

# Raymarine®



## p70 / p70R PILOT CONTROLLER

Installation instructions

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## Software updates



Check the Raymarine website for the latest software releases for your product.  
[www.raymarine.com/software](http://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](http://www.raymarine.com/manuals).  
Please check the website to ensure you have the latest documentation.

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## Chapter 1: Important information



### Warning: Autopilot installation

Correct performance of the vessel's steering is critical for safety, therefore it is STRONGLY RECOMMEND that an Authorized Raymarine Service Representative fits this product. You will only receive full warranty benefits if you can show that an Authorized Raymarine Service Representative has installed and commissioned your autopilot system.



### 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](http://www.raymarine.com/warranty)



### Warning: Aid to navigation

This product is intended only as an aid to navigation and must never be used in preference to sound navigational judgment. 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: Maintain a permanent watch

Always maintain a permanent watch, this will allow you to respond to situations as they develop. Failure to maintain a permanent watch puts yourself, your vessel and others at serious risk of harm.



### 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: 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: Sun covers

- If your product is supplied with a sun cover, to protect against the damaging effects of ultraviolet (UV) light, always fit the sun cover when the product is not in use.
- To avoid potential loss, sun covers must be removed when travelling at high speed, whether in water or when the vessel is being towed.



## TFT Displays

The colors of the display may seem to vary when viewed against a colored background or in colored light. This is a perfectly normal effect that can be seen with all color Thin Film Transistor (TFT) displays.

## 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.

## Declaration of conformity

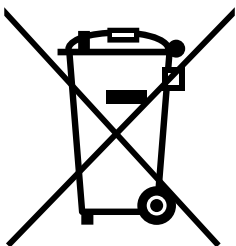
FLIR Belgium BVBA declares that this product is compliant with the essential requirements of EMC Directive 2014/30/EU.

The original Declaration of Conformity certificate may be viewed on the relevant product page at [www.raymarine.com/manuals](http://www.raymarine.com/manuals).

## 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](http://www.raymarine.eu/recycling).



## Warranty registration

To register your Raymarine product ownership, please visit [www.raymarine.com](http://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](http://www.raymarine.com)) to ensure you have the most up-to-date version(s) of the documentation for your product.



## Chapter 2: Document and product information

### Chapter contents

- [2.1 Document information on page 12](#)
- [2.2 Product overview on page 13](#)
- [2.3 Compatible autopilot systems on page 17](#)

## 2.1 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](http://www.raymarine.com/manuals).

### Product documentation

The following documentation is applicable to your product:

This and other Raymarine product documents are available to download in PDF format from [www.raymarine.com](http://www.raymarine.com).

#### p70 / p70R documentation:

- **87426** — p70 / p70R Pilot Controller Installation Instructions (This document)
- **81402** — p70 / p70R / p70s / p70Rs Operation Instructions
- **87130** — p70 / p70Rs Mounting Template

#### Additional documentation:

- **81300** — SeaTalkng<sup>®</sup> Reference Manual
- **87138** — iTC-5 Installation Instructions

### User manuals Print Shop

Raymarine provides a Print Shop service, enabling you to purchase a high-quality, professionally-printed manual for your Raymarine product.

Printed manuals are ideal for keeping onboard your vessel, as a useful source of reference whenever you need assistance with your Raymarine product.

Visit <http://www.raymarine.co.uk/view/?id=5175> to order a printed manual, delivered directly to your door.

For further information about the Print Shop, please visit the Print Shop FAQ pages: <http://www.raymarine.co.uk/view/?id=5751>.

#### Note:

- Accepted methods of payment for printed manuals are credit cards and PayPal.
- Printed manuals can be shipped worldwide.
- Further manuals will be added to the Print Shop over the coming months for both new and legacy products.
- Raymarine user manuals are also available to download free-of-charge from the Raymarine website, in the popular PDF format. These PDF files can be viewed on a PC / laptop, tablet, smartphone, or on the latest generation of Raymarine multifunction displays.

### Pilot controller commissioning and operation instructions

For commissioning and operation instructions please refer to the p70 / p70s / p70R / p70Rs operation instructions.



The p70 / p70s / p70R / p70Rs operation instructions (81402) can be downloaded from the Raymarine website: [www.raymarine.com/manuals](http://www.raymarine.com/manuals).

Please check the website to ensure you have the latest documentation.

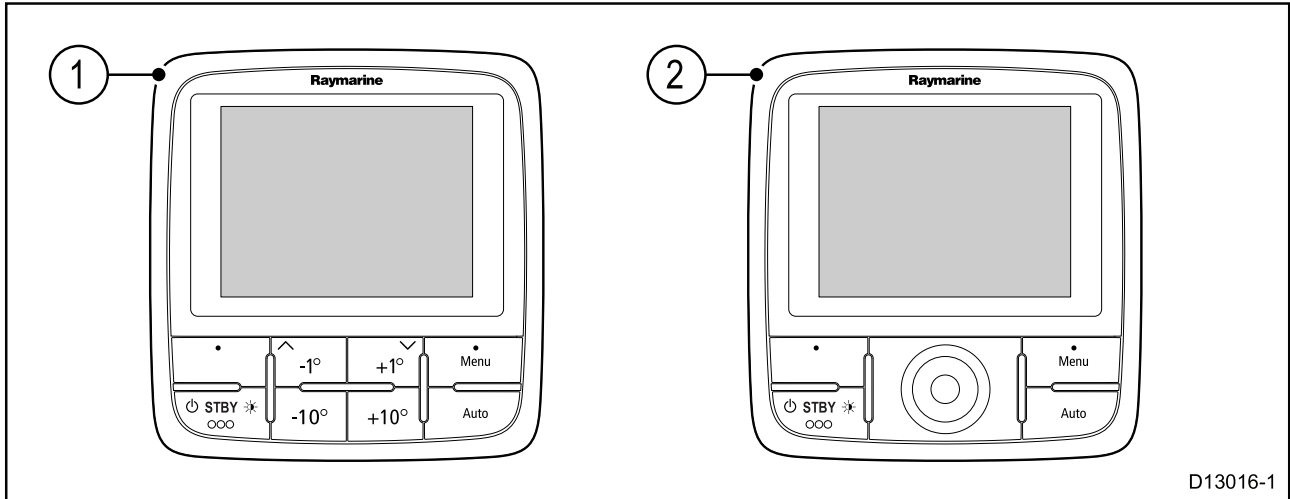
## Document illustrations

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.

## 2.2 Product overview

The p70 and p70R are SeaTalk<sup>ng</sup> autopilot controllers.



1. p70 (8 button pilot control head)
2. p70R (Rotary pilot control head)

