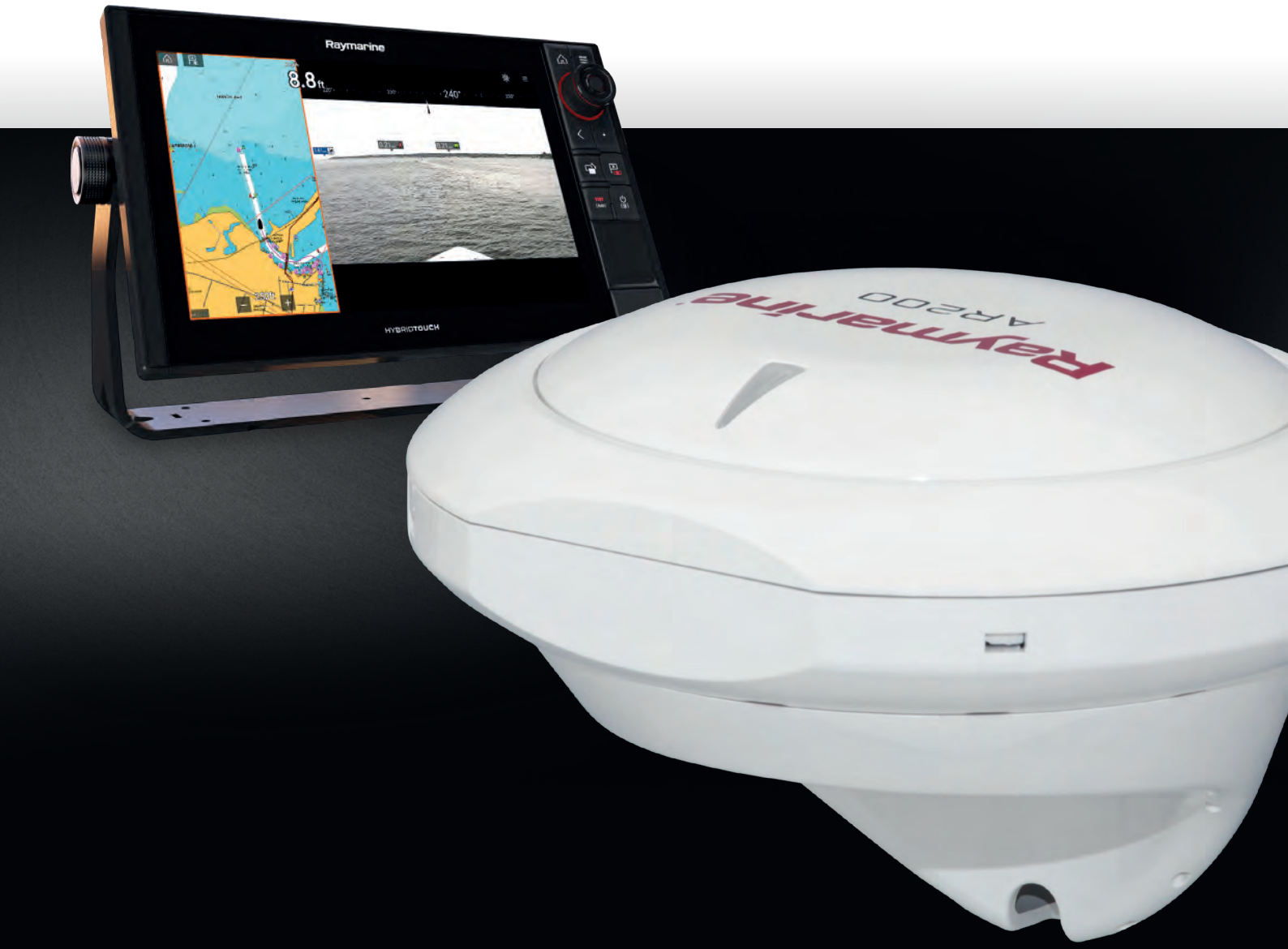
Raymarine®



AR200

Installation instructions

English (en-US)
Date: 12-2021
Document number: 87372 (Rev 2)

Trademark and patents notice

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Software updates

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.

Publication copyright

English (en-US)
Document number: 87372 (Rev 2)
AB;26140;2021-12-01T14:51:21

Contents

Chapter 1: Important information

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: Product installation and operation

- This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your vessel and/or poor product performance.
- Raymarine highly recommends certified installation by a Raymarine approved installer. A certified installation qualifies for enhanced product warranty benefits. Register your warranty on the Raymarine website: www.raymarine.com/warranty

Warning: Potential ignition source

This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

Warning: Product grounding

Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions provided.

Warning: Positive ground systems

Do not connect this unit to a system which has positive grounding.

Warning: Switch off power supply

Ensure the vessel's power supply is switched OFF before starting to install this product. Do NOT connect or disconnect equipment with the power switched on, unless instructed in this document.

Warning: Power supply voltage

Connecting this product to a voltage supply greater than the specified maximum rating may cause permanent damage to the unit. Refer to the product's information label for the correct voltage.

Caution: Power supply protection

When installing this product ensure the power source is adequately protected by means of a suitably-rated fuse or thermal circuit breaker.

Caution: Product cleaning

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.

Caution: Service and maintenance

This product contains no user serviceable components. Please refer all maintenance and repair to authorized Raymarine dealers. Unauthorized repair may affect your warranty.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the stated water ingress protection standard (refer to the product's *Technical Specification*), water intrusion and subsequent equipment failure may occur if the product is subjected to high-pressure washing. Raymarine will not warrant products subjected to high-pressure washing.

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.

Suppression ferrites

- Raymarine cables may be pre-fitted or supplied with suppression ferrites. These are important for correct EMC performance. If ferrites are supplied separately to the cables (i.e. not pre-fitted), you must fit the supplied ferrites, using the supplied instructions.
- If a ferrite has to be removed for any purpose (e.g. installation or maintenance), it must be replaced in the original position before the product is used.
- Use only ferrites of the correct type, supplied by Raymarine or its authorized dealers.
- Where an installation requires multiple ferrites to be added to a cable, additional cable clips should be used to prevent stress on the connectors due to the extra weight of the cable.

Connections to other equipment

Requirement for ferrites on non-Raymarine cables

If your Raymarine equipment is to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite MUST always be attached to the cable near the Raymarine unit.

Declaration of conformity

FLIR Belgium BVBA declares that the following products are in compliance with the Radio Equipment Directive (RED) 2014/53/EU:

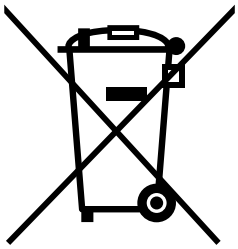
- AR200 Augmented Reality Sensor, part number E70537

The original Declaration of Conformity certificate may be viewed on the relevant product page at www.raymarine.com.

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.

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.

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 information

Chapter contents

2.1 Product documentation

The following documentation is applicable to your product:

Description	Part number
AR200 Installation instructions (This document)	87372
Deck and bracket mounting template	87170

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.

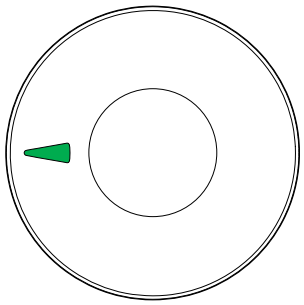
Operation instructions

For detailed operation instructions for your product, refer to the documentation that accompanies your display.

All product documentation is available to download from the Raymarine website: www.raymarine.com/manuals.

Applicable products

This document is applicable to the following products:

	Part number	Name	Description
	E70537	AR200	SeaTalkng ® Augmented Reality Sensor

Chapter 3: Product and system overview

Chapter contents

3.1 AR200 product overview

The AR200 is an Augmented Reality Sensor consisting of a Global Navigation Satellite Systems (GNSS GPS) Receiver and an Attitude and Heading Reference System (AHRS) sensor.

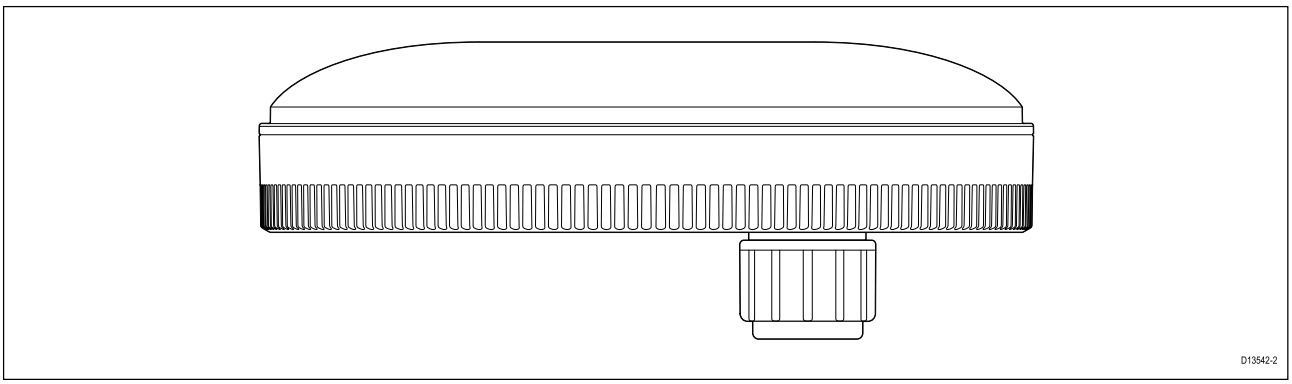
When combined with a compatible IP or Thermal camera and an Axiom multifunction display (MFD), the AR200 enables you to use the ClearCruise™ Augmented Reality features available on Axiom MFDs running LightHouse™ 3 Version 3.7 or above.

These features use the data capabilities of Augmented Reality technology to overlay data objects (such as waypoints and AIS targets) onto a live camera feed being displayed on your MFD. This enhances your situational awareness by allowing you to quickly see the position of these data objects relative to your actual field of view in front of your vessel.

Note:

For more information about Augmented Reality and how it is used on your MFD, refer to *81370 LightHouse 3 Advanced operation instructions*.

The AR200 provides position, heading, pitch and roll data to compatible Axiom MFDs that are on the same SeaTalkng ® network.



The **AR200** has the following features:

- Enables the ClearCruise™ Augmented Reality feature on your MFD.
- 9-axis AHRS (Attitude and Heading Reference System) sensor.
- Compatible with GPS, and GLONASS GNSS systems.
- Ready for BeiDou and Galileo satellite systems (supported by a future software update).

- Automatic calibration.
- Pole, Rail, Surface or Bracket mounting options (mounting kits available).
- Can be used as a source of GNSS (GPS) position and Heading data for other devices in your network. For more information, please refer to the Multiple Data Sources (MDS) information in the *81370 LightHouse 3 Advanced operation instructions* document.
- 10 Hz refresh rate.
- NMEA 2000 compliant.
- Low power consumption.
- 12 V DC operation (protected up to 32 V DC), via the SeaTalkng ® network.
- Waterproof to IPx6 and IPx7.

3.2 Required additional components

The AR200 forms part of the ClearCruise™ Augmented Reality System and requires the following additional components to enable the Augmented Reality features on your system.

Required components for Augmented Reality (IP cameras)

- MFD (Axiom, Axiom Pro or Axiom XL)
- IP camera (CAM210IP or CAM220IP)
- LightHouse™ software (v3.7 or later)

Required components for Augmented Reality (M-Series cameras)

- MFD (Axiom, Axiom Pro or Axiom XL)
- M-Series camera (M100, M200 and M300 Series)
- M100 / M200-Series cameras require LightHouse™ software version 3.9 or later.
- M300-Series cameras require LightHouse™ software version 3.10.71 or later.

Important:

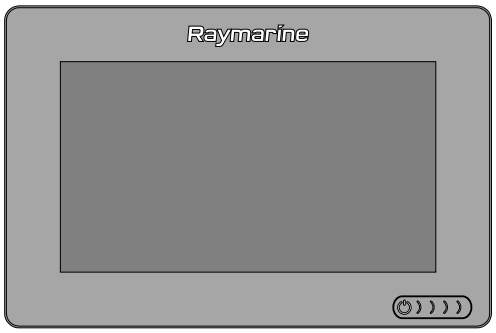
Cameras utilizing ClearCruise™ Augmented Reality are subject to an unstable image on rough waters.

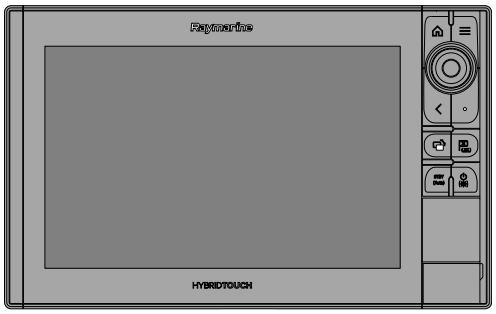
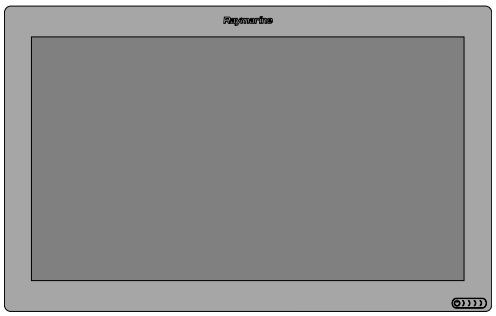
Recommended components

- AIS receiver / transceiver. Required if you want to overlay AIS targets on the live camera feed as part of the Augmented Reality features.

Compatible MFDs

The following multifunction displays (MFDs) are compatible with your product:

	Description	Part number(s)
	Axiom™ 7 Chartplotter variants	E70363, E70363–DISP
	Axiom™ 7 DV variants	E70364, E70364–01, E70364–02, E70364–DISP
	Axiom™ 7 RV 3D variants	E70365, E70365–03, E70365–DISP
	Axiom™ 9 Chartplotter variants	E70366, E70366–DISP
	Axiom™ 9 RV 3D variants	E70367, E70367–02, E70367–03, E70367–DISP
	Axiom™ 12 Chartplotter variants	E70368, E70368–DISP
	Axiom™ 12 RV 3D variants	E70369, E70369-03, E70369–DISP

	Description	Part number(s)
	Axiom™ Pro 9 RVX	E70371
	Axiom™ Pro 9 S	E70481
	Axiom™ Pro 12 RVX	E70372
	Axiom™ Pro 12 S	E70482
	Axiom™ Pro 16 RVX	E70373
	Axiom™ Pro 16 S	E70483
	Axiom™ XL 16	E70399
	Axiom™ XL 19	E70400
	Axiom™ XL 22	E70515
	Axiom™ XL 24	E70401

Multifunction display software requirements

The operation of this product requires that your MFD is running Raymarine LightHouse™ 3 software, version 3.7 or later.

Note:

- The latest MFD software can be obtained by visiting www.raymarine.com/software.
- The website also includes information on how to upgrade your product software.

3.3 Software updates

The software running on the product can be updated.

- Raymarine periodically releases software updates to improve product performance and add new features.
- The software on many products can be updated using a connected and compatible multifunction display (MFD).
- Refer to www.raymarine.com/software/ for the latest software updates and the software update procedure for your specific product.

Important:

- To prevent potential software-related issues with your product, always follow the relevant update instructions carefully and in the sequence provided.
- If in doubt as to the correct procedure for updating your product software, refer to your dealer or Raymarine technical support.

Caution: Installing software updates

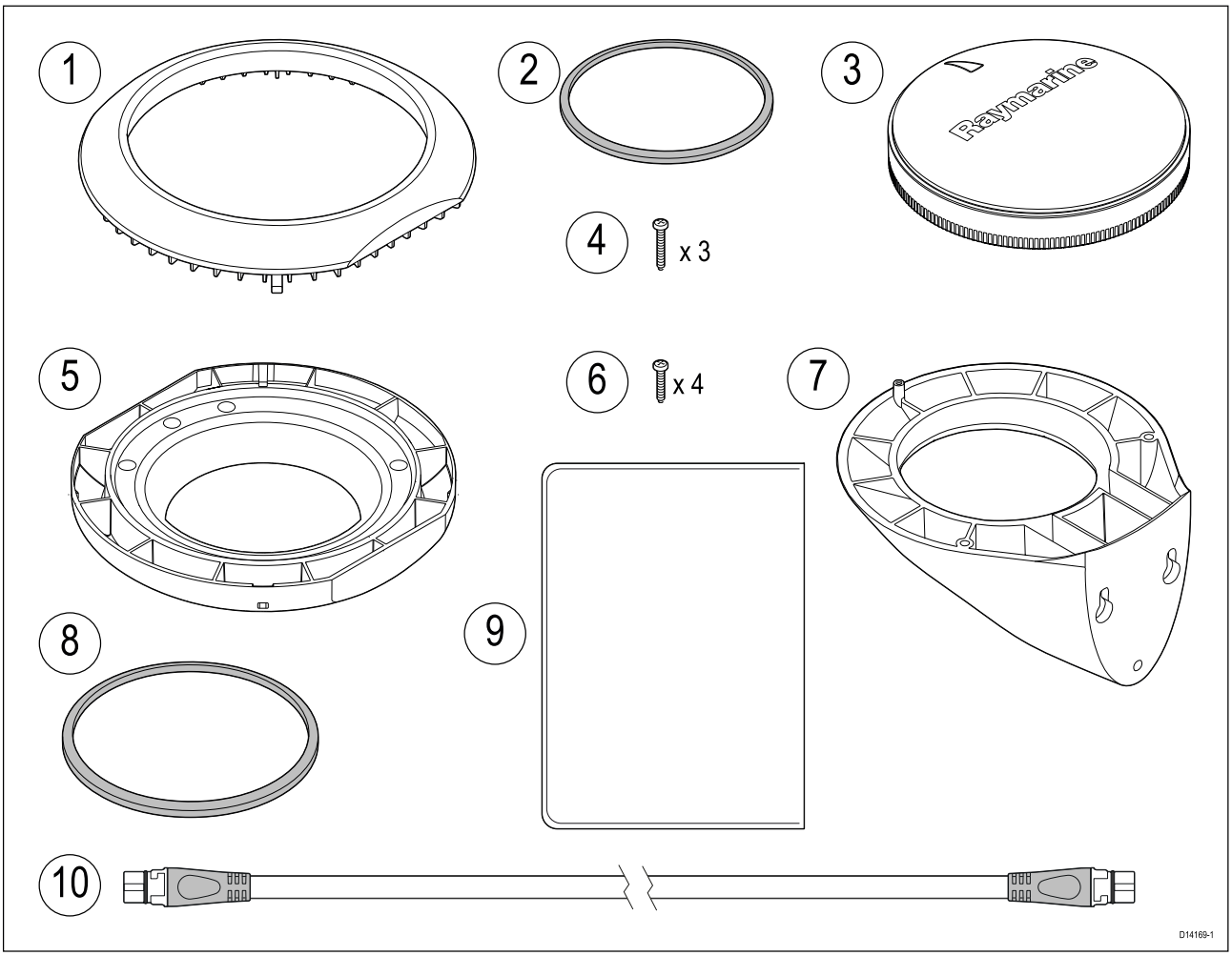
- The software update process is carried out at your own risk. Before initiating the update process ensure you have backed up any important files.
- Ensure that the unit has a reliable power supply and that the update process is not interrupted.
- Damage caused by an incomplete update is not covered by Raymarine warranty.
- By downloading the software update package, you agree to these terms.

Chapter 4: Parts supplied

Chapter contents

4.1 Parts supplied

The following parts are supplied with your product.



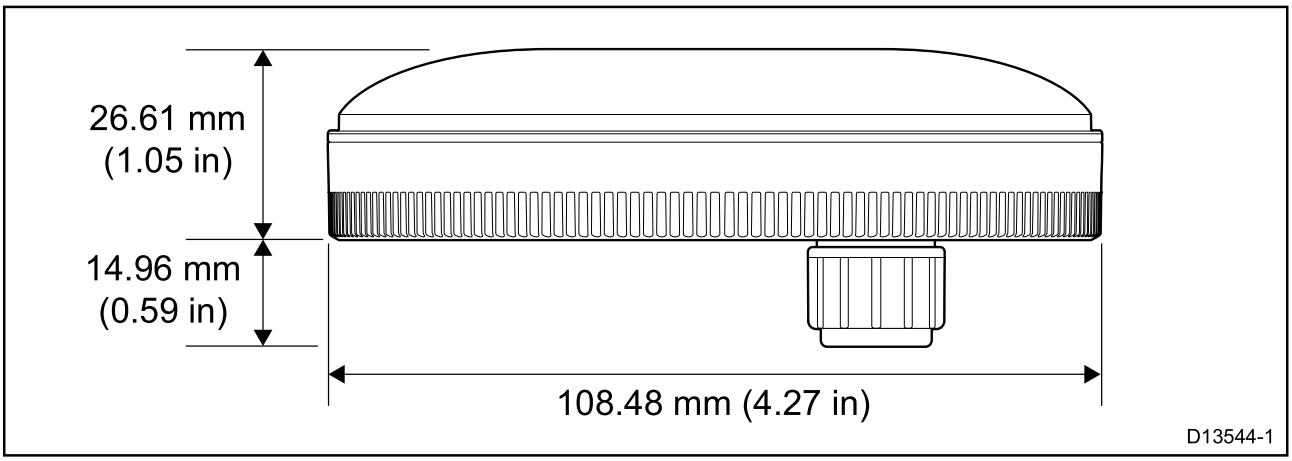
1. Mounting trim (Top).
2. Small sealing ring.
3. AR200.
4. 3 x large bulkhead bracket fixings (Pan head pozi DIN7981 ST 3.9x22 C Z A4 Stainless steel).
5. Mounting tray (Bottom).
6. 4 x small surface mount fixings (Pan head pozi DIN7981–ST 2.9x13 C Z A4 Stainless steel).
7. Bulkhead (Wall) bracket.
8. Large sealing ring.
9. Documentation.
10. 6 m (19.69 ft) SeaTalkng ® (White) cable.

Unpack your product carefully to prevent damage or loss of parts, check the box contents against the list above. Retain the packaging and documentation for future reference.

Chapter 5: Product dimensions

Chapter contents

5.1 Product dimensions



Chapter 6: Location requirements

Chapter contents

6.1 Selecting a location

Warnings and cautions

Important: Before proceeding, ensure that you have read and understood the warnings and cautions provided in the Chapter 1 **Important information** section of this document.

Warning: Switch off power supply

Ensure the vessel's power supply is switched OFF before starting to install this product. Do NOT connect or disconnect equipment with the power switched on, unless instructed in this document.

