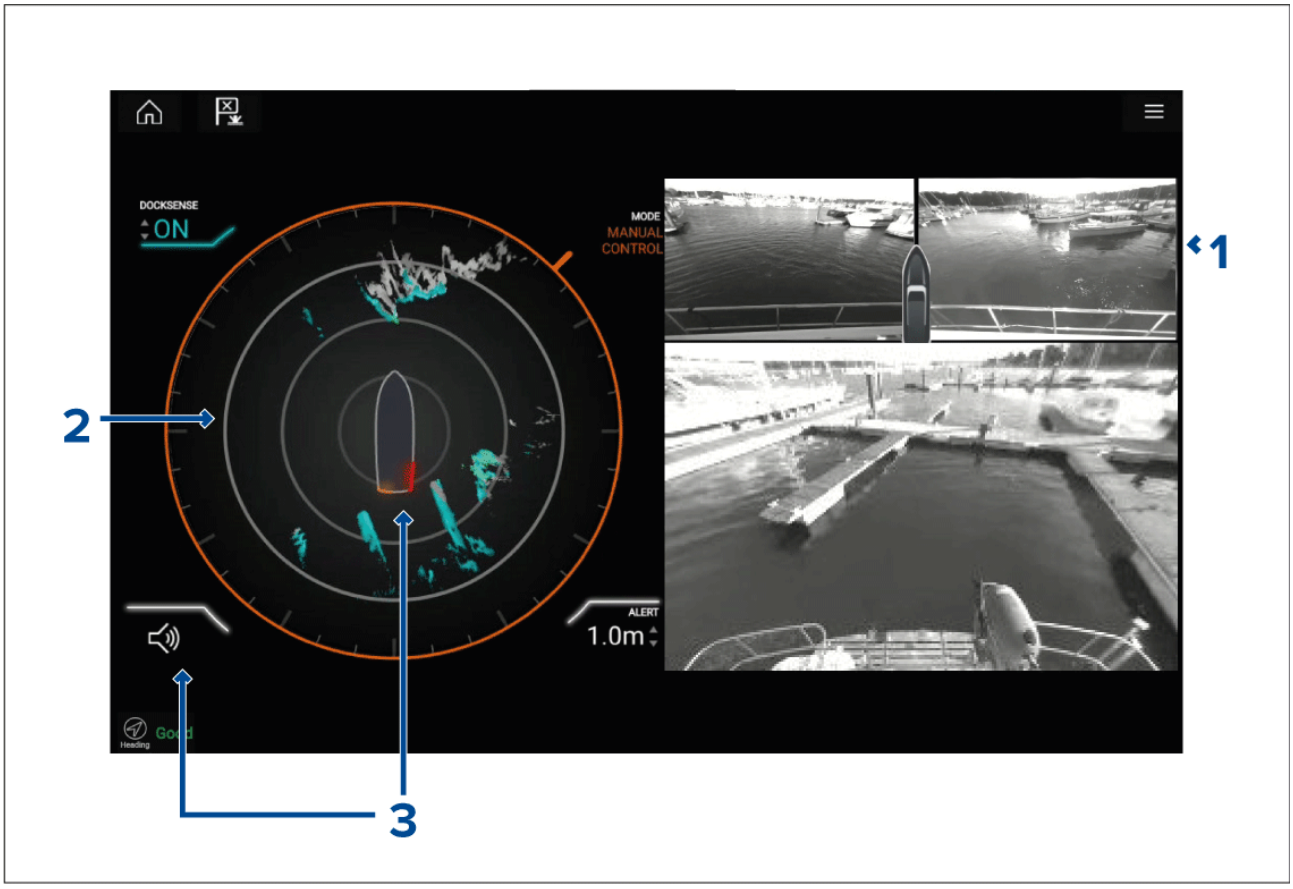
Important:

The DockSense system can take up to 2 minutes to fully power on.

4. The DockSense system is now powered and ready to use.

3.3 Homescreen

After starting your DockSense system, the Homescreen is displayed.



The **Homescreen** is comprised of several key features designed to aid your docking maneuvers:

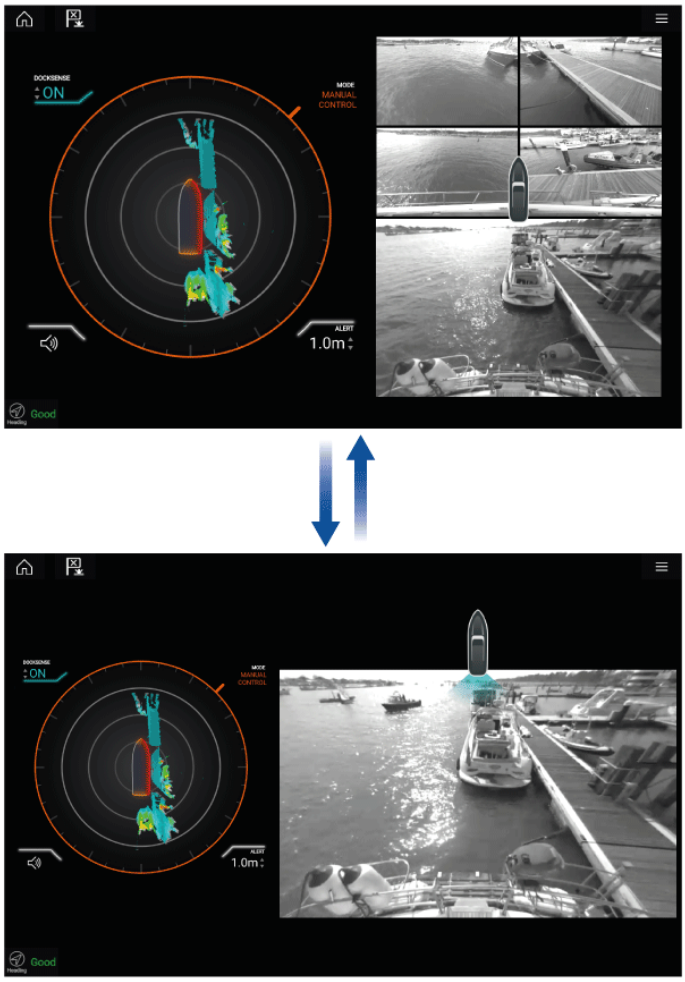
1. **Camera feeds** — live video feeds from each of your DockSense cameras. For more information refer to: **p.21 — Camera feeds**
2. **Map** — a virtual display of your **Vessel outline** and all solid objects detected by your DockSense cameras. For more information refer to: **p.22 — Map**
3. **Alerts** — visual and audible alerts trigger when your vessel approaches solid objects. For more information refer to: **p.22 — Alerts**

DockSense app features can be customized to suit your requirements. For more information refer to: 3.5 **Settings**

3.4 DockSense features

Camera feeds

The cameras provide your DockSense system with visual data and help you see how close your vessel is to solid objects.



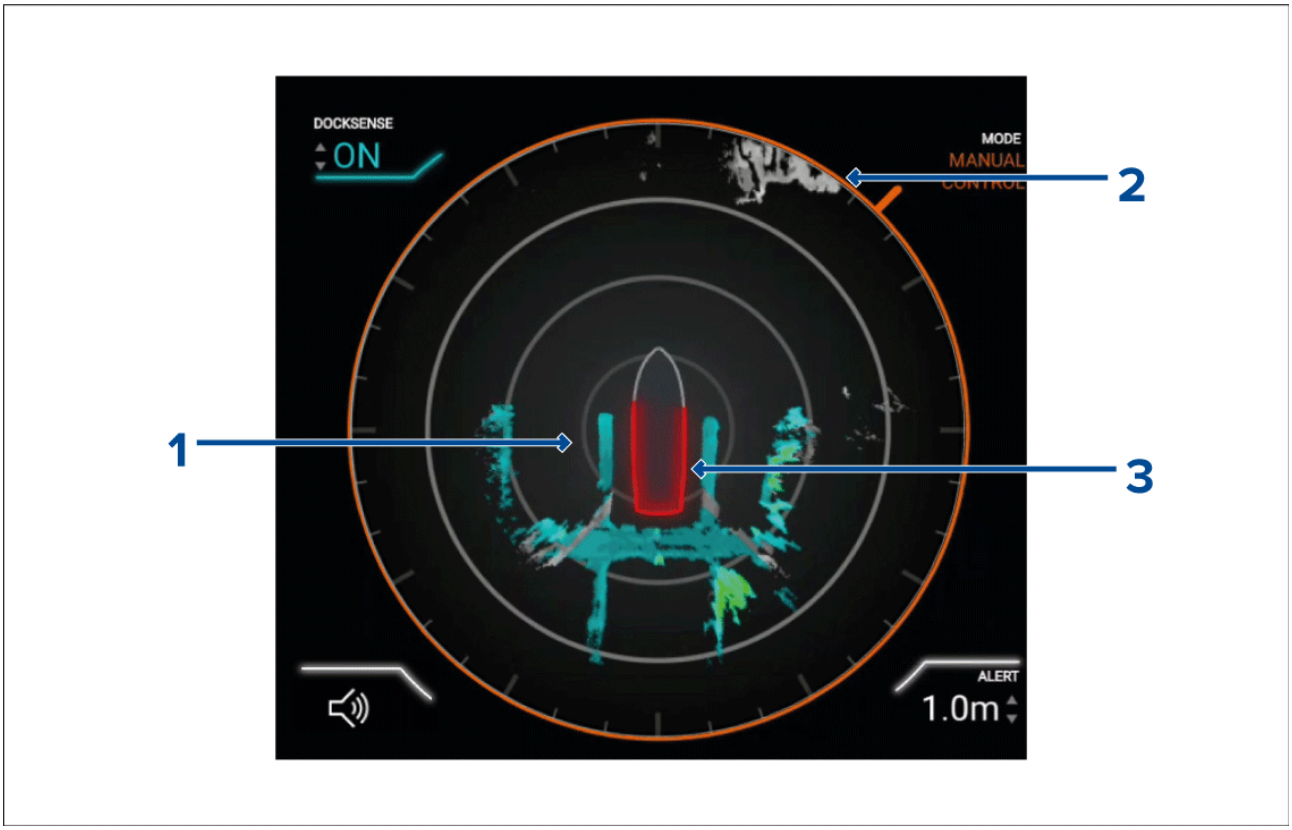
You can **zoom** in on a single camera feed by selecting it, removing all other camera feeds and minimizing the **Map**. Select anywhere on the screen again to return to default camera feed layout.

You can change the camera layout between **Clustered** and **Spatial** from the **Display** settings menu, for more information refer to: **p.24 — Settings**

DockSense cameras must be regularly cleaned to ensure reliable operation, for more information refer to: **p.8 — Cleaning the camera**

Map

The Map displays a virtual representation of your vessel and all solid objects detected by the DockSense cameras.



The **Map** is used to help determine your distance from solid objects:

1. **Solid objects** — Solid objects detected by the cameras are displayed in colour.
2. **Historical solid objects** — Solid objects recently detected by the cameras, but are no longer in their field of view are displayed as grey.

Note: Historical objects are automatically removed when you move away from them and are no longer within the **Map's** coverage.

3. **Vessel outline** — Your **Vessel outline** is displayed in the center of the map. The outline will show visual alerts to indicate your proximity to solid objects. For more information refer to: **p.22 — Alerts**

Alerts

Visual and audible alerts trigger when your vessel approaches solid objects:

Auto mode

Important:

Certain Alert features are not available in Auto mode. For more information refer to **p.28 — Auto mode**

Alert threshold

The intensity of visual and audible proximity alerts are determined by the **Alert threshold**.

Alert threshold has 3 levels, each being triggered when your vessel reaches a certain distance from solid objects:

- **Low** — in range of an object
- **Medium** — close to an object
- **High** — very close to an object

Important:

- The distance for each **Alert threshold** trigger is relative to your **Configuration File (.sense)** and the **Alert distance** setting.
- Lowering the value of the **Alert distance** setting will cause all **Alert thresholds** to trigger at closer distances to solid objects.
- Setting **Alert** distance to **0** will prevent alerts triggering.

