# RS150

GNSS Receiver

Software version: **v1.29**

# INSTALLATION INSTRUCTIONS

English (en-US)
Date: 08-2024
Document number: 87271 (Rev 3)


Raymarine®

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# CHAPTER 1: IMPORTANT INFORMATION

## Safety warnings

### 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: 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).

## Product warnings

### Warning: Positive ground systems

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

### 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.

### Warning: Product grounding

Before applying power to this product, it MUST be correctly grounded, in accordance with the instructions provided.

### 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.

# Regulatory notices

## Declaration of conformity

Raymarine UK Ltd declares that the following products are in compliance with the EMC Directive 2014/30/EU:

- RS150 GNSS Receiver part number E70310.

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

## 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.

Third-party hardware, such as converters, adapters, routers, switches, Access Points etc., provided by third parties, may be made available directly to you by other companies or individuals under separate terms and conditions, including separate fees and charges. Raymarine UK Ltd or its affiliates have not tested or screened the third-party hardware.

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- (b) the privacy or other practices of such third-party hardware.

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## 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.

## 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.

For more information, refer to your third-party cable manufacturer.

## Warranty registration

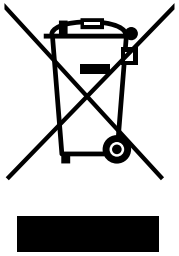
To register your Raymarine product ownership, please visit https://bit.ly/rym-warranty and register online.

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: https://bit.ly/rym-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 (https://bit.ly/raymarine-home) to ensure you have the most up-to-date version(s) of the documentation for your product.

## Publication copyright

# CHAPTER 2: DOCUMENT INFORMATION

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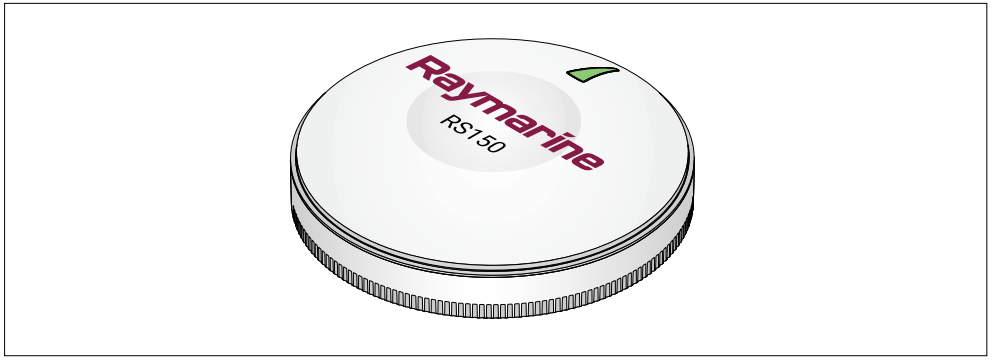
## 2.1 Applicable products

This document is applicable to the RS150 GNSS (GPS) Receiver, part number E70310.




## 2.2 Document information

This document contains important information related to the installation of your Raymarine® product.

The document includes information to help you:

- Plan your installation and ensure you have all the necessary equipment.
- Install and connect your product as part of a wider system of connected marine electronics.
- Troubleshoot problems and obtain technical support if required.

This and other Raymarine® product documents are available to download in PDF format from www.raymarine.com/manuals

## 2.3 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.

## 2.4 Product documentation

The following documentation is applicable to your product:

### Applicable documents

| Document | Description | Link |
|---|---|---|
| **87271** | Installation Instructions (This document) | www.bit.ly/rs150-docs |
| **87272** | Mounting Template | www.bit.ly/rs150-docs |

### Related documents

| Document | Description | Link |
|---|---|---|
| **81406** | LightHouse 4 Advanced Operation Instructions | www.bit.ly/LH4-docs |
| **81370** | LightHouse 3 Advanced Operation Instructions | www.bit.ly/LH3-docs |
| **81300** | SeaTalk NG Reference Manual | www.bit.ly/STNG-docs |

### 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: https://bit.ly/rym-docs

# CHAPTER 3: SOFTWARE DETAILS

CHAPTER CONTENTS

## 3.1 Applicable software version

Product software is updated regularly to add new features and improve existing functionality.

This document has been updated to reflect the following RS150 software version:

| **Applicable software version:** |
| --- |
| v1.29 |

Check the website for the latest software:

| RS150 **software download link** |
| --- |
| https://bit.ly/rs150-download |

## 3.2 New software features and improvements

The following new features have been added to version **v1.29** of the RS150.

**RS150 v1.29 new features:**

- Added support for a new LED indicator 'Switch off' setting which can be toggled via a networked LightHouse 4 multifunction display (running software version v4.6.74 or later). For more information, refer to: **p.50 — Switching off sensor LEDs**
- Added support for a new LED indicator 'Find me' setting which can be toggled via a networked LightHouse 4 multifunction display (running software version v4.6.74 or later). For more information, refer to: **p.50 — Find me**

## 3.3 Software updates

Raymarine regularly issues software updates for its products, which provide new and enhanced features and improved performance and usability. It's important to ensure that you have the latest software for your products by regularly checking the Raymarine website for new software releases.

To check for the latest software updates and the software update procedure for your specific product(s) refer to: https://bit.ly/rym-software

Unless otherwise stated, software updates for Raymarine products are performed using a Raymarine MFD/chartplotter.

- Where applicable, you should always backup your user data and settings before performing a software update.
- To update SeaTalk NG products you must use the datamaster MFD/Chartplotter which is physically connected to the SeaTalk NG backbone.
- Ethernet (RayNet) products can be updated from any MFD/Chartplotter on the same network as the product to be updated.
- In order to perform a software update, any connected Autopilot or Radar must be switched to Standby.
- The MFD's/Chartplotter's "Check online" feature is only available when connected to the Internet.

**Note:**

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

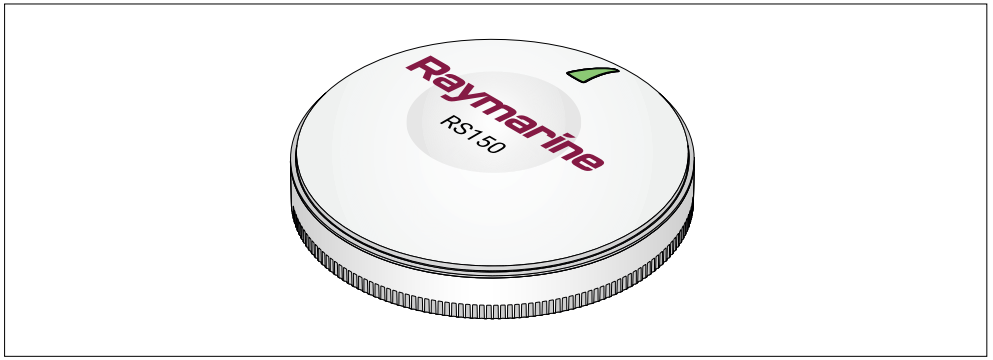
- The software update process is carried out at your own risk. Before initiating the update process ensure you have backed up any important files.
- Ensure that the product(s) has a reliable power supply and that the update process is not interrupted.
- Damage caused by an incomplete update is not covered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

# CHAPTER 4: PRODUCT AND SYSTEM OVERVIEW

## CHAPTER CONTENTS

# 4.1 RS150 product overview

The RS150 is a Global Navigation Satellite Systems (GNSS) Receiver. The RS150 provides position data to devices connected to the SeaTalk NG network.




The **RS150** has the following features:

- Compatible with GPS, GLONASS, and BeiDou GNSS constellations and SBAS.
- Can provide position data to SeaTalk 1 devices when used in conjunction with a SeaTalk 1 to SeaTalk NG Converter.
- Can provide position data to NMEA 2000 devices when used in conjunction with a SeaTalk NG to DeviceNet adaptor cable.
- Pole, Rail, Surface or Bulkhead mountable (mounting kits available).
- 10 Hz refresh rate.
- NMEA 2000 compliant.
- Low power consumption.
- 12 V DC operation (protected up to 32 V DC), via the SeaTalk NG / NMEA 2000 network.
- Waterproof to IPx6, IPx7.

## SeaTalk NG

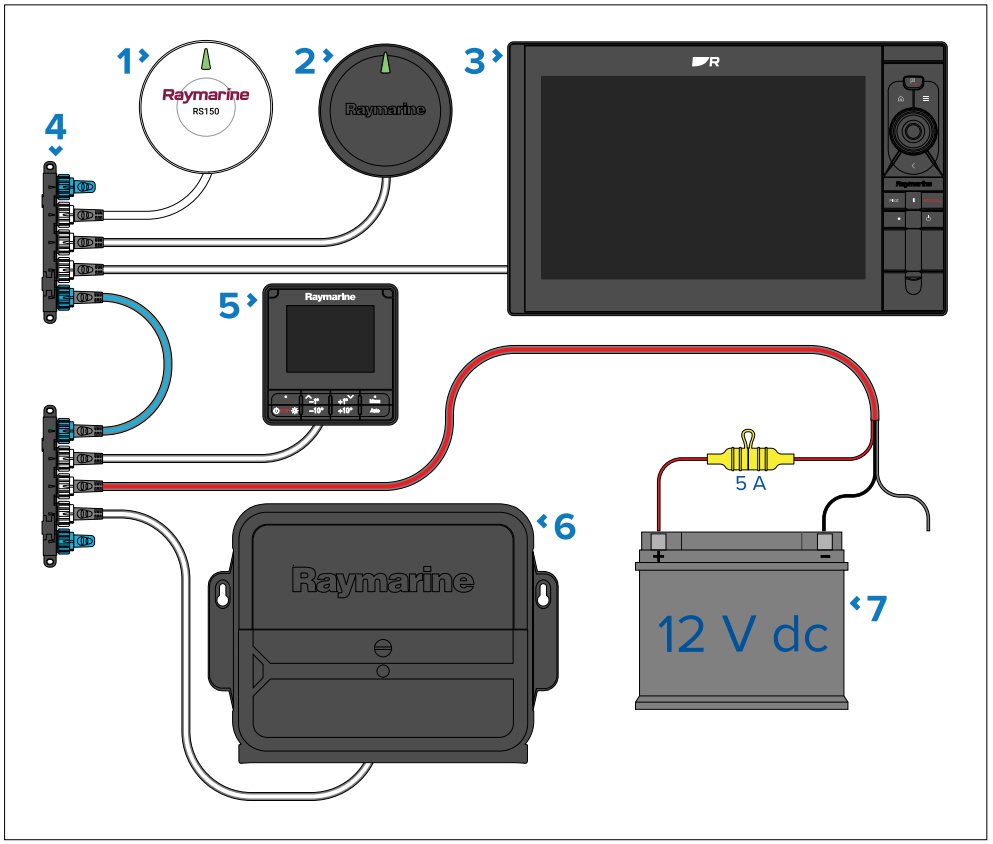
SeaTalk NG (*Next Generation*) is an enhanced protocol for connection of compatible marine instruments and equipment. It replaces the older SeaTalk 1 and SeaTalk 2 protocols.

SeaTalk NG utilizes a single backbone which compatible equipment connects to using a spur. Data and power are carried within the backbone. Devices that have a low power draw can be powered from the network, although high current equipment will need to have a separate power connection.

SeaTalk NG is a proprietary extension to NMEA 2000 and the proven CAN bus technology. Compatible NMEA 2000, SeaTalk 1 and SeaTalk 2 devices can also be connected using the appropriate interfaces or adaptor cables as required.

## 4.2 System example

Below is a typical basic system example showing the required connections to enable the RS150 to transmit position data to devices on your system.




1. RS150.
2. EV-1 sensor.
3. Axiom 2 Pro display.
4. SeaTalk NG network.
5. p70s pilot controller.
6. ACU-Series control unit (e.g.: ACU-200).
7. Power supply providing 12 V dc power to the SeaTalk NG network including powering the RS150.

## 4.3 Required additional components.

The RS150 must be connected to a correctly terminated and powered SeaTalk NG or NMEA 2000 network. Devices connected to the same network may receive data transmitted by the RS150.

# CHAPTER 5: PARTS SUPPLIED

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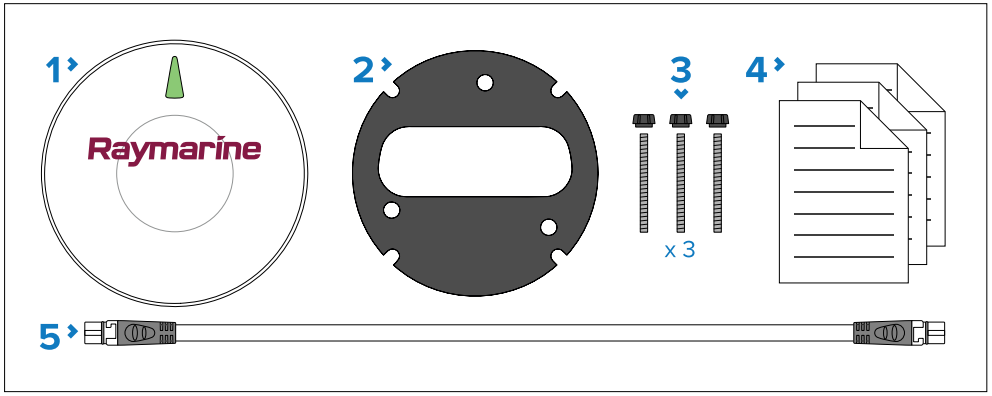
# 5.1 Parts supplied

The following parts are supplied with the unit.




1. Unit.
2. Mounting gasket.
3. 3 x M4x40 Threaded studs and Finger nuts.(used for surface mounting).
4. Documentation.
5. 6 m (19.69 ft) SeaTalk NG (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 6: PRODUCT DIMENSIONS

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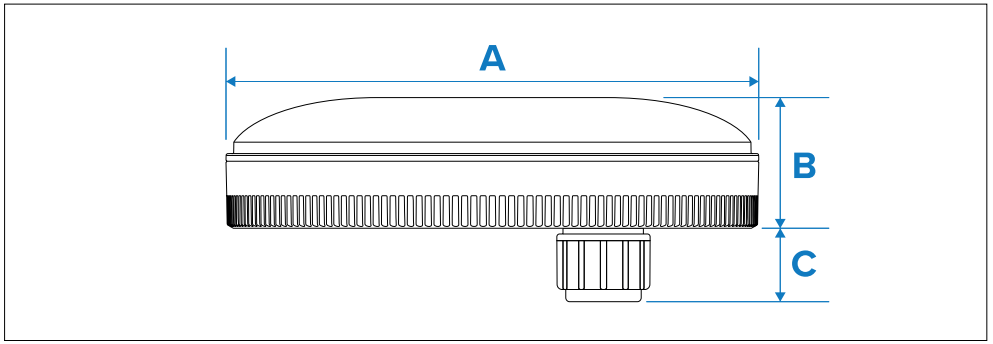
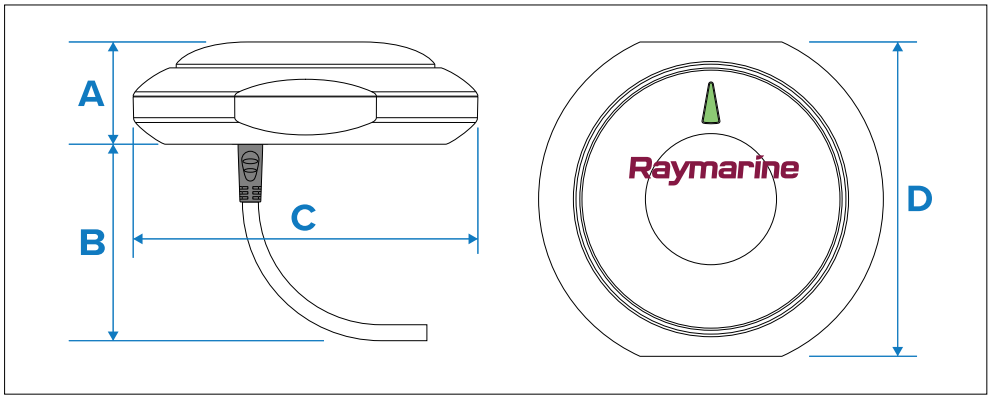
## 6.1 Product dimensions




| | Dimension |
|---|---|
| **A** | 108.48 mm (4.27 in) |
| **B** | 26.61 mm (1.05 in) |
| **C** | 14.96 mm (0.59 in) |