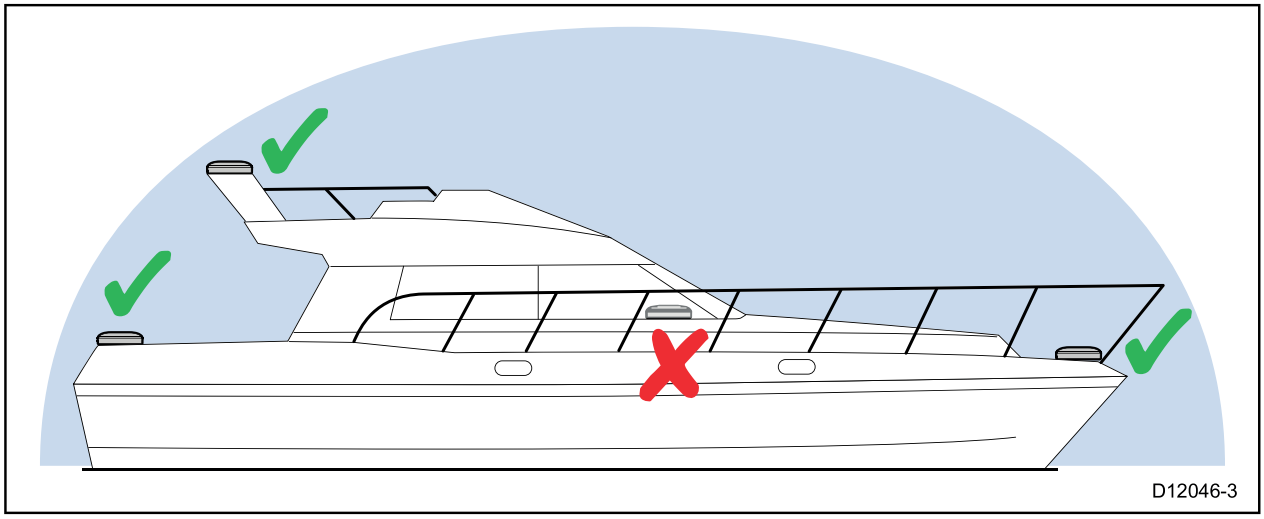
Warning: Potential ignition source

This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

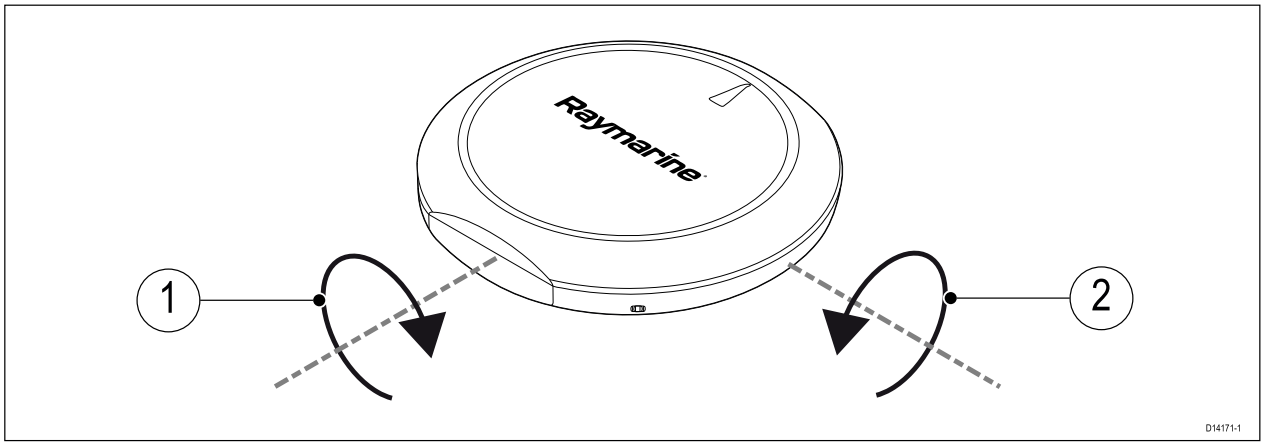
Location requirements

The installation location must take into account the following requirements:

- The unit should be installed above decks.
- Choose a location that provides the most unobstructed view of the sky in all directions:

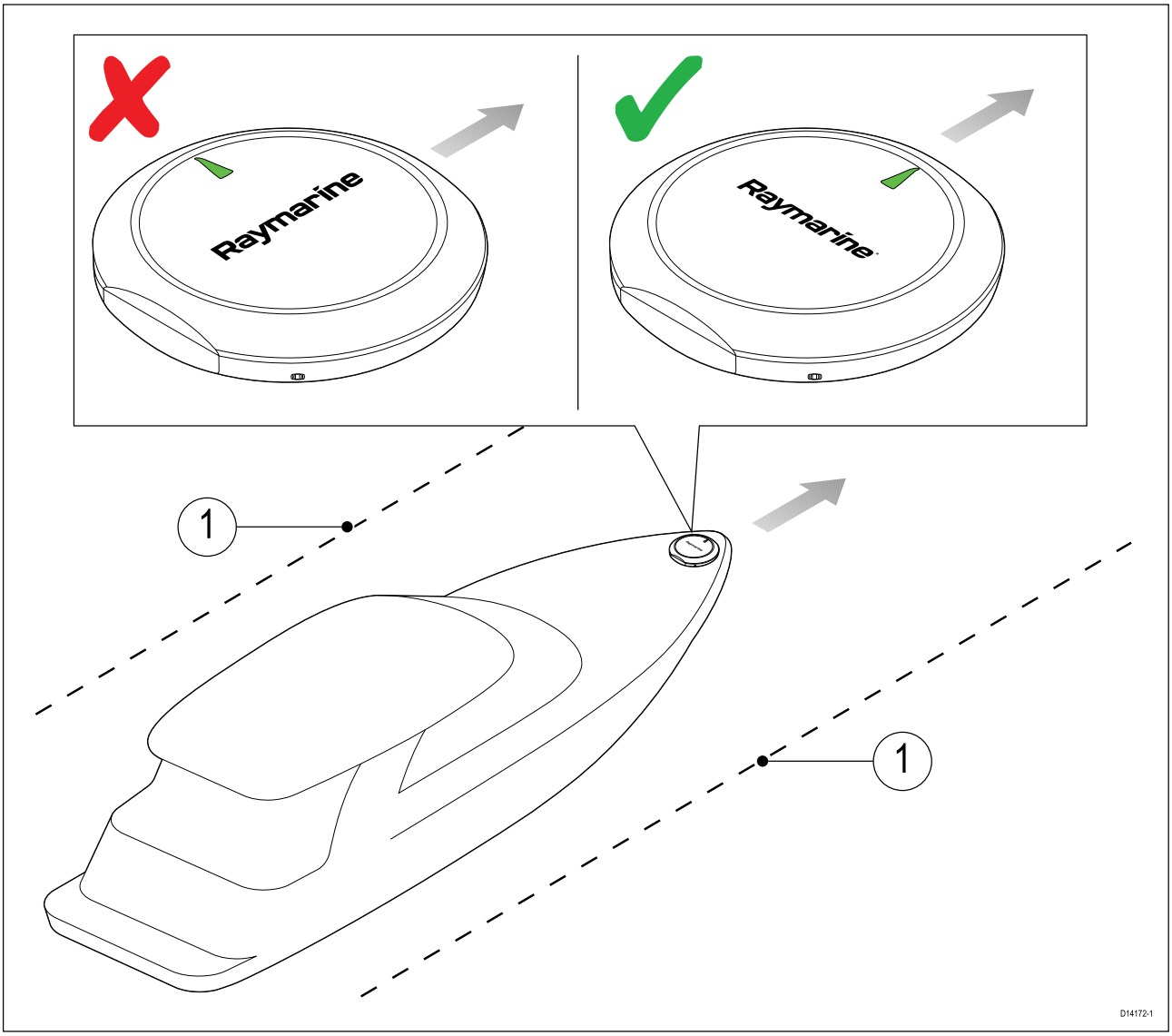


- The unit must be mounted on a horizontal and level surface. The installed unit must be level within **5°** of pitch and **5°** of roll (compared with the vessel's neutral position when at rest and normally laden).



1. Roll
2. Pitch

- The unit can be mounted on a vertical surface such as a bulkhead or mast etc, using the supplied bulkhead bracket.
- Do NOT mount on top of a mast.
- The unit location must be at least 1 m (3 ft.) away from any source of magnetic interference, such as compasses and electrical cables.
- Choose a location where the unit will be safe from physical damage and excessive vibration.
- Choose a location where the unit will not be subjected to a load or force.
- Mount away from any source of heat or potential flammable hazards, such as fuel vapor.
- The unit should be mounted in a location where the diagnostics LED is viewable.
- The unit must be mounted with the LED 'arrow' on the top of the unit pointing forwards, in parallel alignment with the longitudinal axis (centerline) of the vessel.



1. Vessel's longitudinal axis.

RF interference

Certain third-party external electrical equipment can cause Radio Frequency (RF) interference with GNSS (GPS), AIS or VHF devices, if the external equipment is not adequately insulated and emits excessive levels of electromagnetic interference (EMI).

Some common examples of such external equipment include LED lighting (e.g.: navigation lights, searchlights and floodlights, interior and exterior lights) and terrestrial TV tuners.

To minimize interference from such equipment:

- Keep it as far away from GNSS (GPS), AIS or VHF products and their antennas as possible.

- Ensure that any power cables for external equipment are not entangled with the power or data cables for these devices.
- Consider fitting one or more high frequency suppression ferrites to the EMI-emitting device. The ferrite(s) should be rated to be effective in the range 100 MHz to 2.5 GHz, and should be fitted to the power cable and any other cables exiting the EMI-emitting device, as close as possible to the position where the cable exits the device.

Compass safe distance

To prevent potential interference with the vessel's magnetic compasses, ensure an adequate distance is maintained from the product.

When choosing a suitable location for the product you should aim to maintain the maximum possible distance from any compasses. Typically this distance should be at least 1 m (3.3 ft) in all directions. However for some smaller vessels it may not be possible to locate the product this far away from a compass. In this situation, when choosing the installation location for your product, ensure that the compass is not affected by the product when it is in a powered state.

EMC installation guidelines

Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) regulations, to minimize electromagnetic interference between equipment and minimize the effect such interference could have on the performance of your system

Correct installation is required to ensure that EMC performance is not compromised.

Note: In areas of extreme EMC interference, some slight interference may be noticed on the product. Where this occurs the product and the source of the interference should be separated by a greater distance.

For **optimum** EMC performance we recommend that wherever possible:

- Raymarine equipment and cables connected to it are:
  - At least 1 m (3.3 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (6.6 ft).
  - More than 2 m (6.6 ft) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The product is supplied from a separate battery from that used for engine start. This is important to prevent erratic behavior and data loss which can occur if the engine start does not have a separate battery.
- Raymarine specified cables are used.
- Cables are not cut or extended, unless doing so is detailed in the installation manual.

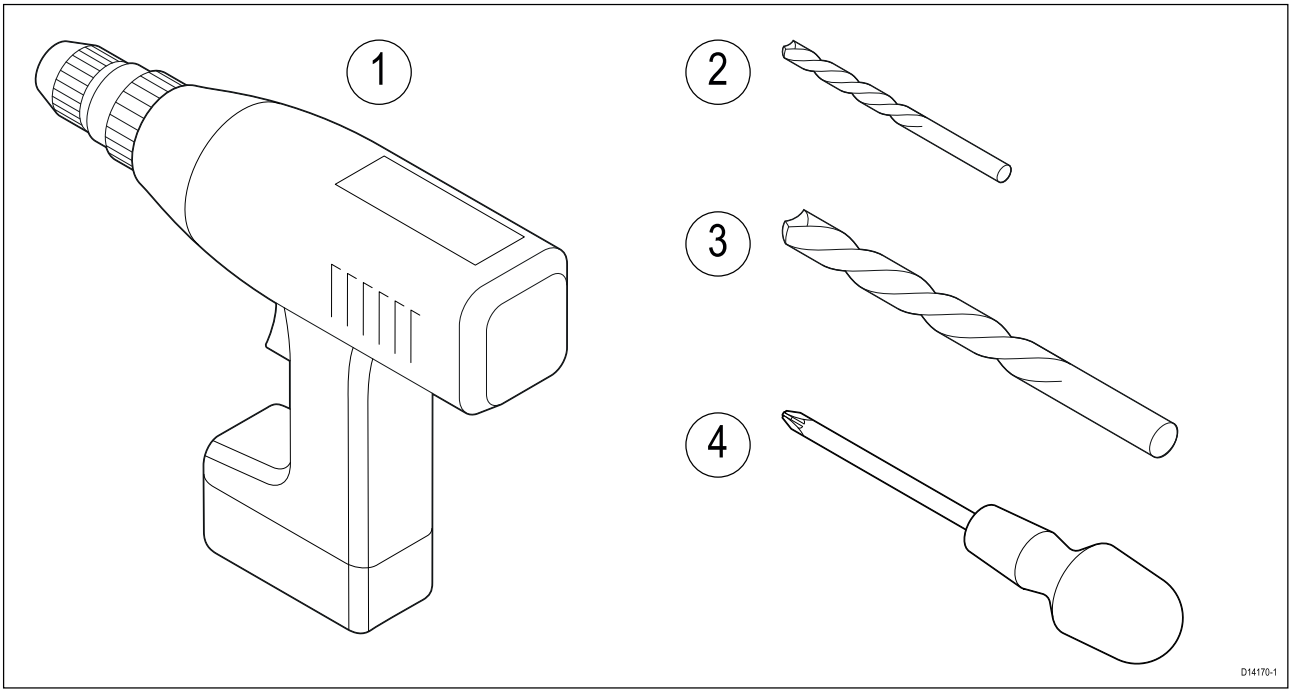
Note:

Where constraints on the installation prevent any of the above recommendations, always ensure the maximum possible separation between different items of electrical equipment, to provide the best conditions for EMC performance throughout the installation.

Chapter 7: Installation

Chapter contents

7.1 Tools required for installation



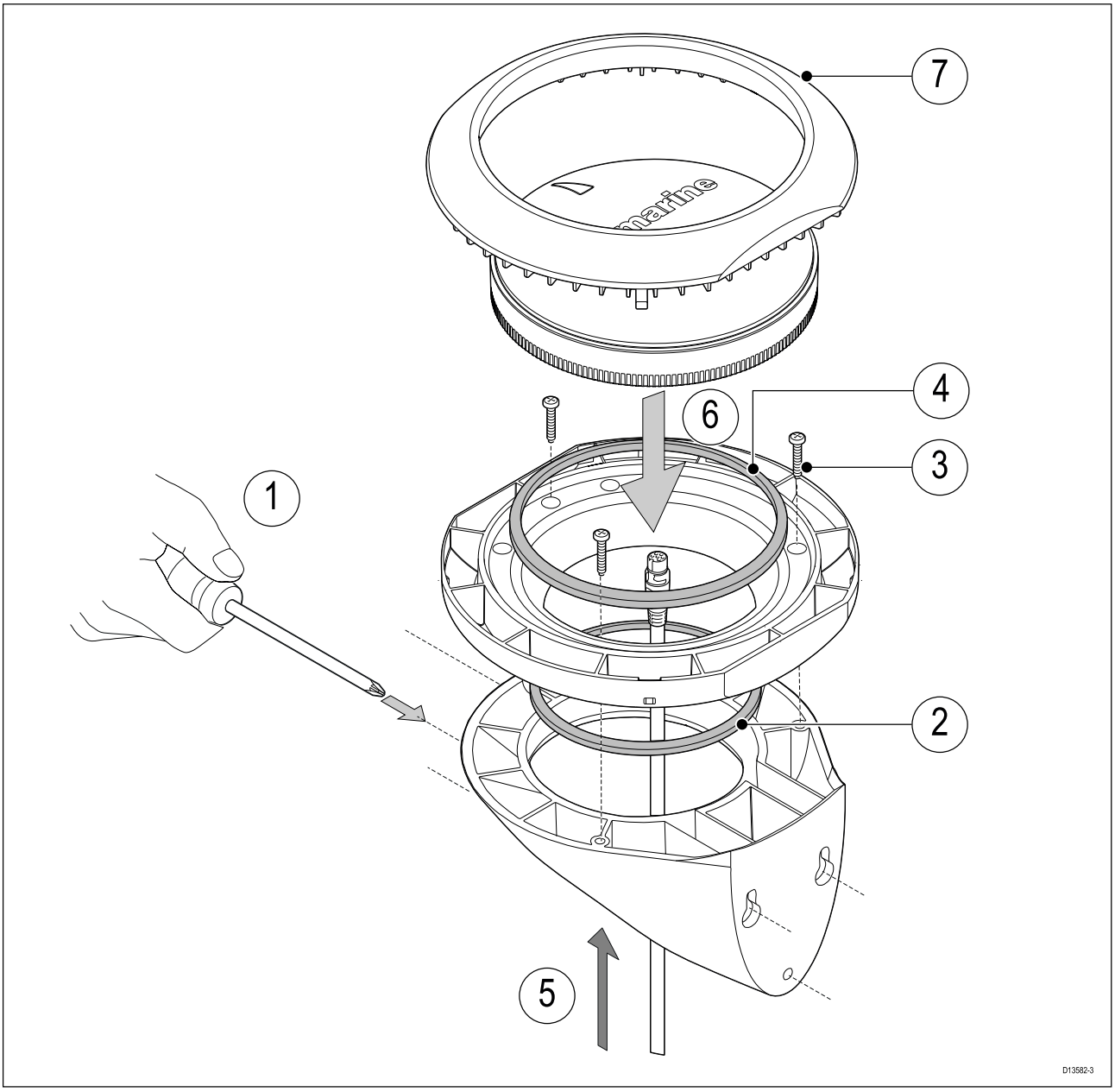
1	Power drill
2	Suitable size drill bit (for Bulkhead bracket mounting) **Note:** Drill bit size is dependent on the type of material the unit is to be mounted on.
3	12 mm ($^{15}/_{32}$”) drill bit (if required, for cable hole)
4	Pozi-drive screwdriver

7.2 Mounting

Bulkhead mounting

The supplied mounting brackets can be used to mount your product horizontally on a bulkhead.

Ensure that the chosen location meets the product’s location requirements, see 6.1 **Selecting a location** for details.

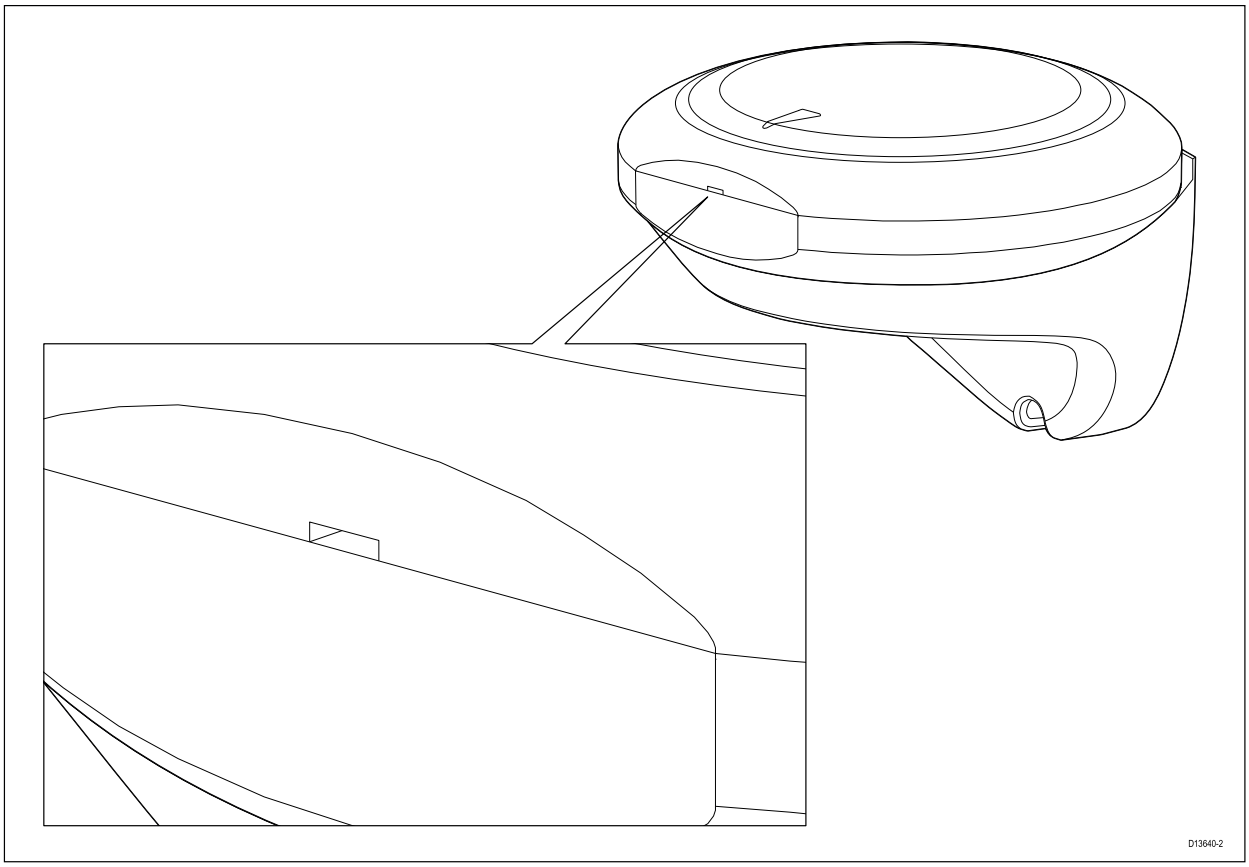


1. Use the supplied Bracket mounting template (87170) to drill 3 pilot holes in the vertical mounting surface. Secure the mounting bracket to the surface using the supplied screws.
2. Place the small sealing ring in the groove located on the bottom of the Mounting tray.
3. Secure the tray to the bracket using 3 of the supplied screws, in the positions indicated in the illustration above.
4. Place the large sealing ring into the groove on the upper side of the Mounting tray.
5. Pull the SeaTalkng ® cable through the center of the bracket and tray. Plug in the cable connector on the underside of the unit and secure by rotating the locking collar clockwise 2 clicks.
6. Insert the unit into the mounting tray, ensuring the tabs in the Mounting tray are slotted into the grooves around the edge of the unit.