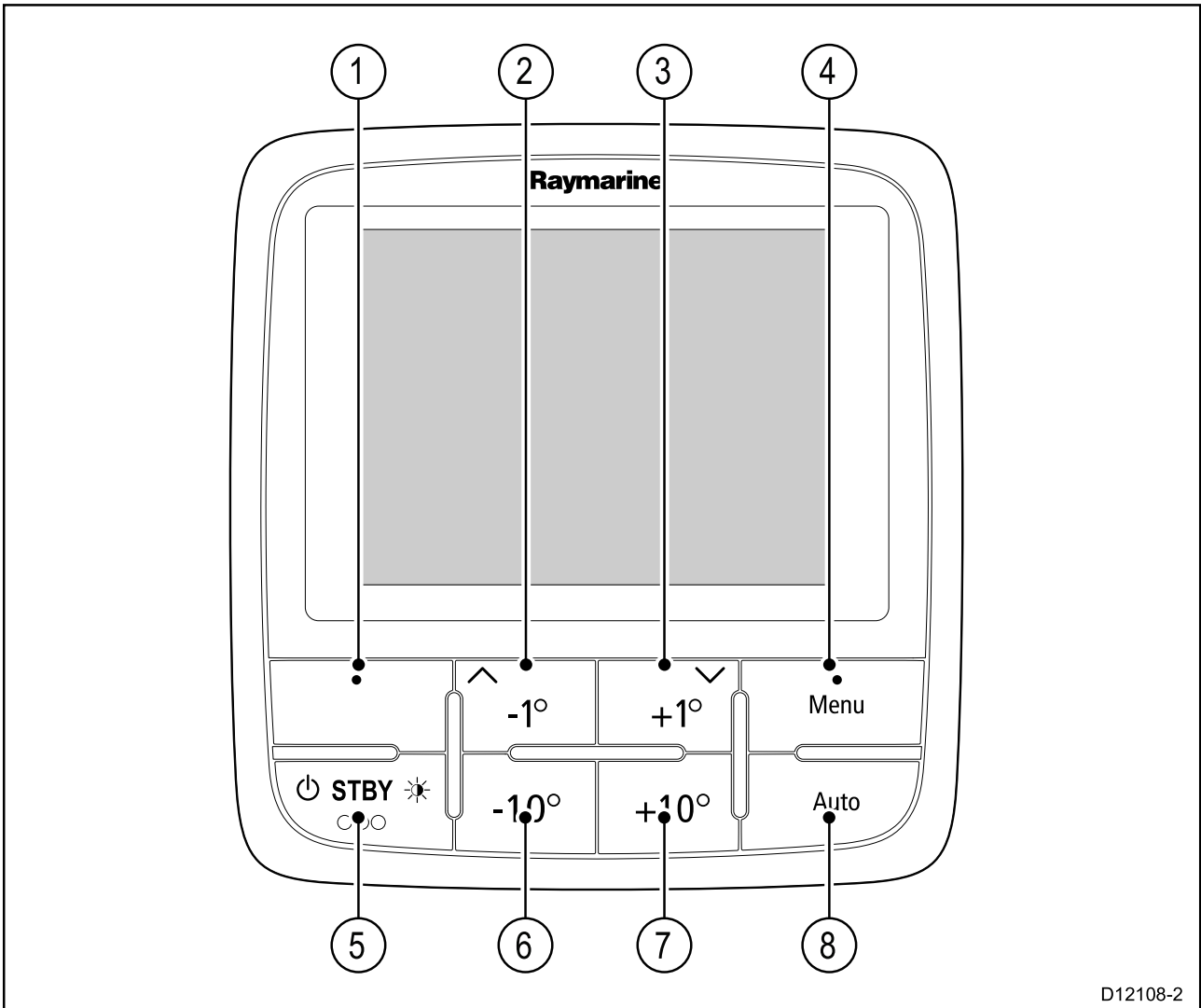
The unit has the following features:

- 2 x SeaTalk<sup>ng</sup> connections
- Compatible with NMEA 2000 and SeaTalk standards.
- 12 V dc operation.
- Waterproof to IPX 6.

## Pilot controls

Control layout and functions.

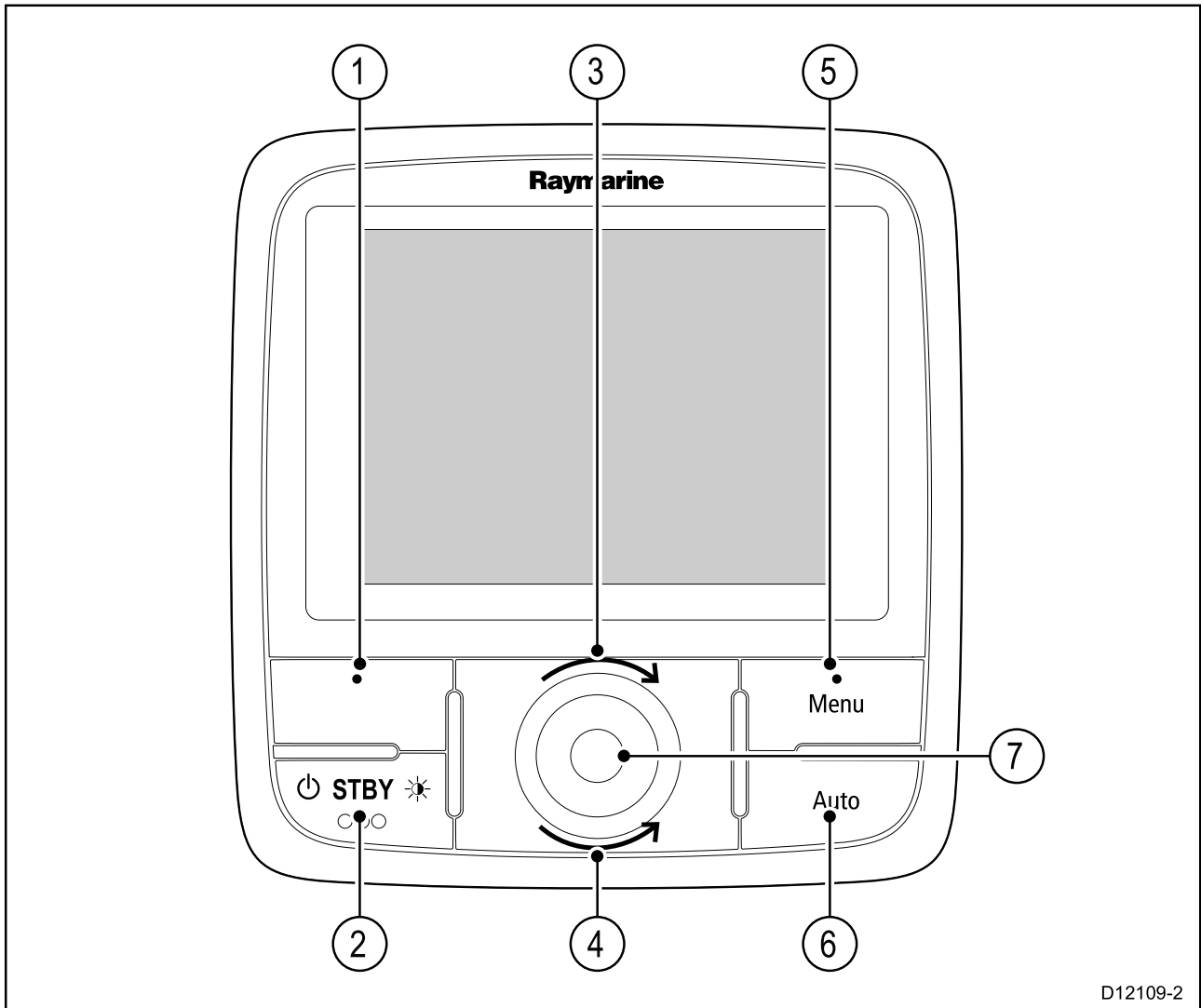
### p70 – 8 button pilot controller



D12108-2

Item	Description
1.	<b>LEFT SOFT BUTTON</b> Cancel, Back, mode selection.
2.	<b>UP BUTTON / -1</b> Up navigation, Adjust Up, Decrease angle.
3.	<b>DOWN BUTTON / +1</b> Down navigation, Adjust Down, Increase angle.
4.	<b>RIGHT SOFT BUTTON</b> Menu, Select, OK, Save.
5.	<b>STANDBY BUTTON</b> Disengage pilot, Manual control, Power, Brightness.
6.	<b>-10° BUTTON</b> Decrease angle.
7.	<b>+10° BUTTON</b> Increase angle.
8.	<b>AUTO BUTTON</b> Engage Auto pilot.

p70r — rotary pilot controller



D12109-2

Item	Description
1.	<b>LEFT SOFT BUTTON</b> Cancel, Back, mode selection.
2.	<b>STANDBY BUTTON</b> Disengage pilot, Manual control, Power, Brightness.
3.	<b>ROTARY CLOCKWISE</b> Down navigation in list, Adjust Up, Increase angle (locked heading), adjust numerical values, power steer.
4.	<b>ROTARY ANTI-CLOCKWISE</b> Up navigation in list, Adjust Down, Decrease angle (locked heading), adjust numerical values, power steer.
5.	<b>RIGHT SOFT BUTTON</b> Menu, Select, OK, Save.
6.	<b>AUTO BUTTON</b> Engage Auto pilot.
7.	<b>ROTARY END PUSH BUTTON</b> Menu, Select, OK, Save.