## 6.2 Product dimensions with Mounting tray

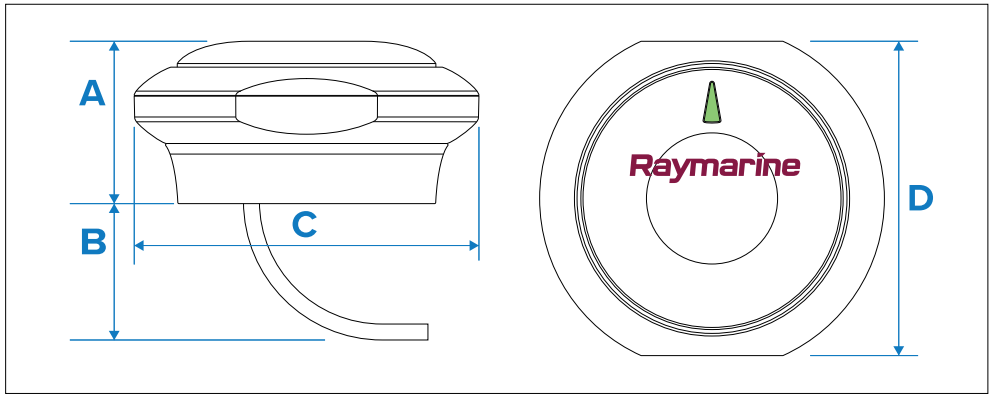
The following dimensions apply when surface mounting using the *Mounting tray*.




| | Dimension |
|---|---|
| **A** | 41.57 mm (1.64 in) |
| **B** | 90.00 mm (3.54 in) |
| **C** | 140.40 mm (5.53 in) |
| **D** | 128.00 mm (5.0 in) |

## 6.3 Product dimensions with Mounting tray and Riser

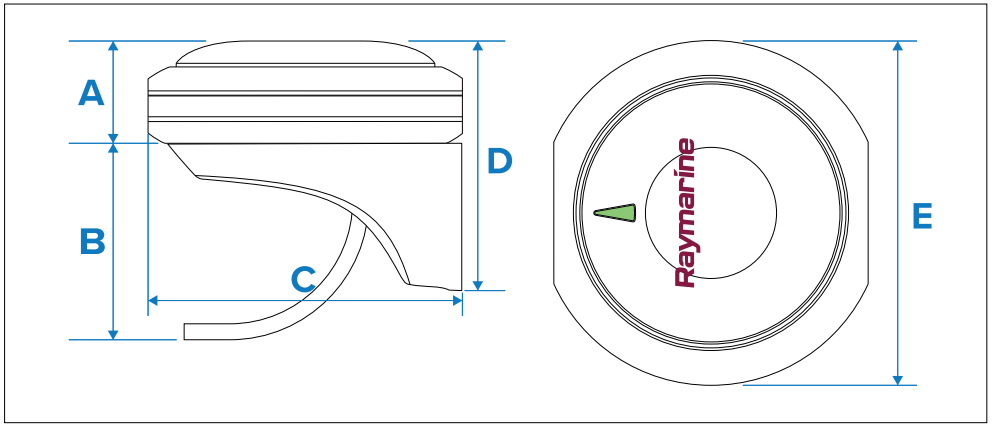
The following dimensions apply when surface mounting using the *Mounting tray* and *Riser* supplied in the *Deck mounting kit*.




| | Dimension |
|---|---|
| **A** | 66.07 mm (2.60 in) |
| **B** | 65.50 mm (2.58 in) |
| **C** | 140.40 mm (5.53 in) |
| **D** | 128.00 mm (5.0 in) |

# 6.4 Product dimensions with Mounting tray and Bulkhead bracket

The following dimensions apply when bulkhead mounting using the *Mounting tray* and the *Bulkhead bracket*.




| | Dimension |
|---|---|
| **A** | 41.57 mm (1.64 in) |
| **B** | 90.00 mm (3.54 in) |
| **C** | 128.00 mm (5.0 in) |
| **D** | 101.57 mm (4.00 in |
| **E** | 140.40 mm (5.53 in) |

# CHAPTER 7: LOCATION REQUIREMENTS

## CHAPTER CONTENTS

## 7.1 Warnings and cautions

**Important:**

Before proceeding, ensure that you have read and understood the warnings and cautions provided in the following section of this document:
**p.8 — Important information**

### Warning: Potential ignition source

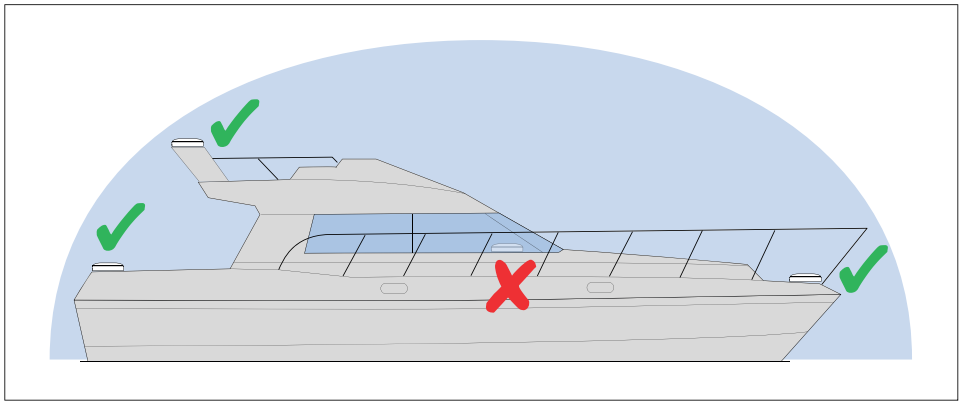
This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

## 7.2 Location requirements

The installation location must take into account the following requirements:

When planning the installation location, consider the following:

- 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 unit can be mounted on a vertical surface such as a bulkhead or mast etc, using the Bulkhead bracket supplied in the *Deck mounting kit*, part number: A80437.
- Do NOT mount on top of a mast.
- The unit location must be at least 1 m (3 ft.) away from sources that can cause interference, such as compasses, electrical cables, motors, generators, VHF radio units and other transmitters / receivers.
- Ensure the unit is NOT mounted in the path of the beam emitted from Radar scanners.
- 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.

**Note:**

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

## 7.3 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.

## 7.4 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 must aim to maintain a distance of at least 1 m (3.3 ft) in all directions from any compasses.

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 on state.

## 7.5 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 (3.28 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 (6.56 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.

### 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.

For more information, refer to your third-party cable manufacturer.

# CHAPTER 8: INSTALLATION

## CHAPTER CONTENTS

# 8.1 Installation checklist

Installation includes the following activities:

**Installation Task**

1. Plan your system.
2. Obtain all required equipment and tools.
3. Site all equipment.
4. Route all cables.
5. Drill cable and mounting holes.
6. Make all connections into equipment.
7. Secure all equipment in place.
8. Power on and test the system.

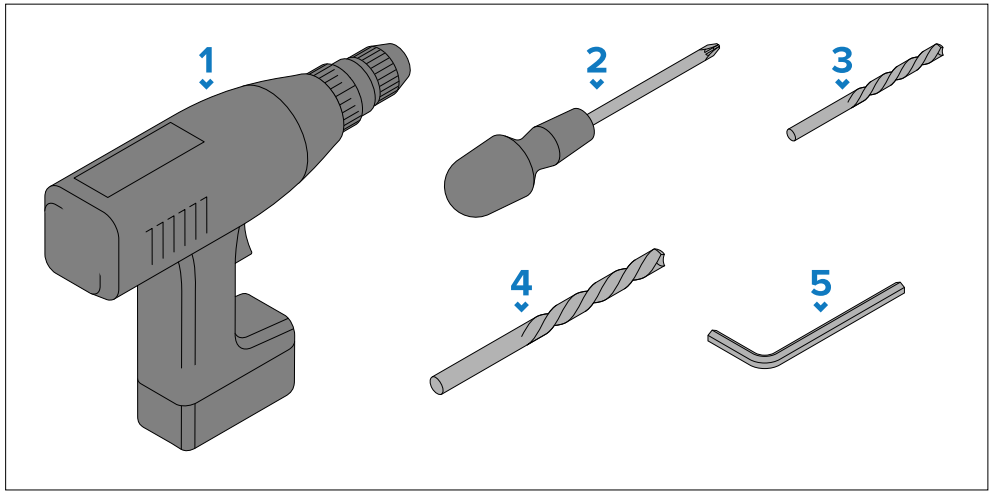
## Schematic diagram

A schematic diagram is an essential part of planning any installation. It is also useful for any future additions or maintenance of the system. The diagram should include:

- Location of all components.
- Connectors, cable types, routes and lengths.

# 8.2 Tools required for installation

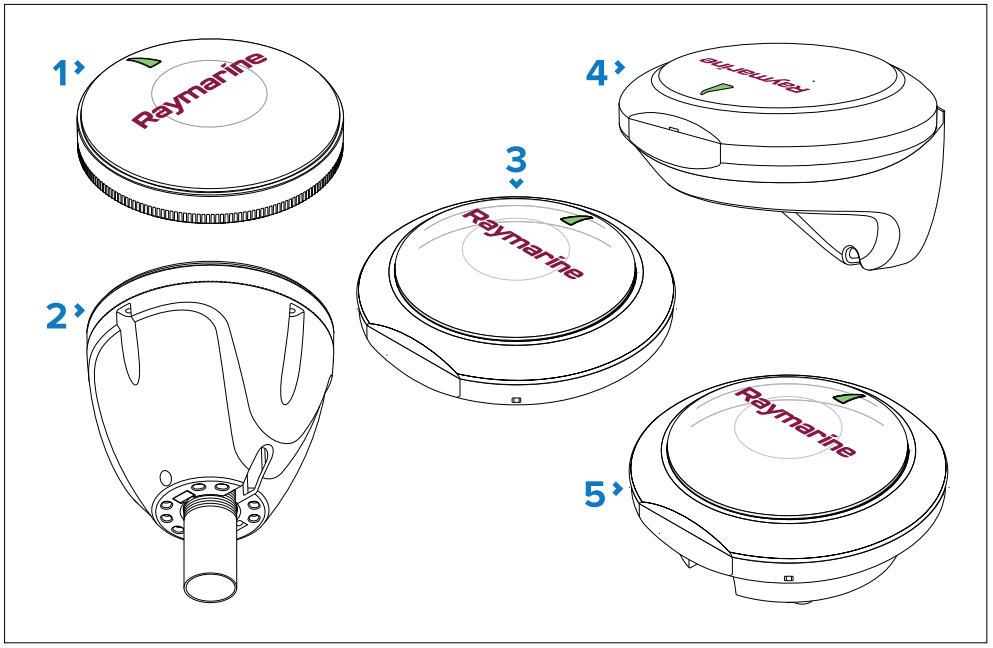
The following tools are required for installation:




| | Description |
|---|---|
| **1** | Power drill. |
| **2** | Pozi-drive screwdriver (Only required when using mounting kits). |
| **3** | • 4 mm ($^{11}/_{64}$) drill bit (for surface mounting using the fixing studs), or<br>• Suitable size drill bit (for Mounting tray and Bulkhead bracket mounting).<br><br>**Note:** Drill bit size is dependent on the type of material the unit is to be mounted on. |
| **4** | • 22 mm drill bit (for connector/cable hole when surface mounting), or<br>• 12 mm ($^{15}/_{32}$”) drill bit (for cable hole when using the Mounting tray, if required). |
| **5** | Size 4 (2.5 mm) Hex Key (only required for Pole mount installations). |

## 8.3 Mounting options

Several mounting options are available.

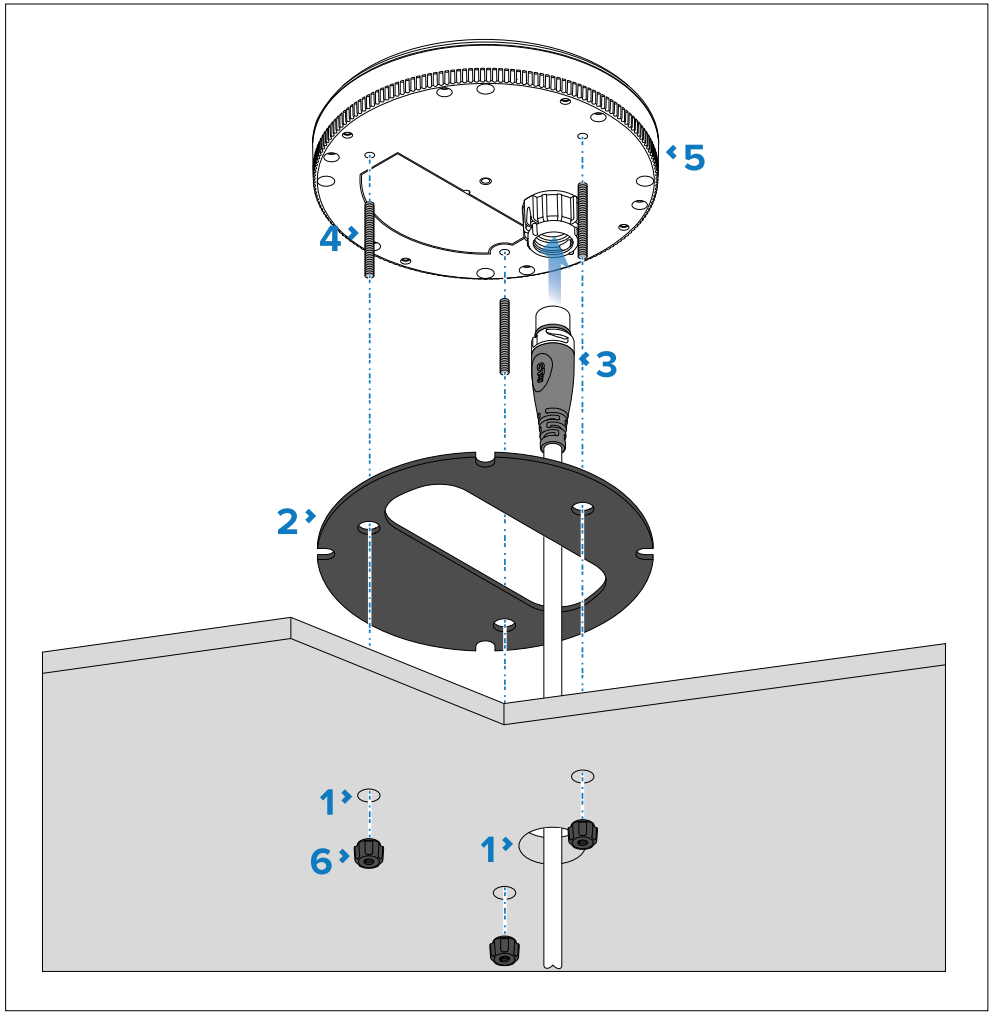



1. Surface mounting using the supplied Studs and Finger nuts. Refer to: **p.29 — Surface mounting using the studs and finger nuts**
2. Pole/rail mounting using the *Pole/rail mounting adaptor kit* (part number: A80370). Refer to: **p.30 — Pole or rail mounting**
3. Surface mounting using the *Mounting tray* supplied in the *Deck mounting (Clamshell/Riser) kit* (part number: A80437). Refer to: **p.32 — Surface mounting using the Mounting tray**
4. Bulkhead mounting using the *Mounting tray* and *Bulkhead bracket* supplied in the *Deck mounting (Clamshell/Riser) kit* (part number: A80437). Refer to: **p.31 — Bulkhead mounting**
5. Surface mounting using the *Riser* and *Mounting tray* supplied in the *Deck mounting (Clamshell/Riser) kit* (part number: A80437). Refer to: **p.33 — Surface mounting using the Riser**

## 8.4 Surface mounting using the studs and finger nuts

The unit can be mounted on a surface that is up to approximately 28 mm (1 10 in) thick, using the fixings supplied with the unit. To mount on a thicker surface, longer studs will be required.