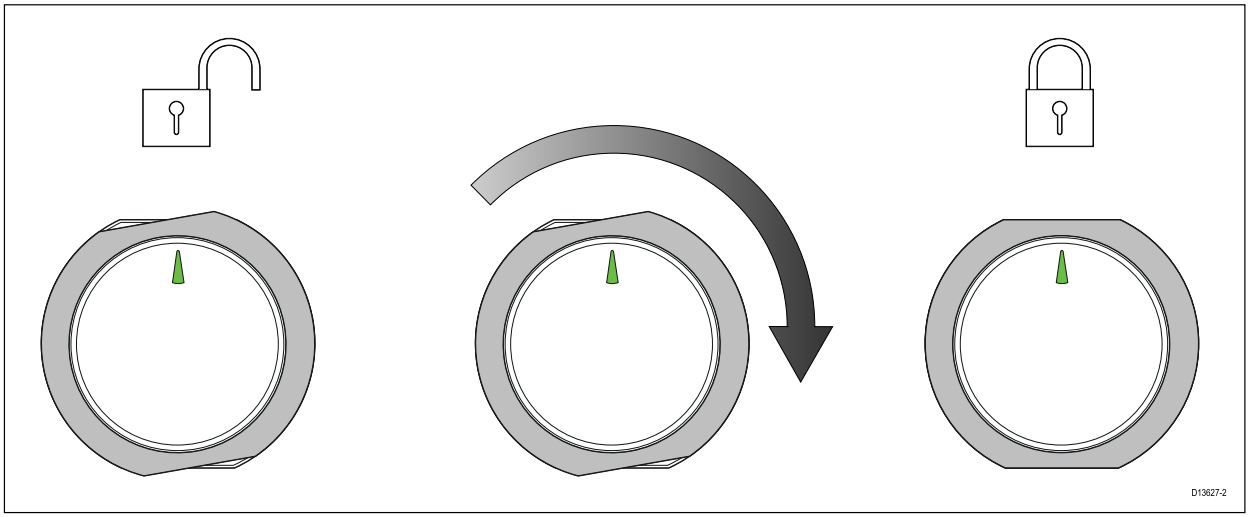
Important:

The unit must be mounted with the LED ‘arrow’ on the top of the unit pointing forwards, in parallel alignment with the longitudinal axis (centerline) of your vessel.

7. Orientate the Mounting trim so that the release hole will be accessible once mounted.



8. Place the Mounting trim over the unit slightly offset, and then twist the Mounting trim clockwise until it locks into position.

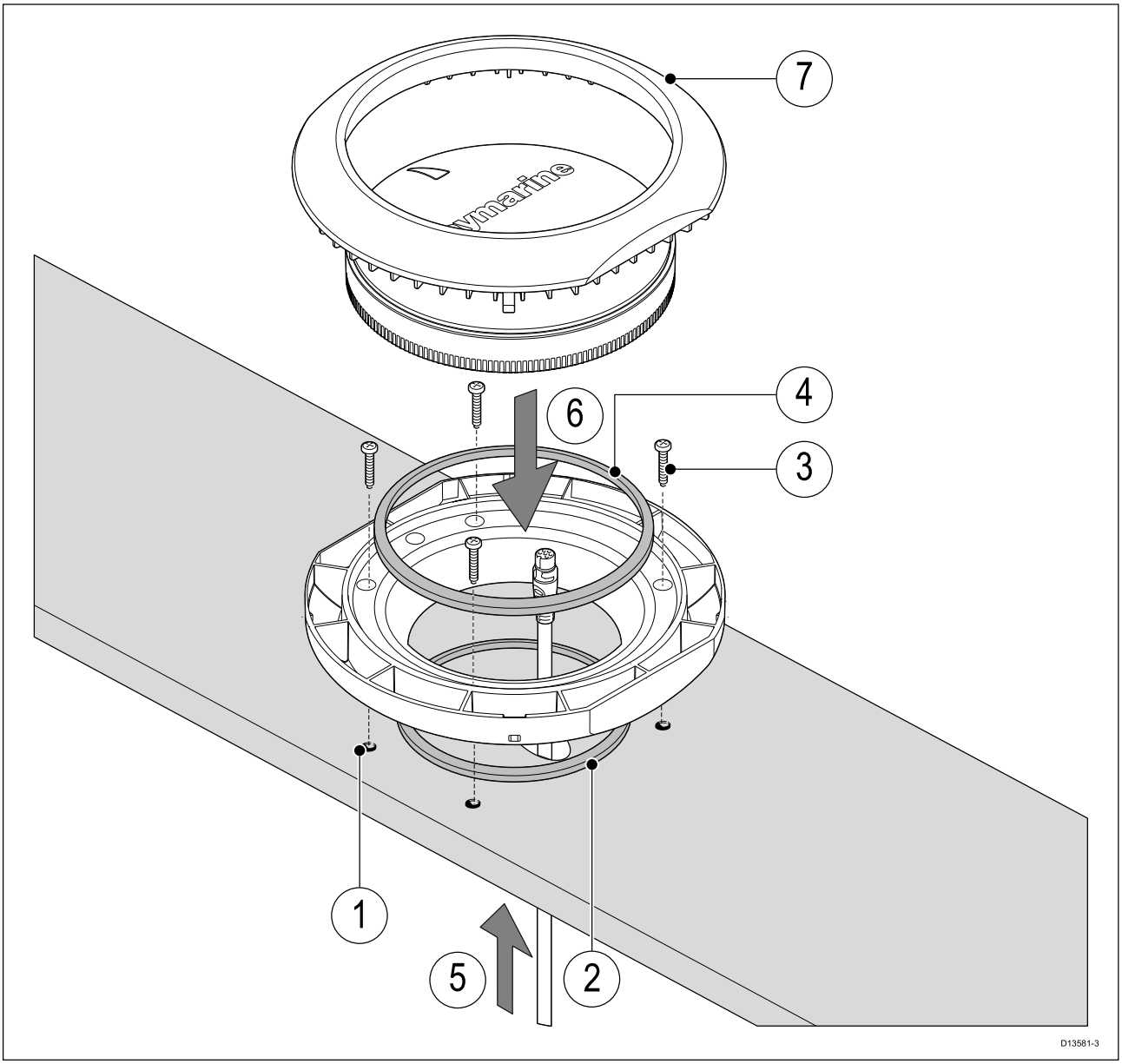


Surface mounting

The supplied mounting bracket can be used to mount your product horizontally or vertically on a flat surface.

The Bulkhead bracket is not required for this type of installation.

Ensure that the chosen location meets the product's location requirements, see 6.1 **Selecting a location** for details.

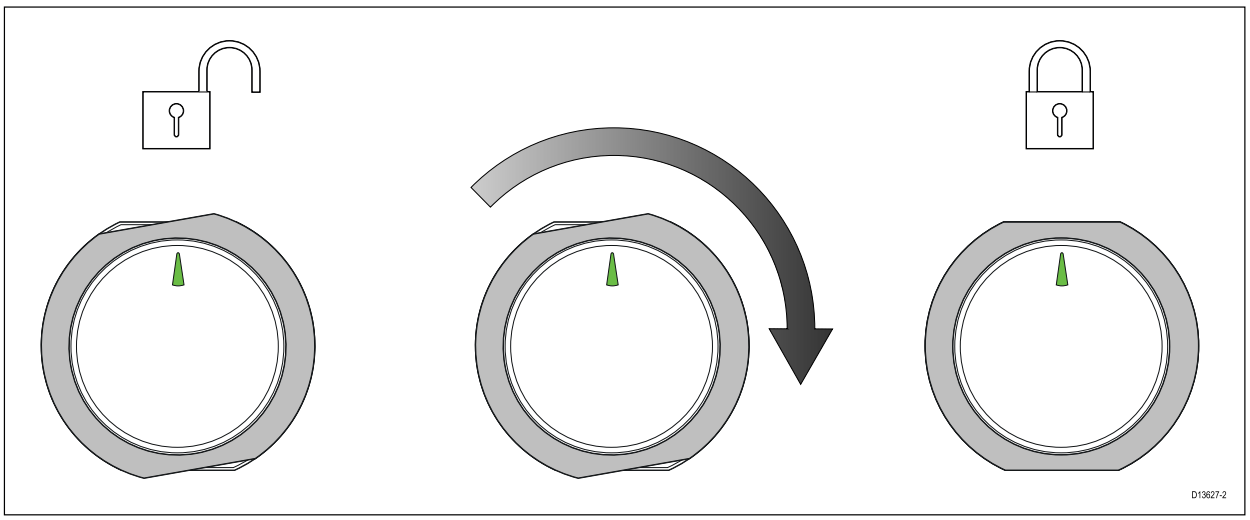


1. Using the supplied Mounting tray template (87170), drill 4 holes in the mounting surface, plus a 12 mm ($^{15}/_{32}$") hole for the SeaTalkng ® cable.
2. Place the small sealing ring in the groove located on the bottom of the mounting tray.
3. Secure the tray to the mounting surface using the 4 x fixings, supplied.
4. Place the large sealing ring into the groove on the upper side of the Mounting tray.
5. Pull the SeaTalkng ® cable through the mounting surface hole and the Mounting tray. Plug in the cable connector on the underside of the unit and secure by rotating the locking collar clockwise 2 clicks.
6. Insert the unit into the mounting tray, ensuring the tabs in the Mounting tray are slotted into the grooves around the edge of the unit.

Important:

The unit must be mounted with the LED 'arrow' on the top of the unit pointing towards the vessel's bow and be in parallel alignment with the longitudinal axis (centerline) of your vessel.

7. Place the Mounting trim over the unit slightly offset, and then twist the Mounting trim clockwise until it locks into position.

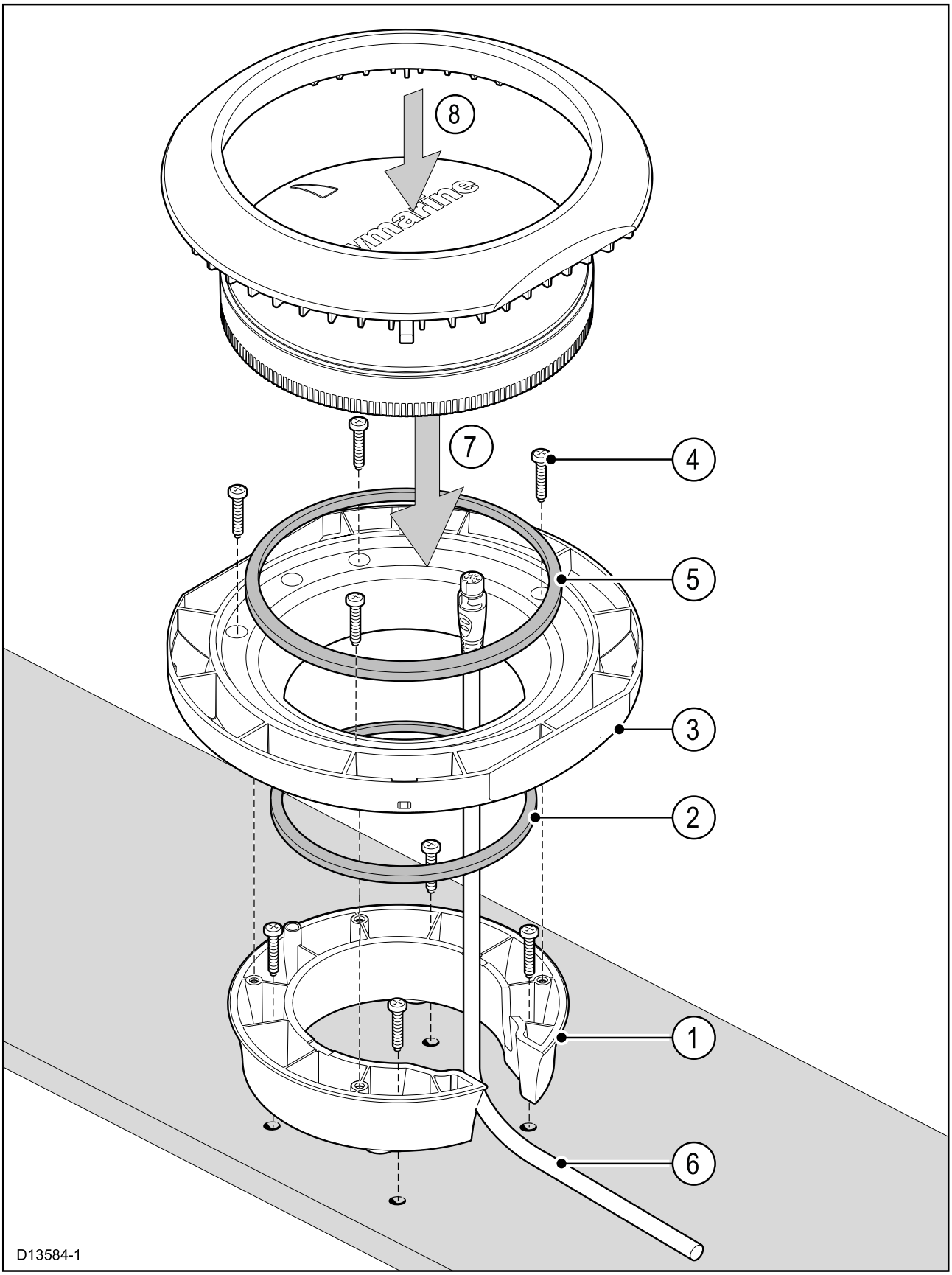


Surface mounting using the Riser

The Deck mounting kit (A80437) can be used to raise the product from the mounting surface.

The Wall bracket is not required when using the Riser.

Ensure that the chosen location meets the product's location requirements, see 6.1 **Selecting a location** for details.



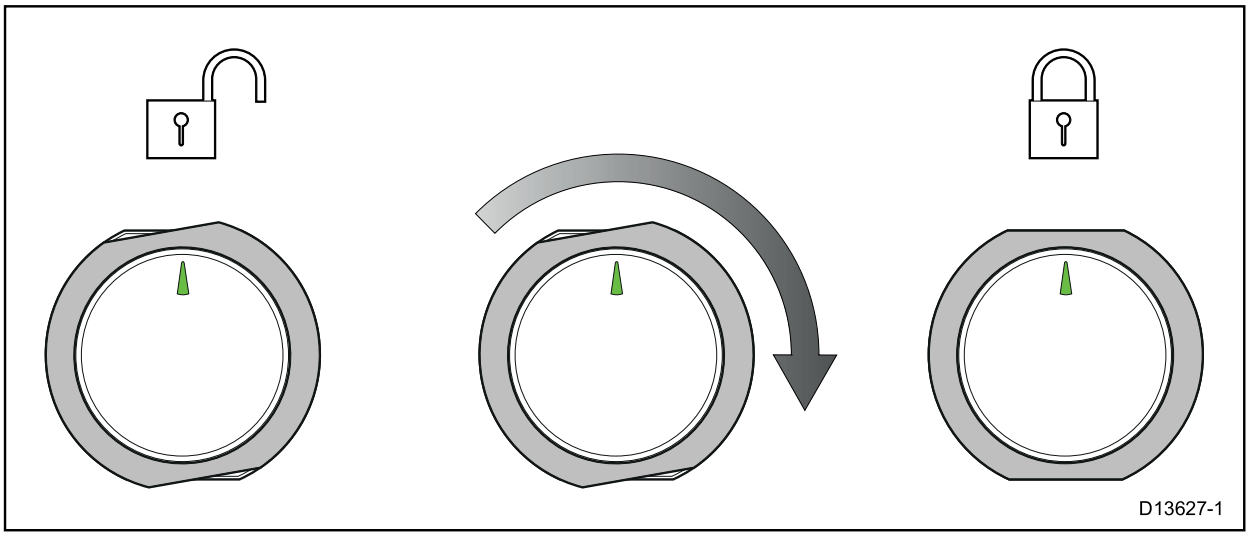
1. Use the supplied Deck mount riser template (87280) to drill 4 holes in the mounting surface. Secure the Riser to the mounting surface using 4x supplied fixings.
2. Place the small sealing ring in the groove located on the bottom of the mounting tray.

3. Position the Mounting tray on top of the Riser.
4. Secure the Mounting tray to the Riser using 3x supplied fixings.
5. Place the large sealing ring into the groove on the upper side of the Mounting tray.
6. Pull the SeaTalkng ® cable through the Riser and Mounting tray. Plug in the cable connector on the underside of the unit and secure by rotating the locking collar clockwise 2 clicks.
7. Insert the unit into the mounting tray, ensuring the tabs in the Mounting tray are slotted into the grooves around the edge of the unit.

Important:

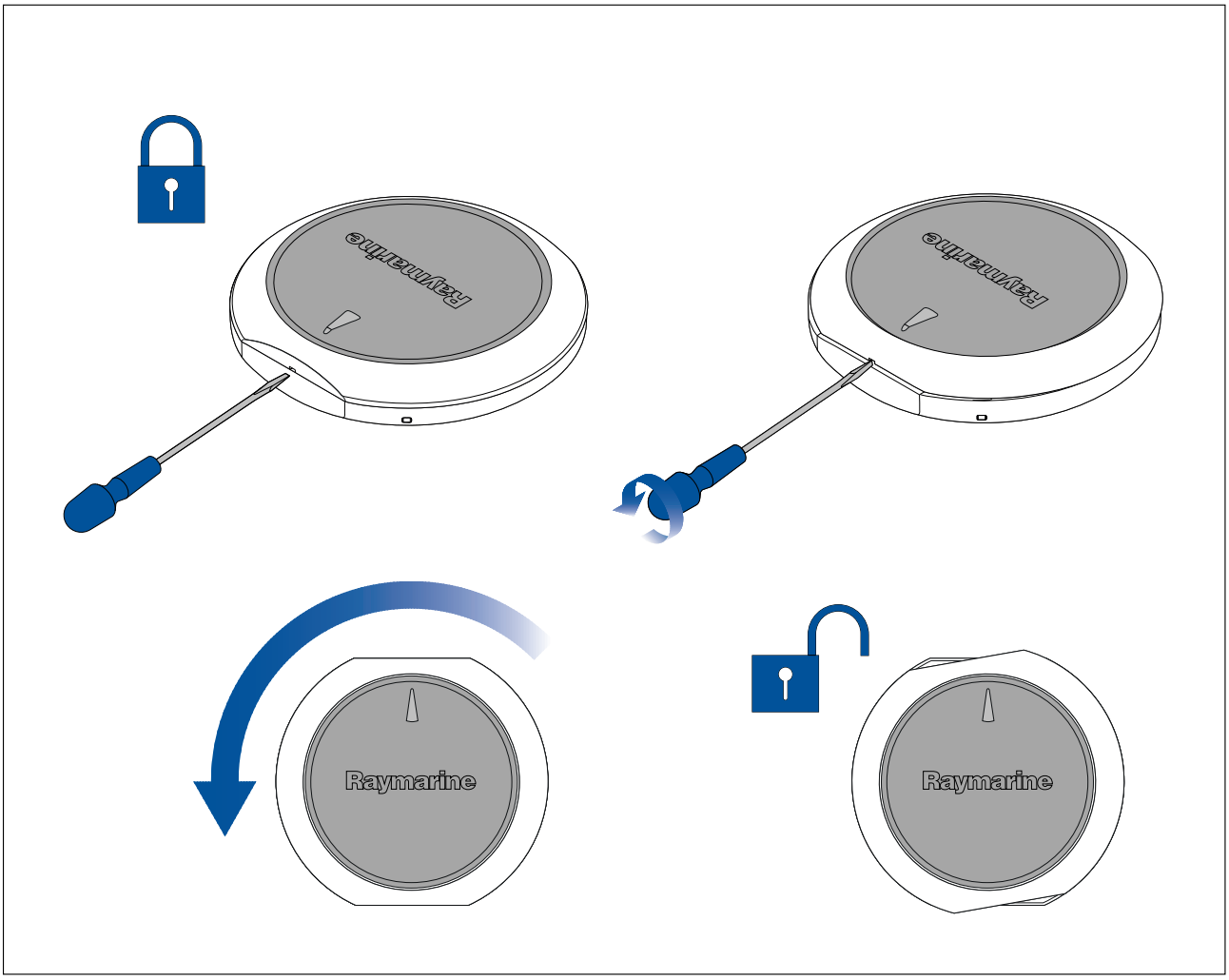
Unit orientation is not important with the RS150, but aesthetically the unit may look better with the LED ‘arrow’ pointing towards the vessel’s bow.

8. Place the Mounting trim over the unit slightly offset, and then twist the Mounting trim clockwise until it locks into position.



Releasing the unit from the bracket

Follow the steps below to release the unit from the Mounting bracket.



1. Insert the flat of a small flat blade screw driver, or similar tool into the release hole located on the flat edge of the mounting bracket and twist the screw driver 90°, so that there is a small gap between the Mounting trim and Mounting tray.

Important: To help prevent scratching the product, cover the tip of your screw driver with a small piece of insulation tape.

2. With the screw driver in place, twist the mounting trim counter-clockwise approximately 10° and then lift away from the unit.

Chapter 8: Connections

Chapter contents

8.1 General cabling guidance

Cable types and length

It is important to use cables of the appropriate type and length.

- Unless otherwise stated only use cables supplied by Raymarine.
- Where it is necessary to use non-Raymarine cables, ensure that they are of correct quality and gauge for their intended purpose. (e.g.: longer power cable runs may require larger wire gauges to minimize voltage drop along the run).

Cable shielding

Ensure that cable shielding is not damaged during installation and that all cables are properly shielded.

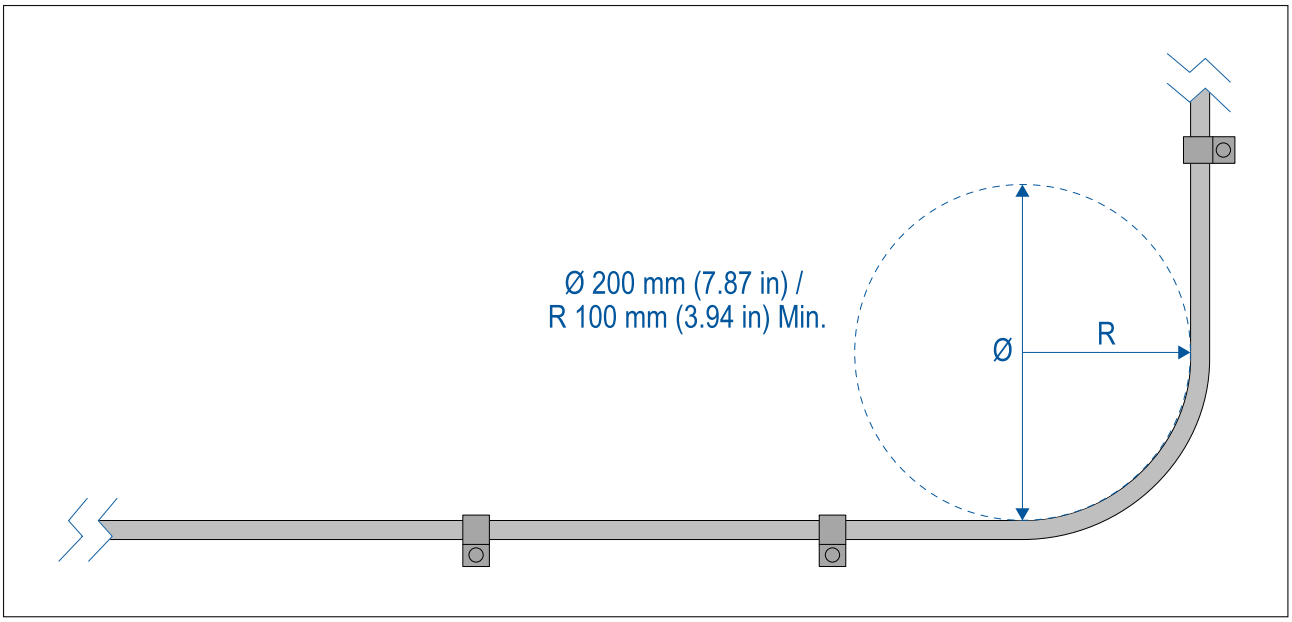
Strain relief

Use adequate strain relief for cabling to ensure that connectors are protected from strain and will not pull out under extreme sea conditions.