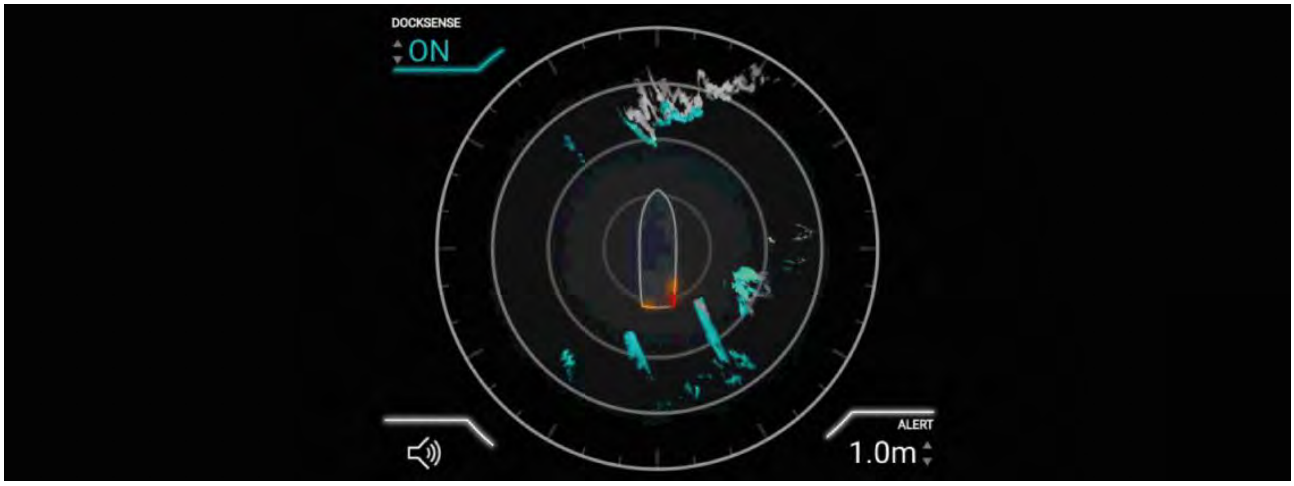
Visual

Visual alerts are displayed on the **Vessel outline**.

When your vessel approaches a solid object, parts of the **Vessel outline** will begin to change colour, indicating each section of your vessel's proximity to objects.

Visual alerts increase in intensity when higher alert thresholds are triggered:

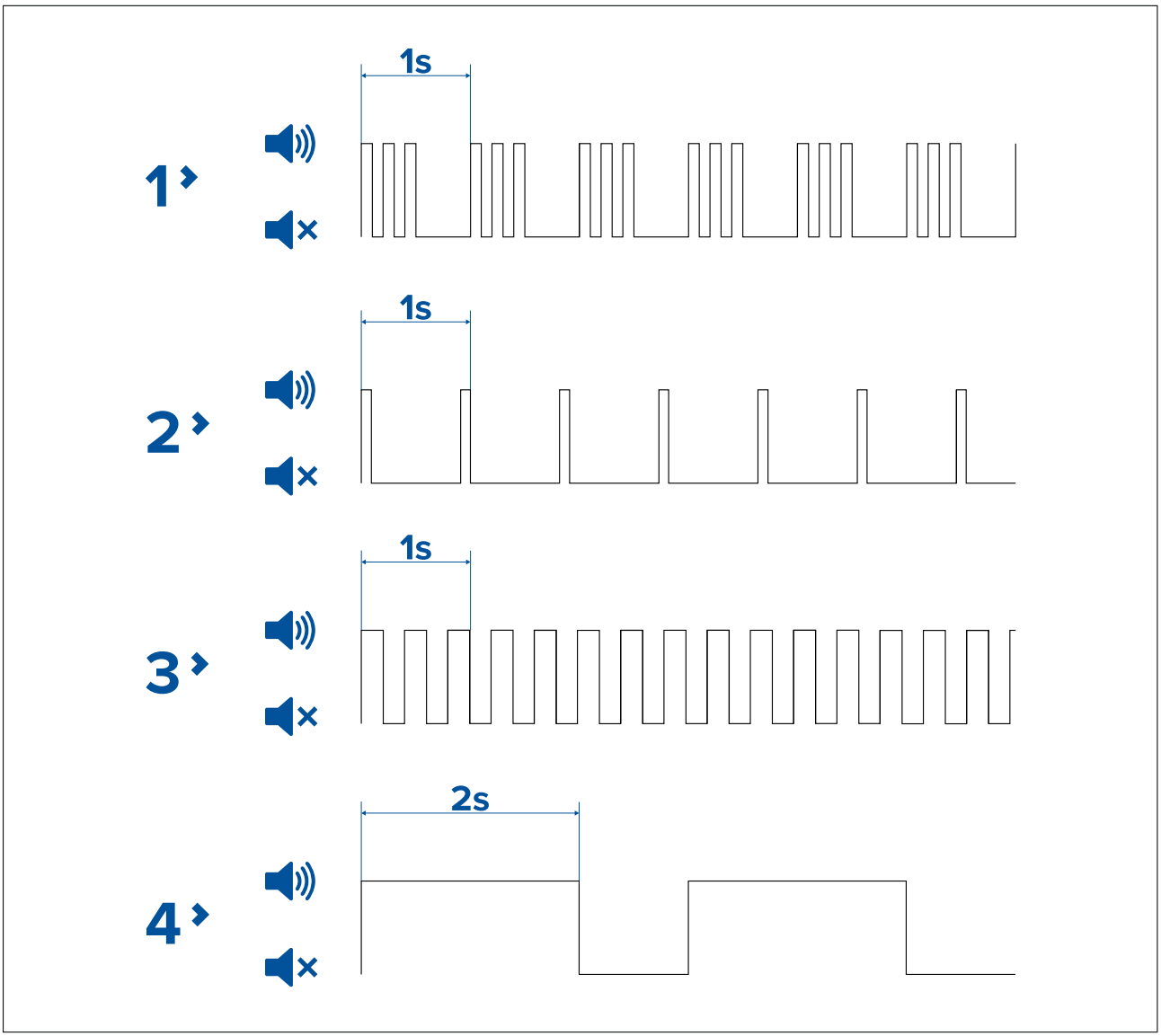
- **No Alert** — threshold not triggered (not in range of an object)
- **Yellow [flashing]** — low threshold (in range of an object)
- **Red [flashing]** — medium threshold (close to an object)
- **Red [solid]** — high threshold (very close to an object)



Audible

When enabled, audible alerts sound from your MFD when approaching solid objects.

Different audible alerts indicate the current alert threshold:



1. Low
2. Low (Axiom XL with Honk)
3. Medium
4. High

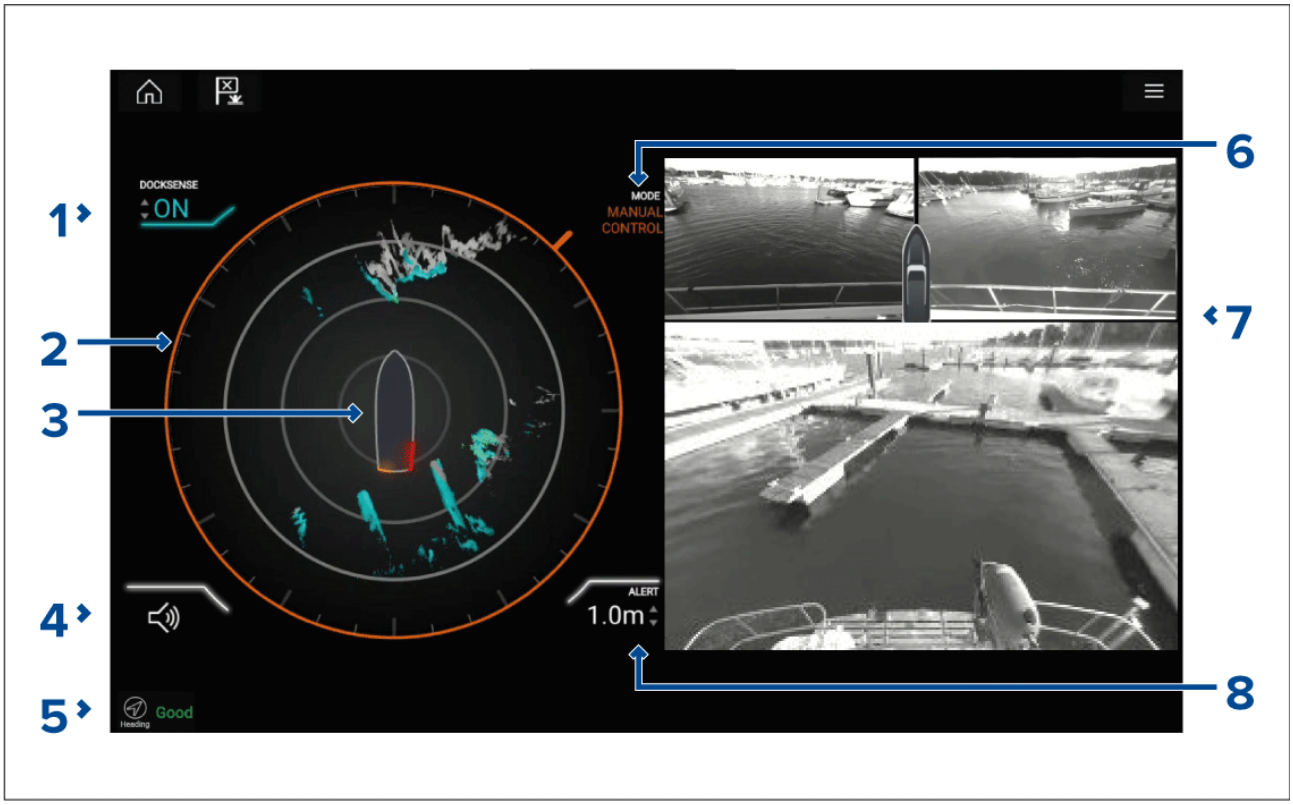
Note:

Audible alerts can be enabled/disabled, for more information refer to: **p.24 — Settings**

3.5 Settings

Your DockSense system settings can be customized to best suit your docking needs.

Homescreen



1. **Mode** — **Select** and change the DockSense system between **On/Standby** (Control Mode only).

Note: If **Power Save** mode has been enabled in your **Configuration File (.sense)**, selecting **Standby** will turn your DockSense system **Off**.

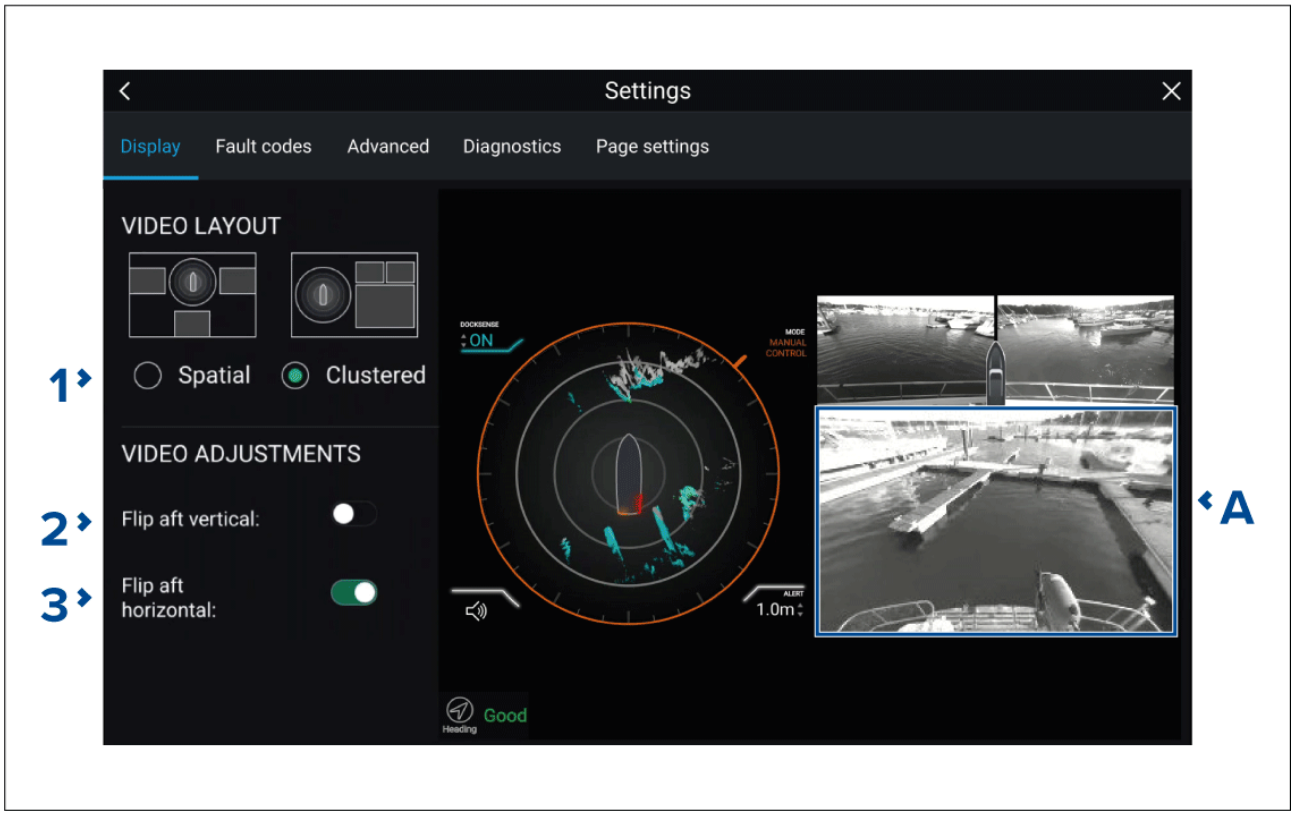
2. **Map** — **Select** the map's outer ring to **enlarge** the map and minimize camera feeds.
3. **Clear map history** — **Select** the center of the map and **Clear map history** to clear all objects recorded by your DockSense cameras from the map.
4. **Audio** — **Select** to set audible alerts to **Active/Muted (Control Mode only)**.