Ensure that the chosen location meets the product's location requirements; refer to: Chapter 7 Location requirements



1. Using the supplied mounting template (Document number: 87272), drill the 3 holes for the fixings and the hole for the connector / cable.
2. Place the waterproof gasket into position on the underside of the unit.
3. Feed the SeaTalk NG cable up through the hole in the mounting surface. Connect the cable to the connector on the underside of the product and secure by rotating the locking collar clockwise 2 clicks. Connect the other end of the cable to an available SeaTalk NG spur connection.
4. Screw the threaded studs into the underside of the unit (these should be hand-tight only).
5. Position the unit so that the mounting studs pass through the holes in the mounting surface.
6. Secure the unit to the mounting surface using the Finger nuts (these should be hand-tight only).

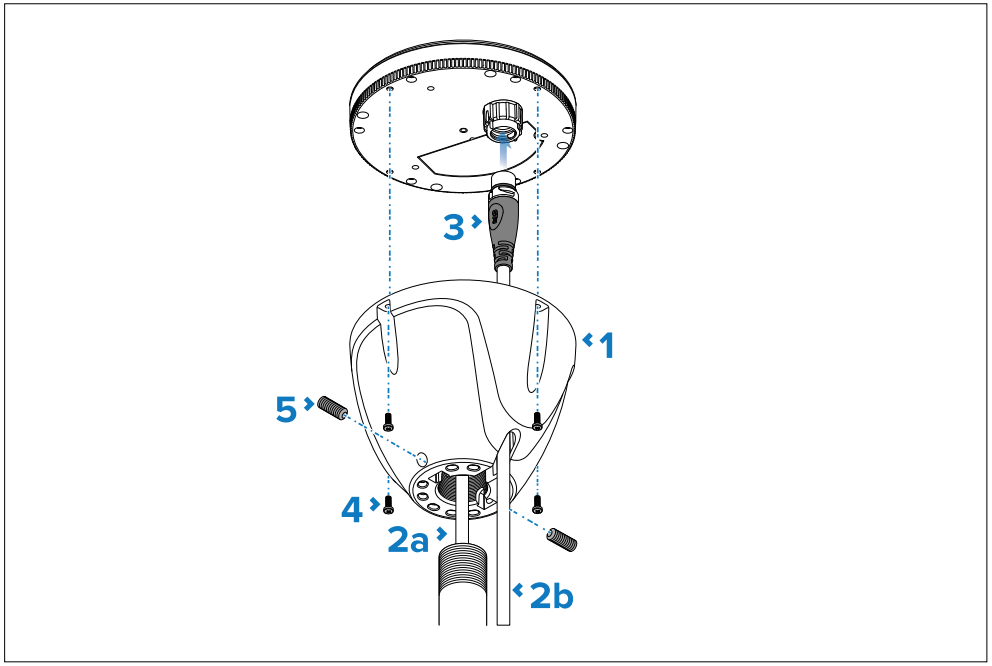
## 8.5 Pole or rail mounting

The *Pole mount kit* (part number: A80370) can be used to mount your product on a pole or rail.

**Note:**

A pole or rail mount with a 1 inch 14 TPI thread is required.

Ensure that the chosen location meets the product's location requirements, for details refer to: **p.23 — Location requirements**




1. Screw the Pole mount adaptor on to the pole.
2. Feed the SeaTalk NG cable through either:
   - a) the center of the pole and Pole mount adaptor, or:
   - b) the cable exit hole in the Pole mount adaptor.
3. Connect the cable to the connector on the underside of the product, and secure using the locking collar. Connect the other end of the cable to an available SeaTalk NG spur connection.
4. Ensuring correct orientation, secure the product to the Pole mount adaptor using the supplied fixings.
5. Fix the products's orientation by tightening the grub screws.

   *The grub screws and their captive nuts are supplied fitted to the adaptor.*

# 8.6 Bulkhead mounting

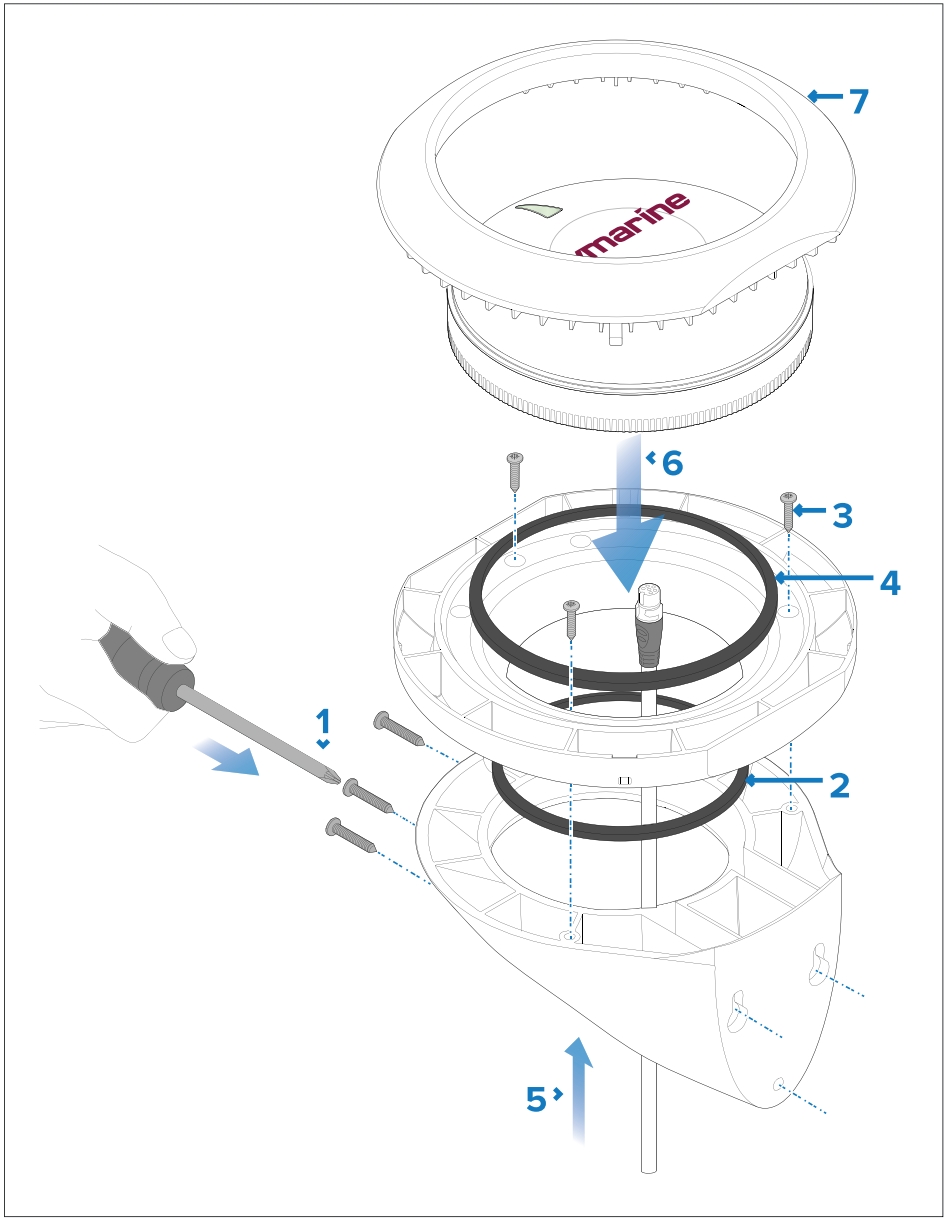
The *Mounting tray* pieces and *Bulkhead bracket* supplied in the *Deck mounting (Clamshell/Riser) kit* (part number: A80437) can be used to mount your product horizontally on a vertical bulkhead.

Ensure that the chosen location meets the product's location requirements; refer to: **p.24 — Location requirements**

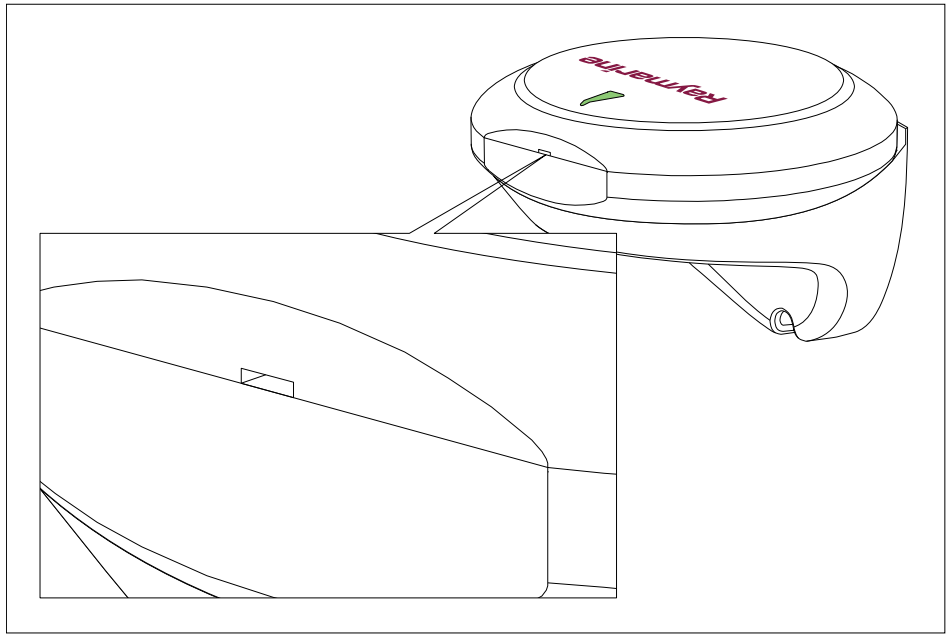
1. Use the supplied Bracket mounting template (Document number: 87170) to drill 3 pilot holes in the vertical mounting surface. Secure the mounting bracket to the surface using the supplied screws.
2. Place the small sealing ring in the groove located on the bottom of the Mounting tray.
3. Secure the tray to the bracket using 3 of the 4 supplied small screws, in the positions indicated in the illustration below.
4. Place the large sealing ring into the groove on the upper side of the Mounting tray.
5. Pull the SeaTalk NG cable up 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 that the tabs in the Mounting tray are slotted into the grooves around the edge of the unit.

**Important:**

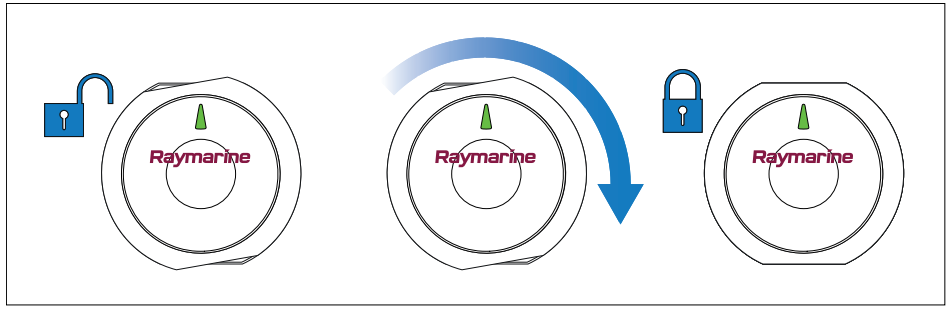
Unit orientation is not important, but aesthetically the unit may look better with the LED 'arrow' pointing towards the vessel's bow.



7. Orientate the Mounting tray top so that the release hole is pointing forwards, so that it 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.

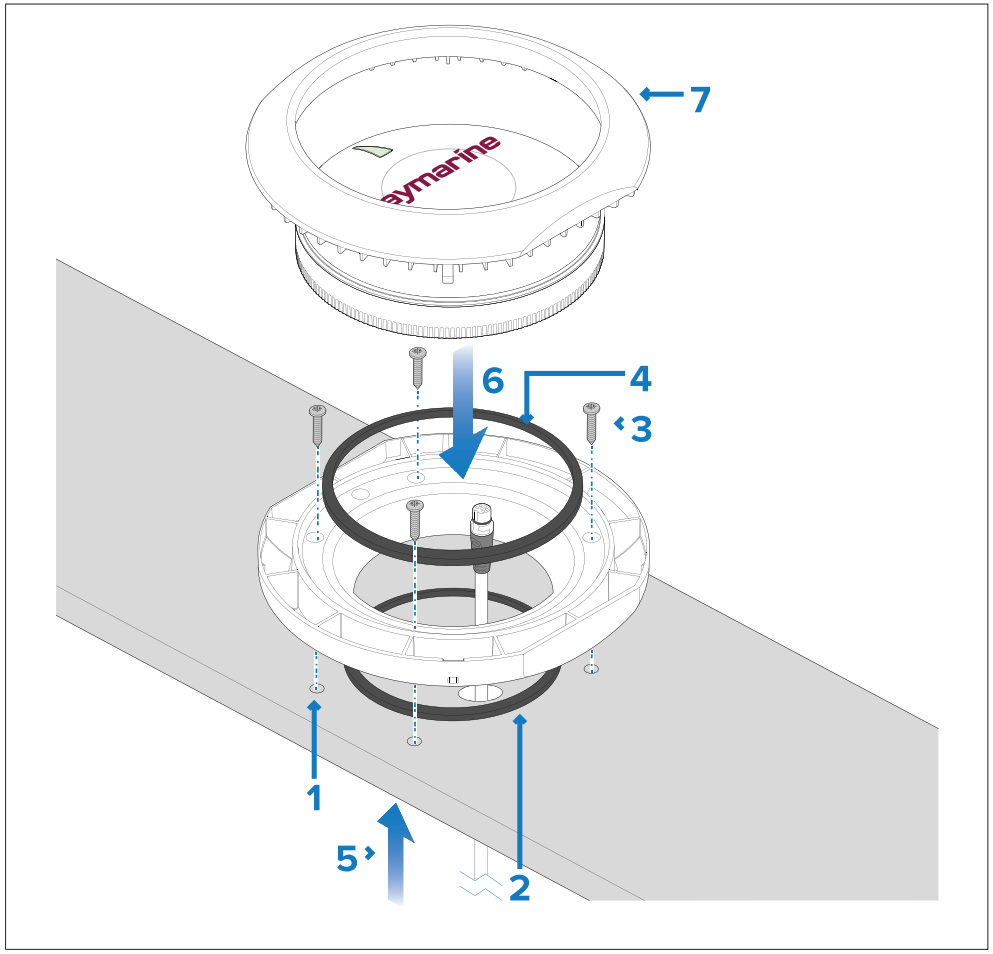



## 8.7 Surface mounting using the Mounting tray

The *Mounting tray* pieces supplied in the *Deck mounting (Clamshell/Riser) kit* (part number: A80437) can be used to mount your product on a horizontal surface.