Cable routing

Cables must be routed correctly, to maximize performance and prolong cable life.

- Do NOT bend cables excessively. Wherever possible, ensure a minimum bend diameter (Ø) of 200 mm (7.87 in) / minimum bend radius (R) of 100 mm (3.94 in).

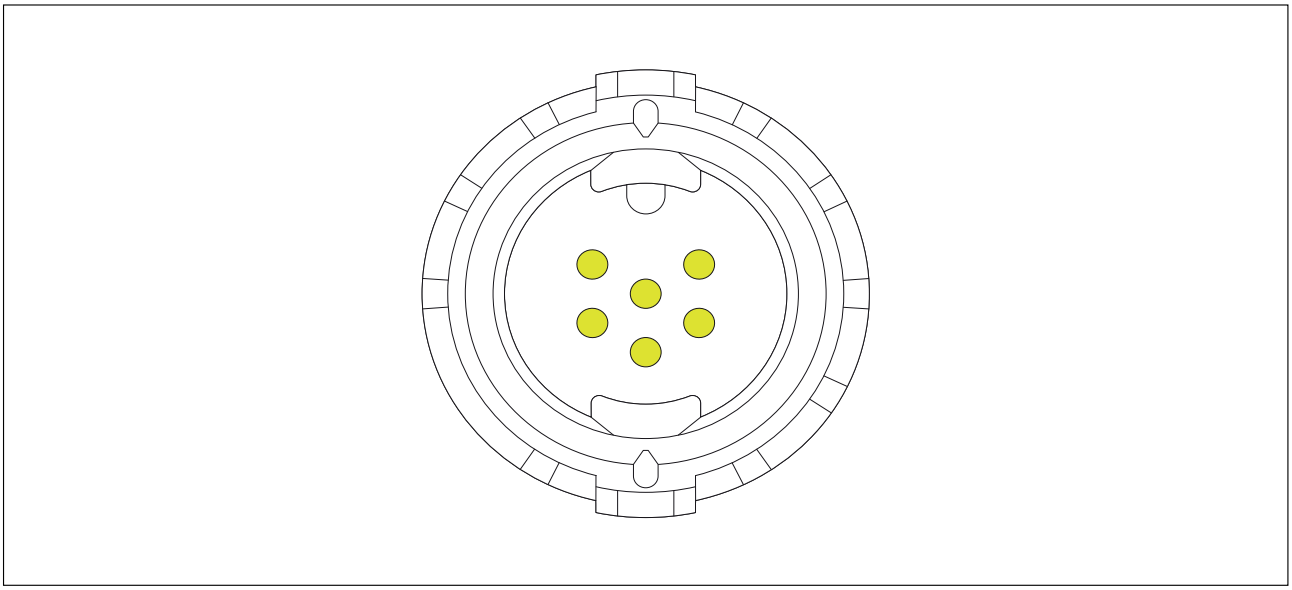


- Protect all cables from physical damage and exposure to heat. Use trunking or conduit where possible. Do NOT run cables through bilges or doorways, or close to moving or hot objects.
- Secure cables in place using cable clips or cable ties. Coil any excess cable and tie it out of the way.
- Where a cable passes through an exposed bulkhead or deckhead, use a suitable watertight feed-through.
- Do NOT run cables near to engines or fluorescent lights.
- Always route data cables as far away as possible from:
  - other equipment and cables,
  - high current carrying AC and DC power lines,
  - antennas.

8.2 Connections overview

Your product includes the following connectors:

1 x SeaTalkng Male Connector



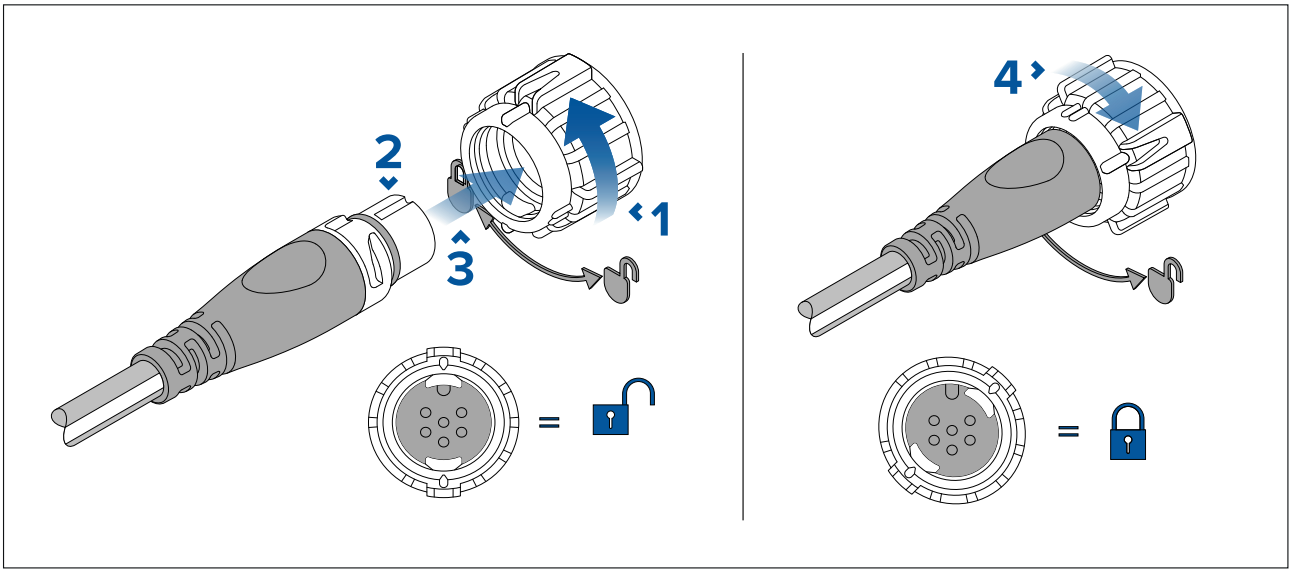
Connects to:

1. **SeaTalk ng** backbone
2. **NMEA 2000** backbone

Suitable cables:

1. **SeaTalk ng** spur cables
2. **SeaTalk ng** to **DeviceNet** adaptor cable (A06045)

Connecting SeaTalkng ® cables



1. Rotate your product's SeaTalkng ® connector locking collar counter clockwise, so that the connector is in the unlocked position.
2. Ensure the cable's connector is correctly oriented (groove pointing up).
3. Fully insert the cable connector..
4. Rotate the locking collar clockwise (2 clicks) until it is in the locked position.

SeaTalkng ® product loading

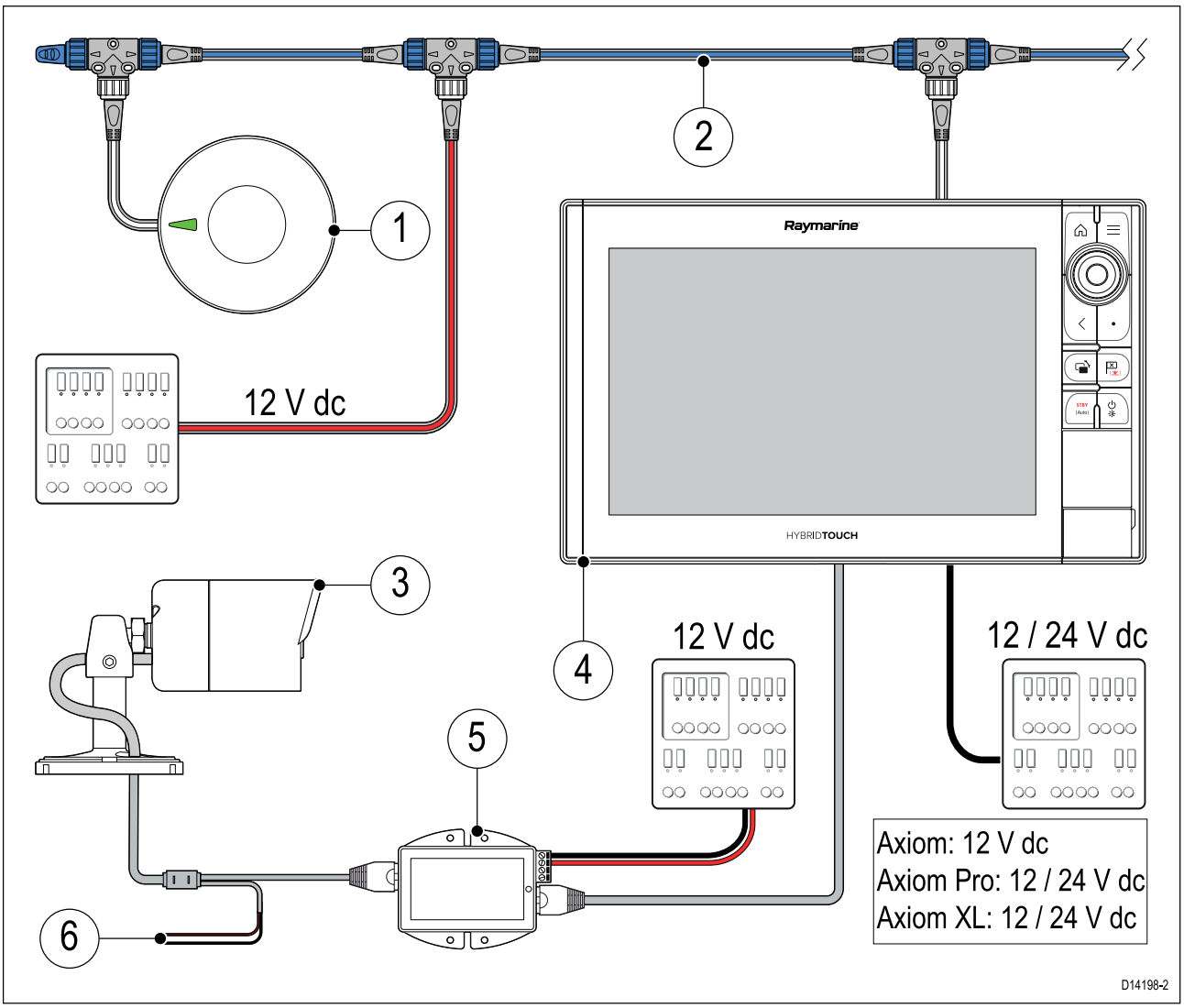
The number of products that can be connected to a SeaTalkng ® backbone depends on the current draw of each product and the physical length of the backbone cabling.

NMEA 2000 Load Equivalency Numbers (LEN) are used to express the amount of current that is drawn from SeaTalkng ® products (1 LEN = 50 mA) The LEN for each product can be found in the product's Technical Specification.

LENs are used to determine the power connection point for the SeaTalkng ® backbone.

8.3 System example

Below is a typical system example showing the components and connections required to enable ClearCruise™ Augmented Reality on your system.



1. AR200.
2. SeaTalkng ® backbone (providing 12 V dc power to the AR200).
3. CAM210IP (CAM220IP is also compatible).
4. Axiom LightHouse™ 3 powered MFD (running LH3 version 3.7 or above).
5. Optional PoE injector (providing power to the camera).
6. Alternate power connection for camera (connection required when not using PoE to power the camera).

8.4 SeaTalkng ® power supply

Your product is supplied power via the SeaTalkng ® backbone.

A SeaTalkng ® backbone requires a single 12 V dc power supply. Power can be supplied to the SeaTalkng ® backbone by one of the following methods:

- (1)direct connection to a 12 V dc battery
- connection via a 12 V dc distribution panel
- (2)via an Autopilot Control Unit (ACU) (not ACU-100 or 150), or an SPX course computer (not SPX-5) that is connected to the SeaTalkng ® backbone.
- for 24 V vessels, via a 5 amp, regulated, continuous 24 V dc to 12 V dc converter

Note:

- (1)The battery used for starting the vessel's engine(s) should NOT be used to power the SeaTalkng ® backbone, as this can cause sudden voltage drops when the engines are started.
- (2)The ACU-100, ACU-150 or SPX-5 products cannot be used to power the SeaTalkng ® backbone.

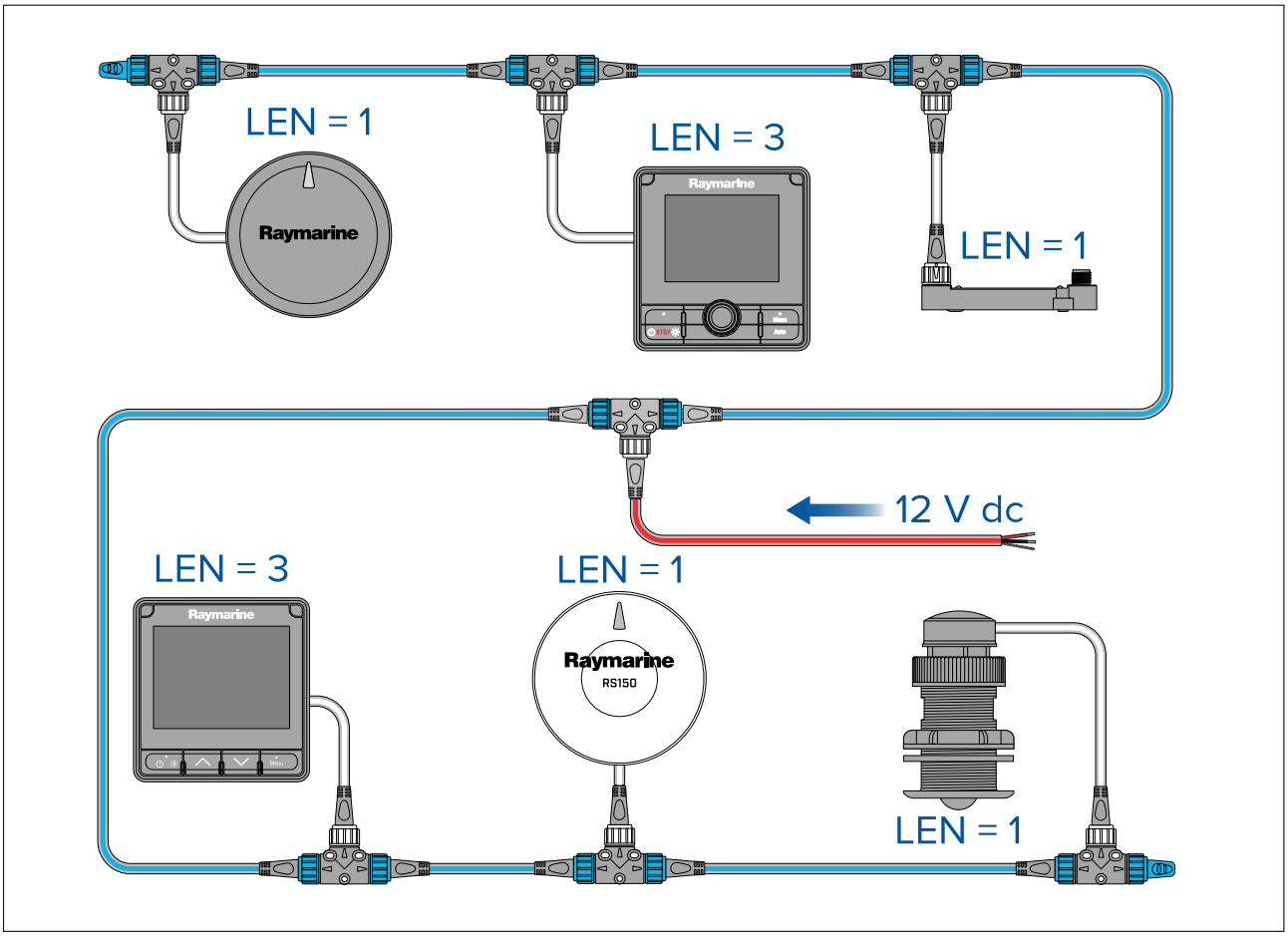
The SeaTalkng ® power cable (A06049) is used to connect the SeaTalkng backbone to your chosen 12 V dc power supply.

SeaTalkng ® power connection point

The 12 V dc power supply is connected to a spur connection on the SeaTalkng ® backbone.

Large systems

If the backbone length is greater than 60 m (197 ft), the power connection point should be connected at a point that creates a balanced current draw from each side of the backbone. The NMEA 2000 Load Equivalency Number (LEN) is used to determine the power connection point for the backbone.



In the example above the backbone has an overall LEN of 10, so the optimum connection point would be to have 5 LEN either side of the connection point.

Small systems

If the backbone length is 60 m (197 ft) or less, the power connection point may be connected at any point in the backbone.

In-line fuse and thermal breaker ratings

The SeaTalkng ® network's power supply requires an in-line fuse or thermal breaker to be fitted.

- In-line fuse rating: 5 A
- Thermal breaker rating : 3 A (refer to note below)

Note:

The suitable fuse rating for the thermal breaker is dependent on: 1) How many devices you have connected to your SeaTalkng ® network; and 2) How many devices are sharing the same thermal breaker that your SeaTalkng ® network is connected to.

SeaTalkng ® system loading

The maximum loading / LEN for a SeaTalkng ® system depends on the length of the backbone.

Unbalanced system loading:

- **Backbone Length**: 0 m (0 ft) to 20 m (66 ft) — **Maximum LEN**: 40
- **Backbone Length**: > 20 m (66 ft) to 40 m (131 ft) — **Maximum LEN**: 20
- **Backbone Length**: > 40 m (131 ft) to 60 m (197 ft) — **Maximum LEN**: 14

Balanced system loading:

- **Backbone Length**: 0 m (0 ft) to 60 m (197 ft) — **Maximum LEN**: 100
- **Backbone Length**: > 60 m (197 ft) to 80 m (262 ft) — **Maximum LEN**: 84
- **Backbone Length**: > 80 m (262 ft) to 100 m (328 ft) — **Maximum LEN**: 60
- **Backbone Length**: > 100 m (328 ft) to 120 m (394 ft) — **Maximum LEN**: 50
- **Backbone Length**: > 120 m (394 ft) to 160 m (525 ft) — **Maximum LEN**: 40
- **Backbone Length**: > 160 m (525 ft) to 200 m (656 ft) — **Maximum LEN**: 32

Power distribution — SeaTalkng ®

Recommendations and best practice.

- Only use approved SeaTalkng ® power cables. Do NOT use a power cable designed for, or supplied with, a different product.
- See below for more information on implementation for some common power distribution scenarios.

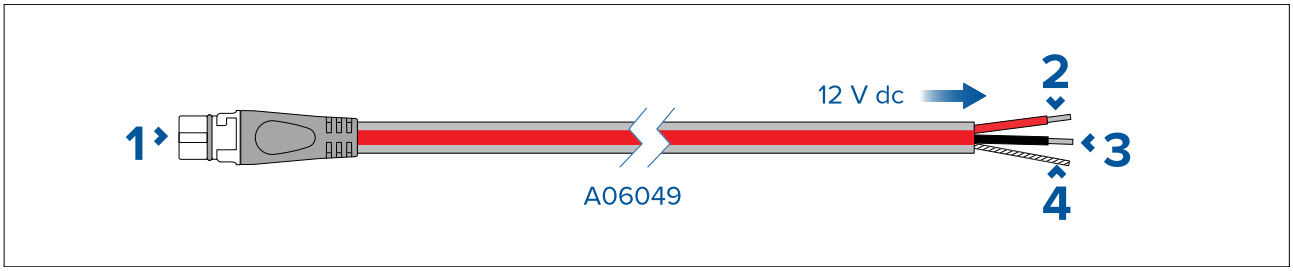
Important:

- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for guidance only, to help protect your product. It covers common vessel power arrangements, but does NOT cover every scenario. If you are unsure how to provide the correct level of protection, please consult an authorized Raymarine dealer or a suitably qualified professional marine electrician.

SeaTalkng ® power cable (A06049)

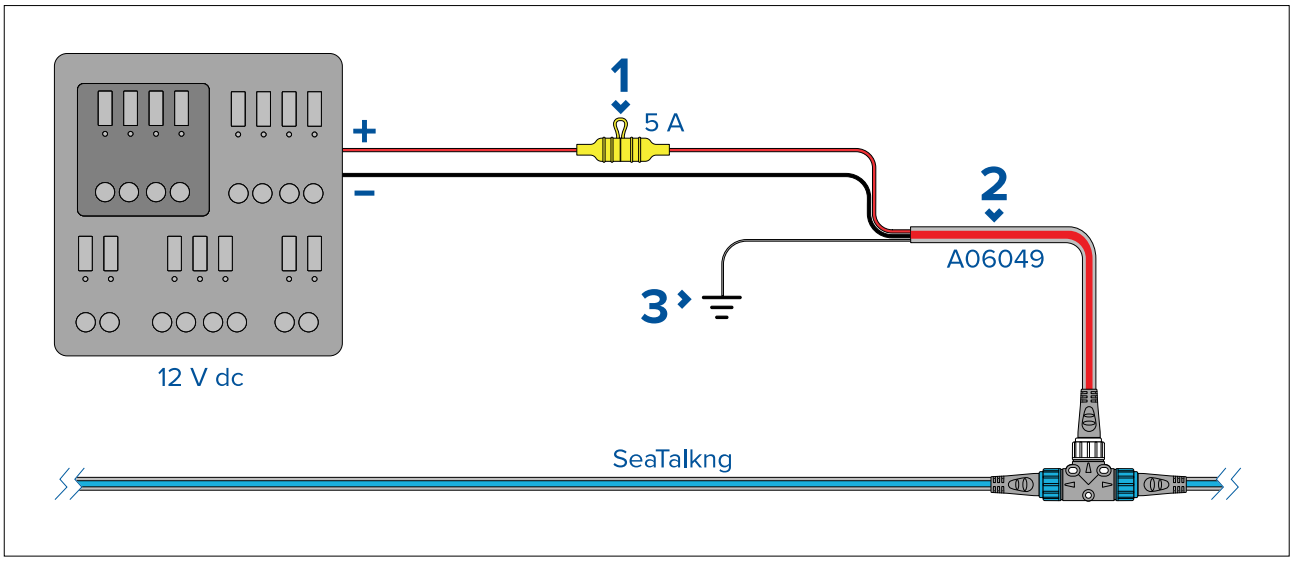
When powering the SeaTalkng ® bus (backbone or 5–way connector) from a battery or distribution panel, the A06049 power cable must be used.