The pilot controller supports the following combination button presses:

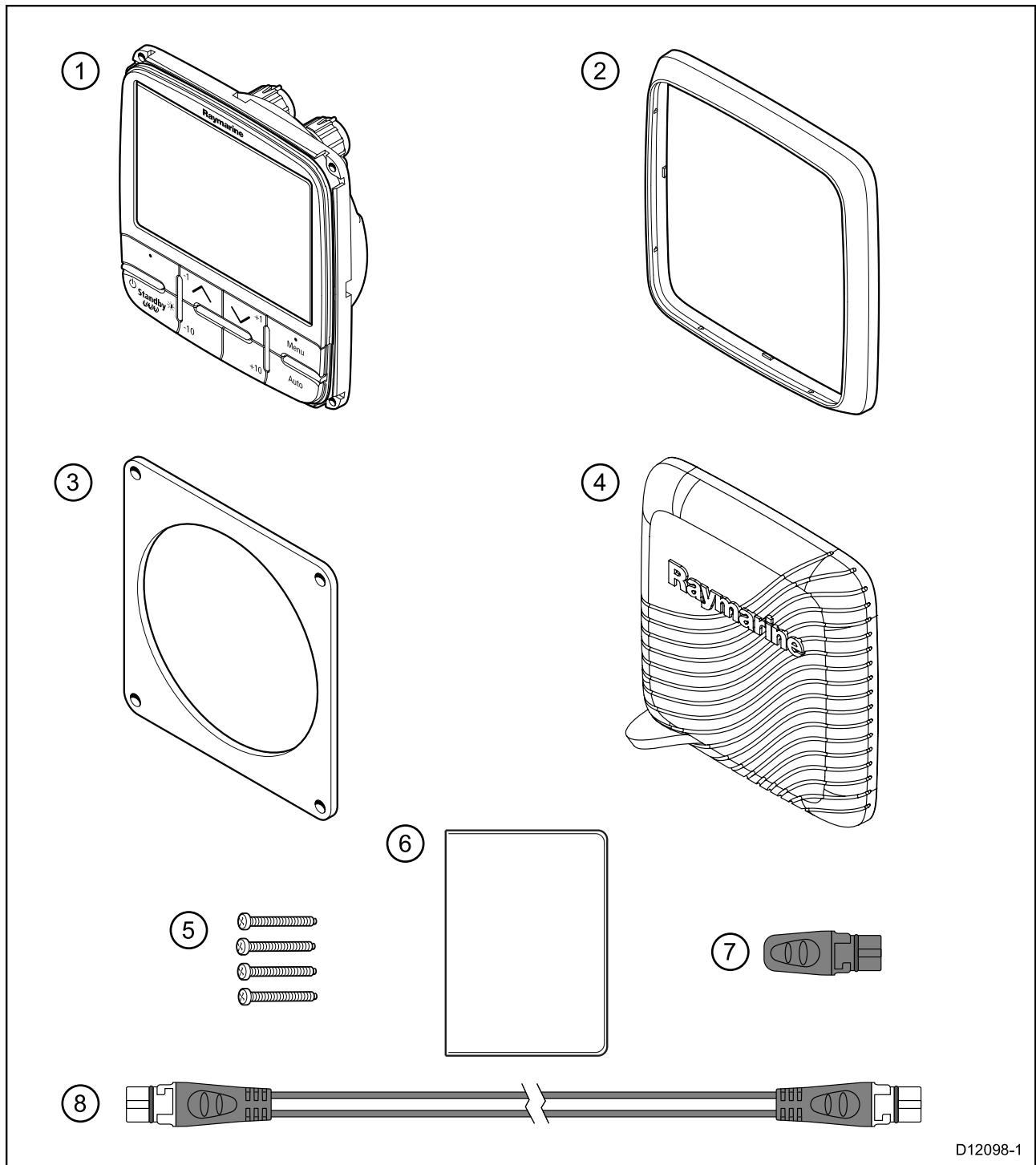


### Combination button press

Buttons	Action
<b>STANDBY</b> and <b>AUTO.</b>	Puts pilot in to Wind Vane mode.
<b>-1</b> and <b>-10</b> or <b>+1</b> and <b>+10.</b>	AutoTack (in wind vane mode), AutoTurn

### Pack contents

All models contain the following items:



D12098-1

Number	Description
1.	p70 / p70R Pilot controller (p70 8 button controller is shown in diagram above.)
2.	Bezel

Number	Description
3.	Gasket
4.	Suncover
5.	4 x fixing screws
6.	Document pack
7.	SeaTalk <sup>ng</sup> Blanking plug
8.	SeaTalk <sup>ng</sup> Spur Cable

Unpack the pilot controller unit carefully to prevent damage. Save the carton and packing in case the unit has to be returned for service.

## Applicable software version

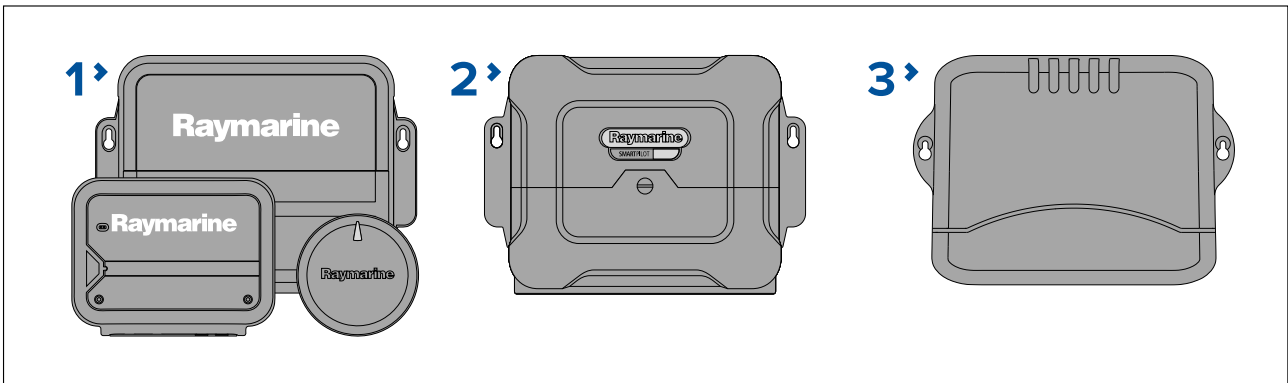
Product software is updated regularly to add new features and improve existing functionality. This document is applicable to LightHouse™ version 3.09 pilot controller software.

Check the website for the latest software and user manuals:

- [www.raymarine.com/software](http://www.raymarine.com/software)
- [www.raymarine.com/manuals](http://www.raymarine.com/manuals)

## 2.3 Compatible autopilot systems

Your product is compatible with the following autopilot systems:



1. Evolution™ autopilots (Connects via SeaTalk<sup>ng</sup>®)
2. SPX SmartPilot (Connects via SeaTalk<sup>ng</sup>®)
3. S1, S2 & S3 SmartPilot (Connects via SeaTalk® to SeaTalk<sup>ng</sup>® converter E22158)



## Chapter 3: Installation

### Chapter contents

- 3.1 Selecting a location on page 20
- 3.2 Unit dimensions on page 22
- 3.3 Tools on page 22
- 3.4 Mounting on page 23

## 3.1 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.

### General location requirements

Below are important requirements that need to be considered when choosing a suitable location to install your product.

The product is suitable for mounting above or below decks.