Note:

- **Muted** alerts are reset to **Active** alerts after exiting the DockSense app.
- Audio alerts can be permanently disabled by toggling the **Alert audio** setting to **Off** in the **Advanced** settings, **DockSense homescreen** > **Menu** > **Settings** > **Advanced** > **Alert audio**.

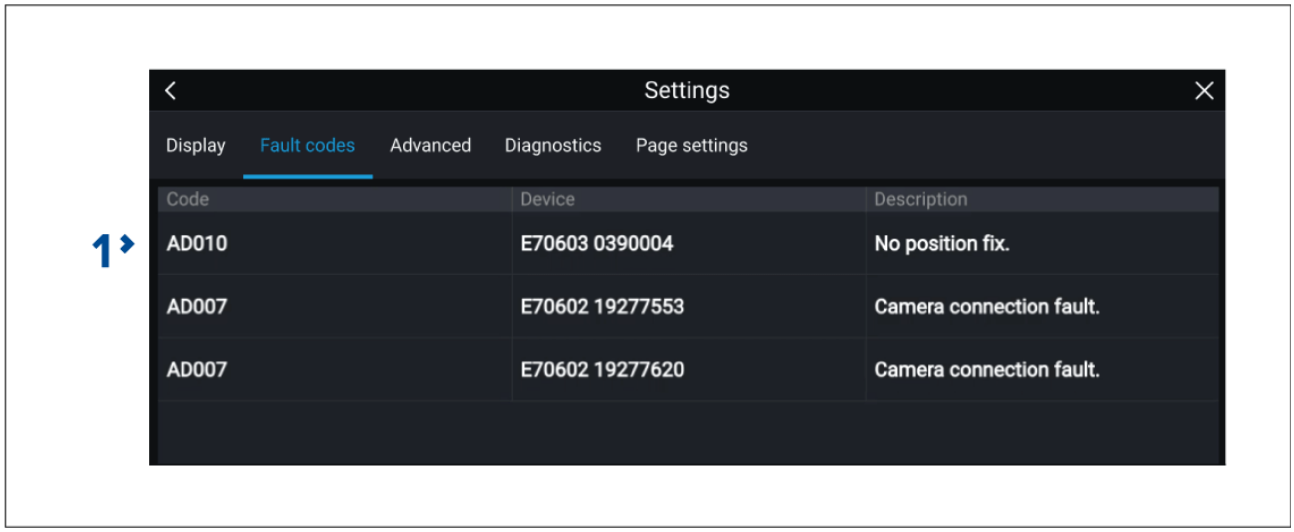
5. **GPS Heading** — Displays the current GPS heading status, for more information refer to: **p.39 — GNSS (GPS) troubleshooting**
6. **Mode** — Switch between Manual and Auto control modes via the **Joystick**, for more information refer to: **p.28 — Auto mode**
7. **Camera feed** — **Select** to **zoom** a camera feed, remove all other feeds and minimize the **Map**. Select anywhere on the screen again to return to default camera feed layout.
8. **Alert** — **Set** the **Alert Distance** of your DockSense **Alerts**. **Alert Distance** determines how close your vessel must be to the dock before audible and visual alerts will trigger. For more information refer to: **Alert threshold**

Display



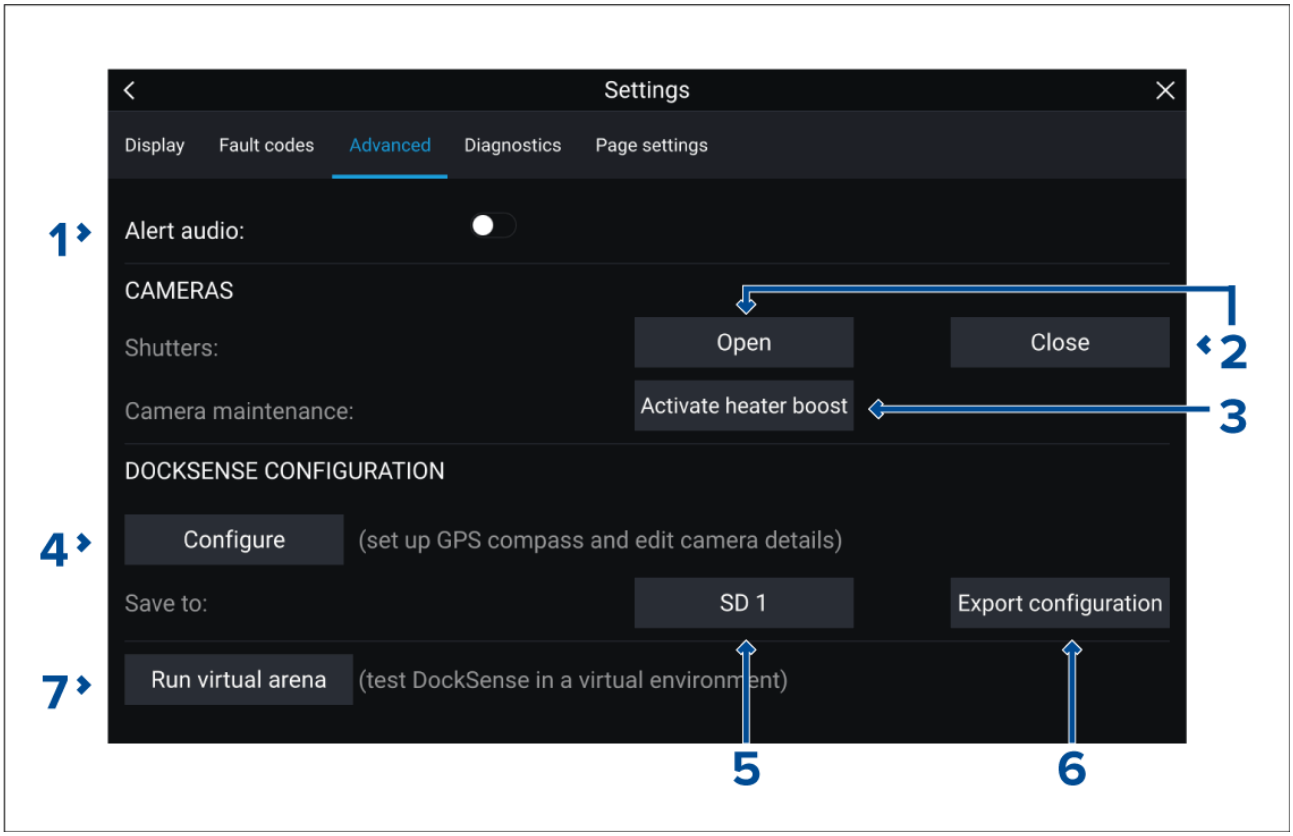
1. **Video Layout** — **Select** the **Spatial** or **Clustered** video layout.
2. **Flip aft vertical** — **Toggle** stern camera feed (**A**) vertical flip **On/Off**.
3. **Flip aft horizontal** — **Toggle** stern camera feed (**A**) horizontal flip **On/Off**.

Fault Codes



1. All active fault codes detected on your DockSense system are displayed here. For more information refer to: **p.37 — Troubleshooting**

Advanced



1. **Alert audio** — **Toggle** audible alerts **On/Off** (setting choice persists after DockSense system power cycle).
2. **Open/Close shutters** — **Open/Close** your DockSense camera shutters. **(Manual Control mode only)**
3. **Activate heater boost** — **Activate** your DockSense camera heaters for de-icing.
4. **Configure** — **Configure** your DockSense GPS and camera system. **(Manual Control mode only)**

Important:

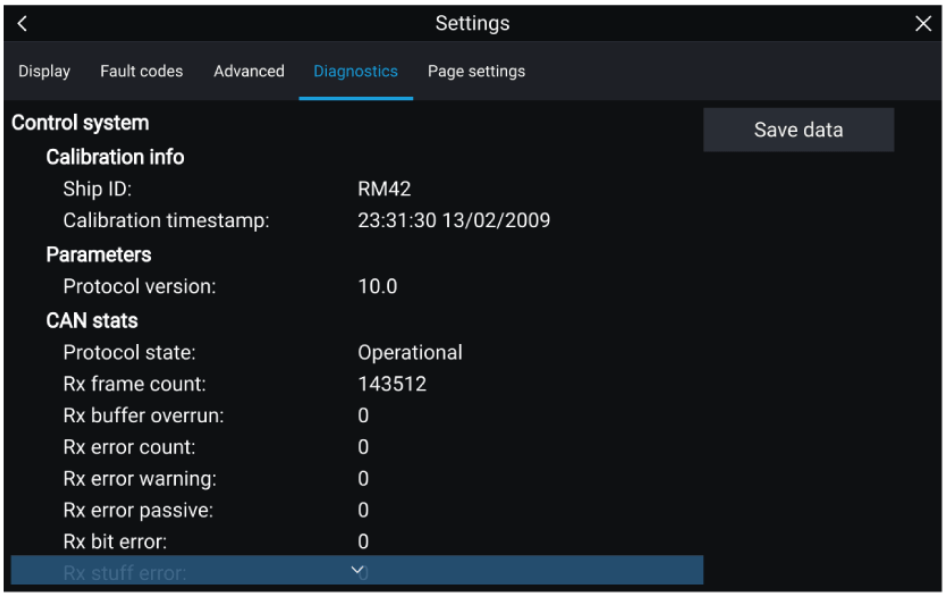
- DockSense configuration should only be accessed and performed by a Raymarine dealer or other appropriately-qualified installer of DockSense systems.
- This setting is password protected.

5. **Save to** — **Select** the SD card the **Configuration File (.sense)** export will be saved to, for backup purposes.
6. **Export configuration** — **Export** a copy of the **Configuration File (.sense)** stored on your DockSense Processor Module to the selected SD card.
7. **Run virtual arena** — **Run** the test **DockSense virtual arena** to practice docking maneuvers, for more information refer to **p.32 — Virtual Arena**

Important:

Raymarine® advises you keep a **Backup** of your **Configuration File (.sense)** on an external storage device.

Diagnostics



View DockSense control equipment diagnostics data.

1. **Save data** — Saves diagnostic data to SD card.

Page Settings (Data Overlays)

- Add data overlays to the DockSense app. For more information on data overlays refer to: **LightHouse 3 advanced operation instructions (81370)**.
- **Edit data overlays** — **Add**, **edit** and **remove** data overlays.

3.6 Auto mode

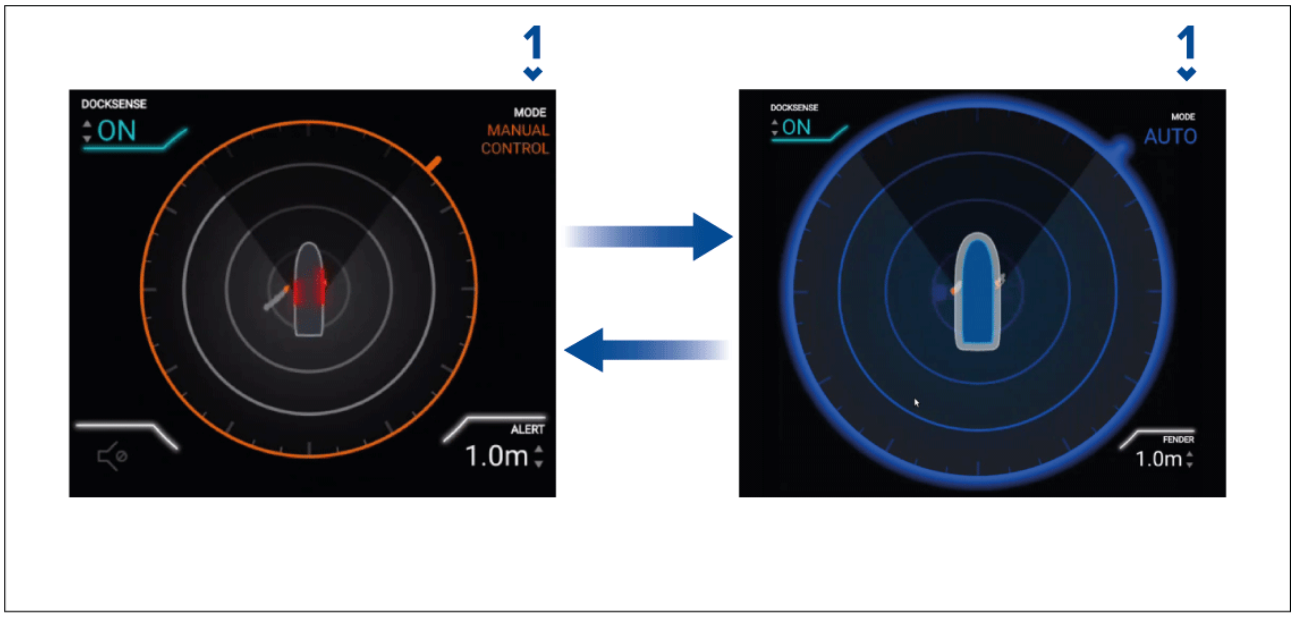
DockSense Control systems can perform docking maneuvers using **Manual Control mode** or **Auto mode**

When docking with **Auto Mode** enabled, your DockSense system will assist you in your docking maneuver by automatically controlling your engine throttle, slowing your vessel's approach to the dock and eventually stopping at the distance specified by the **Fender** setting.