All 3 cores of the cable must be connected correctly:



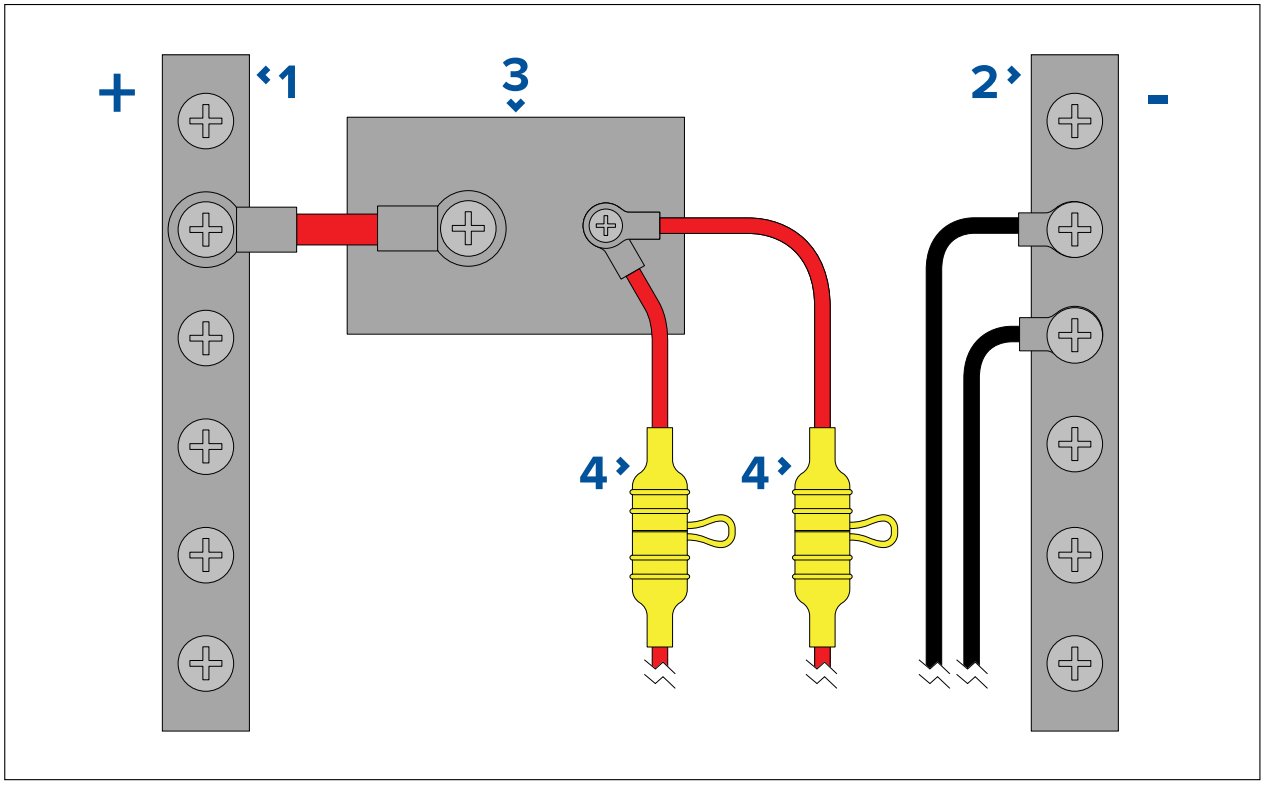
1. SeaTalkng ® spur connector — connects to spur connection on the SeaTalkng ® network.
2. + Red (positive) wire — connects to battery or distribution panel positive terminal.
3. – Black (negative) wire — connects to battery or distribution panel negative terminal.
4. Ground wire connects to RF ground point, if no ground point is available connect to the battery negative (-) terminal.

Implementation — connection to distribution panel



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
2. SeaTalkng ® power cable.
3. RF Ground connection point for drain wire.

- Ideally, the SeaTalkng ® power cable should be connected to a suitable breaker or switch on the vessel's distribution panel or factory-fitted power distribution point. It is recommended that a 5 A inline fuse is fitted to the red (positive) wire of the SeaTalkng ® power cable.
- The distribution point should be fed from the vessel’s primary power source by 8 AWG (8.36 mm^2) cable.
- Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 1 item of equipment shares a breaker, use individual in-line fuses for each power circuit to provide the necessary protection.



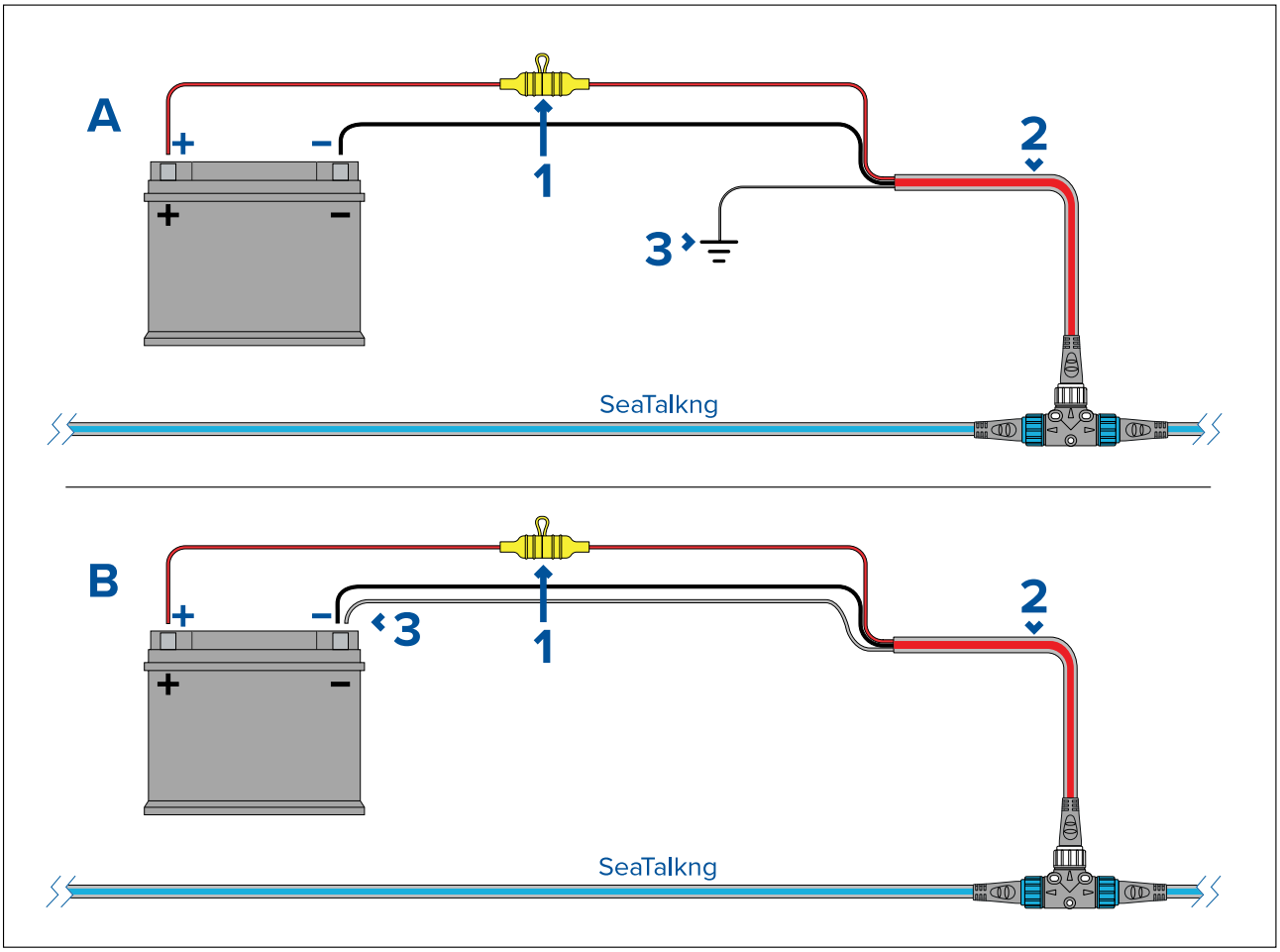
1. Positive (+) bar
2. Negative (-) bar
3. Circuit breaker
4. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).

Important:

Observe the recommended fuse / breaker ratings provided in the product's documentation, however be aware that the suitable fuse / breaker rating is dependent on the number of devices being connected.

Implementation — direct connection to battery

- SeaTalkng ®Where connection to a power distribution panel is not possible, the power cable may be connected to the vessel's battery..
- You MUST fit a suitably rated fuse or breaker between the red wire and the battery's positive terminal.
- Refer to the inline fuse ratings provided in the product's documentation.
- If you need to extend the length of the power cable, ensure you use suitably rated cable and that sufficient power (12 V dc) is available at the SeaTalkng ® backbone's power connection.



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
2. SeaTalkng ® power cable.
3. Drain wire connection point.

Battery connection scenario A:

Suitable for a vessel with a common RF ground point. In this scenario, the power cable's drain wire should be connected to the vessel's common RF ground point.

Battery connection scenario B:

Suitable for a vessel without a common RF ground point. In this scenario the power cable's drain wire should be connected directly to the battery's negative terminal.

SeaTalkng ® Power cable extension

If you need to extend the length of the SeaTalkng ® power cable, ensure you use suitably rated cable and that sufficient power is available at the SeaTalkng ® backbone's power connection point:

- For power cable extensions, a **minimum** wire gauge of 16 AWG (1.31 mm^2) is recommended. For cable runs longer than 15 meters, you may need to consider a thicker wire gauge (e.g. 14 AWG (2.08 mm^2), or 12 AWG (3.31 mm^2)).
- An important requirement for all lengths of power cable (including any extension) is to ensure that there is a continuous **minimum** voltage at the product's power connector of 10.8 V dc, with a fully flat battery at 11 V dc.

Important:

Be aware that some products in your system (such as sonar modules) can create voltage peaks at certain times, which may impact the voltage available to other products during the peaks.

More information

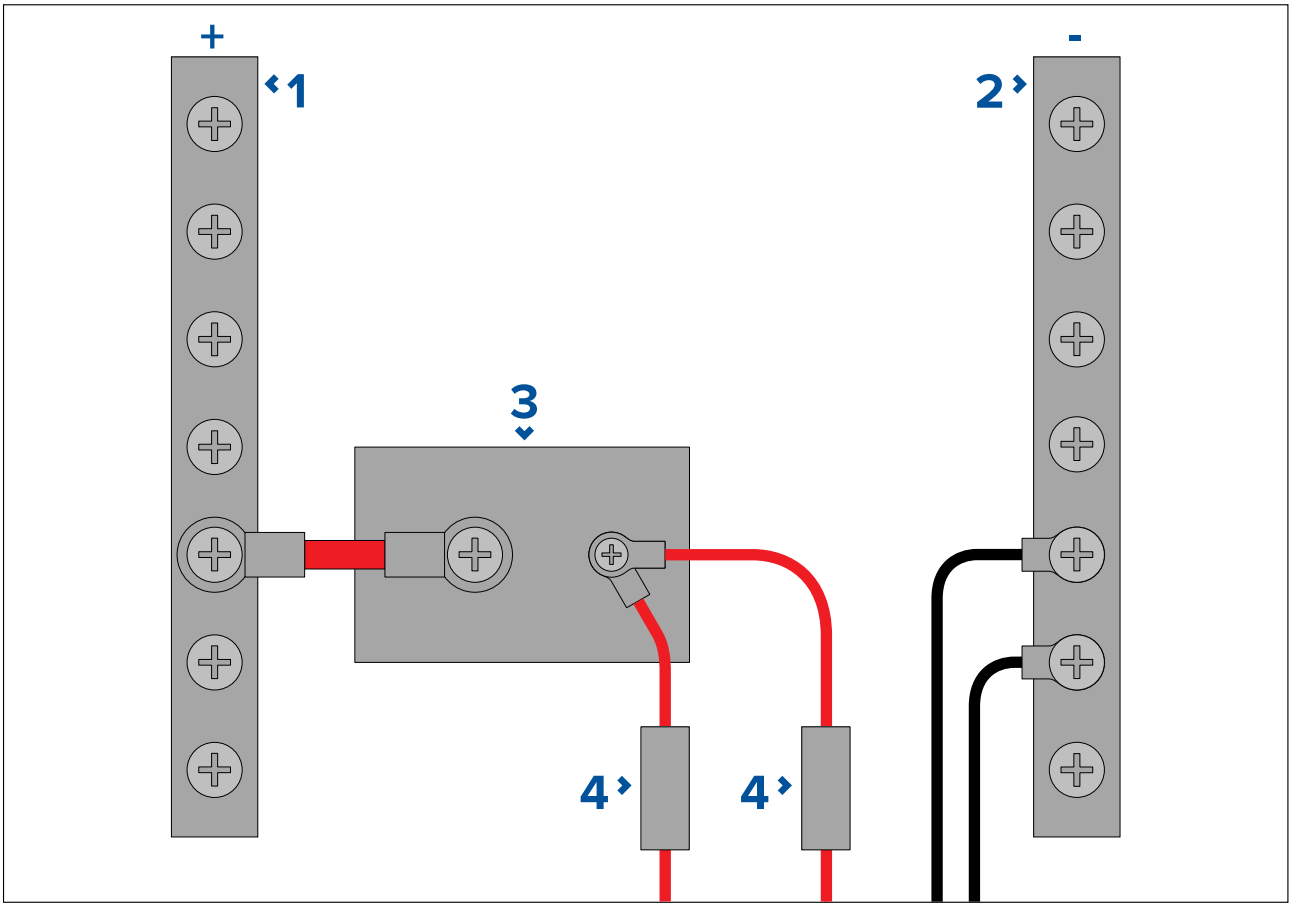
It is recommended that best practice is observed in all vessel electrical installations, as detailed in the following standards:

- BMEA Code of Practice for Electrical and Electronic Installations in Boats
- NMEA 0400 Installation Standard

- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

Sharing a breaker

Where more than 1 piece of equipment shares a breaker you must provide protection for the individual circuits. E.g. by connecting an in-line fuse for each power circuit.



1	Positive (+) bar
2	Negative (-) bar
3	Circuit breaker
4	Fuse

Where possible, connect individual items of equipment to individual circuit breakers. Where this is not possible, use individual in-line fuses to provide the necessary protection.

Warning: Product grounding

Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions provided.

Warning: Positive ground systems

Do not connect this unit to a system which has positive grounding.

Chapter 9: Setup and calibration

Chapter contents

9.1 Camera setup

Before using the Augmented Reality features, it's important to correctly install and setup your compatible camera.

Refer to your camera's installation manual to determine the correct physical installation and connections for using the camera as part of an Augmented Reality system.

A number of additional camera-related settings and calibrations must be completed in the Video app before Augmented Reality features can be used:

- Camera height above the waterline.
- Camera direction.
- Camera horizontal field of view [not required for cameras which auto assign their field of view].
- Horizon calibration.

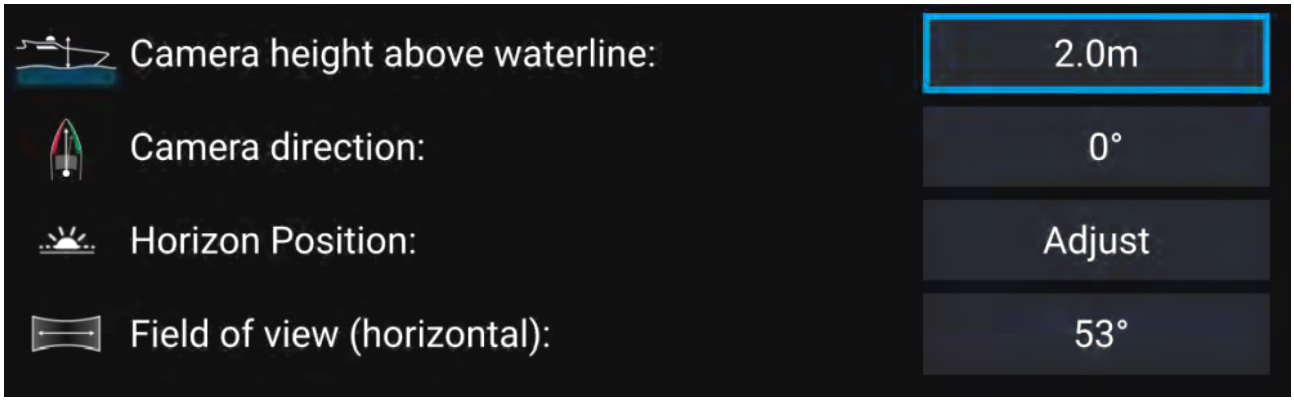
Note:

- The camera's height above the waterline and camera's view direction need to be physically measured for accurate camera installation.
- The camera's horizontal field of view can be found in your camera's installation manual specification.

Fixed camera calibration

Fixed mount cameras require calibration for Augmented Reality to function correctly.

1. For first time setup, either:
   i. Select the **Enter Details** prompt in the Video app.
   ii. Select the **ClearCruise** tab in the Video app's Settings, **Video app > Settings > ClearCruise.** There will be a prompt to **Enter Details** using the **Camera Installation** page.
2. Go directly to the **Camera Installation** page in the Video app (**Settings > Camera Setup > Camera Installation**).
3. The **Camera Installation** page will offer a series of camera installation options which all need to be completed correctly.



Note:

Incorrect physical camera installation and incorrect settings provided in the camera setup page could result in an inaccurate Augmented Reality overlay.

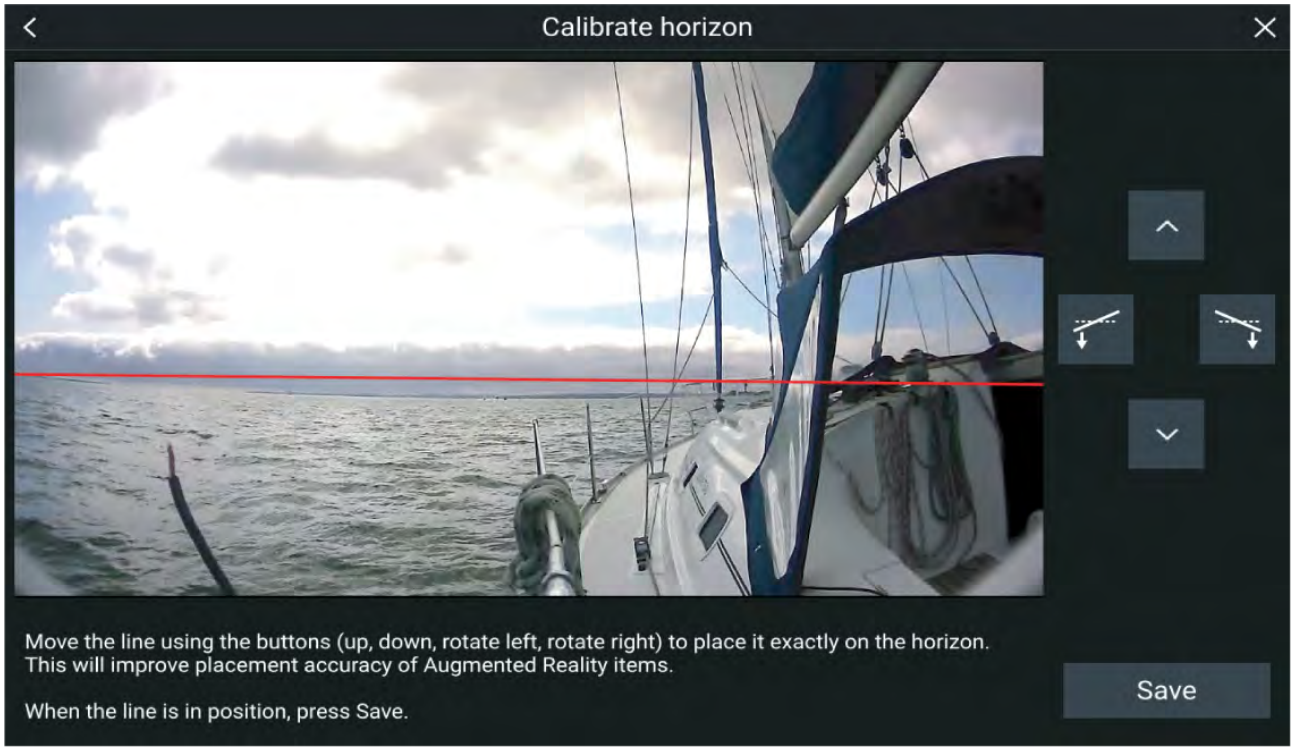
- To adjust the values of **Camera height above waterline**, **Camera direction** and **Field of view**, select the value boxes of each option and adjust using the arrows.

Menu item	Options
Camera height above waterline	• 0m to 50m • 0ft to 165ft
Camera direction	• 0° (Forward) (default) • 0° to 180°p (Port) • 0° to 180°s (Starboard)
Field of view	• 30° to 120° • [CAM210IP – 53°] • [CAM220IP – 93°]

- To Calibrate horizon, use the **up**, **down**, **rotate left** and **rotate right** arrow keys until the red line is placed on the horizon. When the line is in position, select **Save**.

Important:

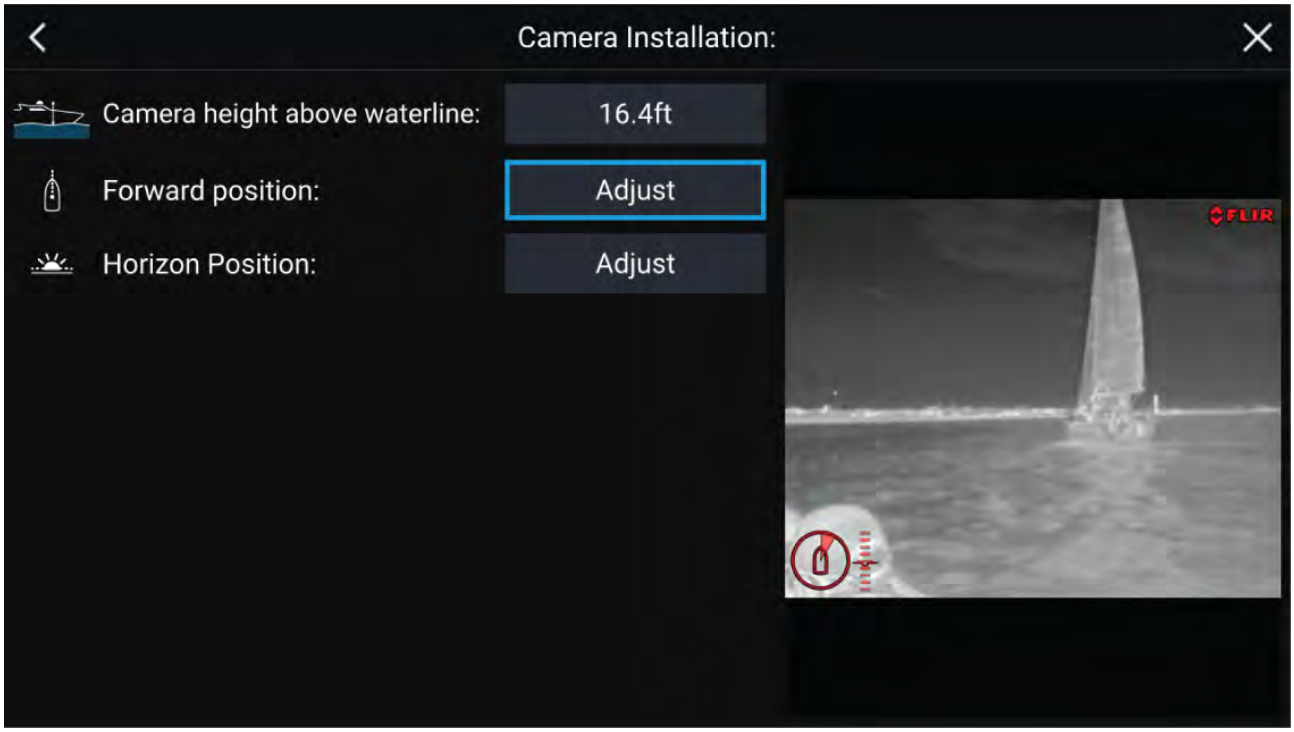
Calibrating the horizon correctly is essential for accurate Augmented Reality overlay. Calibrating on calm water and in clear sight of the horizon is recommended.