The product should be mounted in a location where it will be:

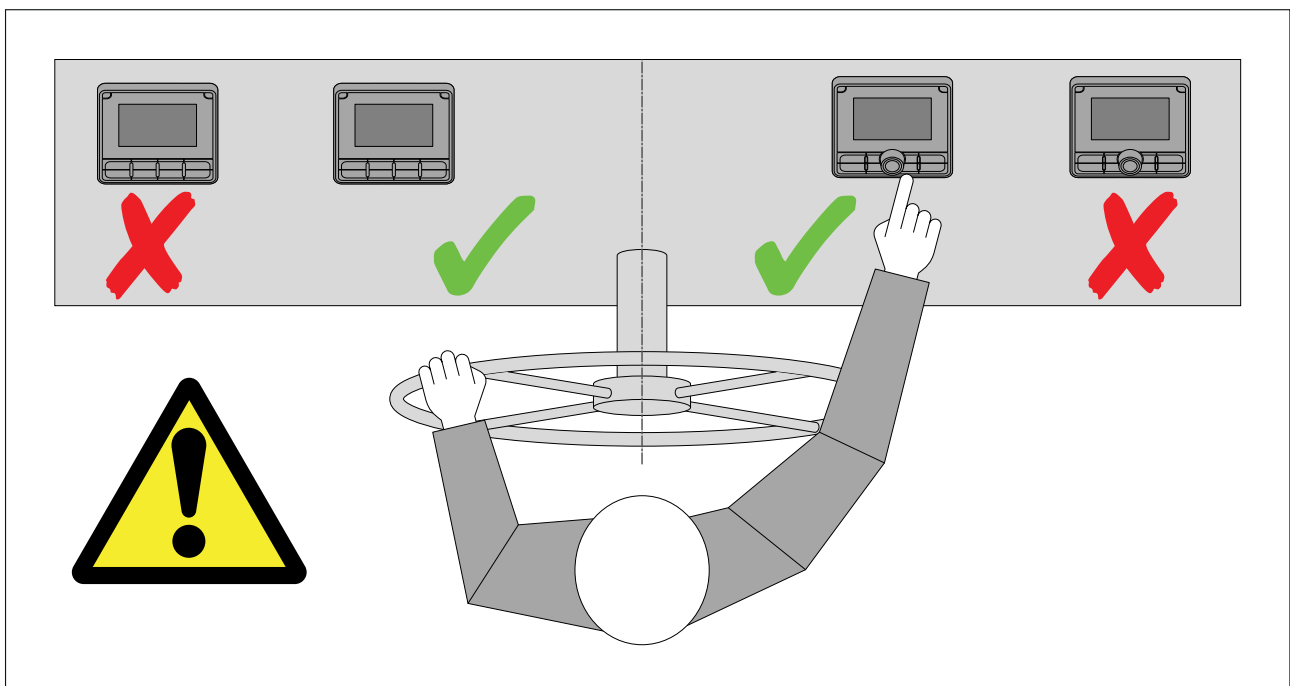
- protected from physical damage and excessive vibration.
- well ventilated and away from heat sources.
- away from any potential ignition source such as an engine room, near fuel tanks or a gas locker.
- easily accessible for operations.

When choosing a location for the product, consider the following to ensure reliable and trouble-free operation:

- Access — there must be sufficient space to enable cable connections and to avoid tight cable bends.
- Electrical interference — the product should be mounted far enough away from any equipment that may cause interference such as engines, motors, generators, radio transmitters / receivers and cables carrying high power.
- Magnetic compass — refer to the *Compass safe distance* section in this document for advice on maintaining a suitable distance between this product and any compasses on your vessel.
- Mounting surface — ensure the product is adequately supported on a secure surface. Refer to the weight information provided in the *Technical specification* for this product and ensure that the intended mounting surface is suitable for bearing the product weight. Do NOT mount units or cut holes in places which may damage the structure of the vessel.

### Site Requirements

When selecting a location ensure that following requirements are adhered to:



- There must be no obstacles between the user and the pilot controller.
- The pilot controller must be located within easy reach of the usual seated helm position.

## Viewing angle considerations

As display contrast and color are affected by the viewing angle, It is recommended that you temporarily power up the display, prior to installation, to enable you to best judge which location provides the optimum viewing angle.

For the viewing angles for your product refer to [p.47 – Technical specification](#)

## 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.

## 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).

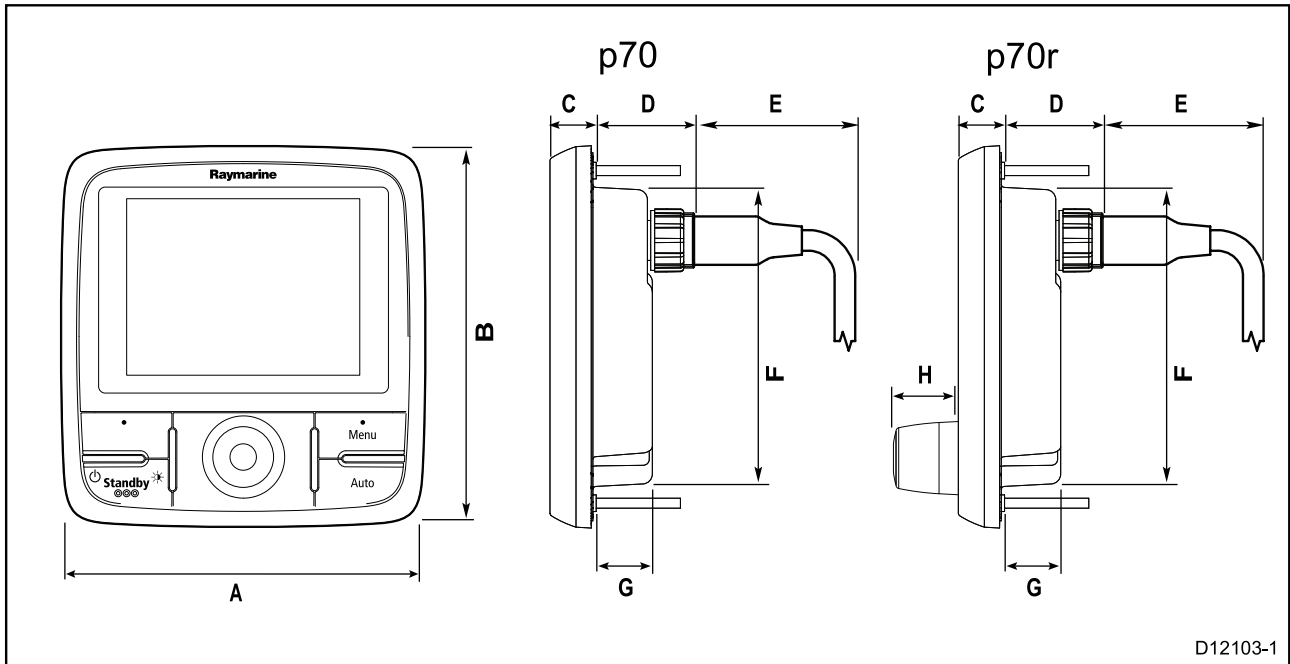
Some common examples of such external equipment include LED lighting (e.g.: navigation lights, searchlights and floodlights, interior and exterior lights) and terrestrial TV tuners.

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.

### 3.2 Unit dimensions

p70 and p70r dimensions

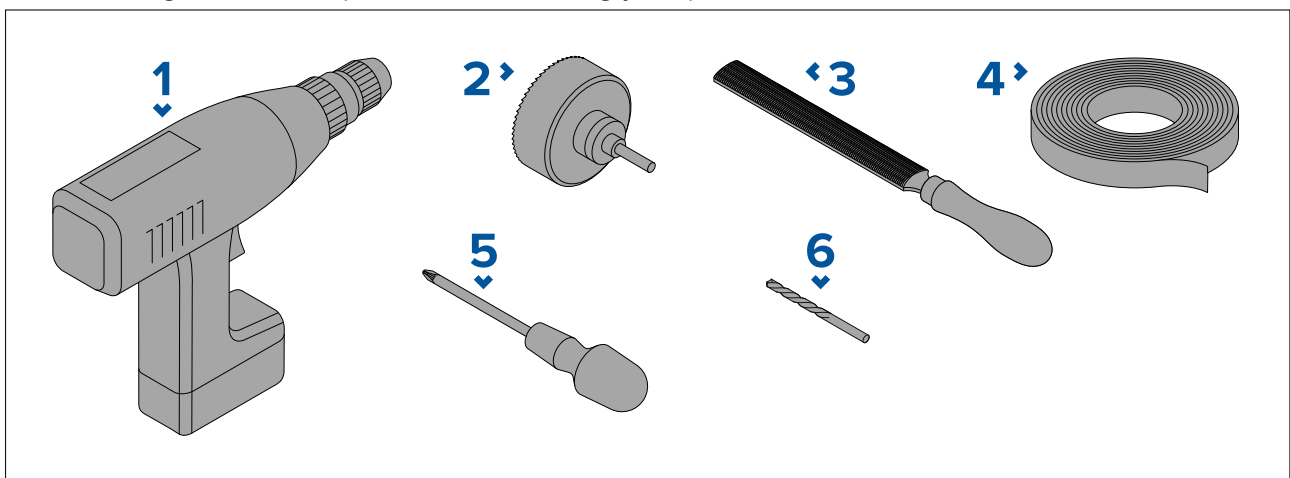


D12103-1

Item	Description
A.	110 mm (4.33")
B.	115 mm (4.52")
C.	14 mm (0.55")
D.	30 mm (1.18")
E.	35 mm (1.38")
F.	90 mm (3.54")
G.	17 mm (0.67")
H.	20.6 mm (0.81")

### 3.3 Tools

The following tools are required when installing your product.