Important:

Auto mode:

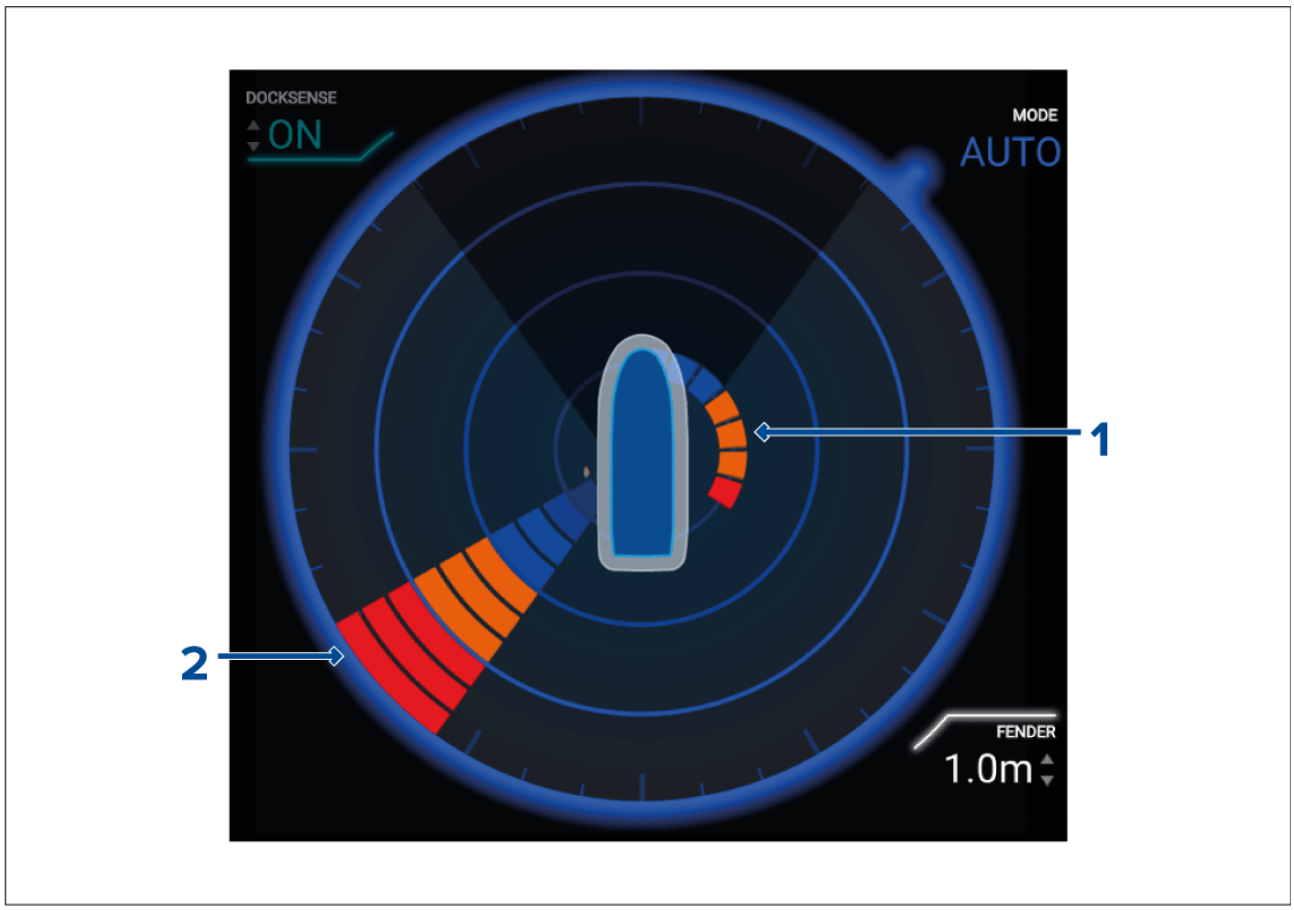
- does NOT feature audible alerts;
- only the **High threshold** visual alert (**Solid Red**) indicates very close proximity to an object



By default, your DockSense system will start in **Manual Control mode**. Selecting the **Mode** button (**1**) on the **Homescreen** will toggle your system between **Manual Control mode** and **Auto mode**.

Engine effort

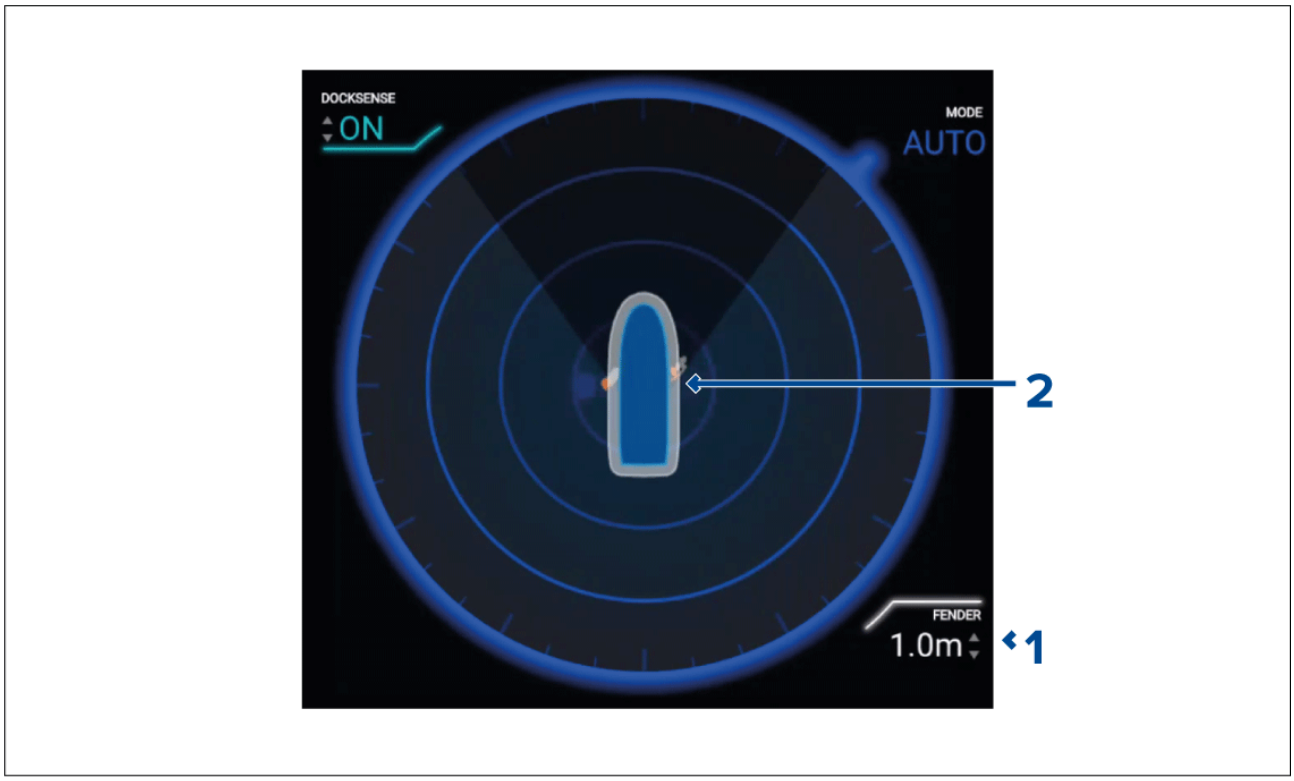
Auto mode displays your vessel's **Rotation effort** and **Translation effort**.



1. **Rotation effort** — the location of the bar on the left or right of the vessel outline indicates whether you are turning to port or starboard. The colour and number of segments in the bar indicates the rotation effort: **Blue** (<30% effort), **Orange** (30% to <60% effort), **Red** (60%+ effort).
2. **Translation effort** — the location of the bar in relation to the vessel outline indicates which direction your vessel is travelling. The colour and number of segments in the bar indicates the translation effort: **Blue** (<50% effort), **Orange** (50% to <80% effort), **Red** (80%+ effort).

Virtual Fender

When **Auto mode** is enabled, the **Alert** setting on the **Homescreen** is replaced with the **Fender (1)** setting. Changing the value of the **Fender** setting increases or decreases the size of the **Virtual Fender (2)** that surrounds the **Vessel Outline**. The Virtual Fender determines what distance your DockSense Control system begins to slow and eventually stop engine throttle when approaching solid objects. Lowering the value of the **Fender** setting will reduce the size of the **Virtual Fender** and decrease the distance between your vessel and the solid object it stops at, e.g. 1 m will stop your vessel 1 meter away from the dock and prevent it from moving closer.



Temporary Override

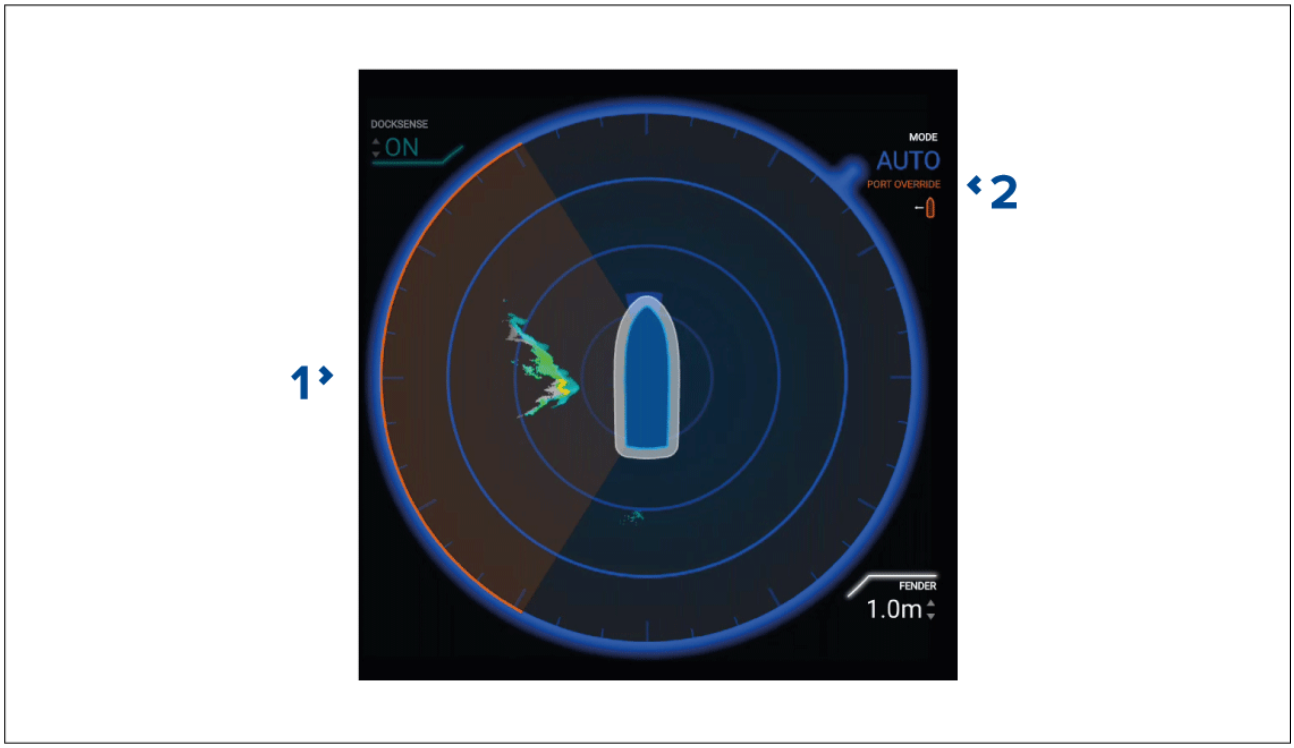
The DockSense cameras may pick up false detections (such as reflections on the water), and present them as obstacles on the Map.

When in Auto mode this may prevent your vessel from moving in the same direction as the false detection. In this scenario, a temporary override can be initiated to ignore the false detection and move your vessel past it.