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

Ensure that the chosen location meets the product's location requirements, for details refer to: 7.2 Location requirements



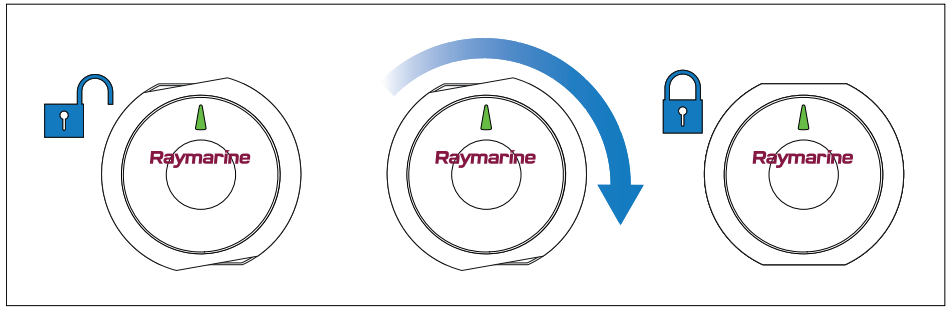

1. Using the Mounting tray template (87170), drill 4 holes in the mounting surface, plus a 12 mm ($^{15}/_{32}$") hole for the SeaTalk NG cable.

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 SeaTalk NG cable up through the hole in the mounting surface 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 tray are slotted into the grooves around the edge of the unit.

**Important:**

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

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

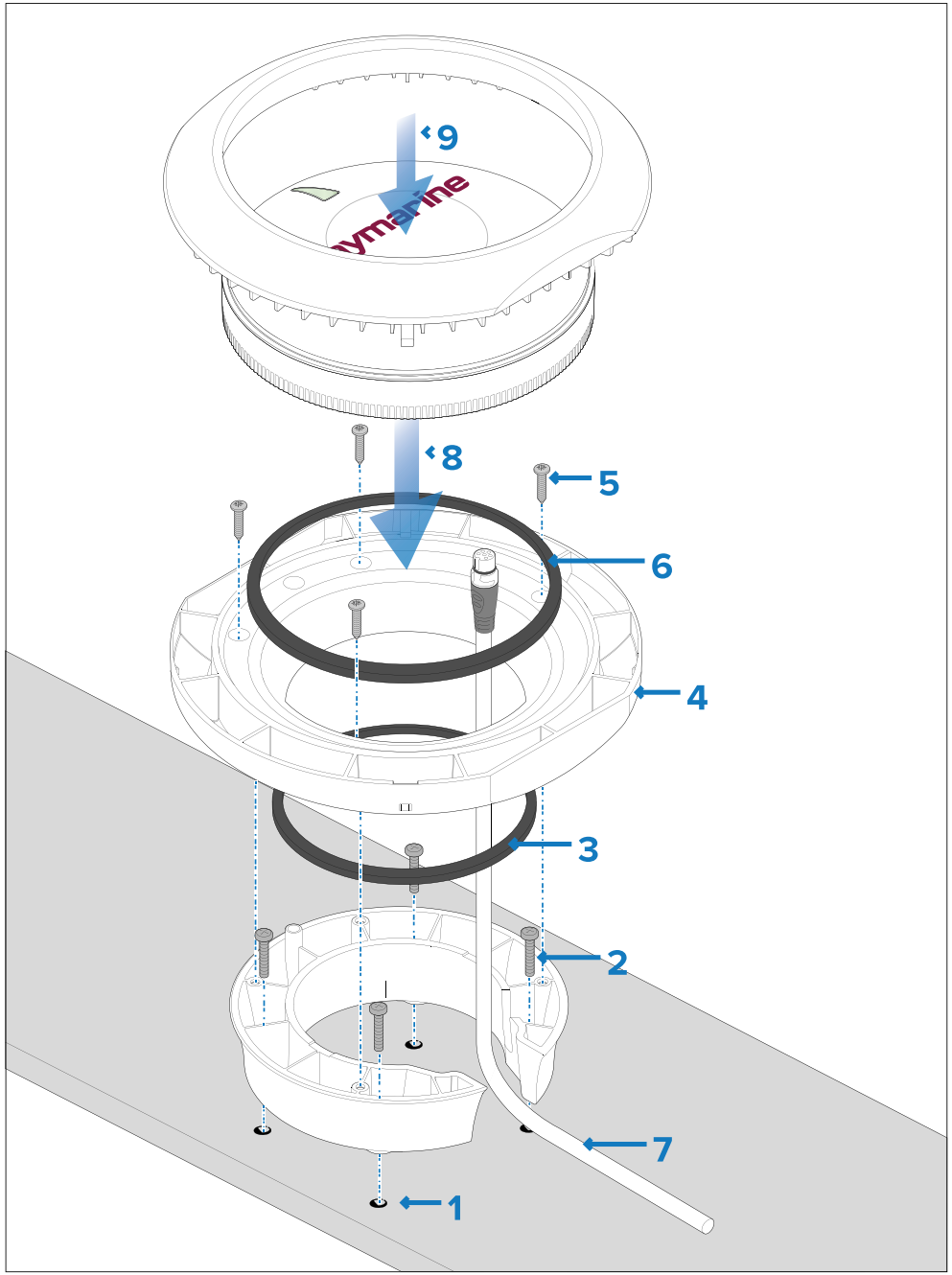



## 8.8 Surface mounting using the Riser

The *Mounting tray* pieces and the *Riser* supplied in the *Deck mounting (Clamshell/Riser) kit* (part number: A80437) can be used to raise the product from the mounting surface.

The bulkhead bracket cannot be used with the Riser.

Ensure that the chosen location meets the product's location requirements, for details refer to: 7.2 Location requirements

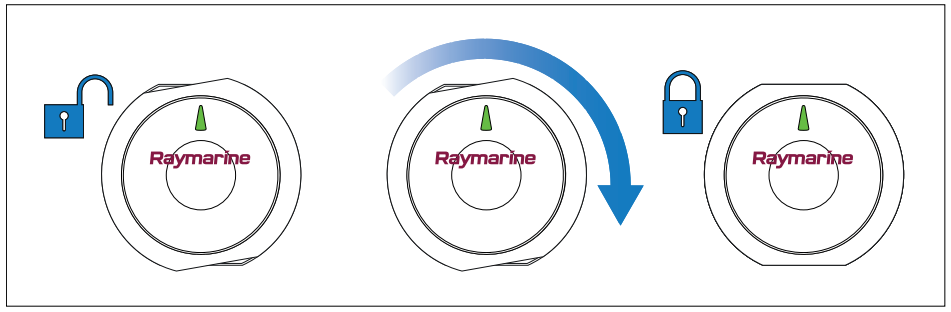


1. Use the mounting template supplied with the *Deck mounting kit* to drill 4 holes in the mounting surface.
2. Secure the Riser to the mounting surface using 4 x supplied fixings.
3. Place the small sealing ring in the groove located on the bottom of the mounting tray.
4. Position the Mounting tray on top of the Riser.
5. Secure the Mounting tray to the Riser using 4 x supplied fixings.
6. Place the large sealing ring into the groove on the upper side of the Mounting tray.
7. Pull the SeaTalk NG cable up 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.
8. 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, but aesthetically the unit may look better with the LED 'arrow' pointing towards the vessel's bow.

9. Place the Mounting tray top over the unit slightly offset, and then twist the Mounting tray top clockwise until it locks into position.

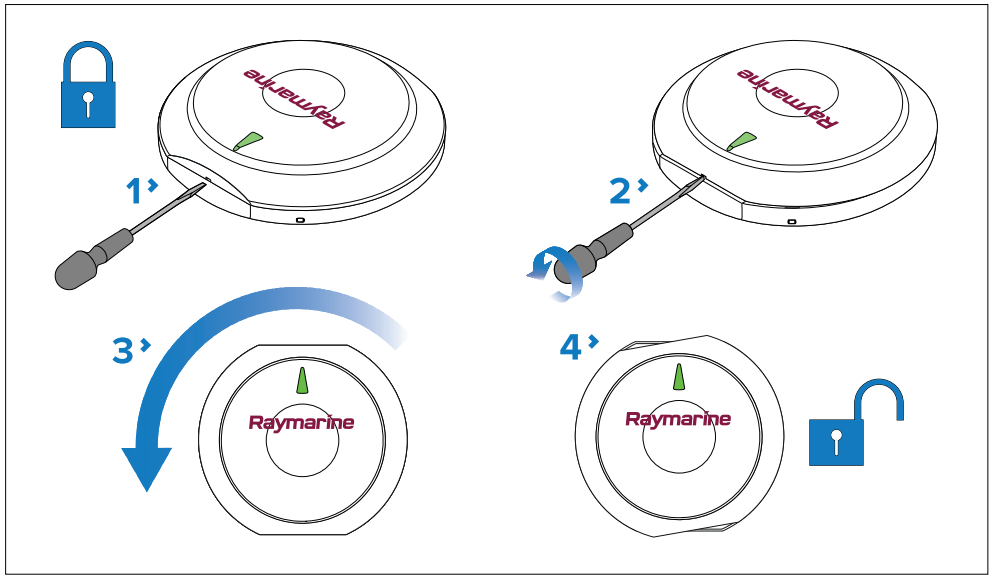



## 8.9 Releasing the product from the mounting tray

Follow the steps below to release the product from the mounting tray.

**Important:**

To help prevent scratching the product, cover the tip of your screwdriver with a small piece of insulation tape.




1. Insert the end of a small flat blade screwdriver (or similar tool) into the release hole located on the flat edge of the mounting tray.
2. Twist the screwdriver 90°, so that there is a small gap between the top and bottom pieces of the mounting tray.
3. With the screwdriver in place, twist the mounting trim counter-clockwise approximately 10°.
4. You should now be able to lift the top away from the product.

# CHAPTER 9: CABLES AND CONNECTIONS — GENERAL INFORMATION

## CHAPTER CONTENTS

# 9.1 General cabling guidance

## Cable types and length

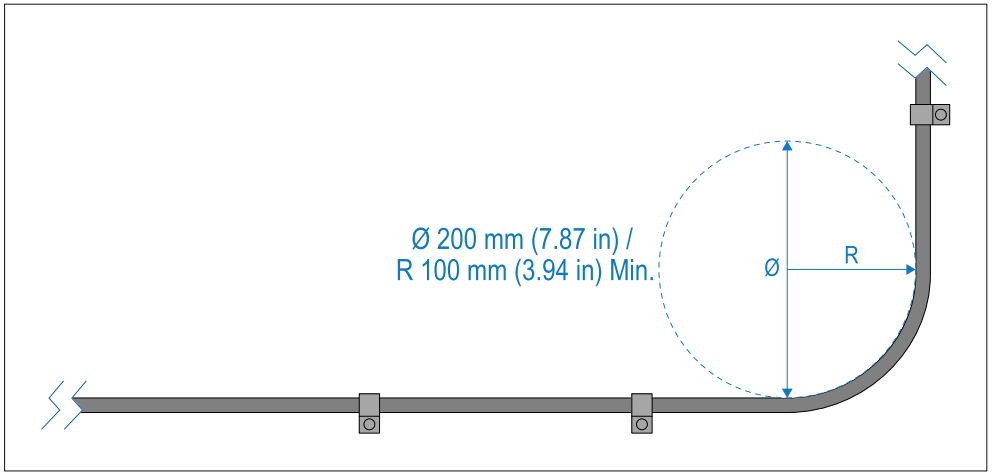
It is important to use cables of the appropriate type and length.

- 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 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.

## 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 shielding

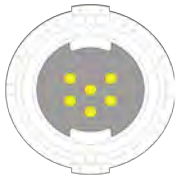
Ensure that cable shielding is not damaged during installation and that all cables are properly shielded.

**Important:**

Be aware that some **third-party** cables and adaptors (for example, certain Ethernet cables using RJ45 connectors) are not always shielded. To prevent breaks in cable shielding continuity and potential grounding issues, special attention is required to ensure that any cables, extension cables, adaptors, or other signal-coupling devices (such as multi-way connectors, junction boxes, terminal blocks etc.) used in cable runs **maintain all shield connections throughout the cable run**.

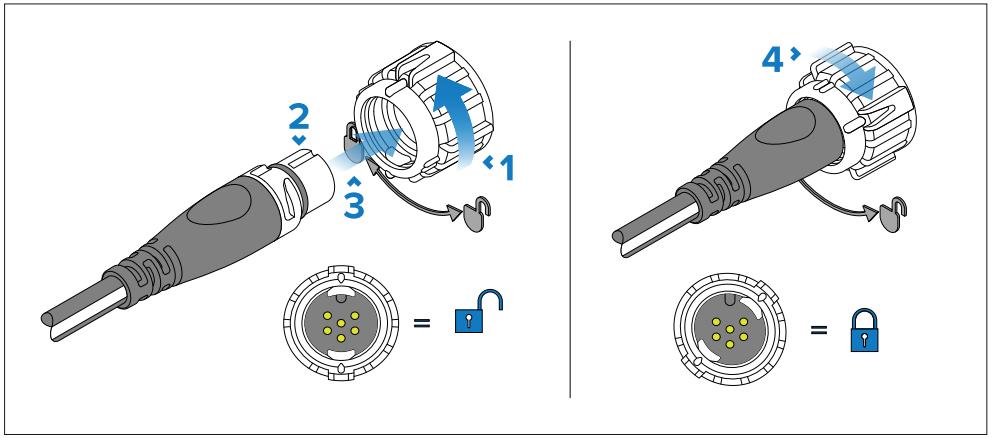
# 9.2 Connections overview

Your product is supplied power and data using the SeaTalk NG connector located on the underside of the unit.

| Connector | Connection options |
|---|---|
|  | • SeaTalk NG backbone using a SeaTalk NG spur cable.<br>• NMEA 2000 backbone using SeaTalk NG to DeviceNet adaptor cable (A06045)<br>• SeaTalk 1 backbone using a SeaTalk 1 to SeaTalk NG adaptor cable (A06073) |

For a list of available cables, refer to: **p.59 — Spares and accessories**

## Connecting SeaTalk NG cables




1. Rotate your product's SeaTalk NG 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.

## SeaTalk NG product loading

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

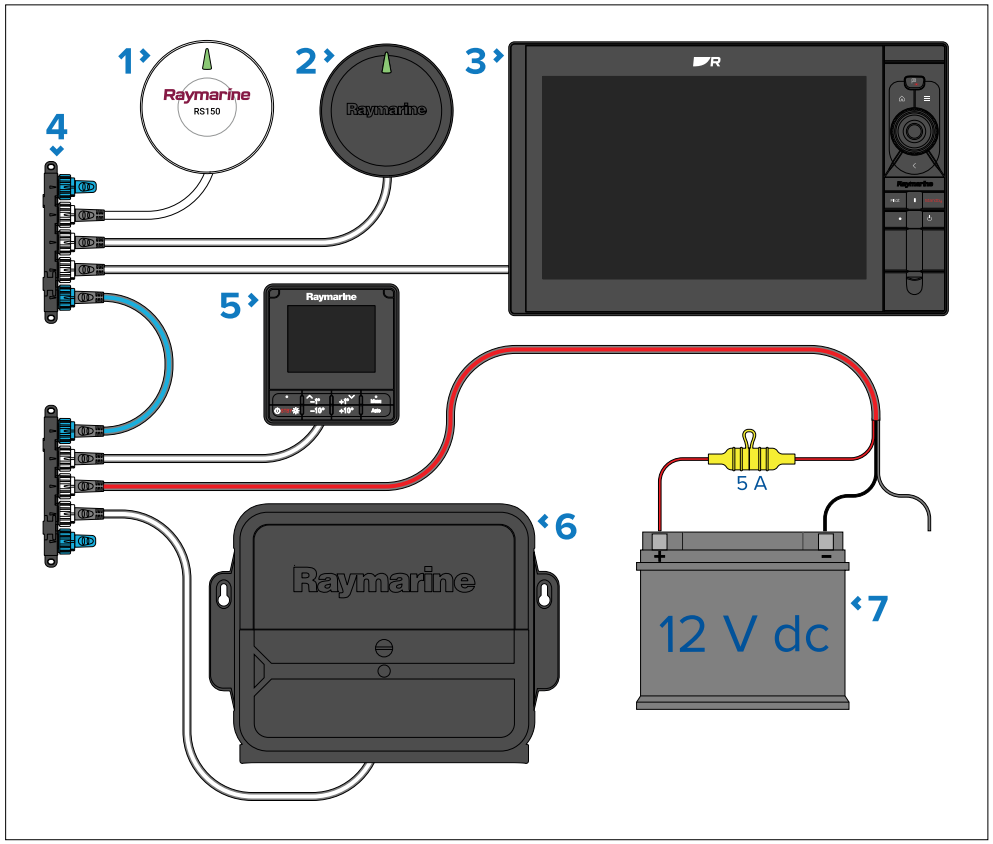
NMEA 2000 Load Equivalency Numbers (LEN) are used to express the amount of current that is drawn from SeaTalk NG products (**1 LEN = 50 mA**). The LEN for each product can be found in the product's *Technical Specification*.