1. Power drill
2. 92 mm (3 5/8") hole cutter
3. File
4. Adhesive tape



5. Pozi drive screwdriver
6. Drill bit of appropriate size <sup>(1)</sup>

**Note:**

(1) Drill bit size is dependent on the thickness and type of material that the unit is to be mounted on.

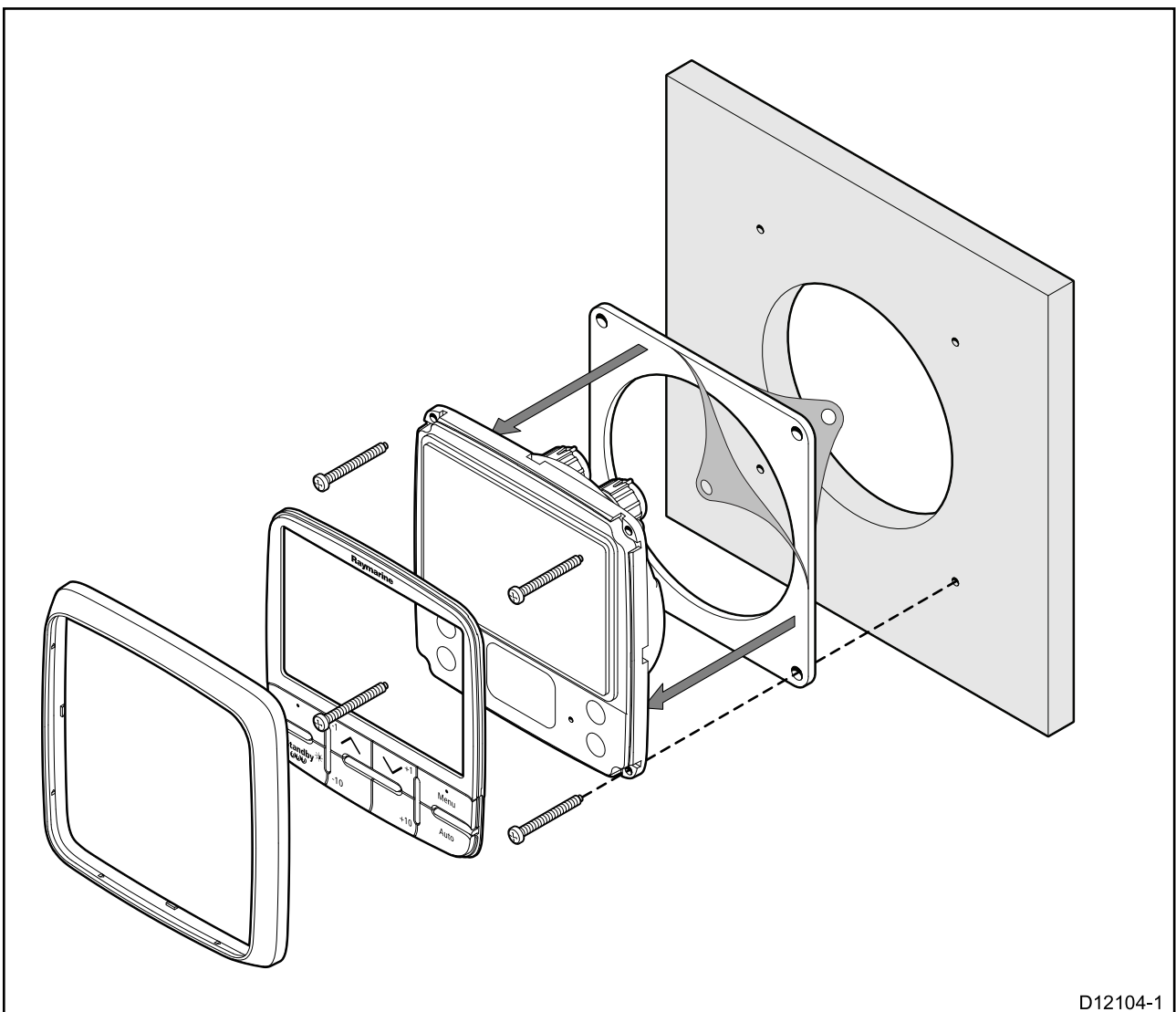
## 3.4 Mounting

The product is designed to be flush mounted.

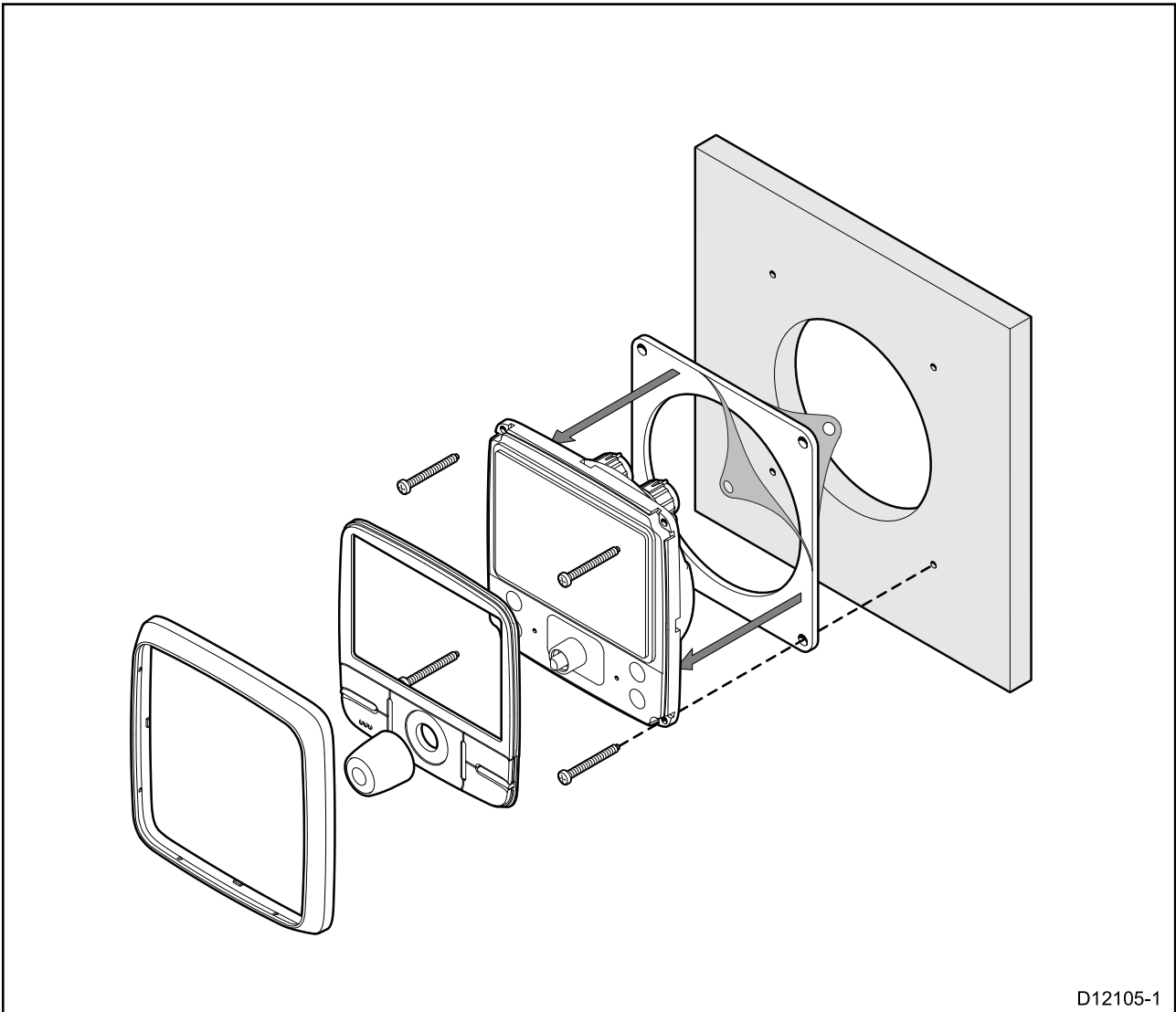
Before mounting the unit, ensure that you have:

- Selected a suitable location.
- Identified the cable connections and route that the cable will take.
- Detached the front bezel.