Note:

Temporary Override is only available in Auto mode.

To initiate Temporary Override, long press the area of the **Map** with the false detection (Port, Starboard, Bow, or Stern). After a 1 second delay, the Temporary Override will be active in the direction pressed, e.g. pressing the left side of the **Map** initiates Temporary Override for port side.



1. Orange area indicating Temporary Override is active for the Port side of the boat.
2. Status icon indicating Temporary Override is active for the Port side of the boat.

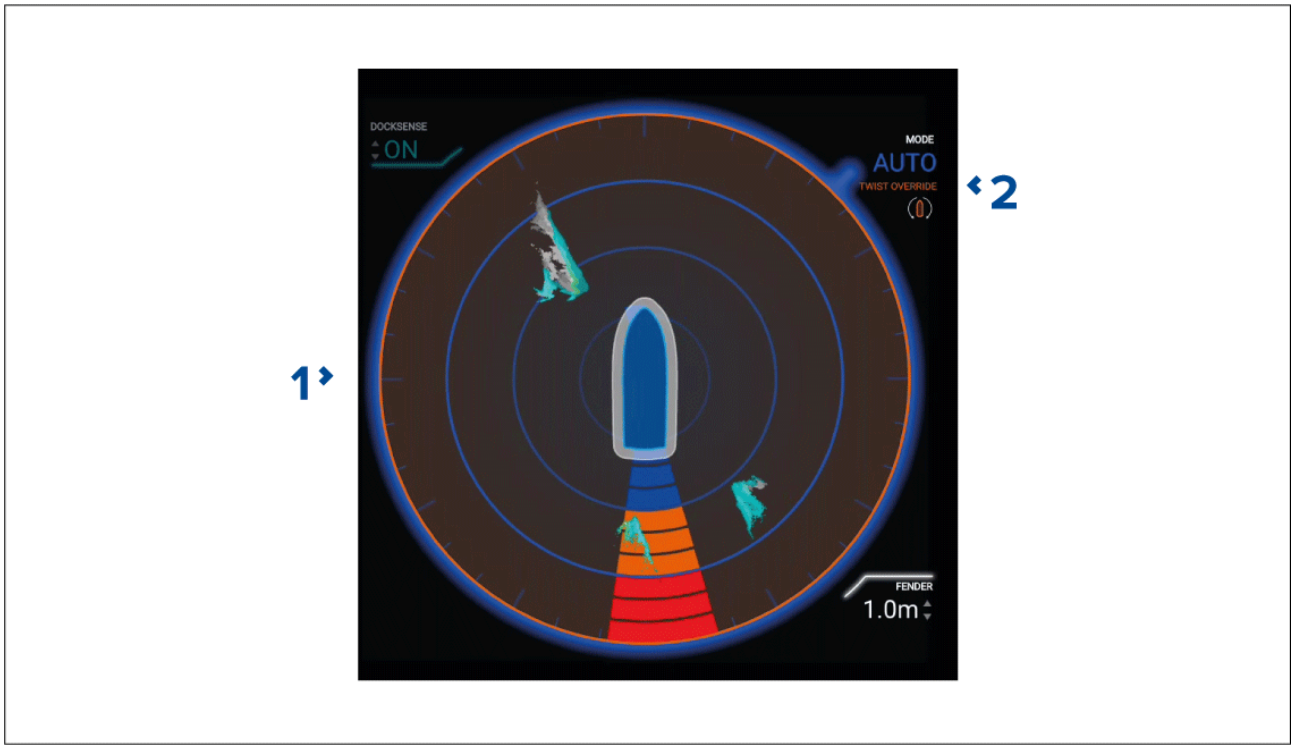
Twist Override

Twist Override allows you to move your vessel freely past false detections when making twist turns with the joystick.

Note:

Twist Override is only available in Auto mode.

To initiate Twist Override, long press the **Vessel Outline** in the center of the **Map**. After a 1 second delay the Twist Override will be active.



1. Orange area indicating Twist Override is active.
2. Status icon indicating Twist Override is active.

3.7 Virtual Arena

Virtual arena is a feature which allows you to safely test your DockSense system on open water, in a simulated virtual environment displayed on your multifunction display.

When virtual arena is active, your DockSense system will begin displaying a digitally-generated test environment which can be used to practice docking maneuvers and test system responsiveness.

Activate Virtual Arena

Important:

- The **Virtual Arena** feature must only be activated when on open water and away from obstructions such as a docks, buoys, or other vessels.
- You must maintain a visual watch of your surroundings at all times. When **Virtual Arena** is active your DockSense system will only alert you to virtual objects. If your vessel approaches real objects the camera system will NOT detect them and you will NOT be alerted to them.
- Virtual arena can only be entered and exited when your DockSense system is in **Manual Control** mode.

1. Open the **Settings menu**.
2. Select **Advanced**.
3. Select **Run virtual arena**.
4. Enter the **Password**.
5. Activate **Virtual Arena** by selecting the toggle button to **On**.



A) You can use the **Virtual arena rotation** setting to rotate the arena to the desired orientation.

B) You can reset your vessel to the centre of the virtual arena at any time by selecting the **Re-centre map** button.

3.8 Using DockSense

The following is an example of how to effectively dock your vessel using the DockSense app:

Prerequisites

Important:

Before attempting to use the DockSense app for docking, ensure:

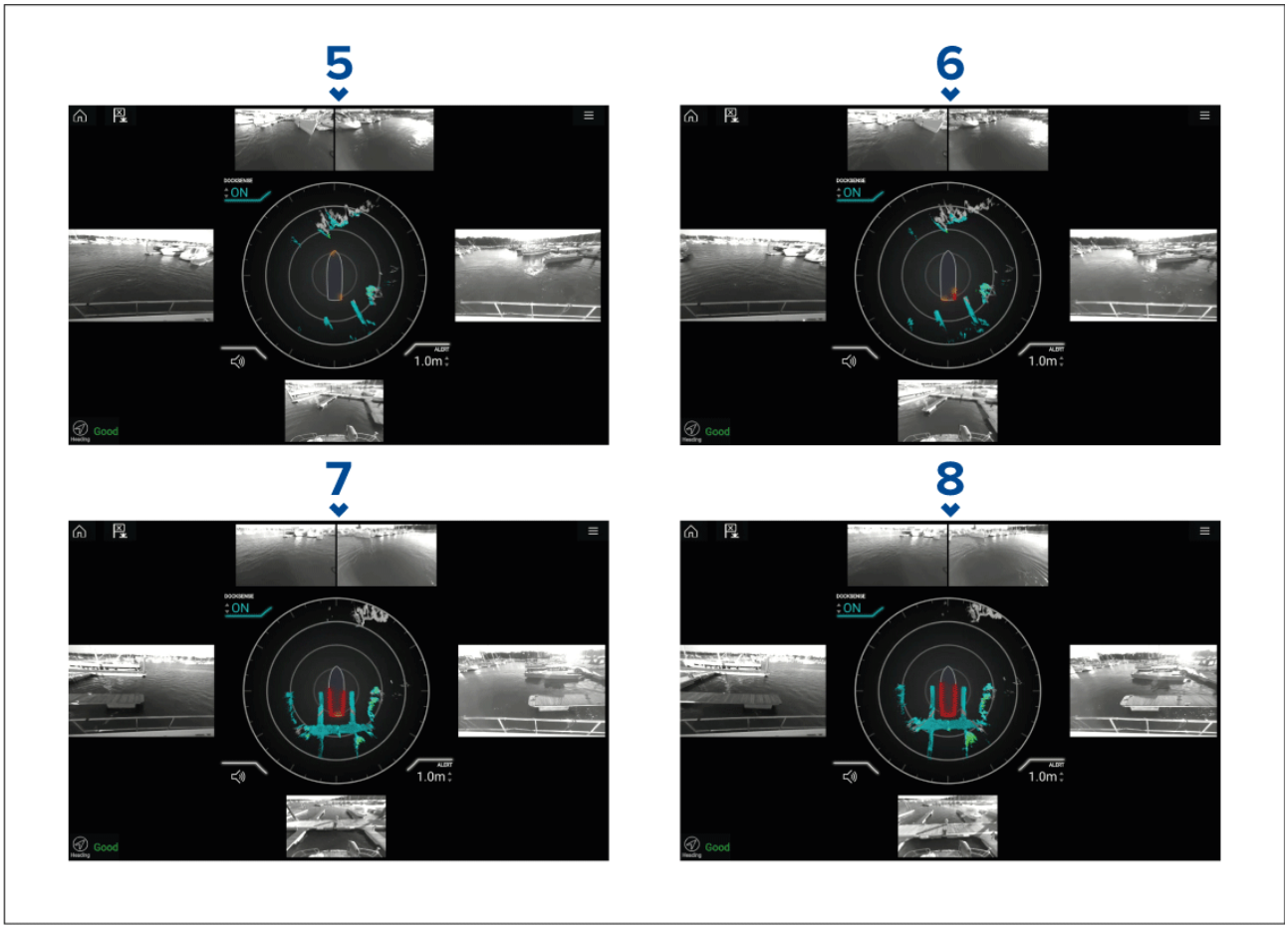
- You have read the Operation chapter and understand the DockSense app's features and settings.
- All cameras are displaying their video feeds correctly and nothing is obscuring the image.
- There are no active alarms or system faults.

Important:

Before attempting to use the DockSense app for docking, it is recommended you use the **Virtual Arena** feature to test your DockSense system and practice maneuvers.

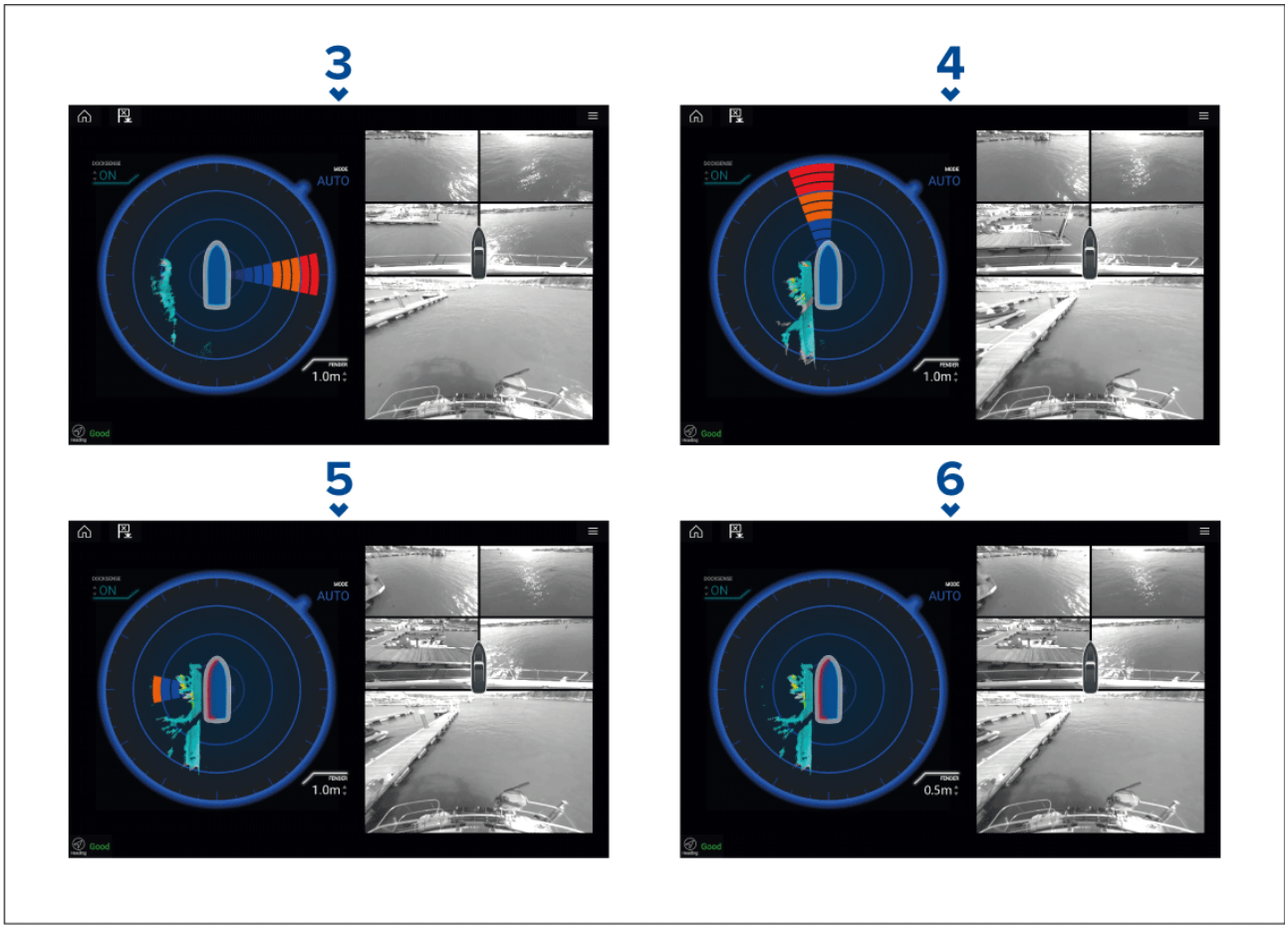
Docking maneuver (Manual Control mode)

1. Set **Audible Alerts** to active and the **Alert Range** to **1m**.
2. While maintaining a visual watch of your surroundings, approach the dock at a slow and safe speed.
3. The cameras should begin to detect solid objects and display them on the **Map**.
4. As you get closer to the dock, the DockSense app will alert you of your vessel's distance from solid objects with visual alerts on the **Vessel outline** and audible alerts.
5. Begin maneuvering slowly into the dock. Watch for alerts at other sections of your **Vessel outline**, such as the stern, making sure it does not inadvertently swing into the opposite dock.
6. As you continue the docking maneuver, more of the dock will be captured in the cameras' fields of view, meaning more of the **Vessel outline** will be covered in alerts. It is important to pay close attention to the intense visual alerts (flashing red and solid red) on the **Vessel outline**; this indicates you are close to the dock and should slow or stop your approach on those sides.
7. With the vessel inside the dock, the port, starboard and stern cameras are detecting close proximity to solid objects and are displaying intense visual alerts (flashing red and solid red) on the **Vessel outline**.
8. To complete the docking maneuver, continue approaching the dock slowly. Maintain a close visual watch of the camera feeds and the **Map**. When you are very close to the dock, the **Vessel outline** alert will change from flashing red to solid red and the audible alert will continuously sound, indicating you should not approach further.
9. Check you are at a suitable distance from the dock using the **Map** and camera feeds.
10. Exit the DockSense app and moor up.