Pan and Tilt camera calibration

Pan and Tilt cameras require calibration for Augmented Reality to function correctly.

1. For first time setup, either:
   i. Select the **Enter Details** prompt in the Video app.
   ii. Select the **ClearCruise** tab in the Video app's Settings, **Video app > Settings > ClearCruise.** There will be a prompt to **Enter Details** using the **Camera Installation** page.
2. Go directly to the **Camera Installation** page in the Video app (**Settings > Camera Setup > Camera Installation**).
3. The **Camera Installation** page will offer a series of camera installation options which all need to be completed correctly.



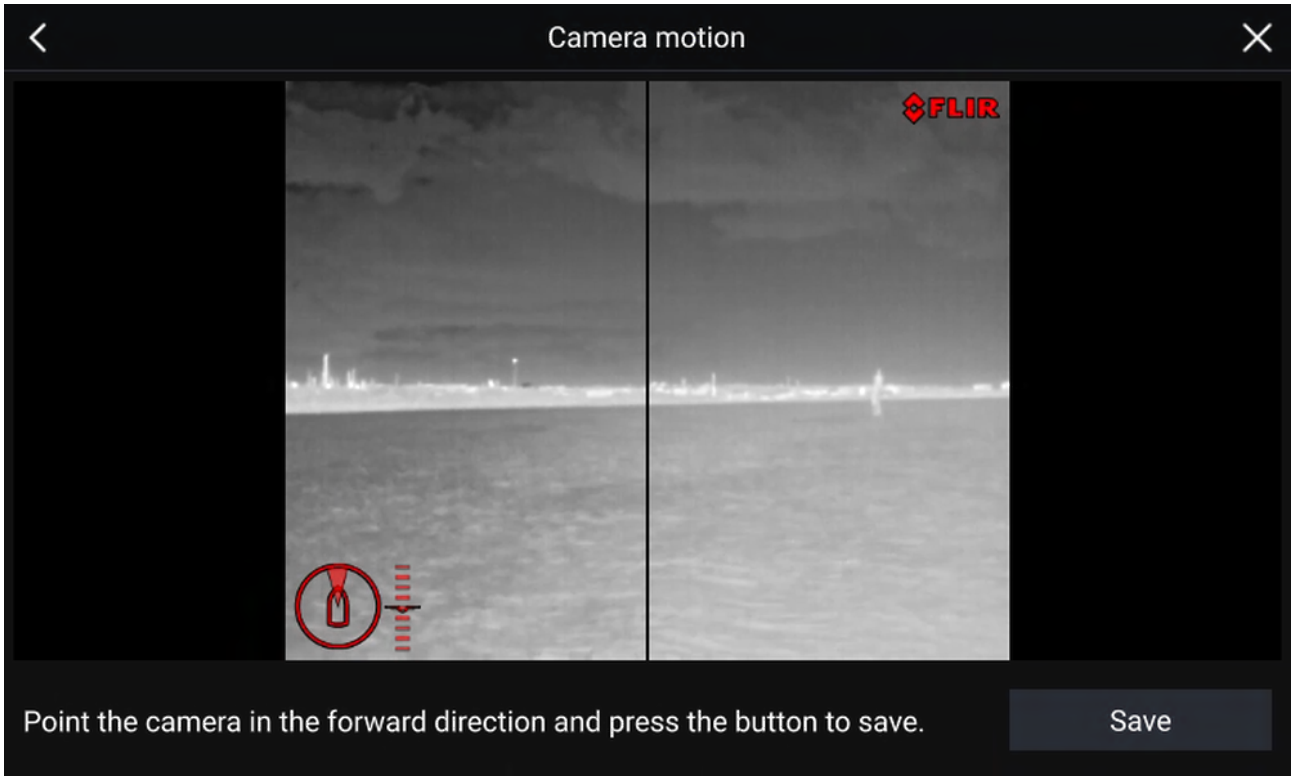
Note:

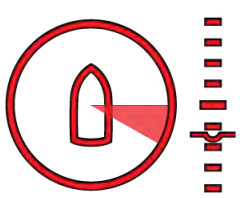
Incorrect physical camera installation and incorrect settings provided in the camera setup page could result in an inaccurate Augmented Reality overlay.

- To adjust the values of **Camera height above waterline** select the value box and adjust using the arrows.

Menu item	Options
Camera height above waterline	• 0m to 50m • 0ft to 165ft

- To Calibrate the camera's **Forward Position** adjust the camera direction so the vertical black line is positioned directly forward, parallel to your vessels forward position.

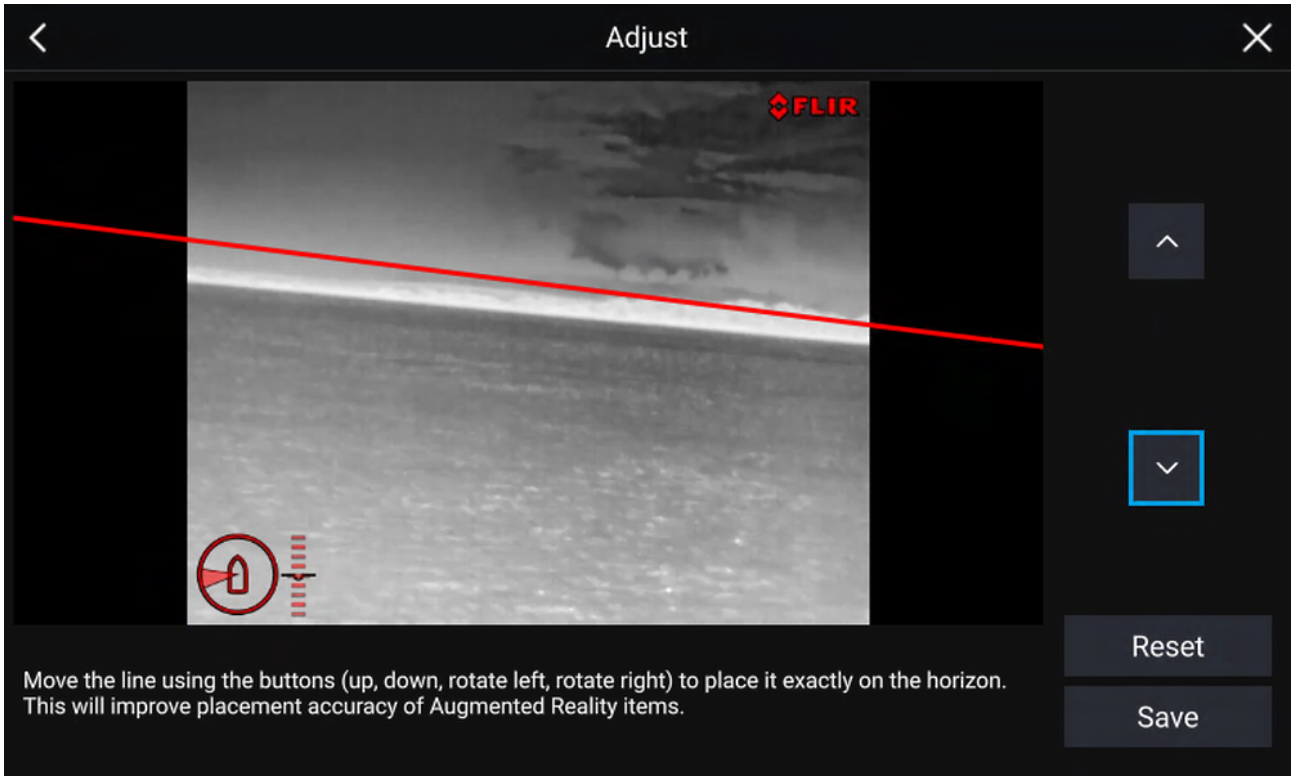




Important:

- Calibrating the cameras forward position is essential for accurate Augmented Reality overlay when the camera pans and tilts. Calibrating on calm water and with a clear view of the front of your vessel is recommended.
- Certain cameras display a camera direction indicator which can help identify when the camera is facing directly forward.

- To Calibrate the camera's **Horizon position** use the arrow keys to align the horizontal red line so it is level with the horizon.
- Pan and tilt the camera 360° during calibration to ensure the horizon line has been positioned correctly.



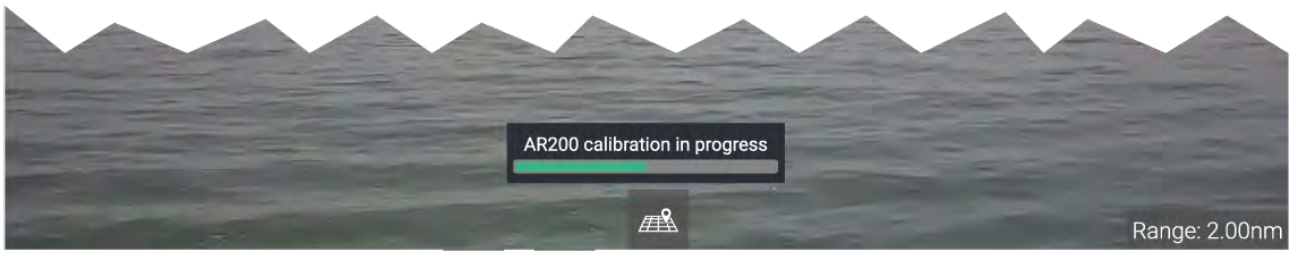
Important:

Calibrating the horizon correctly is essential for accurate Augmented Reality overlay. Calibrating on calm water and in clear sight of the horizon is recommended.

9.2 AR200 Calibration (Linearization)

To enable accurate placement of Augmented Reality (AR) flags on the camera's video feed, the AR200's AHRS sensors need to compensate for local magnetic fields, as well as the Earth's magnetic fields.

Calibration is achieved using an automatic linearization process. The linearization process starts automatically after your vessel has turned approximately 100°, when travelling at a speed of between 3 to 15 knots. The linearization process requires no user input, however at least a 270° turn is required before linearization can be completed. The duration of the linearization process can be decreased by completing a full 360° turn, when travelling at a speed of between 3 to 15 knots. The linearization process can also be restarted at anytime.



In the Video app the Linearization progress bar is displayed when linearization is in progress. The bar is filled to indicate completeness, and will turn Red if the process is paused or otherwise interrupted.

The time taken to complete the linearization process will vary according to the characteristics of the vessel, the AR200's installation location, and the levels of magnetic interference present at the time linearization is performed.

Magnetic interference can be caused by objects onboard your vessel, such as:

- Speakers
- Electronic equipment
- Electrical cabling
- Metal bulkhead or hull

Magnetic interference can also be caused by external objects in close proximately to your vessel, such as:

- Metal hulled vessels
- Underwater electrical cables
- Marine pontoons

Magnetic deviation

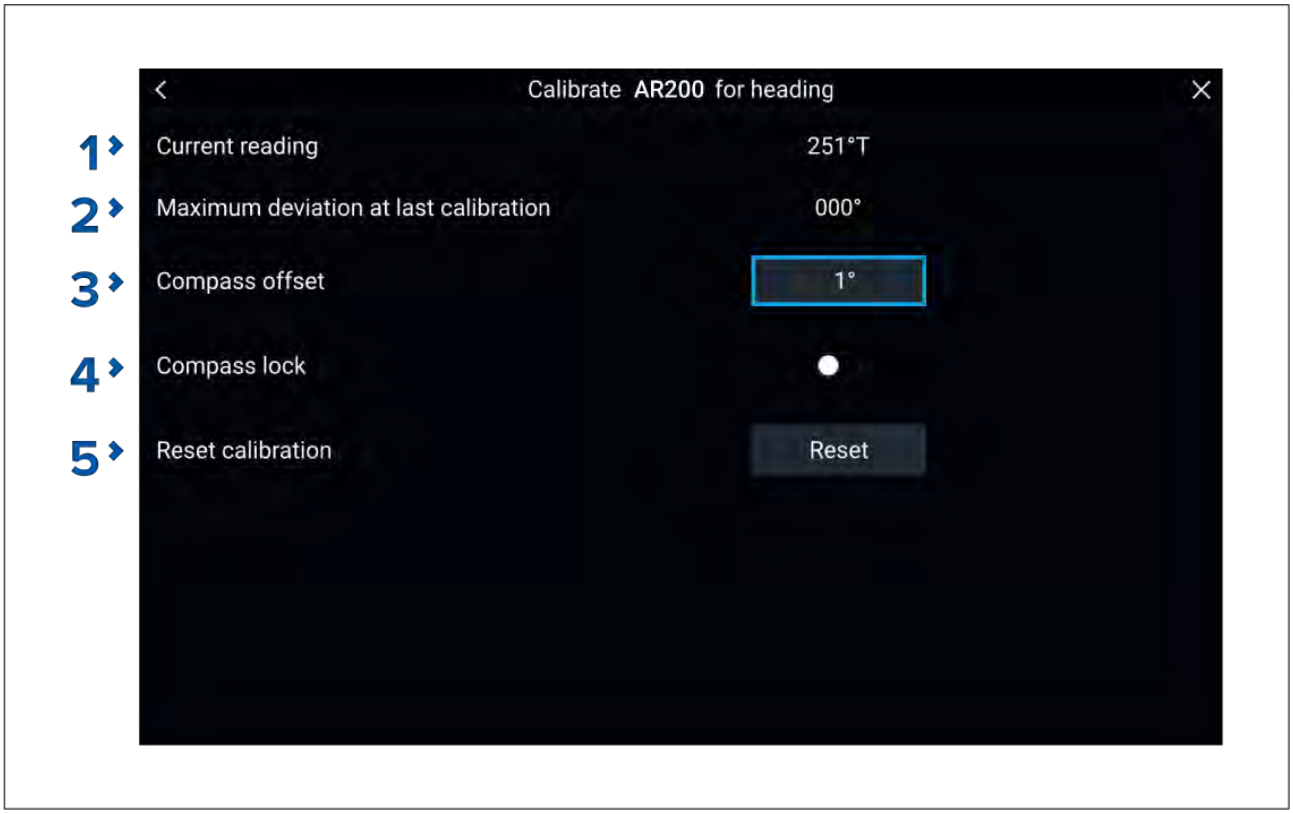
Magnetic deviation is the error induced in a compass caused by interference from local magnetic fields.

The automatic linearization process results in a deviation value being set for your AR200. If Augmented Reality flags in the Video app are not aligned with their onscreen objects, or the compass is out of alignment, you should check the AR200's current calibration settings. For instructions on how to do this, refer to: **AR200 calibration settings**

AR200 calibration settings

The calibration settings page provides access to the AR200's compass calibration options.

The AR200 calibration page can be accessed using your Data master MFD; from the Homescreen select: **Settings** > **Network** > **Data sources** > **Heading** > **AR200** > **Calibrate**.



1	**Current reading:** The current heading reported by the AR200.
2	**Maximum deviation at last calibration:** The maximum deviation reported during the last linearization process. **Important:** • If the **Maximum deviation at last calibration** is 45° or above, it is recommended that the AR200 unit is moved and re-installed in a location which is subject to less magnetic interference. **Calibration in progress:** While linearization is in progress the progress percentage is displayed.
3	**Compass offset** Once the linearization process has completed, it is possible that the heading value may be slightly out of alignment. This is common where installation space is limited and the AR200 is not properly aligned with your vessel's longitudinal axis. In this case, it is possible to manually adjust the Compass offset.
4	**Compass lock** When enabled, the Compass lock prevents the continual monitoring and adaptation of the compass linearization process. For more information, refer to: **Compass lock**.
5	**Reset calibration** You can reset your AR200's current linearization settings by selecting **Reset calibration**

Continual monitoring and adaptation

To ensure optimum performance, after the initial linearization process is complete the unit continues to monitor and adapt the compass linearization to suit current conditions.

If the conditions for linearization are less than ideal, the automatic linearization process temporarily pauses until conditions improve again. The following conditions can cause the linearization process to temporarily pause:

- significant magnetic interference is present
- vessel speed too slow or too fast

- rate-of-turn too slow or too fast

Compass lock

Once you are satisfied with the compass accuracy, you can lock the setting to prevent the system from completing a further automatic linearization in the future.

This feature is particularly useful for vessels in environments that are exposed to strong magnetic disturbances on a regular basis (such as offshore wind farms or very busy rivers, for example). In these situations it may be desirable to use the Compass lock feature to disable the continuous linearization process, as the magnetic interference may build a heading error over time.

Note: The compass lock may be released at any time, to allow the compass continual monitoring and adaptation to re-commence. This is particularly useful if planning a long voyage. The earth's magnetic field will change significantly from one geographical location to another, and the compass can continually compensate for the changes, ensuring you maintain accurate heading data throughout the voyage.

Chapter 10: System checks and troubleshooting

Chapter contents

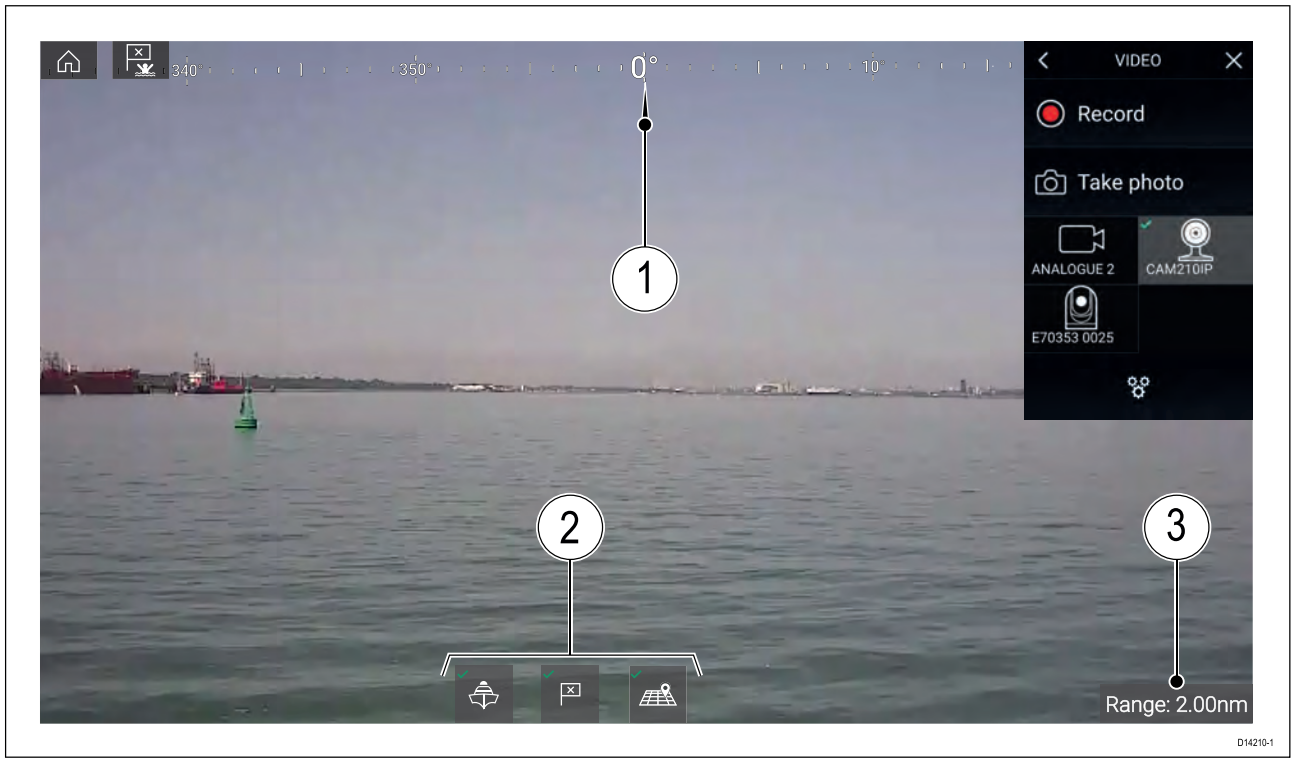
10.1 Augmented Reality (AR) initial test

With the AR200 and a compatible IP camera successfully installed, you can perform an initial check of your Augmented Reality system.

Note:

Your LightHouse™ 3 powered MFD must be running version LH3.7 or above.

1. Select the **Video** app icon from the Homescreen.
2. From the main menu select your augmented reality compatible IP camera.
   When you select the relevant camera, in addition to the video feed being displayed ClearCruise™ AR features are also displayed onscreen.

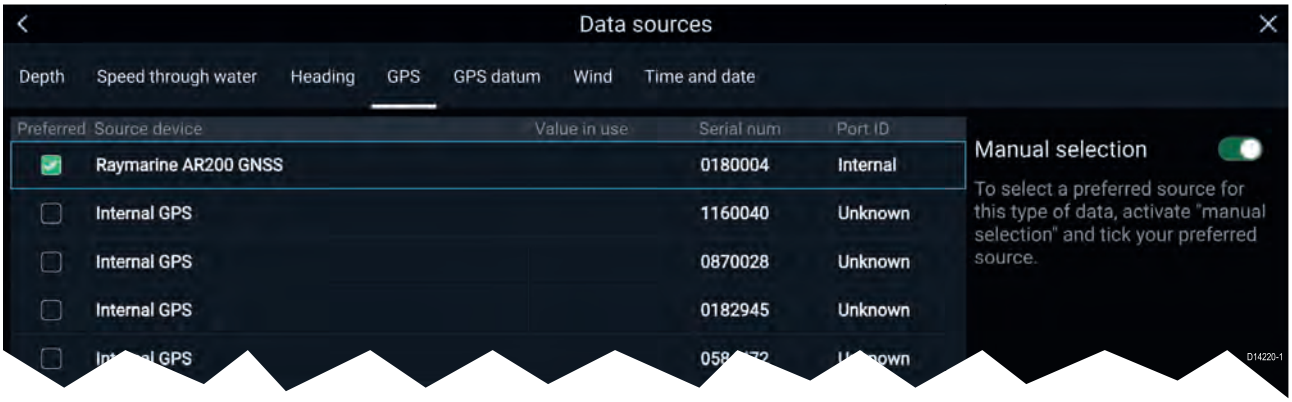


1. Compass bar and heading indicator.
2. AR Object (AIS, Waypoint and Chart object) flag toggle options.
3. AR Object detection range.