Products which have a dedicated power supply connection that are connected to the SeaTalk NG backbone will still have an LEN rating. This is because the product's NMEA 2000/SeaTalk NG internal transceiver will still be powered by the SeaTalk NG backbone.

LENs are used to determine the power connection point for the SeaTalk NG backbone.

# 9.3 System example

Below is a typical basic system example showing the required connections to enable the RS150 to transmit position data to devices on your system.




1. RS150.
2. EV-1 sensor.
3. Axiom 2 Pro display.
4. SeaTalk NG network.
5. p70s pilot controller.
6. ACU-Series control unit (e.g.: ACU-200).
7. Power supply providing 12 V dc power to the SeaTalk NG network including powering the RS150.

# CHAPTER 10: POWER CONNECTIONS

## CHAPTER CONTENTS

# 10.1 SeaTalk NG power supply

Your product is supplied power via the SeaTalk NG backbone (or the NMEA 2000 backbone if applicable).

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

- (1) Direct connection to a 12 V dc battery using an inline 5 amp fuse.
- Connection to a 12 V dc distribution panel using a 3 amp thermal breaker.
- (2) Connection to the SeaTalk NG connector of an ACU-Series Autopilot Control Unit (not ACU-100 or ACU-150), or an SPX-Series course computer (not SPX-5).
- For 24 V vessels, connection must be 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 SeaTalk NG backbone, as this can cause sudden voltage drops when the engines are started.
- (2) The ACU-100, ACU-150 or SPX-5 cannot be used to power the SeaTalk NG backbone.
- The course computer SeaTalk NG connector includes a power switch that must be in the On position to provide power to the backbone.

### Warning: 12 Volt dc only

This product must ONLY be connected to a 12 V dc power source.

## Inline fuse and thermal breaker ratings

The SeaTalk NG network's power supply requires a suitably-rated inline fuse or thermal breaker to be fitted.

| Inline fuse rating | Thermal breaker rating |
|---|---|
| 5A | 3A (refer to note below) |

**Note:**

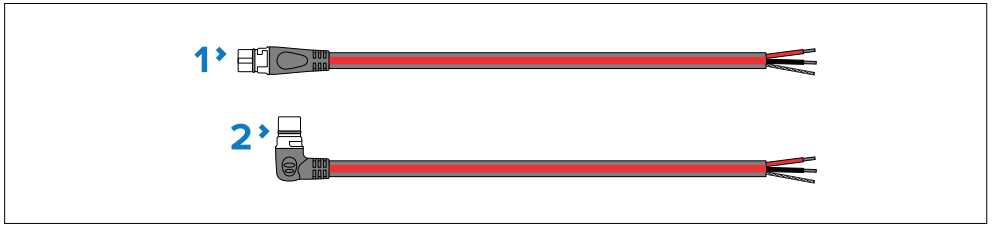
The suitable fuse rating for the thermal breaker is dependent on:

1. How many devices you have connected to your SeaTalk NG network, and;
2. How many devices are sharing the same thermal breaker that your SeaTalk NG network is connected to.

# 10.2 SeaTalk NG power cables

The following SeaTalk NG power cables can be used to connect the backbone to your chosen **12 V dc** power supply:

## Direct connection cables




1. Standard (straight) SeaTalk NG power cable, 2 m (6.6 ft) (part number: **A06049**).
2. Elbow (right-angled) SeaTalk NG power cable, 2 m (6.6 ft) (part number: **A06070**).

### Wiring

- **+ Red (positive) wire** — connects to the battery or distribution panel positive terminal. A waterproof fuse holder with 5 A inline fuse (not supplied) must be fitted to this red wire.
- **– Black (negative) wire** — connects to battery or distribution panel negative terminal.
- **Drain wire** — connects to the vessel's RF common ground point (if available), or the battery's negative (-) terminal.

### Autopilot Control Unit connection cable


1. ACU-Series/SPX-Series autopilot to SeaTalk NG spur cable, 0.3 m (1.0 ft) (part number **R12112**). Connects the course computer to the SeaTalk NG backbone. This connection can also be used to provide 12 V dc power to the SeaTalk NG backbone.

## 10.3 SeaTalk NG product loading

The number of products that can be connected to a SeaTalk NG 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 SeaTalk NG products (**1 LEN = 50 mA**). The LEN for each product can be found in the product's *Technical Specification*.

Products which have a dedicated power supply connection that are connected to the SeaTalk NG backbone will still have an LEN rating. This is because the product's NMEA 2000/SeaTalk NG internal transceiver will still be powered by the SeaTalk NG backbone.

LENs are used to determine the power connection point for the SeaTalk NG backbone.

## 10.4 SeaTalk NG power connection point

The point along the backbone where the power connection should be made is based on the length of the backbone.

**Note:**

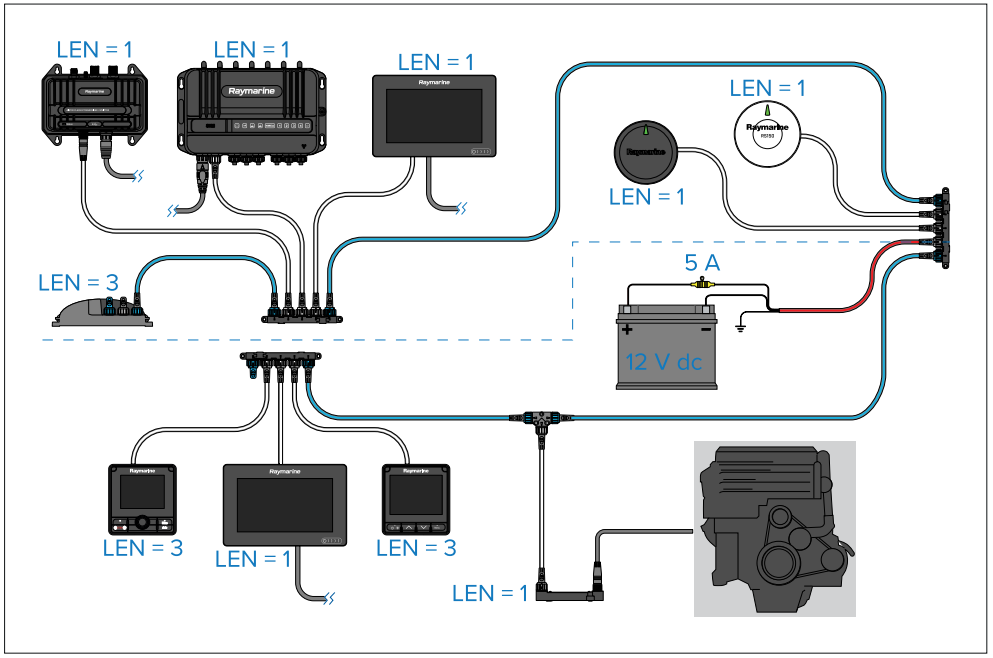
- A 12 V dc power supply must be connected to a *white* spur SeaTalk NG connection on the backbone.
- Do NOT connect the power connection to a *blue* SeaTalk NG backbone connector.
- **With the exception of** the iTC-5 and the backbone itself, do NOT connect the power supply directly to a product's *white* SeaTalk NG spur connector.

### Small systems

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

### Large systems

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




In the example above, the system has an overall LEN of 16, so the optimum connection point would be to have a loading of 8 LEN either side of the connection point.

## 10.5 SeaTalk NG system loading

The maximum loading (LEN) for a SeaTalk NG 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

## 10.6 Power distribution — SeaTalk NG

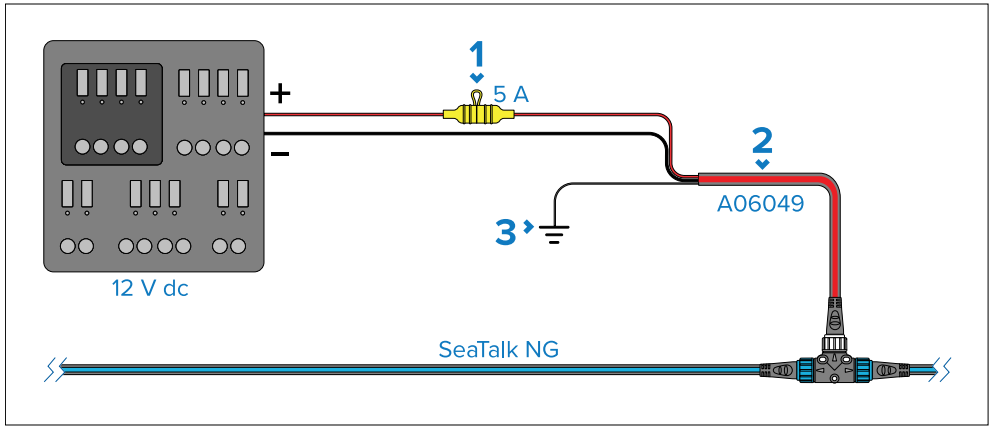
Recommendations and best practice.

- Only use approved SeaTalk NG 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:**

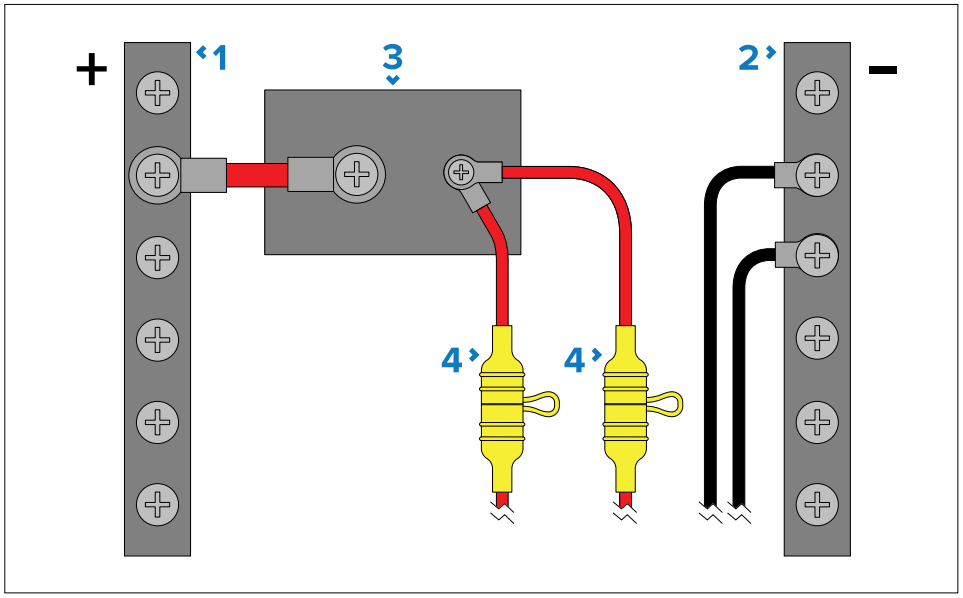
- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for 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.

### Implementation — connection to distribution panel (recommended)



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

- Ideally, the SeaTalk NG 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 SeaTalk NG power cable.
- The distribution point should be fed from the vessel's primary power source by 8 AWG (8.36 mm²) 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 one item of equipment shares a breaker, use individual in-line fuses for each power circuit to provide the necessary protection.



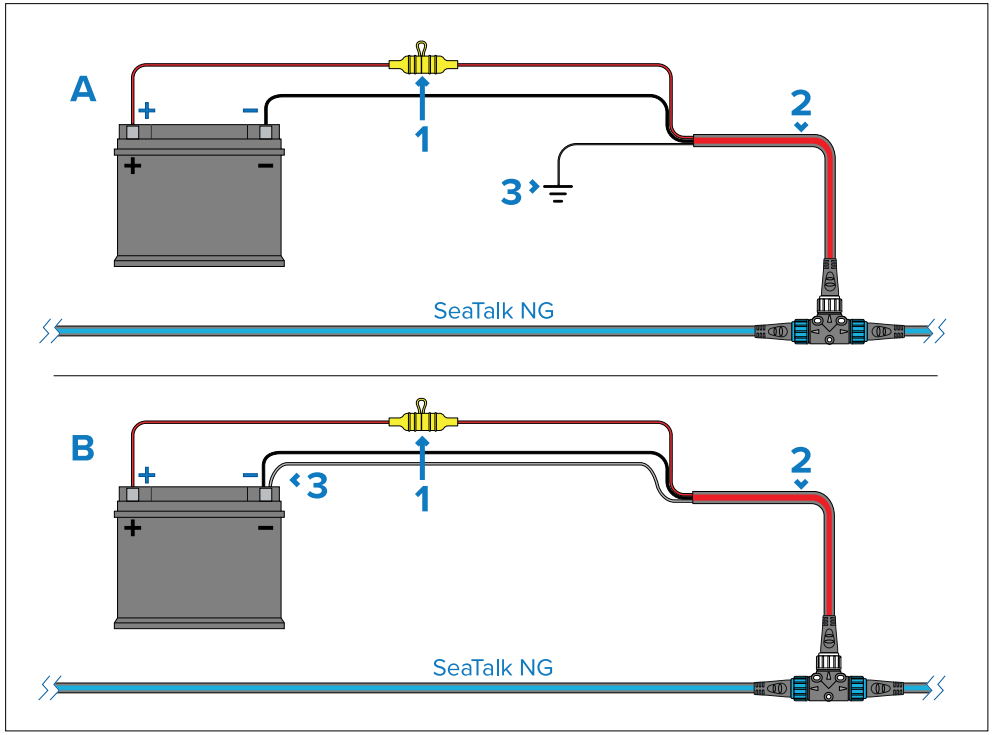

1. Positive (+) bar
2. Negative (-) bar
3. Circuit breaker
4. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).

**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

- 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 5 A inline fuse between the red wire and the battery's positive terminal.
- 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 SeaTalk NG backbone's power connection.




1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
2. SeaTalk NG power cable.

3. Connection point for drain wire.

**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.

### SeaTalk NG Power cable extension

If you need to extend the length of the SeaTalk NG power cable, ensure you use suitably-rated cable, and that sufficient power is available at the SeaTalk NG 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 m (49.2 ft), you may need to consider a thicker wire gauge (e.g. 14 AWG (2.08 $mm^2$), or 12 AWG (3.31 $mm^2$).
- To ensure power cables (including any extension) are of a sufficient gauge, ensure that there is a continuous **minimum** voltage of **10.8 V dc** at the end of the cable where it enters the product's power connector, even with a fully flat battery at 11 V dc. (Do not assume that a flat battery is at 0 V dc. Due to the discharge profile and internal chemistry of batteries, the current drops much faster than the voltage. A "fully flat" battery still shows a positive voltage, even if it doesn't have enough current to power your device.)

**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
- ISO 13297: Small craft — Electrical systems — Alternating and direct current installations
- ISO 10133: Small craft — Electrical systems — Extra-low-voltage d.c. installations
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

**Warning: Product grounding**

Before applying power to this product, it MUST be correctly grounded, in accordance with the instructions provided.