Docking maneuver (Auto mode)

1. Set the **Fender** setting value to **1m**.
2. While maintaining a visual watch of your surroundings, approach the dock at a slow and safe speed.
3. The cameras should begin to detect solid objects and display them on the **Map**. Your translation and rotation effort will also display to indicate which direction your vessel is moving.
4. As you get closer to the dock, the DockSense system will begin to automatically decrease throttle towards detected objects. You can see how much engine effort is being applied by looking at the **Translation effort bar** and **Rotation effort bar**.
5. Your **Vessel outline** will display a **Solid Red** visual alert when solid objects are within the **Virtual Fender**. The system will prevent you from moving closer to the dock and will apply engine effort to keep you at least 1m away.
6. Check you are at a suitable distance from the dock using the **Map** and camera feeds. You can reduce the **Fender** value lower to get even closer to the dock.
7. Exit the DockSense app and moor up.


3
ON
AUTO
1.0m
Good
4
ON
AUTO
1.0m
Good
5
ON
AUTO
1.0m
Good
6
ON
AUTO
0.5m
Good

Chapter 4: Troubleshooting

Chapter contents

- 4.1 Troubleshooting on page 38
- 4.2 Diagnostics on page 38
- 4.3 Power up troubleshooting on page 38
- 4.4 GNSS (GPS) troubleshooting on page 39
- 4.5 Camera troubleshooting on page 40
- 4.6 Alarms list on page 42
- 4.7 LED diagnostics on page 46

4.1 Troubleshooting

The troubleshooting information provides possible causes and corrective action required for common problems associated with installation and operation of your product.

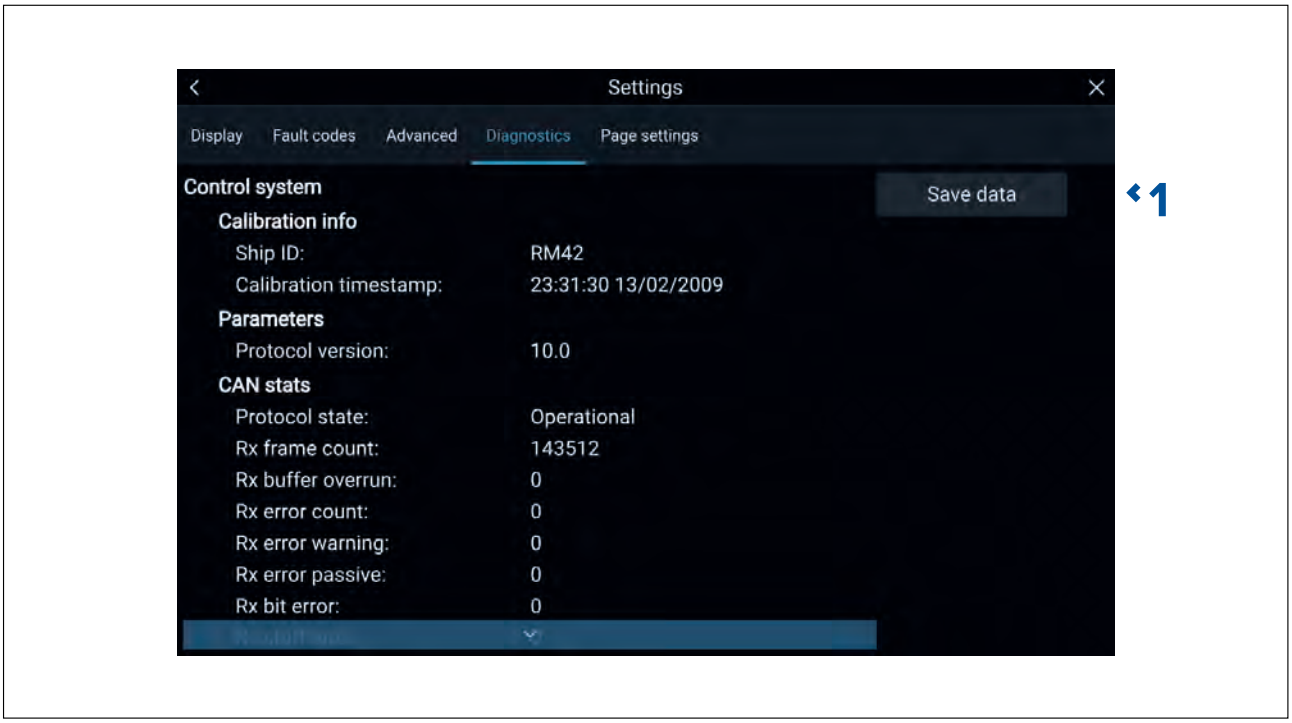
Before packing and shipping, all Raymarine products are subjected to comprehensive testing and quality assurance programs. If you do experience problems with your product this section will help you to diagnose and correct problems to restore normal operation.

If after referring to this section you are still having problems with your product, please refer to the Technical support section of this manual for useful links and Raymarine Product Support contact details.

4.2 Diagnostics

Diagnostics information can help determine if your DockSense system is experiencing any errors.

All equipment diagnostics information can be accessed in the settings menu: **DockSense app** > **Menu** > **Settings** > **Diagnostics**



4.3 Power up troubleshooting

Before troubleshooting problems with your power connection, ensure that you have followed the power connection guidance provided in the product's installation instructions and performed a power cycle/reboot of the device. The troubleshooting information below can be used if you are experiencing problems with powering up your router.

Blown fuse / tripped breaker

1. Check the fuse, located inline with the power cable. Ensure that it has the correct rating (refer to *Connections* chapter), as an under-rated fuse can affect the power supplied to the product. If the fuse has blown, replace with a new fuse.
2. Check the condition of relevant / additional fuses and breakers and connections; replace if necessary.
3. If fuse keeps blowing, check for cable damage, broken connector pins or incorrect wiring.

Poor / damaged / insecure power supply cable / connections

1. Check that the power cable connector is fully inserted into the unit and locked in position.
2. Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary.

3. With the unit turned on, try flexing the power cable near to the connector to see if this causes the unit to re-boot/lose power; replace if necessary.
4. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion; replace if necessary.

Incorrect power connection

The power supply may be wired incorrectly, ensure the installation instructions have been followed.

Power source insufficient

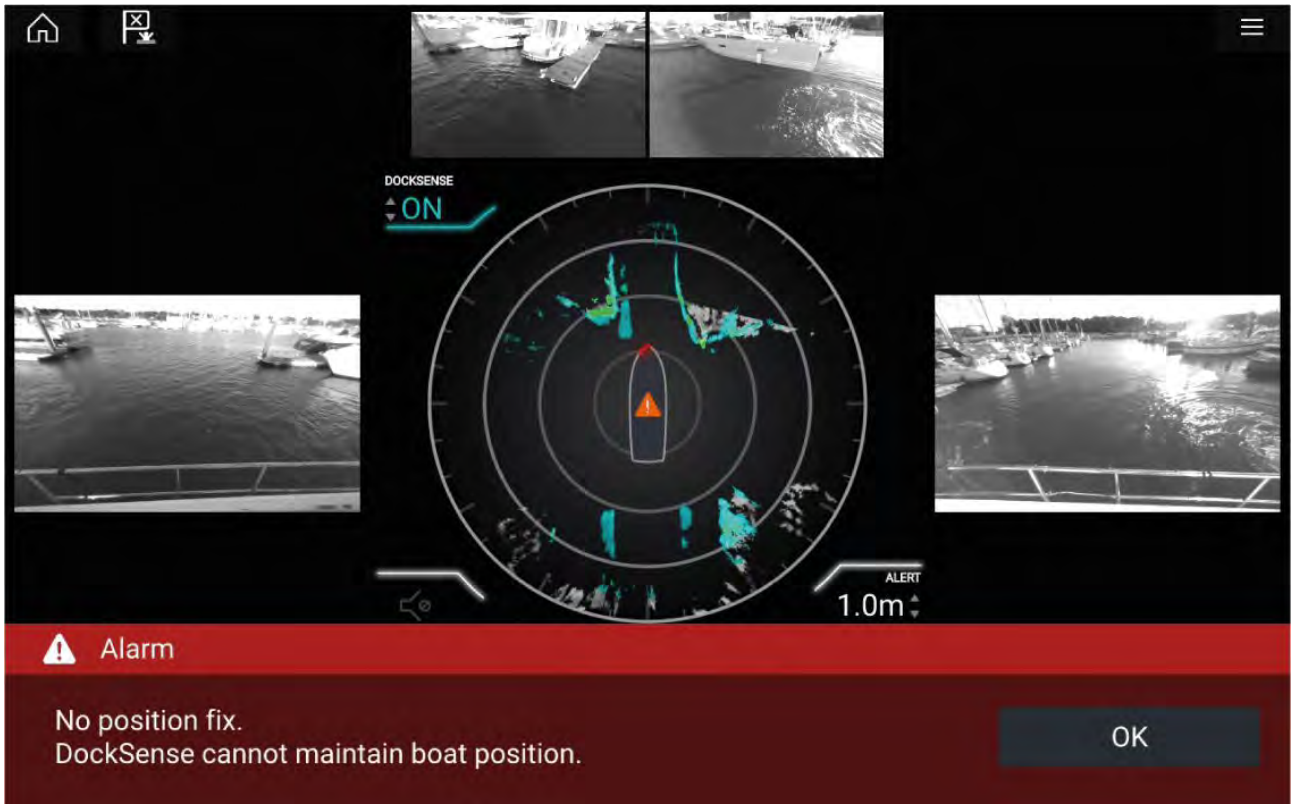
Check that your power supply (battery or distribution panel) is providing a minimum of 10.8 V to each component in the system.

4.4 GNSS (GPS) troubleshooting

Your DockSense system is reliant on a source of accurate heading at all times; if the GPS signal is poor then the heading cannot be relied on.

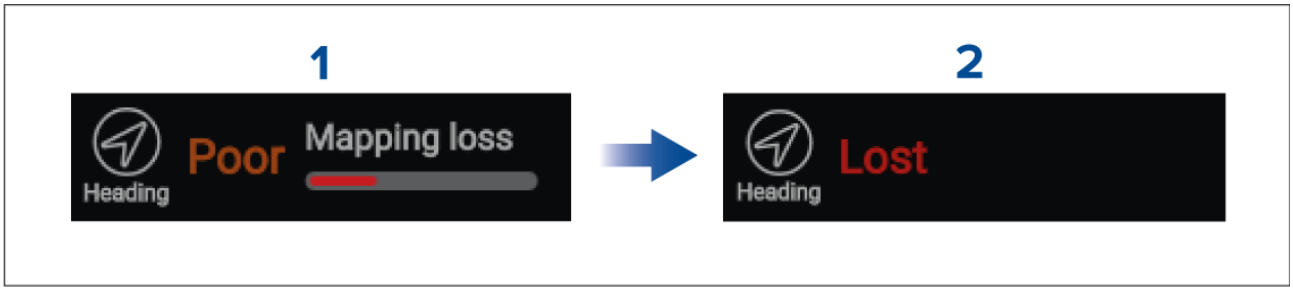
"No Fix" status icon is displayed on the multifunction display (MFD), or the system keeps losing position fix.