### p70 Mounting



## p70r Mounting



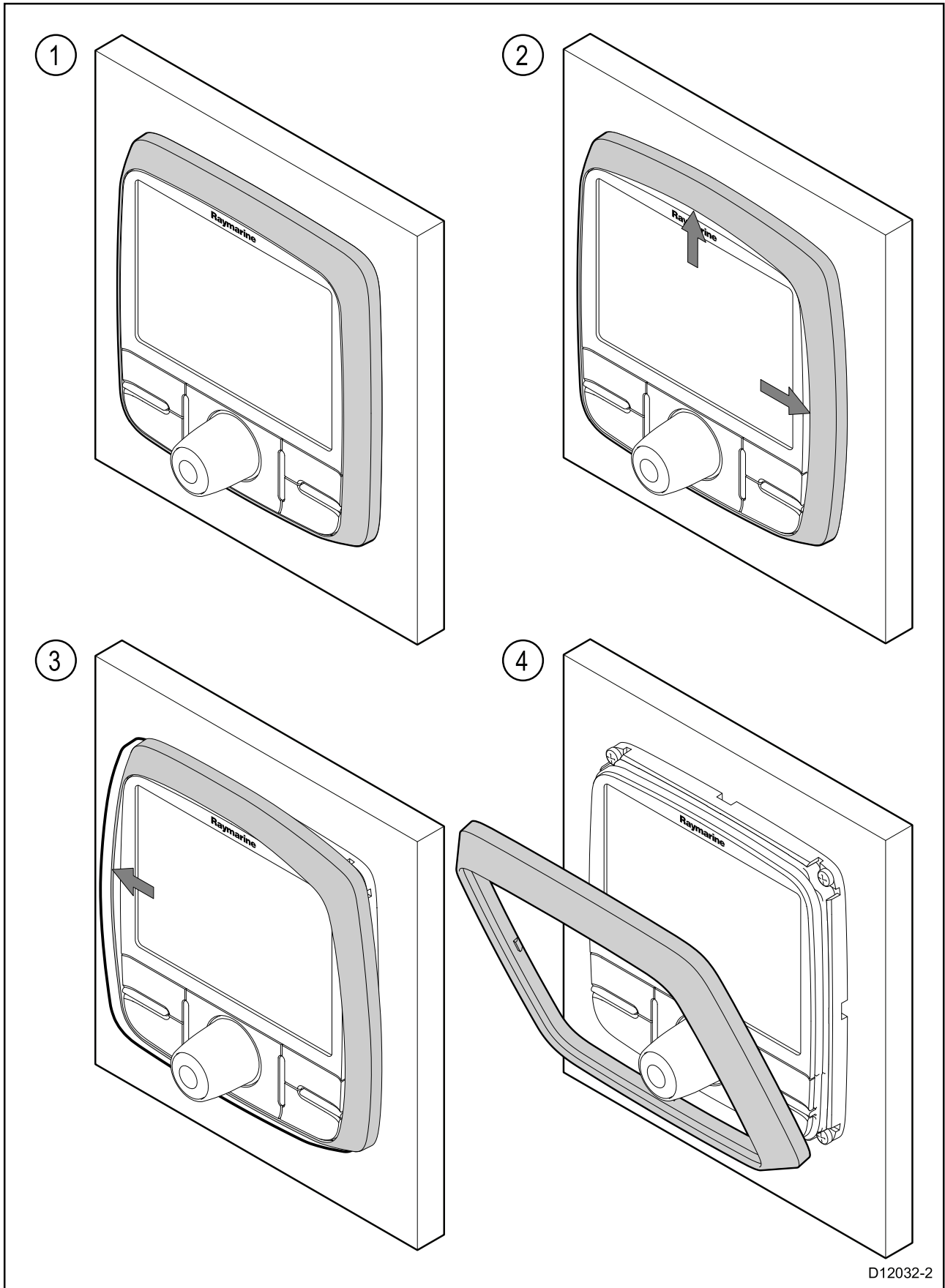
D12105-1

1. Check the selected location for the unit. A clear, flat area with suitable clearance behind the panel, is required.
2. Fix the appropriate cutting template supplied with the product, to the selected location, using masking or self-adhesive tape.
3. Using a suitable hole saw, make a pilot holes in each corner of the cut-out area.
4. Using a suitable saw, cut along the inside edge of the cut-out line.
5. Ensure that the unit fits into the removed area and then file around the cut edge until smooth.
6. Drill four holes as indicated on the template to accept the securing screws.
7. Peel the backing off of the gasket, and place the adhesive side of the gasket onto the display unit and press firmly onto the flange.
8. Connect cables to the unit.
9. Slide the unit into place and secure using screws provided.

**Note:** Drill, tap size, and tightening torque is dependent on the thickness and type of material the unit is to be mounted on.

## Front bezel

### Removing the front bezel



**Important:** Use care when removing the bezel. Do not use any tools to lever the bezel, doing so may cause damage.

1. Using your fingers pull the bezel away from the unit at the top and side, as shown in 2.  
The bezel will start to come away from the unit at the top and side.
2. Now pull the bezel away from the unit on the opposite side, as shown in 3.  
The bezel will now come free from the unit, as shown in 4.

## Chapter 4: Connections

### Chapter contents

- 4.1 General cabling guidance on page 28
- 4.2 Connections overview on page 29
- 4.3 SeaTalkng<sup>®</sup> power supply on page 29
- 4.4 Cable ferrite installation on page 35
- 4.5 SeaTalk<sup>ng</sup> connection on page 35
- 4.6 SeaTalk connection on page 38
- 4.7 NMEA 2000 network connection on page 39

## 4.1 General cabling guidance

### Cable types and length

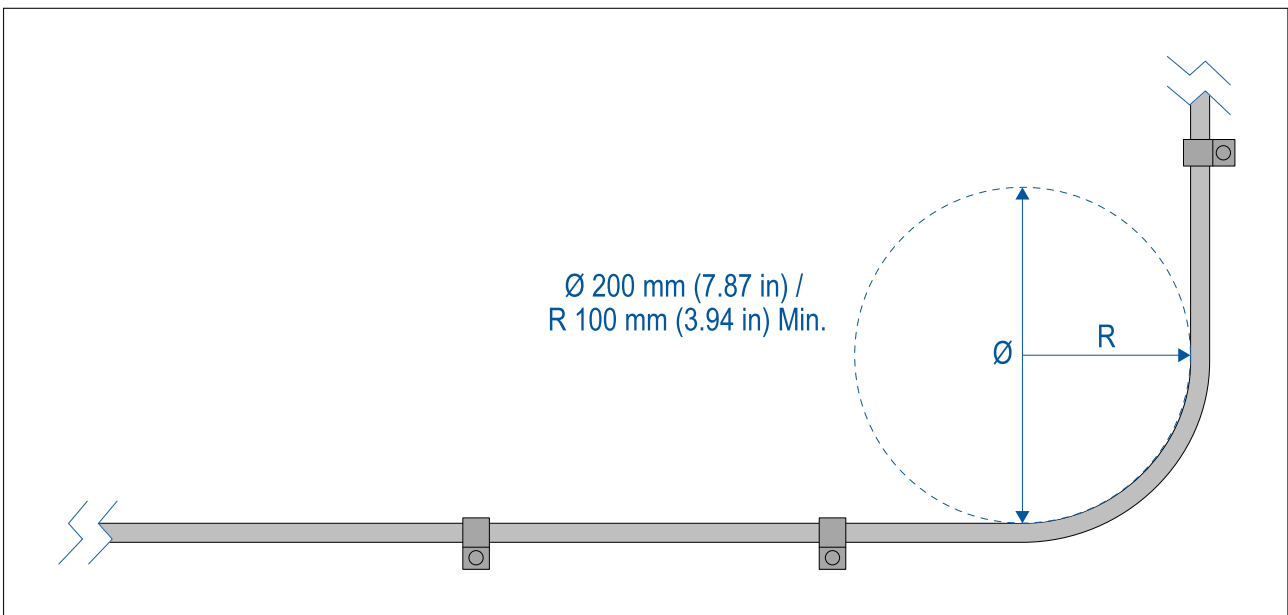
It is important to use cables of the appropriate type and length.