**Warning: Positive ground systems**

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

## 10.7 Power connection via Autopilot Control Unit (ACU-Series)

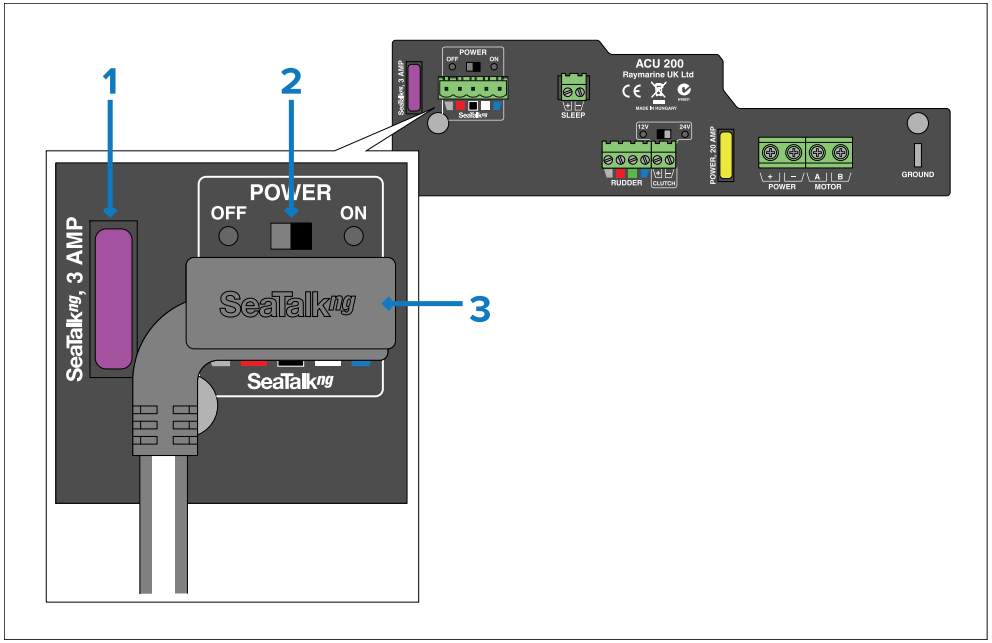
The SeaTalk NG backbone can be supplied 12 V dc power from a compatible Raymarine Autopilot Control Unit (ACU-Series).

**Important:**

The SeaTalk NG backbone must have a single power supply connection. If your SeaTalk NG backbone is supplied power directly from a battery or distribution panel, then you must ensure that the SeaTalk NG power switch on your ACU-Series is switched Off.

**Note:**

ACU-100, ACU-150 and SPX-5 autopilot control units cannot supply power to the SeaTalk NG backbone.



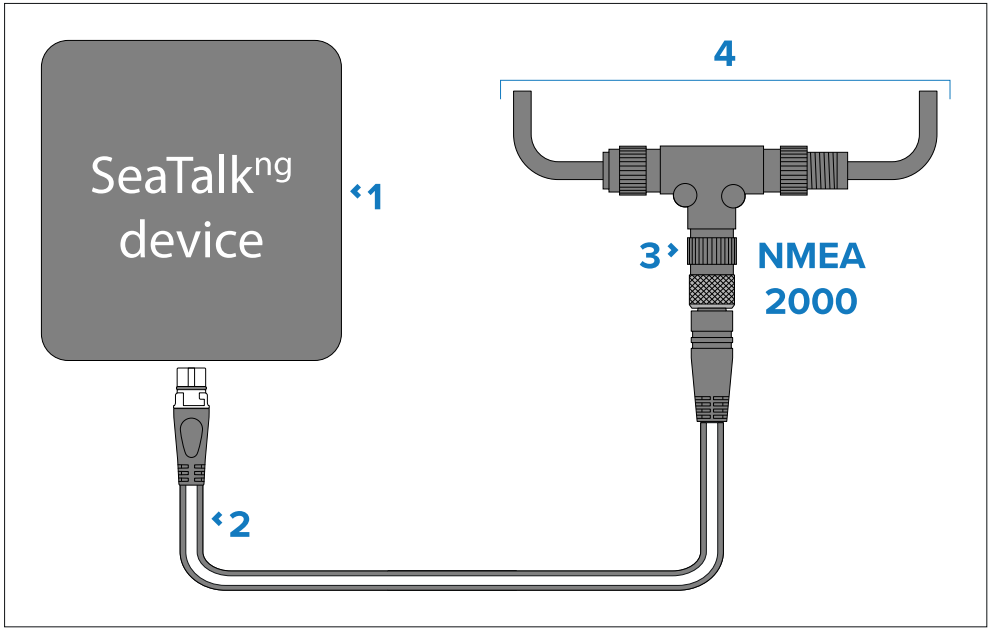

1. Fuse for SeaTalk NG power supply.
2. Power switch for SeaTalk NG power supply:
   a. Select the *[OFF]* position if your SeaTalk NG backbone is supplied power directly from a battery or distribution panel.
   b. Select the *[ON]* position if your SeaTalk NG backbone is supplied power by the ACU-Series.
3. ACU-Series/SPX-Series autopilot to SeaTalk NG spur cable (part number: R12112).

# CHAPTER 11: NMEA 2000 CONNECTION

CHAPTER CONTENTS

# 11.1 NMEA 2000 network connection

Your SeaTalk NG device can be connected to a DeviceNet / NMEA 2000 network.




1. SeaTalk NG device.
2. SeaTalk NG to DeviceNet (male) adapter cable (A06078, A06074, A06076, or A06046).
3. DeviceNet T-piece.
4. NMEA 2000 backbone.

# CHAPTER 12: SYSTEM CHECKS AND TROUBLESHOOTING

CHAPTER CONTENTS

# 12.1 Initial test

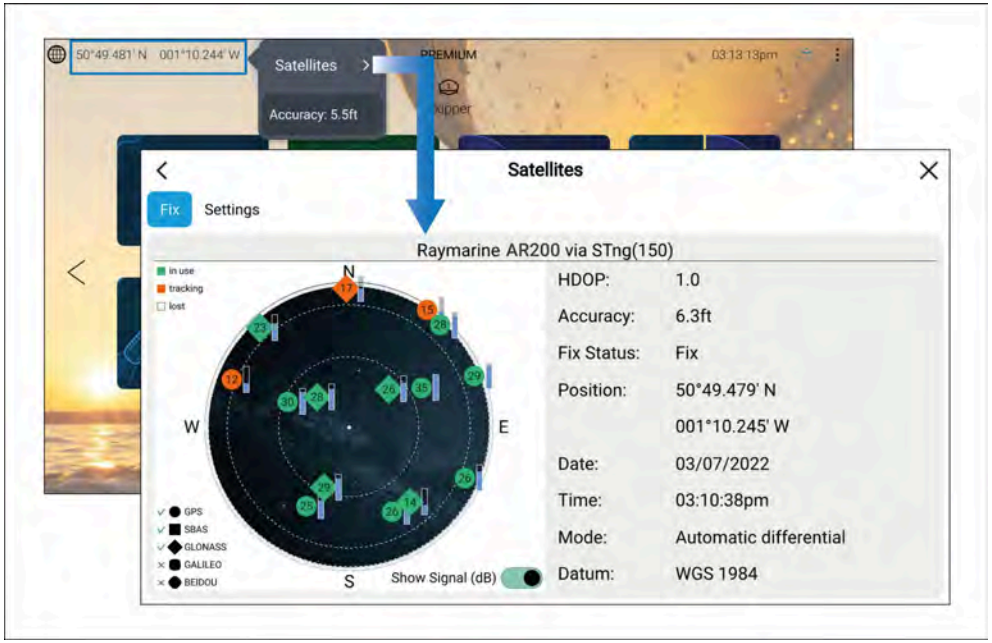
Once the unit is fully connected and installed, perform an initial power on test to verify correct operation.

**Note:**

After initial power on it may take several minutes to achieve a position fix.

### LightHouse 4/LightHouse 3 MFD Chartplotter check:

When a valid position fix is achieved, your vessel's latitude and longitude is displayed in the top left corner of the Homescreen. Fix details can be viewed by selecting the current position and selecting *[Satellites]* from the Pop-over options.

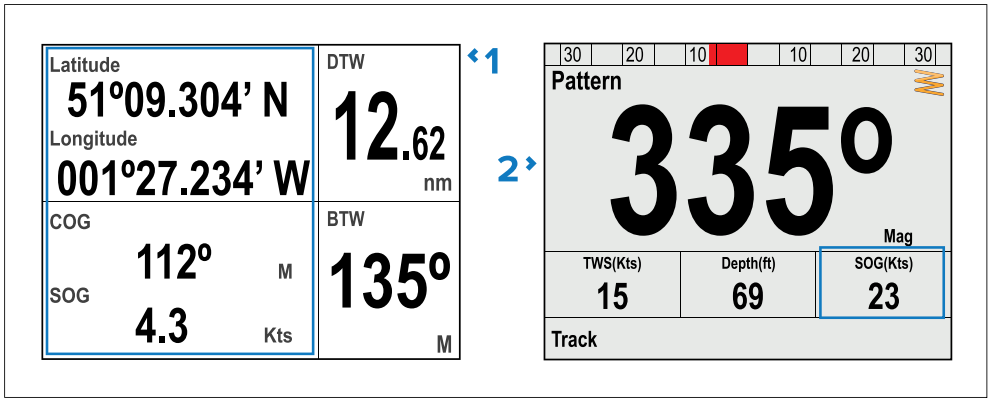



### LightHouse 1/LightHouse 2 MFD Chartplotter check:

When a valid position fix is achieved, the *[GPS Fix ]*icon will be displayed at the bottom of the Homescreen (1). Fix details can be viewed from the View Satellite Status menu: *[Homescreen > Set-up > System Settings > GPS Set-up > View Satellite Status]* (2).


### Pilot controller or Instrument display check:

When a valid position fix is achieved, position data will be available on the display:

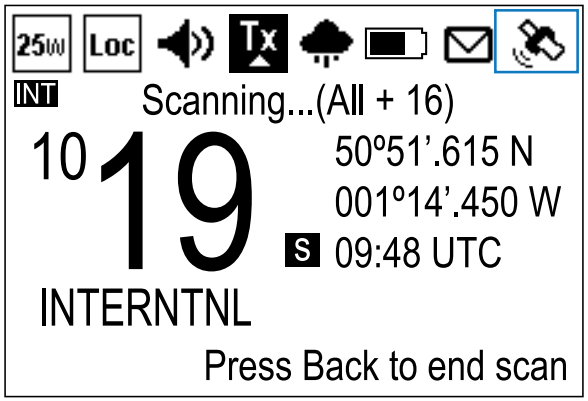


1. By default the Quad-split data page (1) on i70-Series instrument displays includes Latitude, Longitude, COG and SOG.
2. By default the Standard view page (2) on p70-Series pilot controllers includes SOG data.

If pages have been customized you may need to add the position data items to a page manually to check for a position fix.

**VHF Radio check:**

When a valid position fix is achieved, the GNSS (GPS) icon is displayed on the screen.




**Legacy and 3rd party product check:**

For devices capable of displaying GNSS data, please refer to the operation instructions provided with the device for details on how to check for a position fix and availability of position data.

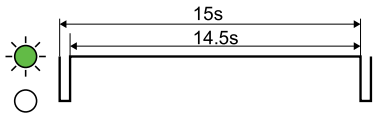
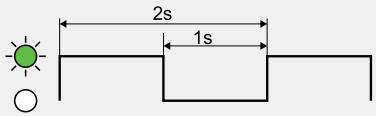
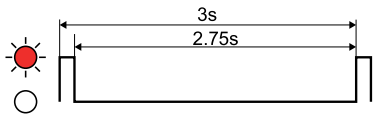
## 12.2 Troubleshooting

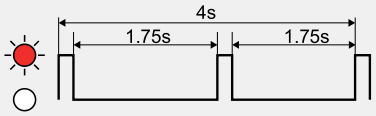
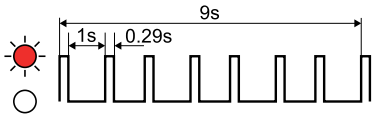
The troubleshooting section provides possible causes and the corrective action required for common problems that are associated with the installation and operation of your product.

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 technical support contact details.

### LED Diagnostics

| LED indication | Status and required action |
|---|---|
|  | Green LED is off once every 15 seconds.<br>• All sensors connected and ready.<br>• Bus healthy, no communication faults<br>**No action required.** |
|  | Green LED flashes on and off once every 2 seconds.<br>• GNSS (GPS) is initializing.<br>**Note:** Initialization can take up to 5 minutes at first use, or after factory reset or software update.<br>**No action required.** |
|  | Red LED flashes on once every 3 seconds.<br>• No GNSS (GPS) signal.<br>**User actions:**<br>1. Try power cycling the system.<br>2. Ensure there is a clear view of the sky.<br>3. Check for interference from other devices.<br>4. Check installation location. Refer to **p.23 — Location requirements** |

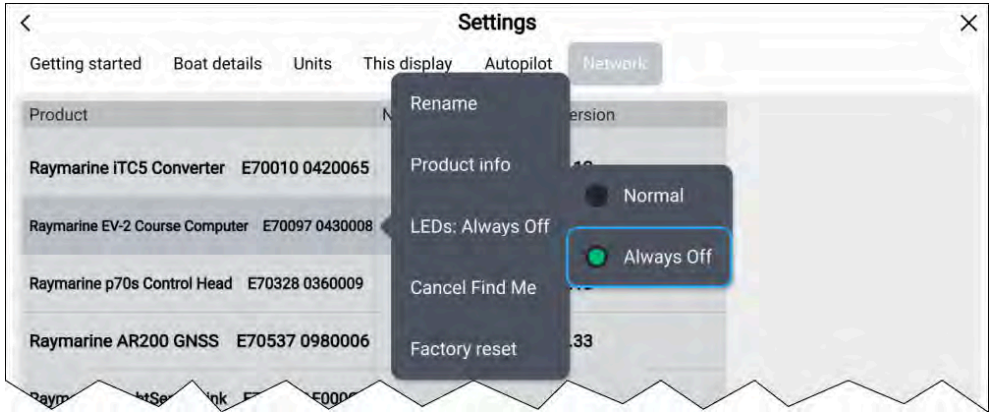
| LED indication | Status and required action |
|---|---|
|  | Red LED flashes twice every 4 seconds.<br>• Cannot send data.<br>**User actions:**<br>1. Check condition of Bus cabling.<br>2. Ensure bus is correctly terminated.<br>3. Ensure bus has correct voltage.<br>4. Replace device. |
|  | Red LED flashes on 7 times every 9 seconds.<br>• Devices are not receiving data.<br>**User actions:**<br>1. Check condition of Bus cabling.<br>2. Ensure bus is correctly terminated.<br>3. Ensure bus has correct voltage.<br>4. Replace device. |

## Switching off sensor LEDs

To assist users who wish their vessel to “go dark” (i.e. not emit any visible light), the LED indicators present on SeaTalk NG position sensors can be switched off. Supported devices: RS150, EV-1, EV-2 and AR200).

**Note:**

The *[Always Off]* feature may not be available for devices running older software versions. Ensure that you obtain the latest available software for your position sensors.




1. Open the *[Network]* settings menu: *[Homescreen > Settings > Network]*.
2. Select the relevant sensor from the network list.
3. Select *[LEDs:]*.
4. Select *[Always Off]*.

The status LED on the selected device will now be switched off, and will remain off until this setting is reverted to *[Normal]*, or the *[Find Me]* feature is enabled.

## Find me

The *[Find me]* feature assists you in finding the physical installation location of a specific Raymarine SeaTalk NG position sensor (i.e.: RS150, EV-1, EV-2, or AR200).

The *[Find me]* feature works by making the selected device’s status LED flash continuously for 5 minutes, giving you time to search the vessel to determine the device’s physical location. The feature works even if the device’s LEDs have been switched to *[Always off]*.

The *[Find Me]* flash sequence will be visibly different than normal LED status sequences in that both the red and green LEDs will flash on and off at the same time, twice every second for 5 minutes.

**Note:**

The *[Find me]* feature may not be available on devices running older software versions. Ensure that you obtain the latest available software for your position sensors.