Ensure that the GPS compass is located in the exact position specified in the **Configuration File (.sense)** supplied with your DockSense system. In particular, the GPS compass requires a clear view of the sky, and both the GPS and AHRS compasses must be level / flat to the water plane, and must also be **at least** 1 m (3.3 ft) away from each other.



Poor Heading or Lost Heading status message displayed in DockSense app.

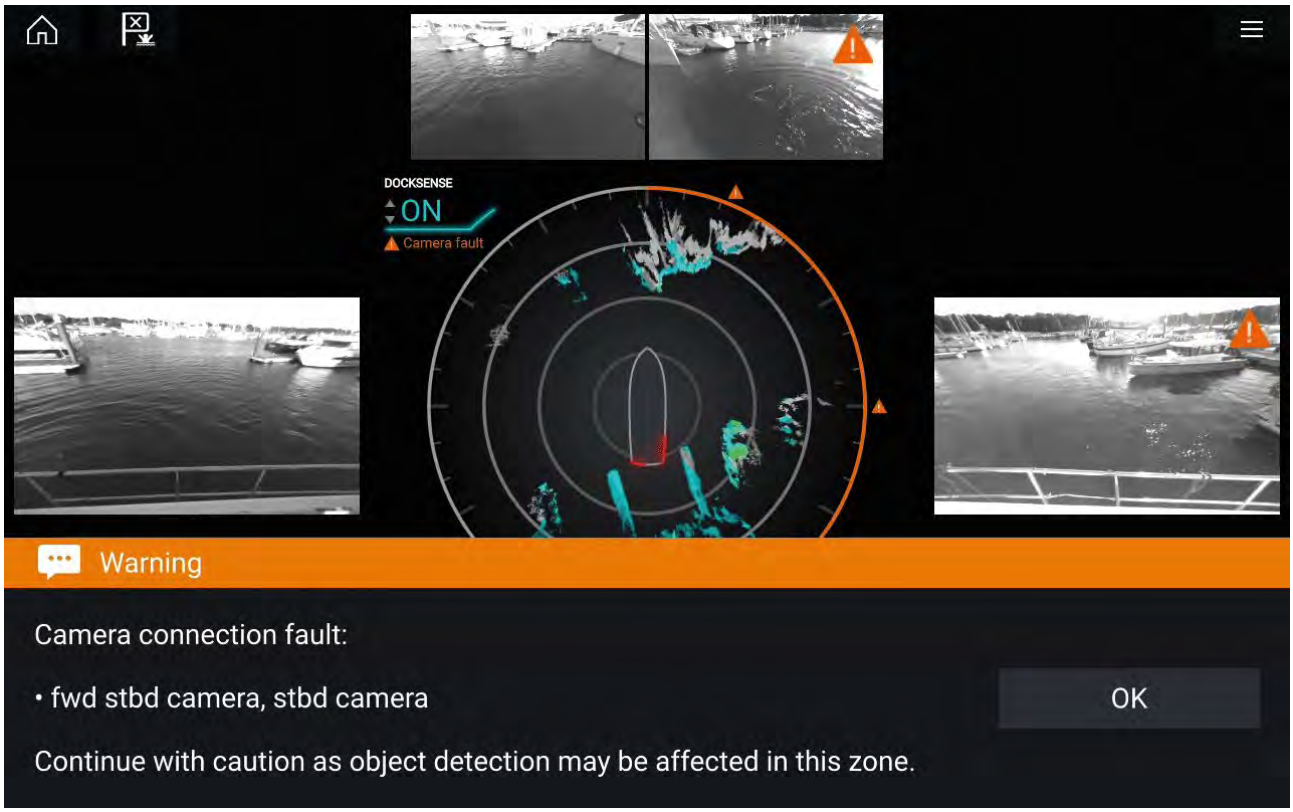
Be aware that the GPS compass can be affected by the number of satellites it sees in the sky. When the heading accuracy falls below a certain threshold, heading will be lost and the map will not be shown on screen in the DockSense app. The app displays a warning when the heading information is low quality. The indicator bar provides an indication of how long the map will be maintained, given the current heading quality (**1**), until it is lost (**2**). If heading quality is consistently poor, your installation will need to be reviewed by your dealer / installer.



4.5 Camera troubleshooting

"Camera connection fault" message and status icons displayed in DockSense app.

Ensure the affected camera(s) have been installed and connected in accordance with Raymarine's recommendations in **DockSense Alert Installation instructions (87405)** or **DockSense Control Installation instructions (87418)**, as appropriate. If this error is persistent, your installation will need to be reviewed by your dealer / installer.



Misaligned camera

If your DockSense system is not detecting solid objects correctly, it could mean your DockSense camera is misaligned. If the camera has been knocked out of position it will require realignment and recalibration. Contact your dealer / installer for more information.

"Camera imaging" message and status icons displayed in DockSense app.

This Alarm can be caused by:

- Poor environmental conditions, e.g. fog and low light levels
- Obscured camera vision

Ensure that the affected camera(s) are clean and no dirt is obscuring the lens. Ensure also that you're using the DockSense system in approved settings. For more information, refer to: **System limitations**

"Ice Alert" message and status icons displayed in DockSense app.

This message can appear if the camera shutter or lens are frozen. Activate **Heater Boost** from **Advanced Settings** and wait for the cameras to de-ice before using the DockSense app, **Homescreen** > **Menu** > **Settings** > **Advanced**.

"Shutter fault" message and status icons displayed in DockSense app.

The shutter on your DockSense camera has failed to open or close correctly. Check the camera shutter is not blocked or frozen when operating. If this error is persistent, your camera will need to be reviewed by your dealer / installer.

“Internal fault” message and status icons displayed in DockSense app.

Your camera has become damaged and is not guaranteed to function correctly. Your camera will need to be reviewed by your dealer / installer.

4.6 Alarms list

ID	Alert	Scope Determines if the Alarm can be triggered only when using the DockSense App (**App**), or anywhere on the MFD system (**Global**)	Severity The severity of the Alarm in the DockSense system: • **Information** — Important information. • **Warning** — Requires your attention. • **Alarm** — Potential Danger — take action.
AD001	Object detected Bumper/fender Infringement	App	Warning
AD002	Camera — Imaging problem (lens contaminated / dirty)	App	Warning
AD003	Camera — imaging problem (too foggy / dark)	App	Warning
AD004	Camera — shutter fault	App	Warning
AD005	Camera — ice alert	App	Warning
AD006	Camera — internal fault	App	Warning
AD007	Camera — not connected / connection lost	App	Warning
AD008	Camera — Calibration Error - Intrinsic	App	Warning
AD009	Camera — Calibration Error - Extrinsic	App	Warning
AD010	Compass — no position fix / position lost	Global	Alarm
AD011	Compass — no heading data / heading fault	Global	Alarm
AD012	Compass — no attitude data / attitude fault	Global	Alarm
AD014	Processor Module — connection to MFD lost	Global	Alarm
AD015	Processor Module — Engine (Velocity Controller) Connection Lost	Global	Alarm
AD016	Processor Module — CAN to Joystick Connection Lost	Global	Alarm
AD025	System — Self Intersecting Boat Polygon	App	Information

AD026	System — Mapping data timeout	Global	Alarm
AD027	System — Boat Polygon Too few points	App	Information
AD028	System — Boat Polygon Invalid Winding	App	Information
AD029	System — Boat Polygon Too many points	App	Information
AD030	System — Joystick Input not detected timeout	Global	Warning
AD031	System — low voltage detected	Global	Alarm
AD032	System — Incorrect Engine Parameters in .toml file	App	Information
AD035	System — connection to external alarm lost	Global	Alarm
AD036	System — System Faulted, cannot go into "AUTO" mode	App	Warning
AD037	Processor Module — MFD to Processor Module Lost Connection	Global	Alarm
AD038	Processor Module — Shut Down Warning	Global	Information
AD039	High Speed Warning	App	Warning
AD040	Location of GNSS receiver parameter missing from config file	Global	Alarm
AD041	Camera — running outdated firmware	App	Warning
AD042	Position of centre of gravity parameter missing from config file	Global	Alarm
AD043	Velocity controller tuning parameters missing from config file	Global	Alarm
AD044	Auto mode error — No instance of DockSense app open	Global	Alarm
AD045	Auto mode error — DockSense is not ready	Global	Alarm
AD046	Auto mode error — Camera shutters are closed	Global	Alarm

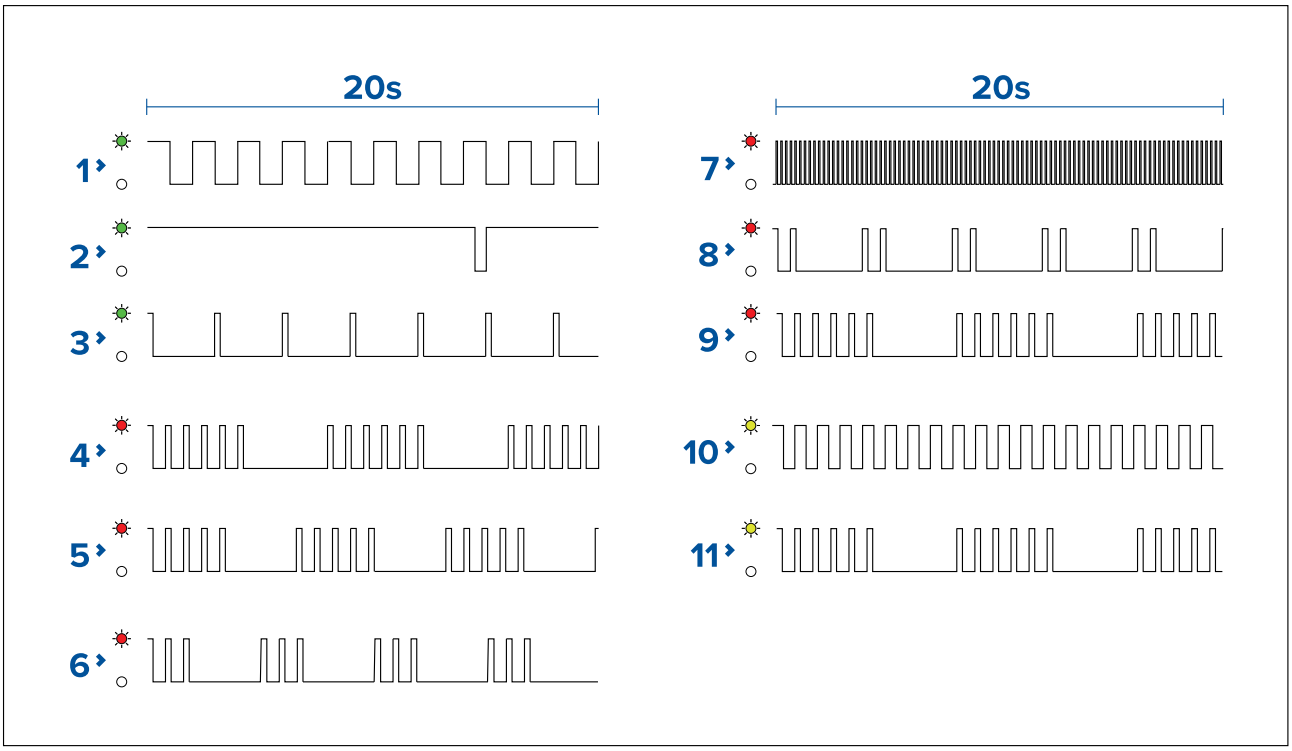
AD047	Aventics — Aventics protocol hasn't been checked	Global	Alarm
AD048	Aventics — Communication error between DockSense controller and Aventics system	Global	Alarm
AD049	Aventics — Aventics mode is not compatible with DockSense	Global	Alarm
AD050	Aventics — Aventics protocol is incompatible with DockSense controller's protocol version	Global	Alarm
AD051	Aventics — Aventics calibration not detected	Global	Alarm
AD052 & AD053	Aventics — Fault with <port/starboard> propulsion	Global	Alarm
AD054 & AD055	Aventics — Fault with <Port/starboard> propulsion issue detected	Global	Warning
AD056 & AD057	Aventics — Fault with <bow/stern> thruster	Global	Alarm
AD058 & AD059	Aventics — Fault with <Bow/stern> thruster issue detected	Global	Warning
AD060 & AD061	Aventics —Fault with rudder to <port/starboard>	Global	Alarm
AD062 & AD063	Aventics —Rudder to <port/starboard> issue detected	Global	Warning
AD064	Aventics —Alarm within Aventics Marex 3D system	Global	Alarm
AD065	Aventics —Propulsion is not ready	Global	Alarm
AD066	Aventics — Joystick is in the incorrect propulsion mode	Global	Alarm
AD067	System — Unable to generate DockSense mapping	Global	Alarm
AD068	System — High speed warning	Global	Alarm
AD069	System — DockSense controller software is incompatible with this display's version	Global	Alarm