10.2 GNSS (GPS) check

If you intend to use the AR200 as your system's main GNSS (GPS) receiver, you may need to manually select it from the **Data sources** menu.

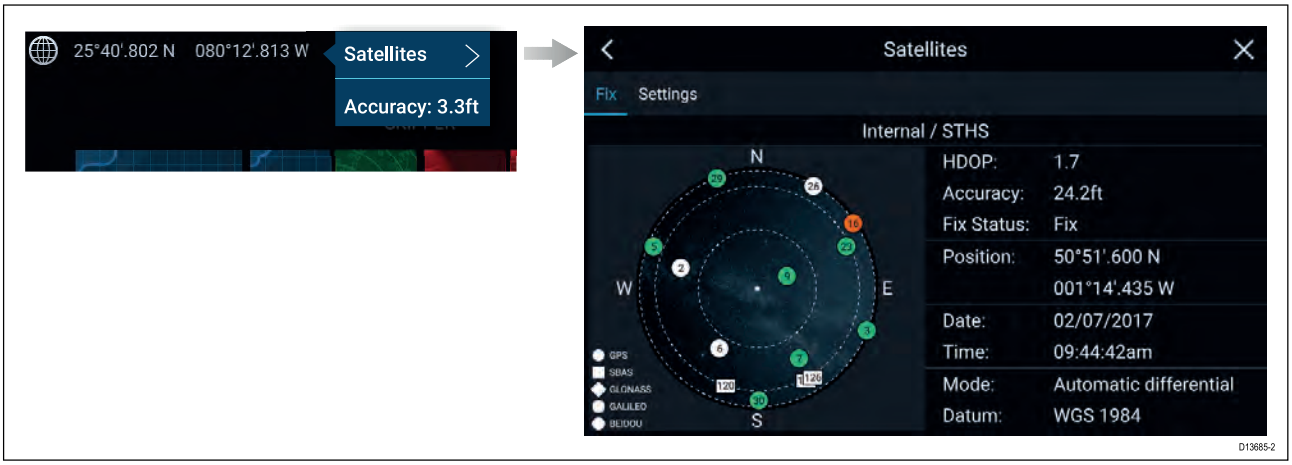
The Data sources menu can be accessed from your Data master MFD: **Homescreen** > **Settings** > **Network** > **Data sources** > **GPS**.



To choose the AR200 as your preferred source for GNSS (GPS) position data, select **Raymarine AR200 GNSS** from the list of devices, and then select **Always use this device** from the Pop-over menu. This will make the AR200 the preferred source for GNSS (GPS) position data.

Once selected, a tick is placed in the **Preferred** column and the **Manual selection** toggle switch will be enabled. If your AR200 has a position fix, position accuracy is displayed in the **Value in use** column.

When a valid position fix is achieved, your vessel's latitude and longitude position is displayed on the Homescreen.



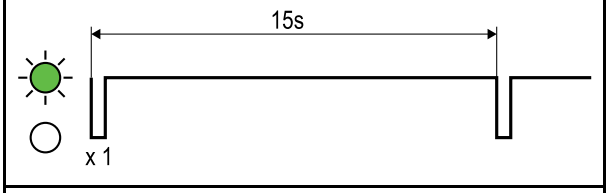
10.3 Troubleshooting

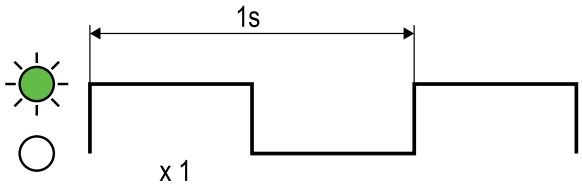
The troubleshooting information provides possible causes and corrective action required for common problems associated with installation and operation of your product.

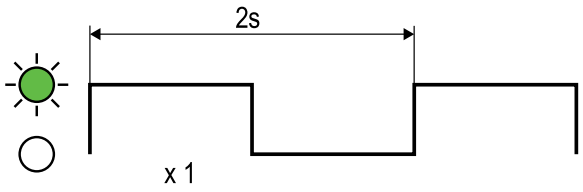
Before packing and shipping, all Raymarine products are subjected to comprehensive testing and quality assurance programs. If you do experience problems with your product this section will help you to diagnose and correct problems to restore normal operation.

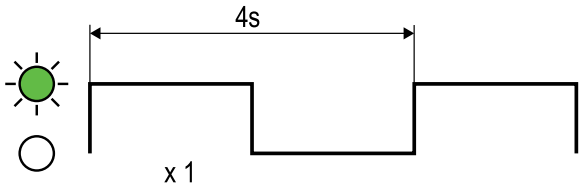
If after referring to this section you are still having problems with your product, please refer to the Technical support section of this manual for useful links and Raymarine Product Support contact details.

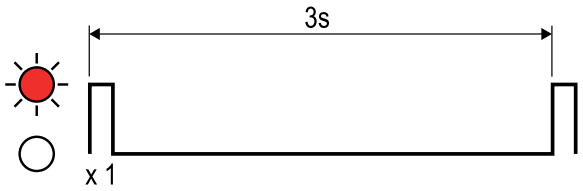
LED Diagnostics

<table>
<tr><th>LED Sequence</th><th>Status</th></tr>
<tr><td> 

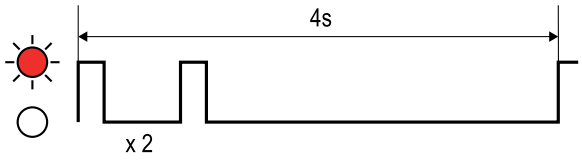
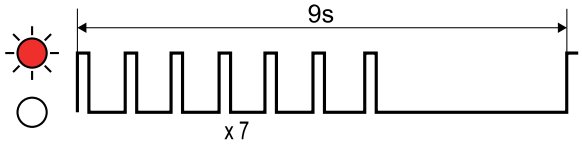
Green LED is off once every 15 seconds.</td><td>• All sensors connected and ready.
• Bus healthy, no communication faults</td></tr>
<tr><td> 

Green LED flashes on and off once every second.</td><td>All sensors are initializing.</td></tr>
<tr><td> 

Green LED flashes on and off once every 2 seconds.</td><td>GNSS (GPS) initializing
Note:
Can take up to 5 minutes at first use or after factory reset or software update.</td></tr>
<tr><td> 

Green LED flashes on and off once every 4 seconds.</td><td>Compass linearizing</td></tr>
<tr><td> 

Red LED flashes on once every 3 seconds.</td><td>No GNSS (GPS) signal</td></tr>
</table>

LED Sequence	Status
	Bus not connected / fault
Red LED flashes on twice every 4 seconds.	
	Bus connected but not receiving data
Red LED flashes on 7 times every 9 seconds.	

GNSS (GPS) troubleshooting

Potential problems with the GNSS (GPS) receiver and possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
“No Fix” GNSS status icon is displayed.	Geographic location or prevailing conditions preventing satellite fix.	Check periodically to see if a fix is obtained in better conditions or another geographic location.
	GNSS (GPS) connection fault.	Ensure that external GNSS connections and cabling are correct and fault free.
	External GNSS (GPS) receiver in poor location. For example: • Below decks. • Close proximity to transmitting equipment such as VHF radio.	Ensure GNSS (GPS) receiver has a clear view of the sky.
	GNSS (GPS) installation problem.	Refer to the installation instructions.

Note: A GNSS Status screen is accessible from the display. This provides satellite signal strength and other relevant information.

Augmented Reality (AR) Troubleshooting

AR options not available in Video app

Possible causes	Possible solutions
Wrong camera selected.	Ensure that the correct AR-compatible camera has been selected in the Video app menu.
Compatible camera not detected.	1. Ensure your camera is AR compatible. 2. Ensure your camera is correctly installed and networked to your MFD.
AR200 not detected.	1. Ensure your AR200 is correctly installed and on the same network as the MFD from which you are using the AR features.
Incorrect LightHouse™ 3 software version.	Ensure that your MFD is running LightHouse™ 3 version 3.7 or above.
AR options turned off.	The Compass bar, AIS, Waypoint and Chart object flags can be enabled and disabled from the **ClearCruise** settings page (**Video app** > **Menu** > **Settings** > **ClearCruise**). Ensure relevant options are enabled. **Note:** For AIS flags to be displayed, compatible AIS hardware must be operational and connected to the same network as your MFD.

AR flags do not appear directly above on-screen target

Possible causes	Possible solutions
AIS update rate	Depending on the classification of the target's AIS hardware, transmitted position updates may be sent up to 3 minutes apart and therefore the flag may appear up to 3 minutes behind the actual onscreen target.
Camera Field of View (FOV) set incorrectly.	Ensure that the FOV setting reflects your camera's horizontal FOV. Check your camera's documentation for FOV specifications.
AR200 interference	If your AR200 is installed in a location which includes a source of magnetic interference large enough to affect AR flag placement, you may need to re-install the AR200 in a different location.
Deviation too high	1. Reset the AR200 calibration by selecting **Reset** from the AR200 calibration page: **Homescreen** > **Settings** > **Network** > **Data sources** > **Heading** > **Raymarine AR200 Attitude** > **Calibrate**. 2. If the problem persists, you may need to move your AR200 to a location with less magnetic interference.

Chapter 11: Operation

Chapter contents

11.1 Operation instructions

For detailed operation instructions for your product, refer to the documentation that accompanies your display.

All product documentation is available to download from the Raymarine website: www.raymarine.com/manuals

- **81370** — LightHouse 3 MFD Advanced Operation Instructions

Chapter 12: Maintenance

Chapter contents

12.1 Service and maintenance

This product contains no user serviceable components. Please refer all maintenance and repair to authorized Raymarine dealers. Unauthorized repair may affect your warranty.

12.2 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.

12.3 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.

Chapter 13: Technical support

Chapter contents

13.1 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):

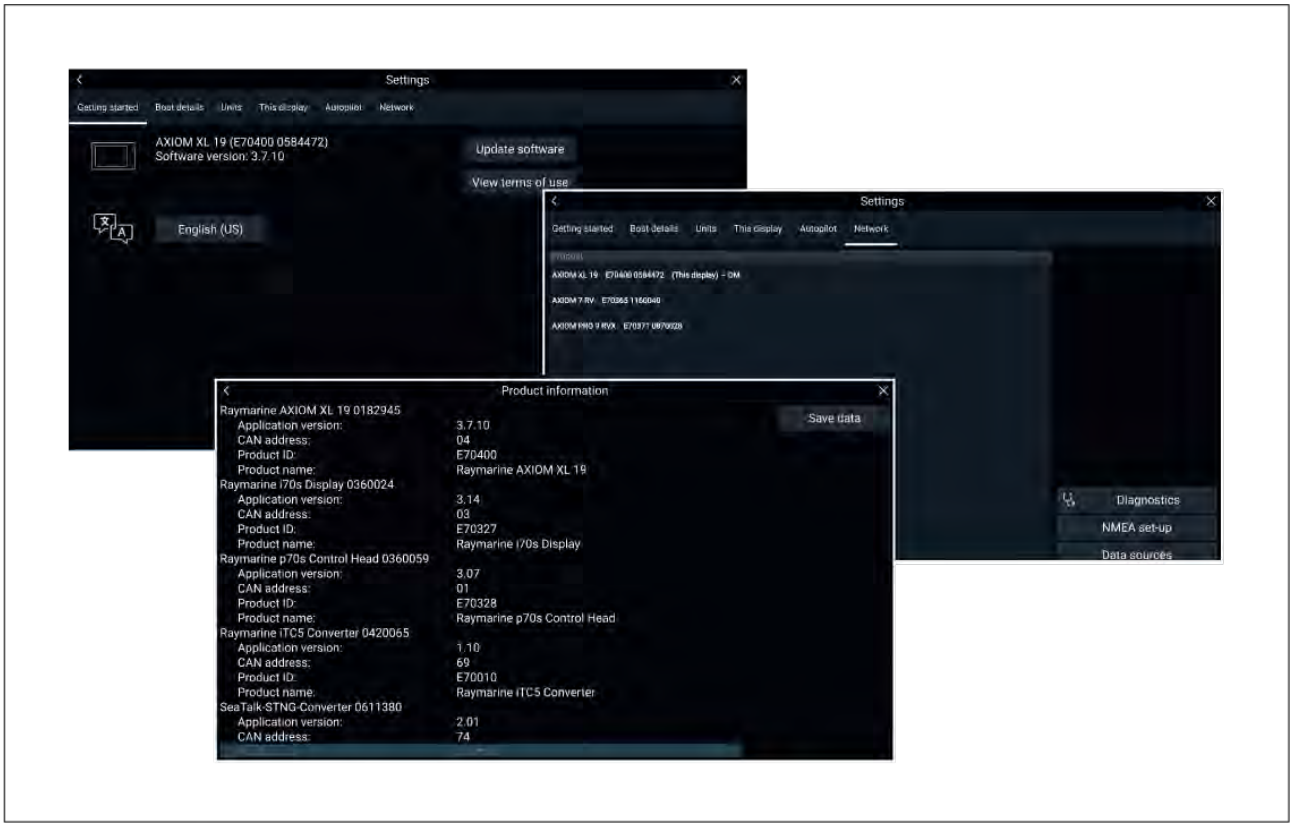
- E-Mail: support.dk@raymarine.com
- Tel: +45 437 164 64

Russia (Authorized Raymarine distributor):

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

Viewing product information (LightHouse™ 3)

Use the **Settings** menu to view hardware and software information about your MFD, and connected products.



1. Select **Settings**, from the Homescreen.
   The **Getting started** menu contains hardware and software information for your MFD.
2. You can view further information about your MFD, or view information about products networked using SeaTalkhs ® and SeaTalkng ® / NMEA 2000, by selecting the **Network** tab, then:
   i. to display detailed software information and your MFD's network IP address, select your MFD from the list.

ii. to display detailed diagnostics information for all products, select **Product info** from the **Diagnostics** pop over menu.

13.2 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

13.3 Operation instructions

For detailed operation instructions for your product, refer to the documentation that accompanies your display.

All product documentation is available to download from the Raymarine website: www.raymarine.com/manuals.

Chapter 14: Technical specification

Chapter contents

14.1 Technical specification

Power specification

Nominal supply voltage:	12 V dc (Supplied by the SeaTalkng ® network.)
Operating voltage range:	9 V dc to 16 V dc (protected up to 32 V dc)
Power consumption:	30 mA Max.
LEN (Load Equivalency Rating):	1

Environmental specification

Operating temperature range:	-25 °C to +55 °C (-13 °F to 131 °F)
Storage temperature range:	-25 °C to +70 °C (-13 °F to 158 °F)
Relative humidity:	93%
Water ingress protection:	IPx6 and IPx7

Conformance specification

EMC Directive:	2014/30/EU
Australia and New Zealand C-Tick compliance:	Level 2
RoHS Directive:	2011/65/EU
WEEE Directive:	2012/19/EU

GNSS (GPS) receiver specification

Signal acquisition:	Automatic
Channels:	Simultaneously track up to 28 satellites.
Operating frequency:	1574 MHz to 1605 MHz
Update rate:	10 Hz
Sensitivity:	• Cold start = -147 dBm • Re-acquisition = -160 dBm • Tracking = -164 dBm
GNSS (GPS) satellite system compatibility:	• GPS • GLONASS • Galileo ready • Beidou ready
Satellite Differential Type (SBAS):	• WAAS (United States) • EGNOS (Europe) • MSAS (Japan) • GAGAN (India) • QZSS ready (Japan)
Differential acquisition:	Automatic
Position accuracy without SBAS (95%):	< 15 m
Position accuracy with SBAS (95%):	< 5 m
Speed accuracy (95%):	< 0.3 kt
Time to first fix from cold start:	< 2 minutes (< 60 seconds typical)

Time to first fix from hot start:	< 45 seconds
Geodetic Datum:	WGS–84
Antenna:	Internal

AHRS specification

AHRS:	• 3–Axis digital accelerometer • 3–Axis digital compass • 3–Axis MEMS Gyro digital angular rate sensor
Magnetic compass accuracy:	• Static = ≤1° RMS • Dynamic = ≤3° RMS
Pitch, Roll and Yaw accuracy:	≤1°
Heading, Pitch, Roll and Rate of Turn update rate:	10 Hz

Chapter 15: Spares and accessories

Chapter contents

15.1 Accessories

The following accessories are available:

Accessories

Item	Part number
Pole/rail mounting adaptor kit	A80370
6 m SeaTalkng white spur cable	A06072
Deck mounting (Clamshell/Riser) kit	A80437

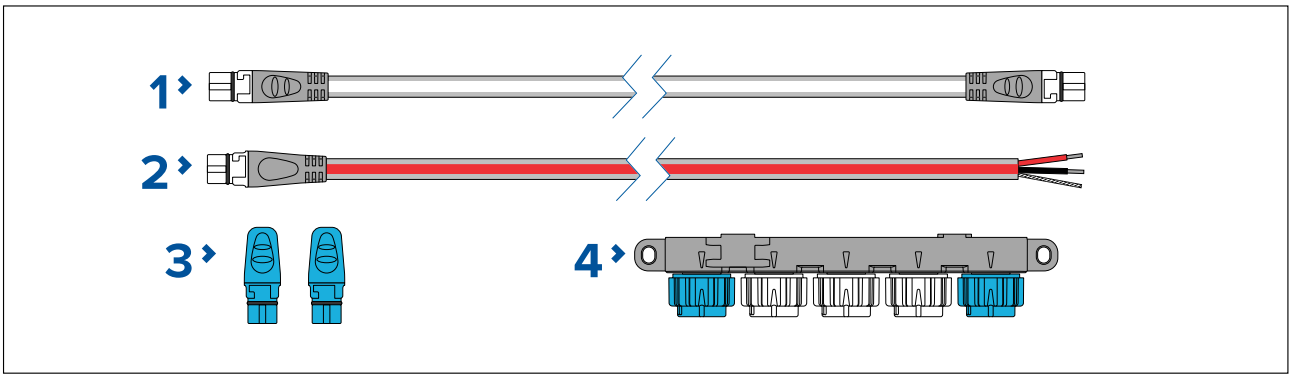
15.2 SeaTalkng® cables and accessories

SeaTalkng® cables and accessories for use with compatible products.

SeaTalkng® kits

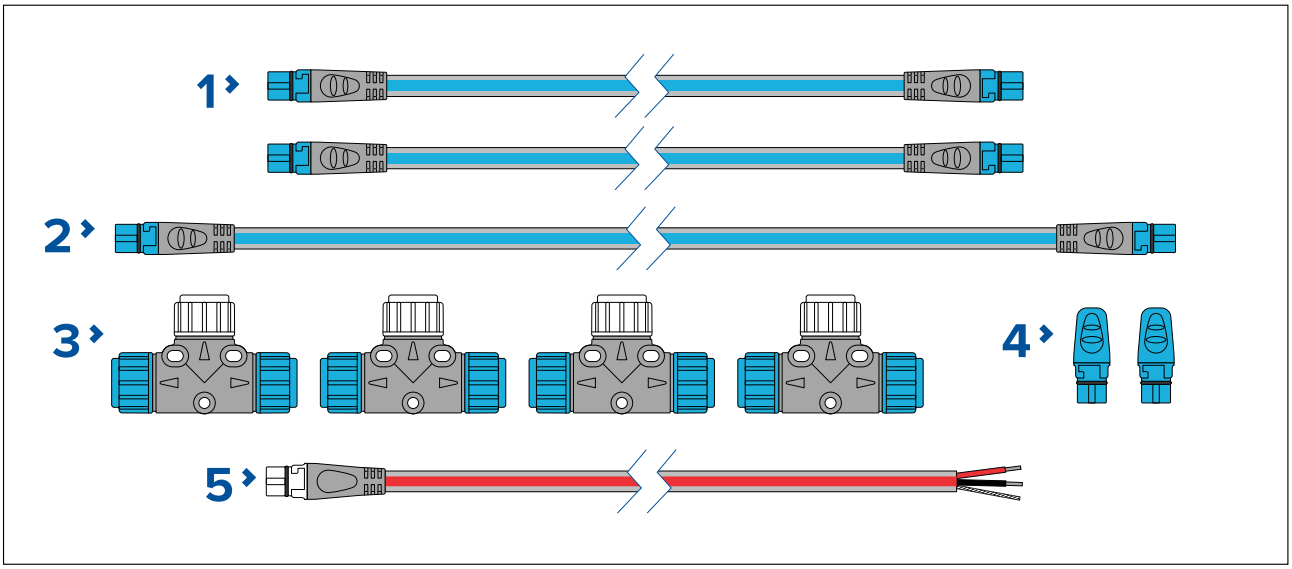
SeaTalkng kits enable you to create a simple SeaTalkng backbone.

Starter kit (T70134) consists of:



1. 1 x 3 m (9.8 ft) Spur cable (**A06040**). Used to connect device to the SeaTalkng backbone.
2. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.
3. 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.
4. 1 x 5-Way connector (**A06064**). Each connector block allows connection of up to 3 SeaTalkng devices. Multiple connector blocks can be 'daisy chained' together.

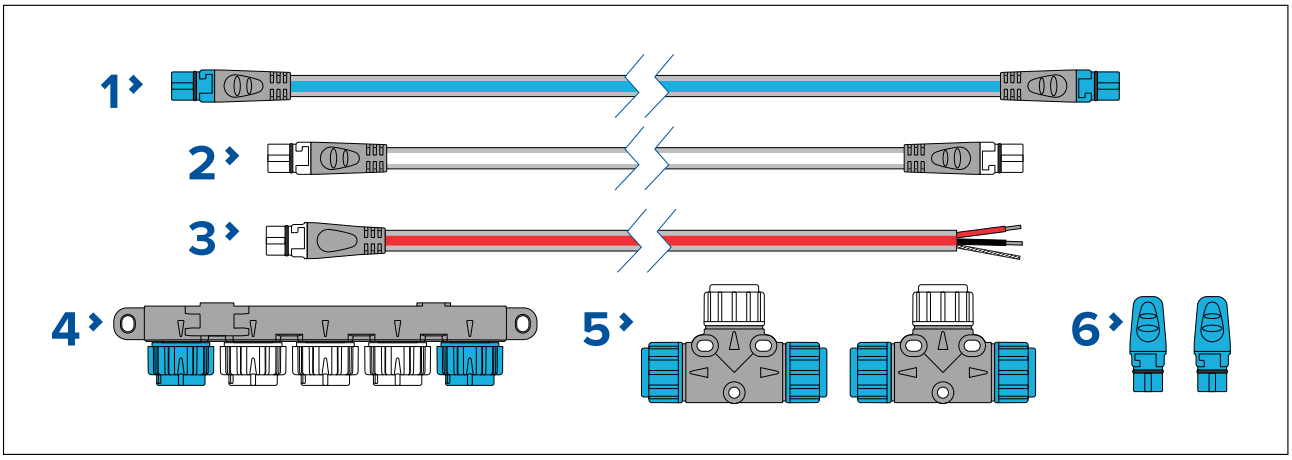
Backbone kit (A25062) consists of:



1. 2 x 5 m (16.4 ft) Backbone cables (**A06036**). Used to create and extend the SeaTalkng backbone.
2. 1 x 20 m (65.6 ft) Backbone cable (**A06037**). Used to create and extend the SeaTalkng backbone.