To initiate the *[Find Me]* feature for a specific SeaTalk NG device, locate the device name in the *[Network]* settings menu, and then select *[Find Me]* from the device's pop-over menu.

Once *[Find Me]* has been activated, its menu option will change to *[Cancel Find Me]* until 5 minutes has elapsed.

Selecting *[Cancel Find Me]* at any time within the 5 minute timeframe will stop the LED flashing and return the device to its previous LED state.

## GNSS (GPS) troubleshooting

Problems with the GNSS (GPS) and their possible causes and solutions are described here. Your position fix coordinates are displayed in the status area located in the top left corner of the Homescreen.

**No position fix**

| Possible causes | Possible solutions |
|---|---|
| Display installation location (e.g.: installed below decks or in close proximity to equipment which may cause interference). | Connect an external passive GNSS (GPS) antenna such as the GA200 to the display GPS antenna connection. |
| Internal GNSS (GPS) receiver disabled. | When using your product's internal GNSS (GPS) receiver, ensure that it is enabled in the relevant settings menu.<br>To access the relevant menu, select the status area located in the top left corner of the Homescreen and select *[Satellites]* and then select the *[Settings]* tab, locate the Internal GPS option and ensure it is enabled. |
| External GNSS (GPS) receiver connection fault. | When using an external GNSS (GPS) receiver, ensure that connections are secure and that the cabling is free from damage. |
| External GNSS (GPS) receiver or antenna location (e.g.: installed below decks or in close proximity to equipment which may cause interference). | Ensure the GNSS (GPS) receiver or antenna has a clear unobstructed view of the sky.<br>Refer to the documentation supplied with your external receiver / antenna and ensure location requirements have been adhered to. |
| Geographic location or prevailing conditions preventing satellite fix. | Check periodically to see if a fix is obtained in better conditions or another geographic location. |

# CHAPTER 13: MAINTENANCE

CHAPTER CONTENTS

## 13.1 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.

## 13.2 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.

## 13.3 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 14: TECHNICAL SUPPORT

CHAPTER CONTENTS

# 14.1 Raymarine technical 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 display.

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: https://www.raymarine.com/en-us/support/product-registration

**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** — https://raymarine.custhelp.com/app/home
- **Software updates** — http://www.raymarine.com/software

Worldwide support

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

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

**United States (US):**

- Help desk: https://raymarine.custhelp.com/app/home
- 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):**

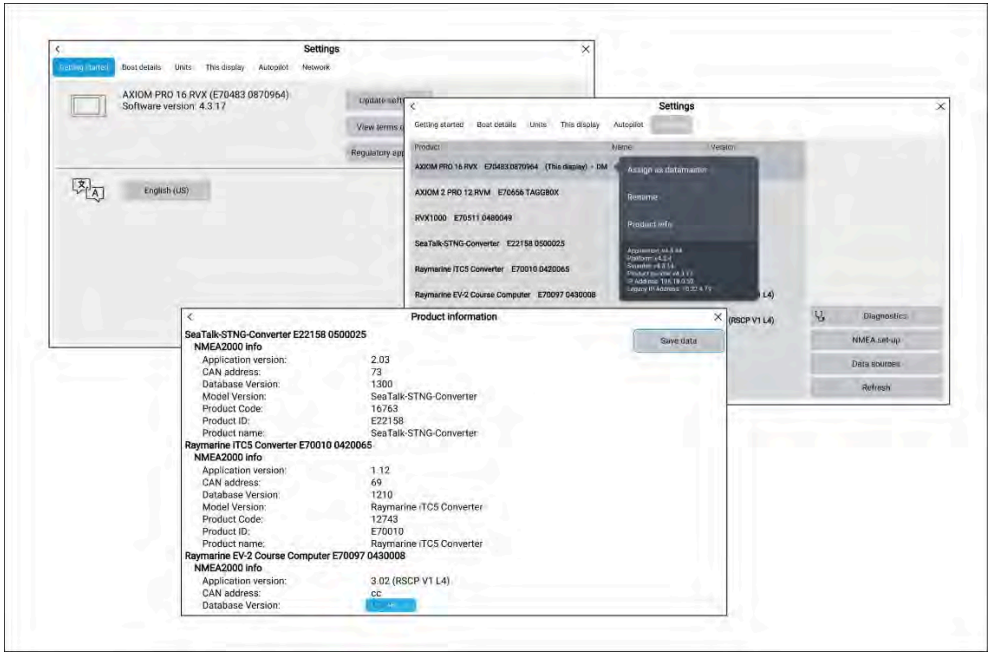
- E-Mail: support.dk@raymarine.com
- Tel: +45 437 164 64

**Russia (Authorized Raymarine distributor):**

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

## Viewing product information

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




1. Select *[Settings]*, from the Homescreen.

   The *[Getting started]* menu contains hardware and software information for your display.

2. You can view further information about your display, or view information about products networked using SeaTalk HS and SeaTalk NG / NMEA 2000, by selecting the *[Network]* tab, then:
   i. to display detailed software information and your display's network IP address, select your display from the list.
   ii. to display detailed diagnostics information for all products, select *[Product info]* from the *[Diagnostics]* pop over menu.

# 14.2 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*

- http://www.youtube.com/user/RaymarineInc

## 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

# 14.3 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: https://bit.ly/rym-docs

# CHAPTER 15: TECHNICAL SPECIFICATION

CHAPTER CONTENTS

## 15.1 Power specification

| Specification | |
|---|---|
| **Nominal supply voltage:** | 12 V dc (Supplied by the SeaTalk NG 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 |

## 15.2 Environmental specification

| 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, IPx7 |

## 15.3 GNSS (GPS) receiver specification

| Specification | |
|---|---|
| **Signal acquisition:** | Automatic |
| **Channels:** | 72 |
| **Operating frequency:** | 1574 MHz to 1605 MHz |
| **Update rate:** | 10 Hz |
| **Sensitivity:** | -163 dBm (tracking), –147 dBm (acquisition) |
| **GNSS (GPS) satellite system compatibility:** | • GPS<br>• GLONASS<br>• Beidou |
| **Satellite Differential Type (SBAS):** | • WAAS (United States)<br>• EGNOS (Europe)<br>• MSAS (Japan)<br>• GAGAN (India) |
| **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 (< 45 seconds typical) |
| **Time to first fix from hot start:** | < 8 seconds |
| **Geodetic Datum:** | WGS–84 |
| **Antenna:** | Internal |

## 15.4 Conformance specification

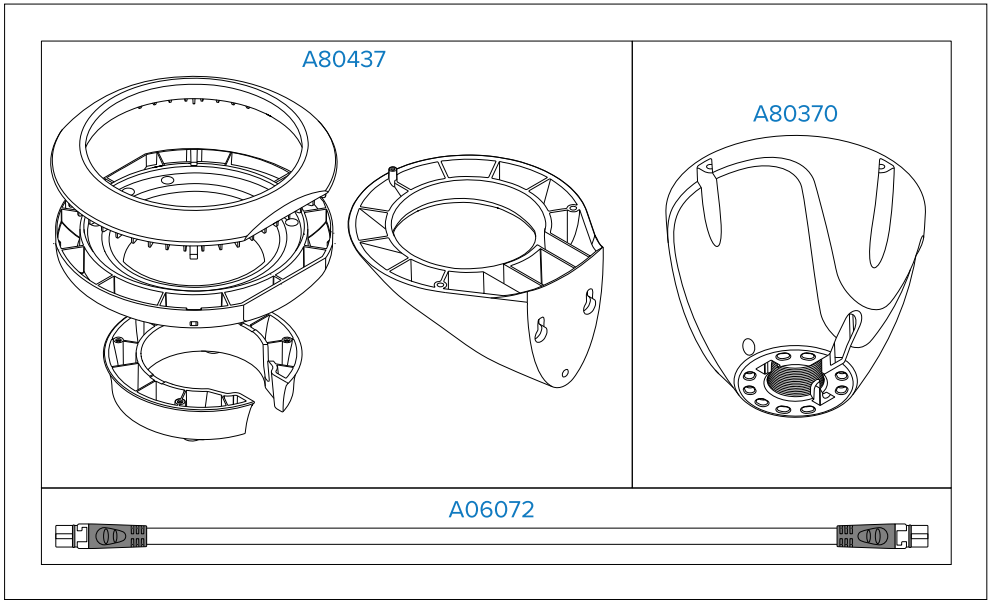
| Specification | |
|---|---|
| **EMC Directive:** | 2014/30/EU |
| **Australia and New Zealand C-Tick compliance:** | Level 2 |
| **RoHS Directive:** | 2011/65/EU |
| **WEEE Directive:** | 2012/19/EU |

# CHAPTER 16: SPARES AND ACCESSORIES

CHAPTER CONTENTS

# 16.1 Accessories

The following accessories are available:




| Part | Description |
|---|---|
| A80437 | Deck mounting (Clamshell / Riser) kit. |
| A80370 | Pole / rail mounting adaptor kit. |
| A06072 | 6 m (19.69 ft) SeaTalk NG white spur cable. |

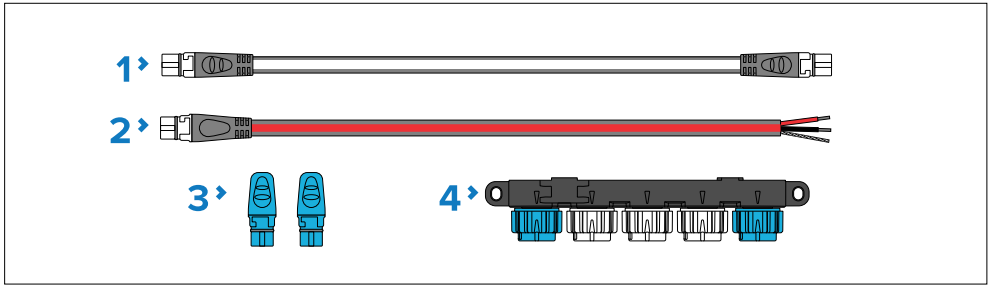
# 16.2 SeaTalk NG cables and accessories

SeaTalk NG cables and accessories for use with compatible products.

## SeaTalk NG kits

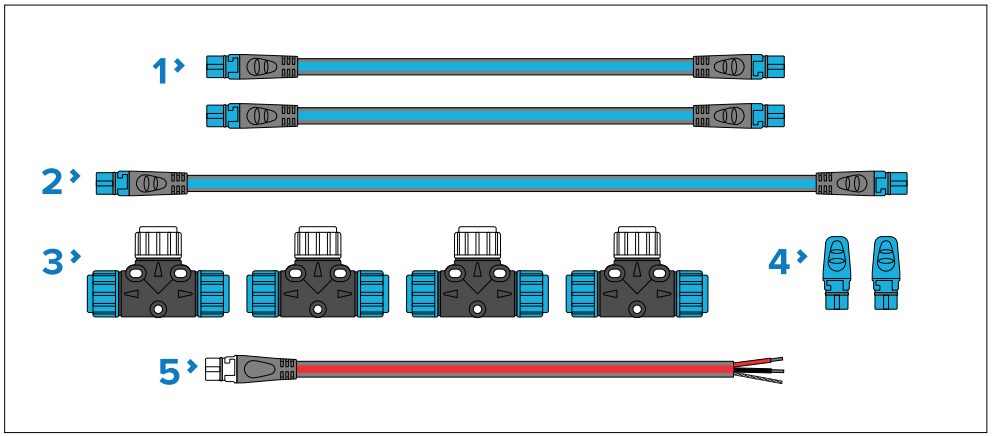
SeaTalk NG kits enable you to create a simple SeaTalk NG backbone.

**Starter kit (part number: T70134)** consists of:




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

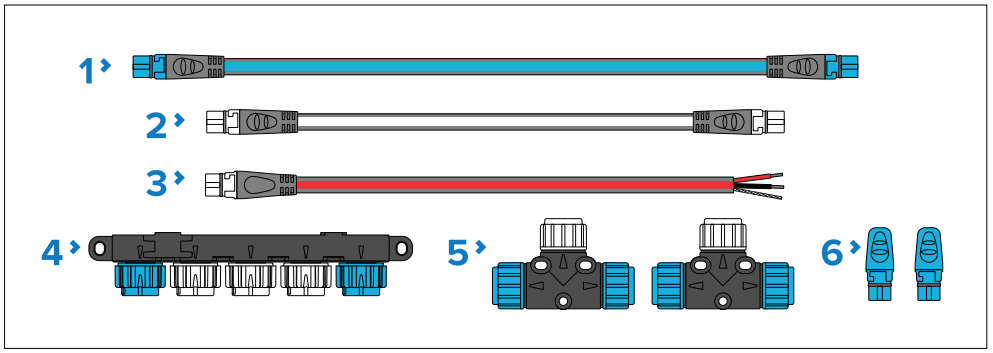
**Backbone kit (part number: A25062)** consists of:




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

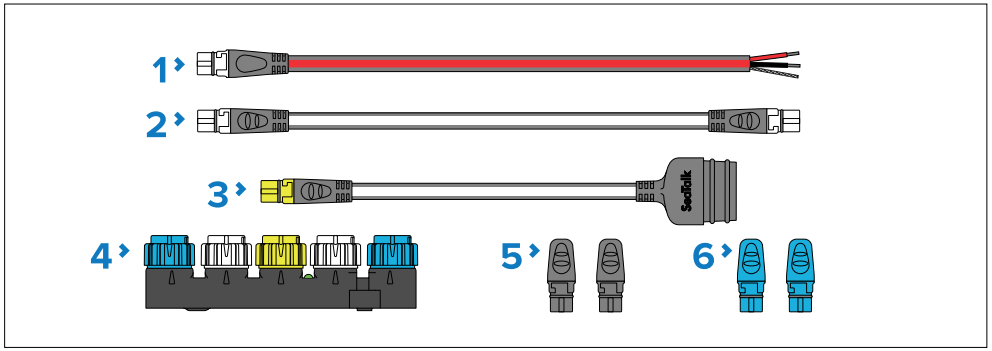
3. 4 x T-piece (part number: **A06028**). Each T-piece allows connection of one SeaTalk NG device. Multiple T-pieces can be 'daisy chained' together.
4. 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.
5. 1 x Power cable 2 m (6.6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

**Evolution-Series autopilot cable kit (part number: R70160)** consists of:



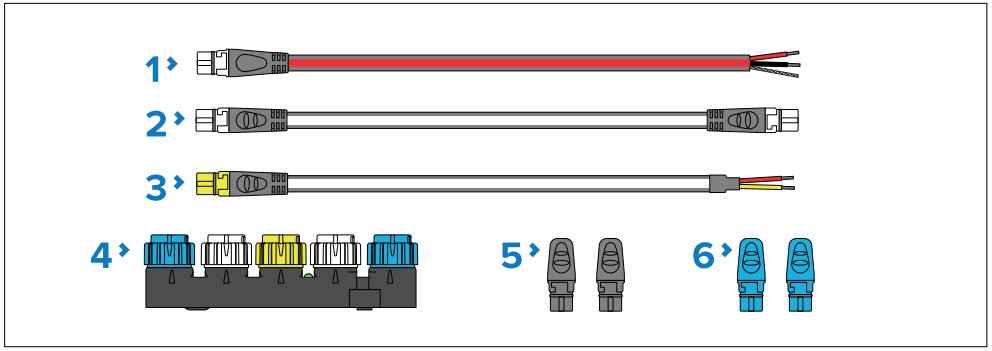

1. 1 x Backbone cable 5 m (16.4 ft) (part number: **A06036**). Used to create and extend the SeaTalk NG backbone.
2. 1 x Spur cable 1 m (3.3 ft) (part number: **A06040**). Used to connect device to the SeaTalk NG backbone.
3. 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12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

**SeaTalk 1 to SeaTalk NG converter kit (part number: E22158)** consists of:




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

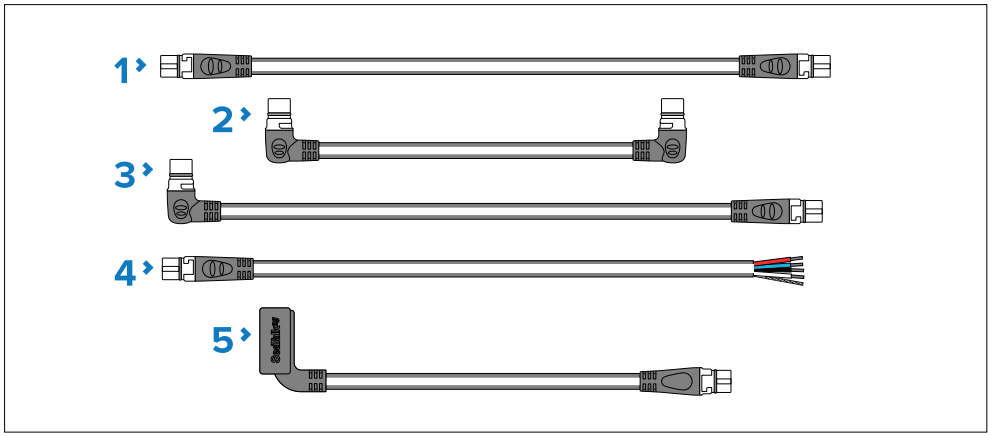
**NMEA 0183 VHF 2-wire to SeaTalk NG converter kit (part number: E70196)** consists of:



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

### SeaTalk NG spur cables

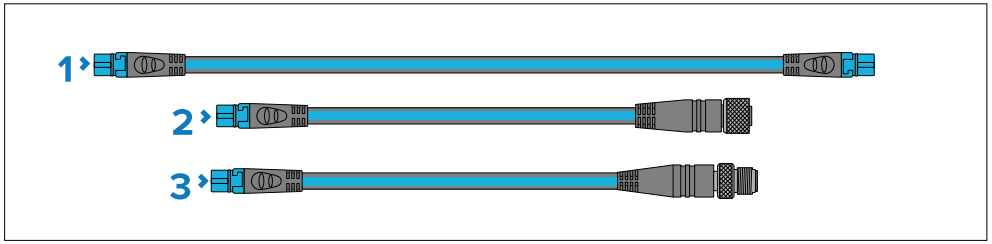
SeaTalk NG spur cables are required to connect devices to the SeaTalk NG backbone.