AD070	Aventics — Conflict with Aventics and DockSense controller calibration data	Global	Alarm
AD071	System — Internal timeout STM	Global	Alarm
AD072	System — Internal timeout mapping	Global	Alarm
AD073	System — Internal timeout localisation	Global	Alarm
AD074	System — Waiting for joystick recentring	Global	Alarm

4.7 LED diagnostics

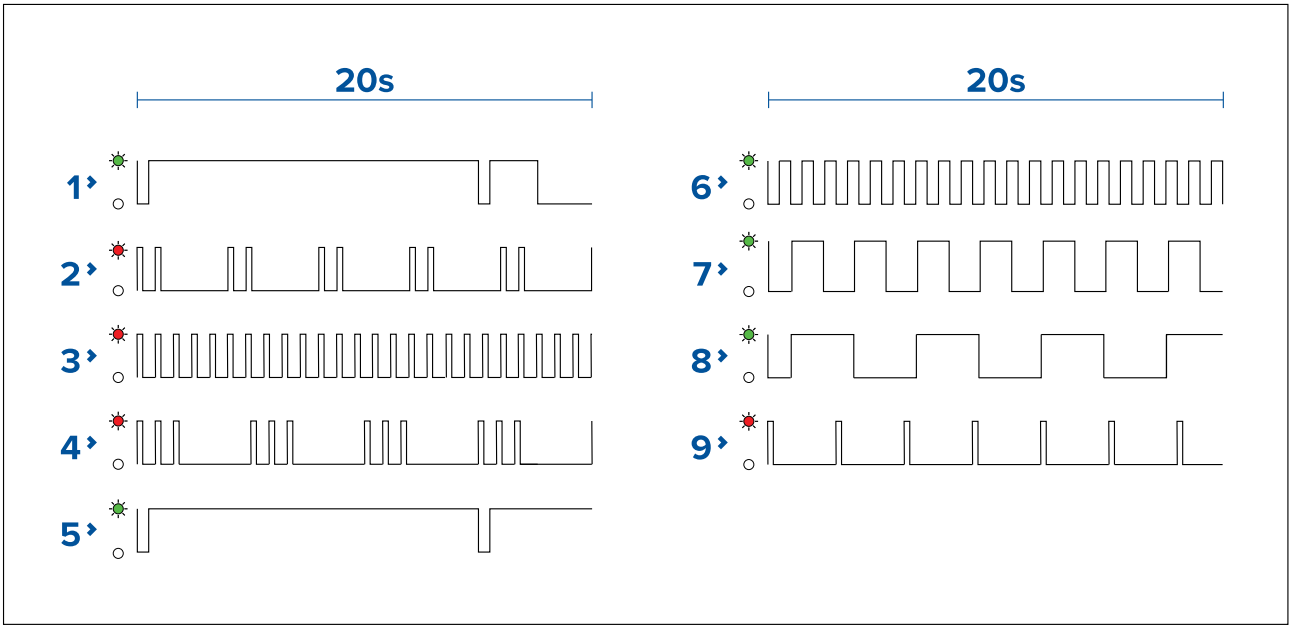
The LED lights on your system's equipment can help identify faults and errors.

Processor module



1. Startup sequence
2. Normal operation
3. Power save
4. Over voltage
5. Under voltage
6. Over temperature
7. Unit requires reprogramming
8. Network Bus connection fault
9. Network Bus connected but not receiving data
10. Engine Bus connection fault
11. Engine Bus connected but not receiving data

AR250 / AR270



1. Normal operation
2. NMEA Bus not connected / fault
3. NMEA Bus connected but not receiving data
4. Private Bus no comms / not connected / fault
5. All sensors connected and ready
6. All sensors are initialising
7. GPS Initializing / not ready / no fix
8. Compass Linearizing
9. Internal fault / error

Chapter 5: Maintenance

Chapter contents

- 5.1 Routine equipment checks on page 50
- 5.2 Product cleaning on page 50
- 5.3 Cleaning the camera on page 50

5.1 Routine equipment checks

It is recommended that you perform the following routine checks, on a regular basis, to ensure the correct and reliable operation of your equipment:

- Examine all cables for signs of damage or wear and tear.
- Check that all cables are securely connected.

5.2 Product cleaning

Best cleaning practices.

When cleaning products:

- Switch off power supply.
- Use a clean damp cloth to wipe clean.
- Do NOT use: abrasive, acidic, ammonia, solvent or other chemical based cleaning products.
- Do NOT use a jet wash.

5.3 Cleaning the camera

The camera housing and lens require regular cleaning. You should clean the lens when system performance appears to deviate from its usual level, or when excessive contaminant buildup is seen on the lens. You should also ensure that the camera's protective cover is also unobstructed and operating correctly.

When cleaning this product:

- Do NOT wipe the lens window with a dry cloth, or with abrasive materials such as paper or scrub brushes, as this could scratch the coating.
- Do NOT use acid or ammonia based products.
- Do NOT pressure wash.

Particular care should be taken when cleaning the lens window, as this has a protective anti-reflective coating which may be damaged by improper cleaning.

1. Switch off the power to the unit.
2. Clean the camera body with a clean, soft cotton cloth. You can moisten the cloth and use a mild detergent if required.
3. Clean the camera lens.
    - Rinse the lens with fresh water to remove all dirt particles and salt deposits, and allow to dry naturally.
    - If any spots or smears remain, very gently wipe the lens window with a clean microfibre cloth or soft cotton cloth.
    - If necessary, use isopropyl alcohol (IPA) or a mild detergent to remove any remaining spots, marks, or salt deposits.

Chapter 6: Technical support

Chapter contents

- 6.1 Raymarine product support and servicing on page 52
- 6.2 Learning resources on page 53

6.1 Raymarine product support and servicing

Raymarine provides a comprehensive product support service, as well as warranty, service, and repairs. You can access these services through the Raymarine website, telephone, and e-mail.

Product information

If you need to request service or support, please have the following information to hand:

- Product name.
- Product identity.
- Serial number.
- Software application version.
- System diagrams.

You can obtain this product information using diagnostic pages of the connected MFD.

Servicing and warranty

Raymarine offers dedicated service departments for warranty, service, and repairs.

Don't forget to visit the Raymarine website to register your product for extended warranty benefits: http://www.raymarine.co.uk/display/?id=788.

United Kingdom (UK), EMEA, and Asia Pacific:

- E-Mail: emea.service@raymarine.com
- Tel: +44 (0)1329 246 932

United States (US):

- E-Mail: rm-usrepair@flir.com
- Tel: +1 (603) 324 7900

Web support

Please visit the "Support" area of the Raymarine website for:

- **Manuals and Documents** — http://www.raymarine.com/manuals
- **Technical support forum** — http://forum.raymarine.com
- **Software updates** — http://www.raymarine.com/software

Worldwide support

United Kingdom (UK), EMEA, and Asia Pacific:

- Help desk: https://raymarine.custhelp.com/app/ask
- Tel: +44 (0)1329 246 777

United States (US):

- Help desk: https://raymarine.custhelp.com/app/ask
- Tel: +1 (603) 324 7900 (Toll-free: +800 539 5539)

Australia and New Zealand (Raymarine subsidiary):

- E-Mail: aus.support@raymarine.com
- Tel: +61 2 8977 0300

France (Raymarine subsidiary):

- E-Mail: support.fr@raymarine.com
- Tel: +33 (0)1 46 49 72 30

Germany (Raymarine subsidiary):

- E-Mail: support.de@raymarine.com
- Tel: +49 40 237 808 0

Italy (Raymarine subsidiary):

- E-Mail: support.it@raymarine.com
- Tel: +39 02 9945 1001

Spain (Authorized Raymarine distributor):

- E-Mail: sat@azimut.es

- Tel: +34 96 2965 102

Netherlands (Raymarine subsidiary):

- E-Mail: support.nl@raymarine.com
- Tel: +31 (0)26 3614 905

Sweden (Raymarine subsidiary):

- E-Mail: support.se@raymarine.com
- Tel: +46 (0)317 633 670

Finland (Raymarine subsidiary):

- E-Mail: support.fi@raymarine.com
- Tel: +358 (0)207 619 937

Norway (Raymarine subsidiary):

- E-Mail: support.no@raymarine.com
- Tel: +47 692 64 600

Denmark (Raymarine subsidiary):

- E-Mail: support.dk@raymarine.com
- Tel: +45 437 164 64

Russia (Authorized Raymarine distributor):

- E-Mail: info@mikstmarine.ru
- Tel: +7 495 788 0508

6.2 Learning resources

Raymarine has produced a range of learning resources to help you get the most out of your products.

Video tutorials

Raymarine official channel on YouTube:

- YouTube

Training courses

Raymarine regularly runs a range of in-depth training courses to help you make the most of your products. Visit the Training section of the Raymarine website for more information:

- http://www.raymarine.co.uk/view/?id=2372

Technical support forum

You can use the Technical support forum to ask a technical question about a Raymarine product or to find out how other customers are using their Raymarine equipment. The resource is regularly updated with contributions from Raymarine customers and staff:

- https://raymarine.custhelp.com/app/home

Chapter 7: NMEA Support

Chapter contents

- 7.1 AR250 / AR270 supported NMEA 2000 PGNs on page 56

7.1 AR250 / AR270 supported NMEA 2000 PGNs

Transmit

- 59392 ISO Acknowledgement
- 60416 ISO Transport Protocol, Connection Management - BAM group function
- 60928 ISO Address Claim
- 126208 NMEA - Acknowledge group function
- 126464 PGN Lists
- 126992 System Time
- 126993 Heartbeat
- 126996 Product Information
- 126998 Configuration Information
- 129025 Position, Rapid Update
- 129026 COG & SOG Rapid Update
- 129029 GNSS Position Data
- 129033 Time and Date
- 129539 GNSS DOPs
- 129044 Datum
- 129540 GNSS Sats in View
- 129542 GNSS Pseudo range Noise Statistics
- 129547 GNSS Pseudo range Error Statistics

Receive

- 59904 ISO Request
- 60160 ISO Transport Protocol, Data Transfer
- 60416 ISO Transport Protocol, Connection Management - BAM group function
- 60928 ISO Address Claim
- 65240 ISO Commanded Address
- 126208 NMEA - Command group function
- 126208 NMEA - Request group function
- 129044 Datum

Index

A

Additional system components 13
  Aventics 14
Alarms 42
Alert 20
  Audible 22, 24
  Threshold 22
  Visual 22–23
Alert audio 27
Alert threshold 22
Applicable products 13
Audible alert 24
Auto mode 28–30

C

Camera 14
Camera feed 20–21
  Zoom 21
Cleaning 50
Clear map history 25
Compass 14
Contact details 52
Create app 18

D

Data overlays 28
Diagnostics 27
Docking 33
Docking maneuver (Auto mode) 34
Docking maneuver (Manual Control mode) 33
DockSense Control 15
DockSense System 14
Document conventions 14

E

Engine effort 29
Export .Sense 27

F

Fault codes 26
Features 21
Flip aft 26

G

GNSS (GPS) 39
GPS 25

H

Heater boost 27
Historical objects 22
Homescreen 20

L

LED diagnostics 46
LightHouse 3 18
Limitations of use 19

M

Maintenance 50
Map 20, 22, 25
  Historical objects 22
  Solid objects 22
  Vessel outline 22
Mode 25

N

NMEA 2000
  Supported PGNs 56

O

Open app 19
Operation 17
  Alarms list 42
  Create app 18
  Docking 33
  Docking maneuver (Auto mode) 34
  Docking maneuver (Manual Control mode) 33
  Features 21
  Homescreen 20
  LightHouse 3 18
  Map 22
  Open app 19
  Settings 24
  Virtual Arena 32

P

Power save mode 25
Prerequisites 33
Processor module 14
Product documentation 12
Product information 15
  Applicable products 13
Product recycling (WEEE) 9
Product support 52

R

Rotation effort 29
Routine checks 50

S

Service Center 52
Settings 24
  Alert 25
  Alert audio 27
  Audio 25
  Camera feed 25
  Clear map history 25
  Data overlays 28
  Diagnostics 27
  Export .Sense 27
  Fault codes 26
  Flip aft 26

GPS 25
Heater boost 27
Map 25
Mode 25
Power save mode 25
Shutters 27
Video Layout 26
Shutters 27
Solid objects 22
Support forum 53

T

Technical support 52–53
Training courses 53
Translation effort 29
Troubleshooting 38
Alarms list 42
Camera 40
GNSS (GPS) 39
Power up 38

V

Vessel outline 22
Video Layout 26
Virtual Arena 32
Activate 32
Virtual Fender 30
Visual alert 23

W

Warranty 52
WEEE Directive 9

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