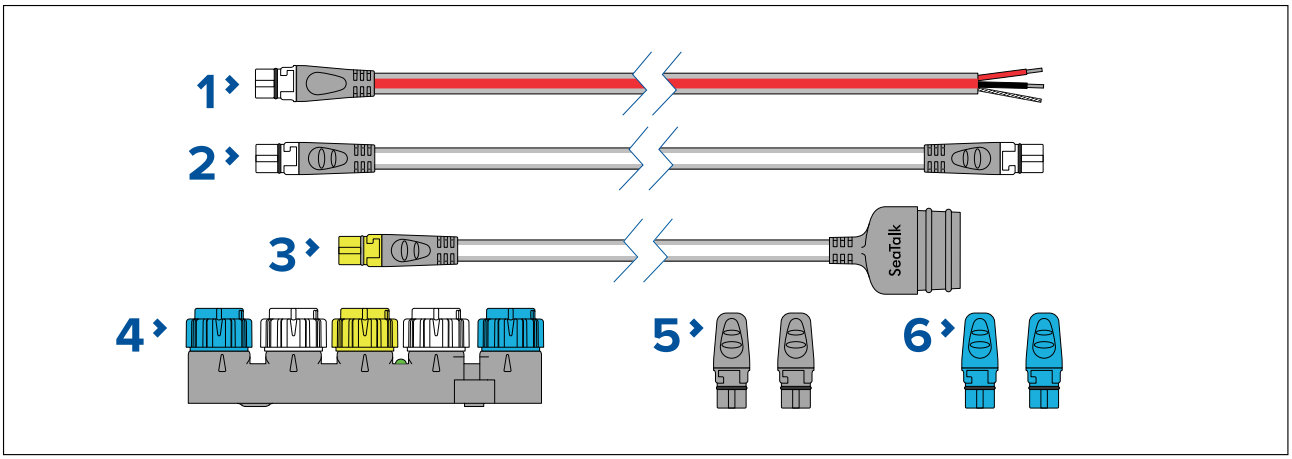
3. 4 x T-piece (**A06028**). Each T-piece allows connection of one SeaTalkng device. Multiple T-pieces can be 'daisy chained' together.
4. 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.
5. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.

Evolution autopilot cable kit (R70160) consists of:



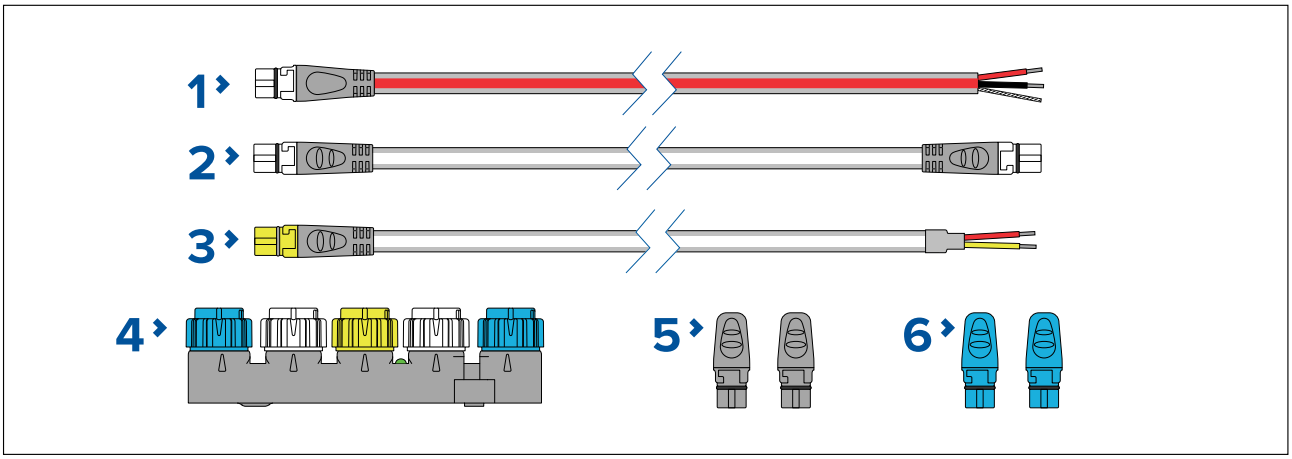
1. 1 x 5 m (16.4 ft) Backbone cable (**A06036**). Used to create and extend the SeaTalkng backbone.
2. 1 x 1 m (3.3 ft) Spur cable (**A06040**). Used to connect device to the SeaTalkng backbone.
3. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.
4. 1 x 5-Way connector (**A06064**). Each connector block allows connection of up to 3 SeaTalkng devices. Multiple connector blocks can be 'daisy chained' together.
5. 2 x T-pieces (**A06028**). Each T-piece allows connection of one SeaTalkng device. Multiple T-pieces can be 'daisy chained' together.
6. 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.

SeaTalk to SeaTalkng converter kit (E22158) consists of:



1. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.
2. 1 x 1 m (3.3 ft) Spur cable (**A06039**). Used to connect a device to the SeaTalkng backbone.
3. 1 x 0.4 m (1.3 ft) SeaTalk (3 pin) to SeaTalkng adapter cable (**A22164**). Used to connect SeaTalk devices to the SeaTalkng backbone via the SeaTalk to SeaTalkng converter.
4. 1 x SeaTalk to SeaTalkng converter (**E22158**). Each converter allows connection of one SeaTalk device and up to 2 SeaTalkng devices.
5. 2 x Spur blanking plugs (**A06032**). Used to cover unused spur connections in 5–way blocks, T-piece connectors and SeaTalk to SeaTalkng converter.
6. 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.

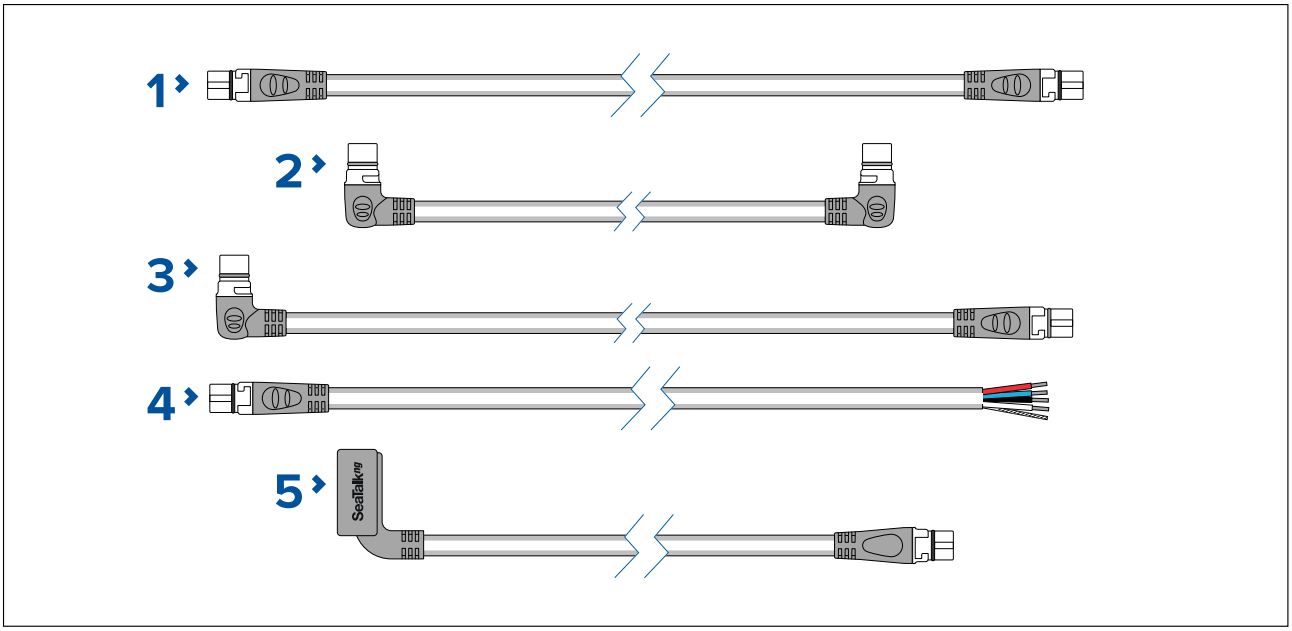
NMEA 0183 VHF 2 wire to SeaTalkng converter kit (E70196) consists of:



1. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.
2. 1 x 1 m (3.3 ft) Spur cable (**A06039**). Used to connect a device to the SeaTalkng backbone.
3. 1 x 1 m (3.3 ft) NMEA 0183 VHF stripped-end (2 wire) to SeaTalkng adapter cable (**A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalkng backbone via the NMEA 0183 VHF to SeaTalkng converter.
4. 1 x SeaTalk to SeaTalkng converter (**E22158**). Each converter allows connection of 1 SeaTalk device and up to 2 SeaTalkng devices.
5. 2 x Spur blanking plugs (**A06032**). Used to cover unused spur connections in 5-way blocks, T-piece connectors and SeaTalk to SeaTalkng converter.
6. 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.

SeaTalkng® spur cables

SeaTalkng spur cables are required to connect devices to the SeaTalkng backbone.

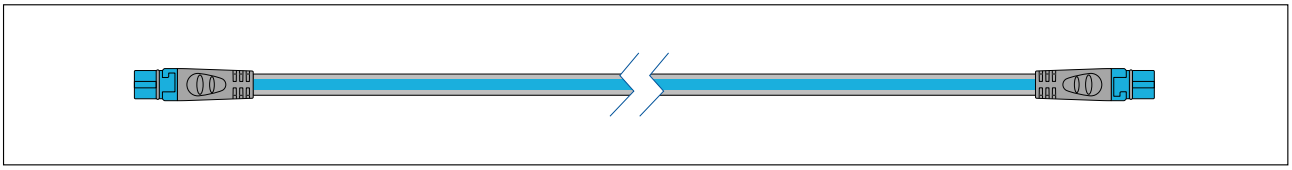


1. SeaTalkng spur cables:
   - 0.4 m (1.3 ft) Spur cable (**A06038**).
   - 1 m (3.3 ft) Spur cable (**A06039**).
   - 3 m (9.8 ft) Spur cable (**A06040**).
   - 5 m (16.4 ft) Spur cable (**A06041**).
2. 0.4 m (1.3 ft) Elbow (right angled) to elbow spur cable (**A06042**). Used in confined spaces where a straight spur cable will not fit.
3. 1 m (3.3 ft) Elbow (right angled) to straight spur cable (**A06081**). Used in confined spaces where a straight spur cable will not fit.

4. SeaTalkng to stripped-end spur cables (Connects compatible product that do not have a SeaTalkng connector such as transducer pods):
   - 1 m (3.3 ft) SeaTalkng to stripped-end spur cable — **A06043**
   - 3 m (9.8 ft) SeaTalkng to stripped-end spur cable — **A06044**
5. 0.3 m (1.0 ft) ACU / SPX autopilot to SeaTalkng spur cable (**R12112**). Connects the course computer to the SeaTalkng backbone. This connection can also be used to provide 12 V dc power to the SeaTalkng backbone.

SeaTalkng® backbone cables

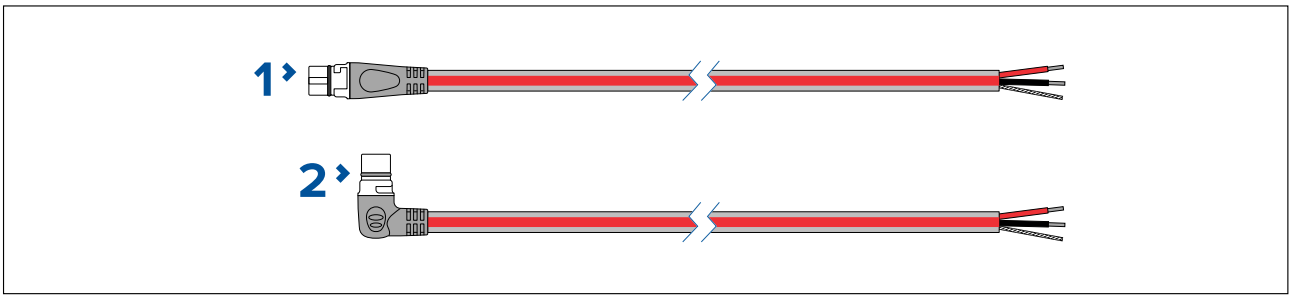
SeaTalkng backbone cables are used to create or extend a SeaTalkng backbone.



- 0.4 m (1.3 ft) Backbone cable (**A06033**).
- 1 m (3.3 ft) Backbone cable (**A06034**).
- 3 m (9.8 ft) Backbone cable (**A06035**).
- 5 m (16.4 ft) Backbone cable (**A06036**).
- 9 m (29.5 ft) Backbone cable (**A06068**).
- 20 m (65.6 ft) Backbone cable (**A06037**).

SeaTalkng® power cables

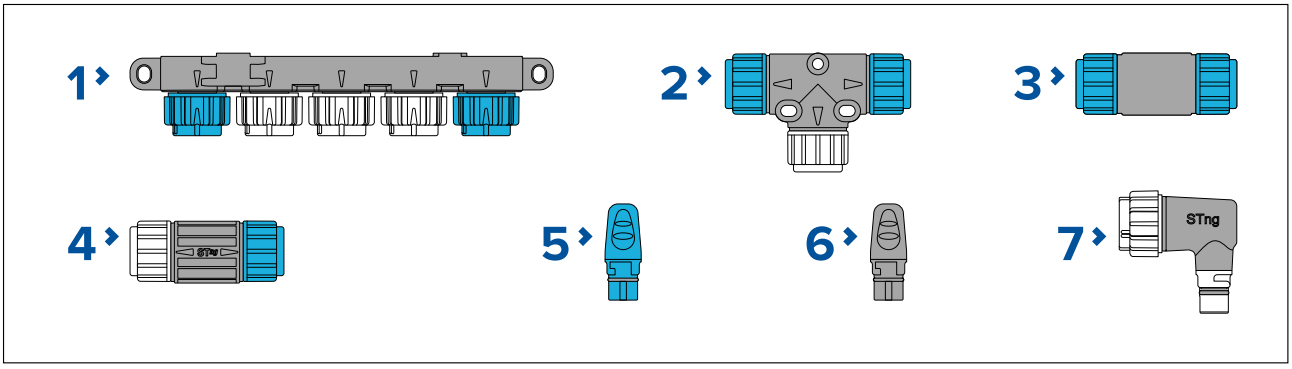
SeaTalkng power cables are used to provide the SeaTalkng backbone with a single 12 V dc power source. The power connection must include a 5 amp inline fuse (not supplied).



1. 2 m (6.6 ft) Power cable (straight) (**A06049**).
2. 2 m (6.6 ft) Elbow (right angled) power cable (**A06070**).

SeaTalkng® connectors

SeaTalkng connectors are used to connect SeaTalkng devices to the SeaTalkng backbone and to create and extend the backbone.

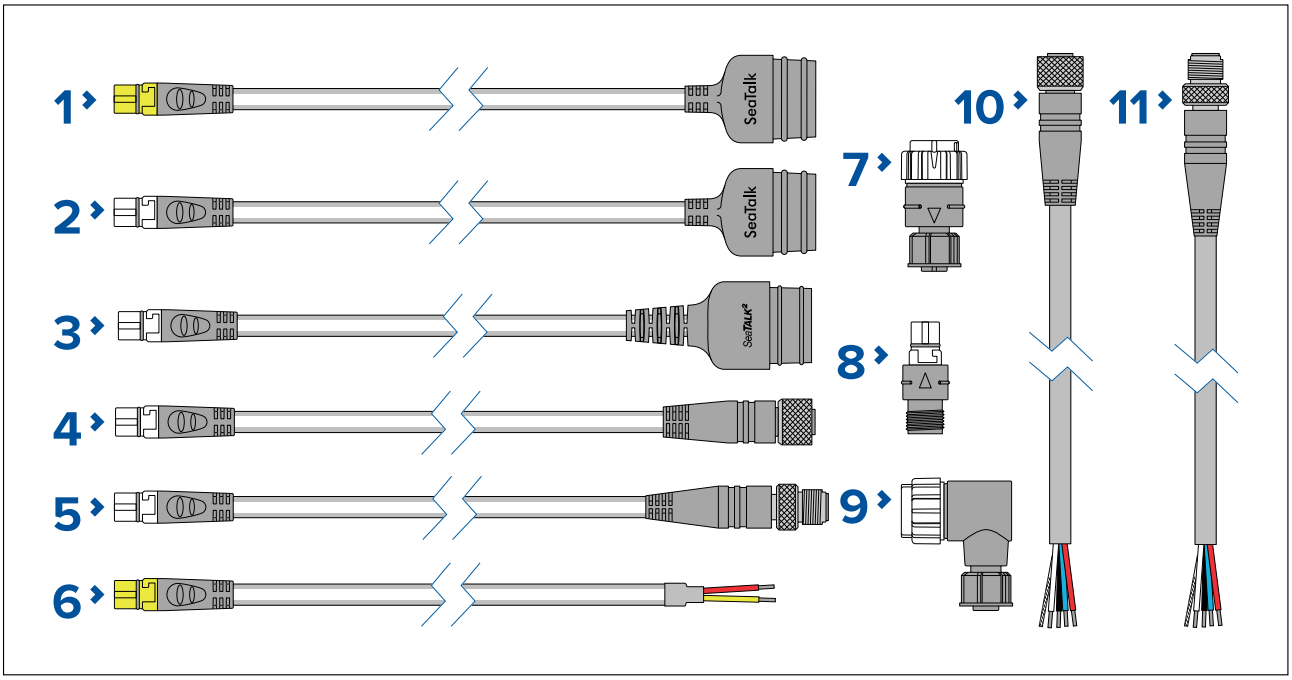


1. 5-Way connector (**A06064**). Each connector block allows connection of up to 3 SeaTalkng devices. Multiple connector blocks can be 'daisy chained' together.
2. T-piece (**A06028**). Each T-piece allows connection of one SeaTalkng device. Multiple T-pieces can be 'daisy chained' together.
3. Backbone extender (**A06030**). Used to connect 2 backbone cables together.
4. Inline terminator (**A80001**). Used to connect a spur cable and SeaTalkng device at the end of a backbone instead of a backbone terminator.

5. Backbone terminator (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.
6. Spur blanking plugs (**A06032**). Used to cover unused spur connections in 5–way blocks, T-piece connectors, or the SeaTalk to SeaTalkng converter.
7. Spur connector right angled elbow (**A06077**). Used in confined spaces where a straight spur cable will not fit.

SeaTalkng® adaptors and adaptor cables

SeaTalkng adaptor cables are used to connect devices designed for different CAN bus backbones (e.g.: SeaTalk or DeviceNet) to the SeaTalkng backbone.



1. 1 m (3.3 ft) SeaTalk (3 pin) to SeaTalkng converter cable (**A22164 / A06073**). Can be used to connect a SeaTalk device to a SeaTalkng backbone via the SeaTalk to SeaTalkng converter, or to connect a SeaTalkng product directly to a SeaTalk network.
2. 0.4 m (1.3 ft) SeaTalk (3 pin) to SeaTalkng adaptor cable (**A06047**). Can be used to connect a SeaTalk device to a SeaTalkng backbone via the SeaTalk to SeaTalkng converter, or to connect a SeaTalkng product directly to a SeaTalk network.
3. 0.4 m (1.3 ft) SeaTalk2 (5 pin) to SeaTalkng adaptor cable (**A06048**). Used to connect SeaTalk2 devices or networks to a SeaTalkng backbone.
4. SeaTalkng to DeviceNet (female) adaptor cables connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalkng backbone, or connects SeaTalkng devices to an NMEA 2000 network. The following cables are available:
   - 0.4 m (1.3 ft) SeaTalkng to DeviceNet (female) adaptor cable (**A06045**).
   - 1 m (3.3 ft) SeaTalkng to DeviceNet (female) adaptor cable (**A06075**).
5. SeaTalkng to DeviceNet (male) adaptor cables. Connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalkng backbone, or connect SeaTalkng devices to an NMEA 2000 network. The following cables are available:
   - 0.1 m (0.33 ft) SeaTalkng to DeviceNet (male) adaptor cable (**A06078**).
   - 0.4 m (1.3 ft) SeaTalkng to DeviceNet (male) adaptor cable (**A06074**).
   - 1 m (3.3 ft) SeaTalkng to DeviceNet (male) adaptor cable (**A06076**).
   - 1.5 m (4.92 ft) SeaTalkng to DeviceNet (male) adaptor cable (**A06046**).
6. 1 m (3.3 ft) NMEA 0183 VHF stripped-end (2 wire) to SeaTalkng adapter cable (**A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalkng backbone via the NMEA 0183 VHF to SeaTalkng converter.
7. SeaTalkng (male) to DeviceNet (female) adaptor (**A06082**).
8. SeaTalkng (female) to DeviceNet (male) adaptor (**A06083**).
9. SeaTalkng (male) to DeviceNet (female) elbow (right angled) adaptor (**A06084**).

10. (0.4 m (1.3 ft) DeviceNet (female) to stripped-end adaptor cable (**E05026**).
11. (0.4 m (1.3 ft) DeviceNet (male) to stripped-end adaptor cable (**E05027**).

Appendix A NMEA 2000 PGN support

The unit supports the following NMEA 2000 PGNs.

PGN	Description	Transmit (Tx)	Receive (Rx)
59904	ISO Request		●
59392	ISO Acknowledgement	●	
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 - Request group function		●
126208	NMEA - Command group function		●
126208	NMEA - Acknowledge group function	●	
126464	Transmission PGN List	●	
126464	Received PGN List	●	
126992	System time	●	
126993	Heartbeat	●	
126996	Product information	●	
126998	Configuration information	●	
127250	Vessel heading	●	
127251	Rate of turn	●	
127257	Attitude	●	
129025	Position, rapid update	●	
129026	COG & SOG rapid update	●	
129027	Position delta high precision	●	
129029	GNSS Position data	●	
129033	Time and date	●	
129044	Datum	●	●
129539	GNSS DOPs	●	
129540	GNSS Satellites in view	●	
129542	GNSS Pseudo range noise statistics	●	
129547	GNSS Pseudo range error statistics	●	

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