1. SeaTalk NG spur cables:
   - Spur cable 0.4 m (1.3 ft) (part number: **A06038**).
   - Spur cable 1 m (3.3 ft) (part number: **A06039**).
   - Spur cable 3 m (9.8 ft) (part number: **A06040**).
   - Spur cable 5 m (16.4 ft) (part number: **A06041**).
2. Elbow (right-angled) to elbow (right-angled) spur cable 0.4 m (1.3 ft) (part number: **A06042**). Used in confined spaces where a straight spur cable will not fit.
3. Elbow (right-angled) to straight spur cable 1 m (3.3 ft) (part number: **A06081**). Used in confined spaces where a straight spur cable will not fit.
4. SeaTalk NG to stripped-end spur cables (connects compatible products that do not have a SeaTalk NG connector, such as transducer pods):
   - SeaTalk NG to stripped-end spur cable 1 m (3.3 ft) (part number: **A06043**)
   - SeaTalk NG to stripped-end spur cable 3 m (9.8 ft) (part number: **A06044**)
5. ACU-Series / SPX-Series autopilot to SeaTalk NG spur cable 0.3 m (1.0 ft) (part number **R12112**). Connects the course computer to the SeaTalk NG backbone. This connection can also be used to provide 12 V dc power to the SeaTalk NG backbone.

### SeaTalk NG backbone cables

SeaTalk NG backbone cables are used to create or extend a SeaTalk NG backbone.

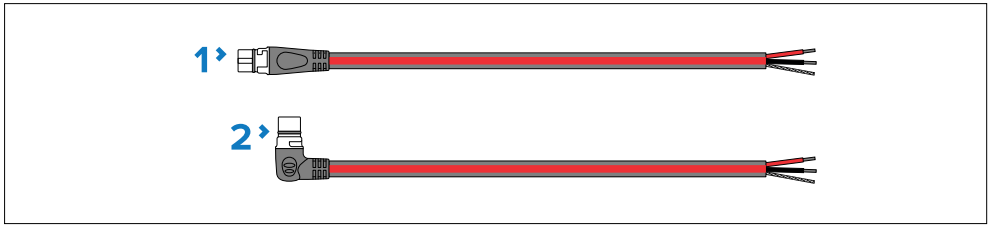



1. Backbone cables:
   - Backbone cable 0.4 m (1.3 ft) (part number: **A06033**).
   - Backbone cable 1 m (3.3 ft) (part number: **A06034**).
   - Backbone cable 3 m (9.8 ft) (part number: **A06035**).
   - Backbone cable 5 m (16.4 ft) (part number: **A06036**).
   - Backbone cable 9 m (29.5 ft) (part number: **A06068**).
   - Backbone cable 20 m (65.6 ft) (part number: **A06037**).
2. SeaTalk NG to DeviceNet (female) Backbone cable 0.4 m (1.3 ft) (part number: **A80675**)

3. SeaTalk NG to DeviceNet (male) Backbone cable 0.4 m (1.3 ft) (part number: **A80674**)

### SeaTalk NG power cables

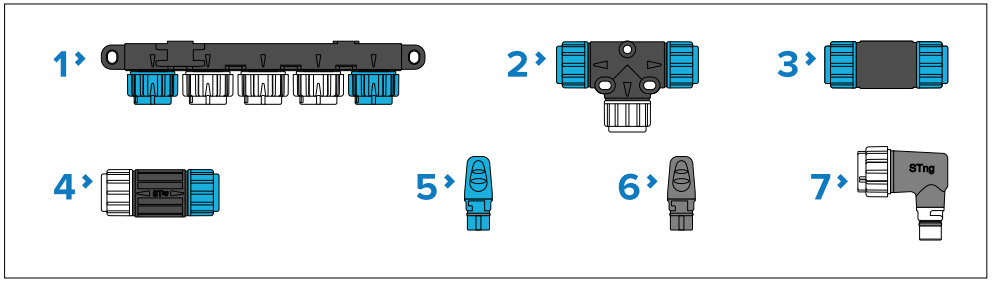
SeaTalk NG power cables are used to provide the SeaTalk NG backbone with a single 12 V dc power source. The power connection must include a 5 amp inline fuse (not supplied).




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

### SeaTalk NG connectors

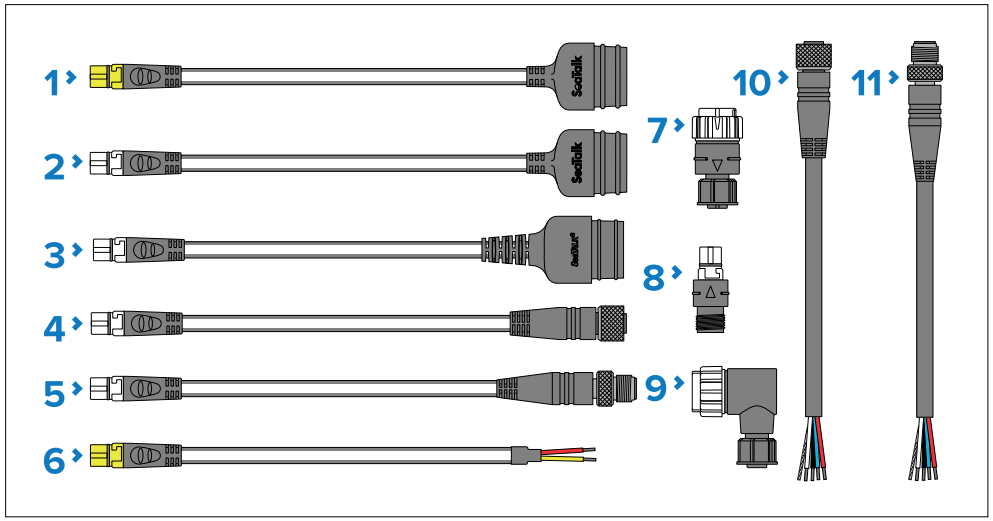
SeaTalk NG connectors are used to connect SeaTalk NG devices to the SeaTalk NG backbone and to create and extend the backbone.




1. 5-Way connector (part number: **A06064**). Each connector block allows connection of up to 3 SeaTalk NG devices. Multiple connector blocks can be 'daisy chained' together.
2. T-piece (part number: **A06028**). Each T-piece allows connection of one SeaTalk NG device. Multiple T-pieces can be 'daisy chained' together.
3. Backbone extender (part number: **A06030**). Used to connect 2 backbone cables together.
4. Inline terminator (part number: **A80001**). Used to connect a spur cable and SeaTalk NG device at the end of a backbone instead of a backbone terminator.
5. Backbone terminator (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.
6. Spur blanking plug (part number: **A06032**). Used to cover unused spur connections in 5-Way blocks, T-piece connectors, or the SeaTalk 1 to SeaTalk NG converter.
7. Elbow (right-angled) spur connector (part number: **A06077**). Used in confined spaces where a straight spur cable will not fit.

### SeaTalk NG adaptors and adaptor cables

SeaTalk NG adaptor cables are used to connect devices designed for different CAN Bus backbones (e.g.: SeaTalk 1 or DeviceNet) to the SeaTalk NG backbone.




1. SeaTalk 1 (3 pin) to SeaTalk NG converter cable 1 m (3.3 ft) (part number: **A22164 / A06073**). Can be used to connect a SeaTalk 1 device to a SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter, or to connect a SeaTalk NG product directly to a SeaTalk 1 network.
2. SeaTalk 1 (3 pin) to SeaTalk NG adaptor cable 0.4 m (1.3 ft) (part number: **A06047**). Can be used to connect a SeaTalk 1 device to a SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter, or to connect a SeaTalk NG product directly to a SeaTalk 1 network.
3. SeaTalk 2 (5 pin) to SeaTalk NG adaptor cable 0.4 m (1.3 ft) (part number: **A06048**). Used to connect SeaTalk 2 devices or networks to a SeaTalk NG backbone.

4. SeaTalk NG to DeviceNet (female) adaptor cables connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalk NG backbone, or connects SeaTalk NG devices to an NMEA 2000 network. The following cables are available:
   - SeaTalk NG to DeviceNet (female) adaptor cable 0.4 m (1.3 ft) (part number: **A06045**).
   - SeaTalk NG to DeviceNet (female) adaptor cable 1 m (3.3 ft) (part number: **A06075**).
5. SeaTalk NG to DeviceNet (male) adaptor cables. Connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalk NG backbone, or connect SeaTalk NG devices to an NMEA 2000 network. The following cables are available:
   - SeaTalk NG to DeviceNet (male) adaptor cable 0.1 m (0.33 ft) (part number: **A06078**).
   - SeaTalk NG to DeviceNet (male) adaptor cable 0.4 m (1.3 ft) (part number: **A06074**).
   - SeaTalk NG to DeviceNet (male) adaptor cable 1 m (3.3 ft) (part number: **A06076**).
   - SeaTalk NG to DeviceNet (male) adaptor cable 1.5 m (4.92 ft) (part number: **A06046**).
6. NMEA 0183 stripped-end (2-wire) to SeaTalk NG adapter cable 1 m (3.3 ft) (part number: **A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalk NG backbone via the NMEA 0183 to SeaTalk NG converter.
7. SeaTalk NG (male) to DeviceNet (female) adaptor (**A06082***).
8. SeaTalk NG (female) to DeviceNet (male) adaptor (**A06083***).
9. SeaTalk NG (male) to DeviceNet (female) elbow (right-angled) adaptor (**A06084***).
10. DeviceNet (female) to stripped-end adaptor cable (0.4 m (1.3 ft)) (part number: **E05026**).
11. DeviceNet (male) to stripped-end adaptor cable (0.4 m (1.3 ft)) (part number: **E05027**).

**Important:**

* Do NOT connect the A06082, A06083, or A06084 adaptors directly to a backbone. Only connect as part of a **spur** connection between backbone and device.

# Appendix A NMEA 2000 PGN support

Supported standard NMEA 2000 PGNs are listed below. Raymarine and other proprietary PGNs are not listed.

## Administration PGNs

| PGN | Description | Transmit | Receive |
|---|---|---|---|
| 59392 | ISO Acknowledge | ● | |
| 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 — Request Group Function | | ● |
| 126208 | NMEA — Command Group Function | | ● |
| 126208 | NMEA — Acknowledge Group Function | ● | |
| 126464 | PGN Transmit and Receive List | ● | ● |

## Data PGNs

| PGN | Description | Transmit | Receive |
|---|---|---|---|
| 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 | ● | |
| 129044 | Datum | ● | ● |
| 129539 | GNSS DOPs | ● | |
| 129540 | GNSS Satellites In View | ● | |
| 129542 | GNSS Pseudo Range Noise Statistics | ● | |

# Appendix B RS150 Software release history

The list below is a cumulative list of the new features introduced in subsequent releases of the RS150 software, since the initial release (v1.19; November 2016).

**This list includes *new features* only. It does NOT include software maintenance items, such as bug fixes or performance improvements.**

To download the software, and view the complete list of all software updates, including new features, bug fixes, and performance improvements, visit:

| RS150 **software download link** |
| --- |
| https://bit.ly/rs150-download |

## RS150 v1.29 new features:

(Software release date: *February 2024*)

- Added support for a new LED indicator 'Switch off' setting which can be toggled via a networked LightHouse 4 multifunction display (running software version v4.6.74 or later). For more information, refer to: **p.50 — Switching off sensor LEDs**
- Added support for a new LED indicator 'Find me' setting which can be toggled via a networked LightHouse 4 multifunction display (running software version v4.6.74 or later). For more information, refer to: **p.50 — Find me**

## RS150 v1.28 new features:

(Software release date: *July 2021*)

- GNSS constellation and SBAS selection options now supported.
- **Note:** Also requires an Axiom-Series display running v3.14.108, or later to access this feature.

## RS150 v1.24 new features:

(Software release date: *July 2018*)

- Resolved issue with regards to Satellite information reported on the NMEA 2000 bus.
- Added support for NMEA 2000 PGN 129547 Pseudo range error.
- Resolved issue with Fix Status reported on Network to some 3rd Party MFDs.
- Other bug fixes and enhancements.

## RS150 v1.21 new features:

(Software release date: *January 2017*)

- Software upgrade to support a running hardware change in Production.
- This release has no enhancements or additional features for the end user.

## RS150 v1.19 new features:

(Software release date: *November 2016*)

- Initial release.

# Appendix C Document change history

| Document revision and (Date) | Changes |
|---|---|
| 87271 Rev 3<br>(08–2024)<br>Software version: v1.29 | • Added software details chapter.<br>• Split document and product information into 2 chapters.<br>• Added new system example and required additional components details.<br>• Updated to include details of Axiom 2-Series displays.<br>• Added additional product dimensions for Mounting tray, Bulkhead bracket and Riser.<br>• Added orientation note to location requirements.<br>• Added mounting options.<br>• Updated connections overview.<br>• Updated and expanded details for system checks and troubleshooting chapter.<br>• Updated LED diagnostics to include required user actions.<br>• Added details for switching the LED off and the Find me feature.<br>• Removed Galileo from GNSS constellations.<br>• Added image of accessories.<br>• Removed “Position delta high precision (PGN 129027)” from supported PGN list.<br>• Added software and document release history to appendix |
| | • Updated to bring inline with latest styling standards. |
| 87271 Rev 2<br>(05–2017)<br>Software version: v1.21 | • Updated parts supplied.<br>• Updated PGN list.<br>• Added new mounting procedures when using the Deck mounting kit.<br>• Updated accessories list to include Deck mounting kit. |
| 87271 Rev 1<br>(05–2016)<br>Software version: v1.19 | • Initial release. |

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