- 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 ( $\emptyset$ ) 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.

#### **Caution: Pulling cables**

Do NOT use cords or ropes, attached to cable connectors, to pull cables through restricted apertures (e.g. as in bulkheads), as this could cause damage to cables.

### Strain relief

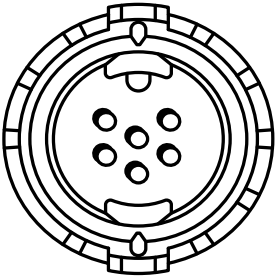
Use adequate strain relief for cabling to ensure that connectors are protected from strain and will not pull out under extreme sea conditions.

### Cable shielding

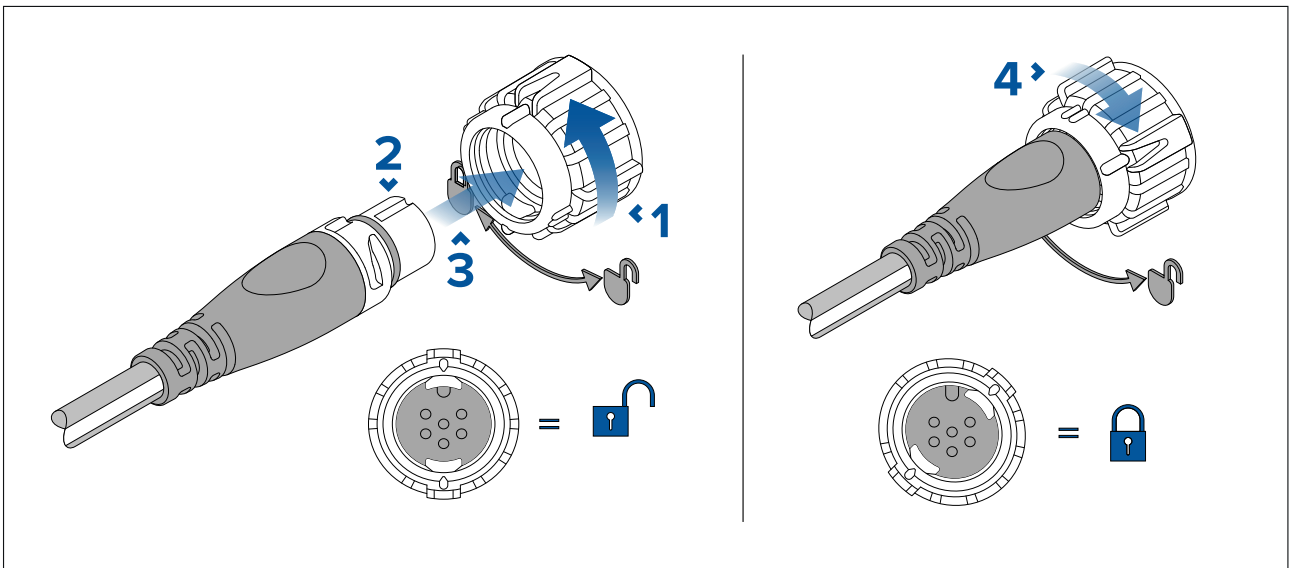
Ensure that cable shielding is not damaged during installation and that all cables are properly shielded.

## 4.2 Connections overview

Use the following information to help you identify the connections on your product.

Connector	Qty	Connects to:	Suitable cables
	2	<ol style="list-style-type: none"> <li>SeaTalkng® backbone</li> <li>NMEA 2000 backbone</li> <li>SeaTalk backbone</li> <li>SeaTalkng® device</li> </ol>	<ol style="list-style-type: none"> <li>SeaTalkng® spur cables</li> <li>SeaTalkng® to DeviceNet adaptor cable (A06045)</li> <li>SeaTalk to SeaTalkng® adaptor cable (A06073)</li> </ol>

### 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.

## 4.3 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:

- <sup>(1)</sup>direct connection to a 12 V dc battery
- connection via a 12 V dc distribution panel
- <sup>(2)</sup>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:**

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

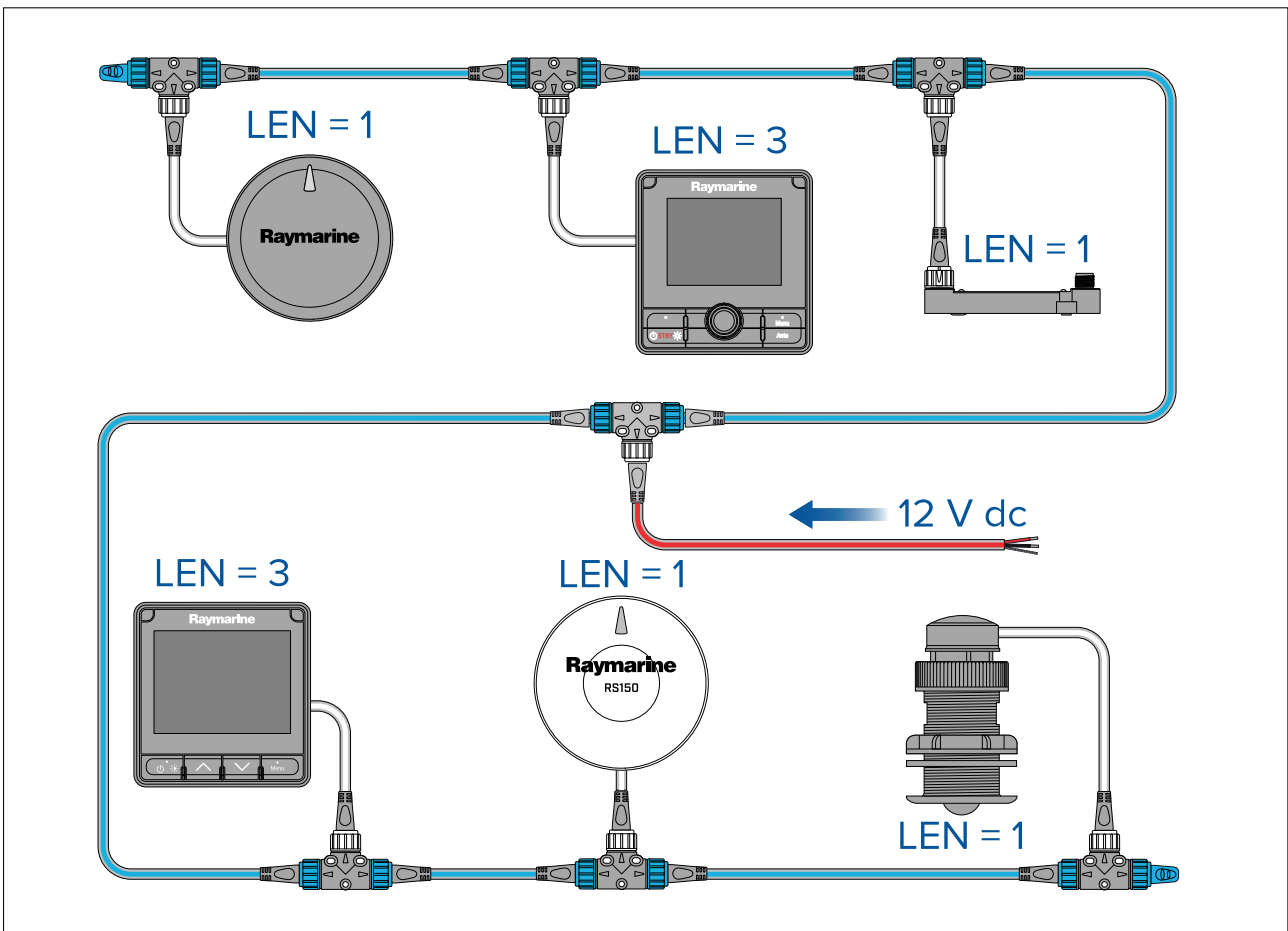
The SeaTalkng<sup>®</sup> power cable (A06049) is used to connect the SeaTalkng backbone to your chosen 12 V dc power supply.

### SeaTalkng<sup>®</sup> power connection point

The 12 V dc power supply is connected to a spur connection on the SeaTalkng<sup>®</sup> 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<sup>®</sup> 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.

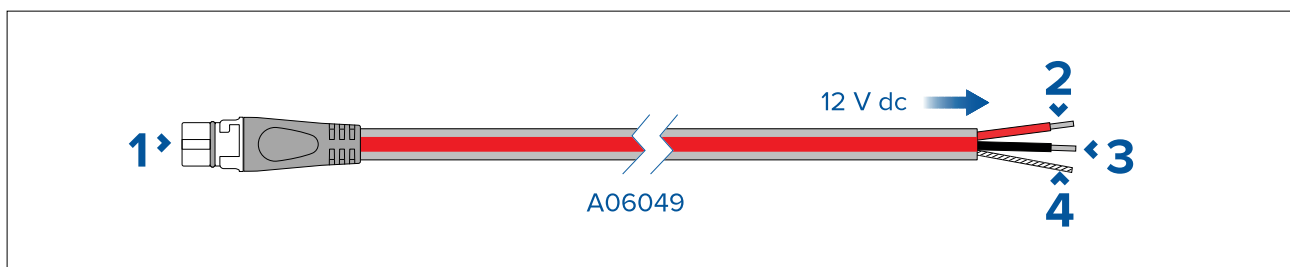
**Important:**

- 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)**

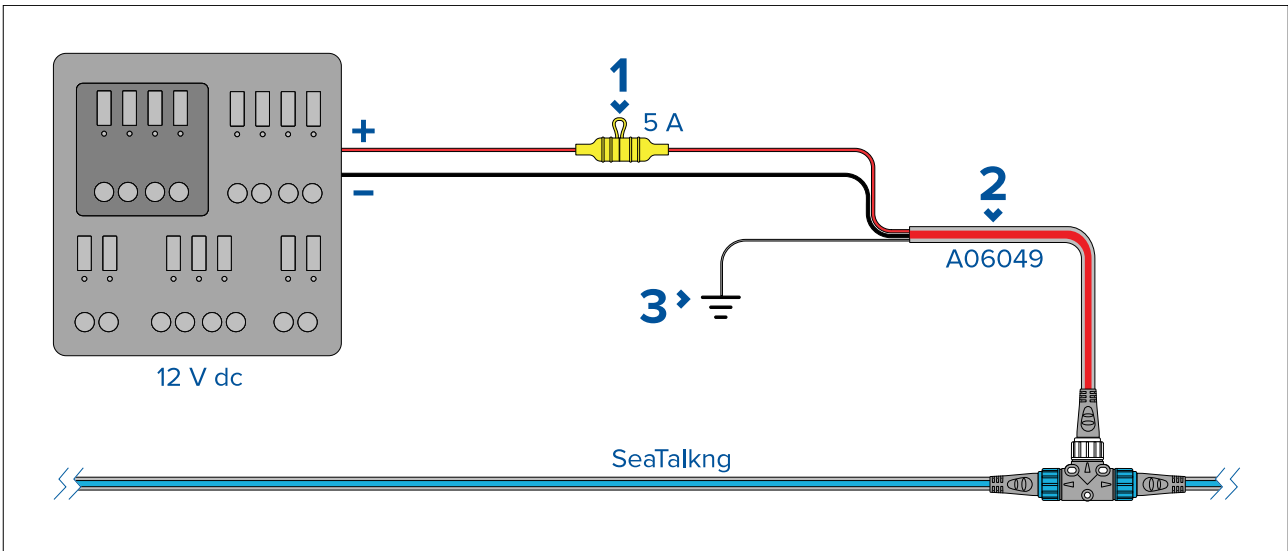
When powering the SeaTalkng® bus (backbone or 5-way connector) from a battery or distribution panel, the A06049 power cable must be used.

All 3 cores of the cable must be connected correctly:

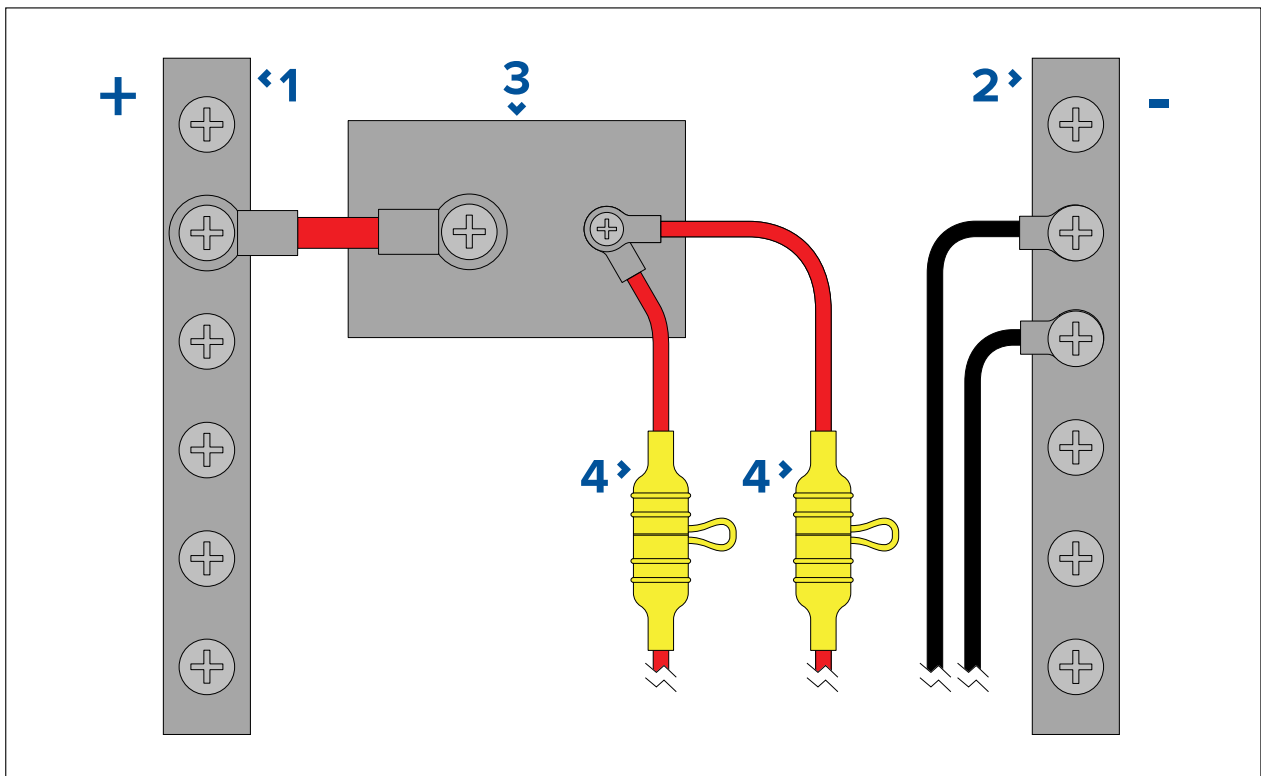


1. SeaTalkng® spur connector — connects to spur connection on the SeaTalkng® network.
2. + Red (positive) wire — connects to battery or distribution panel positive terminal.
3. – Black (negative) wire — connects to battery or distribution panel negative terminal.
4. Ground wire connects to RF ground 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<sup>®</sup> power cable.
  3. RF Ground connection point for drain wire.
- Ideally, the SeaTalkng<sup>®</sup> 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<sup>®</sup> power cable.
  - The distribution point should be fed from the vessel's primary power source by 8 AWG (8.36 mm<sup>2</sup>) 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.



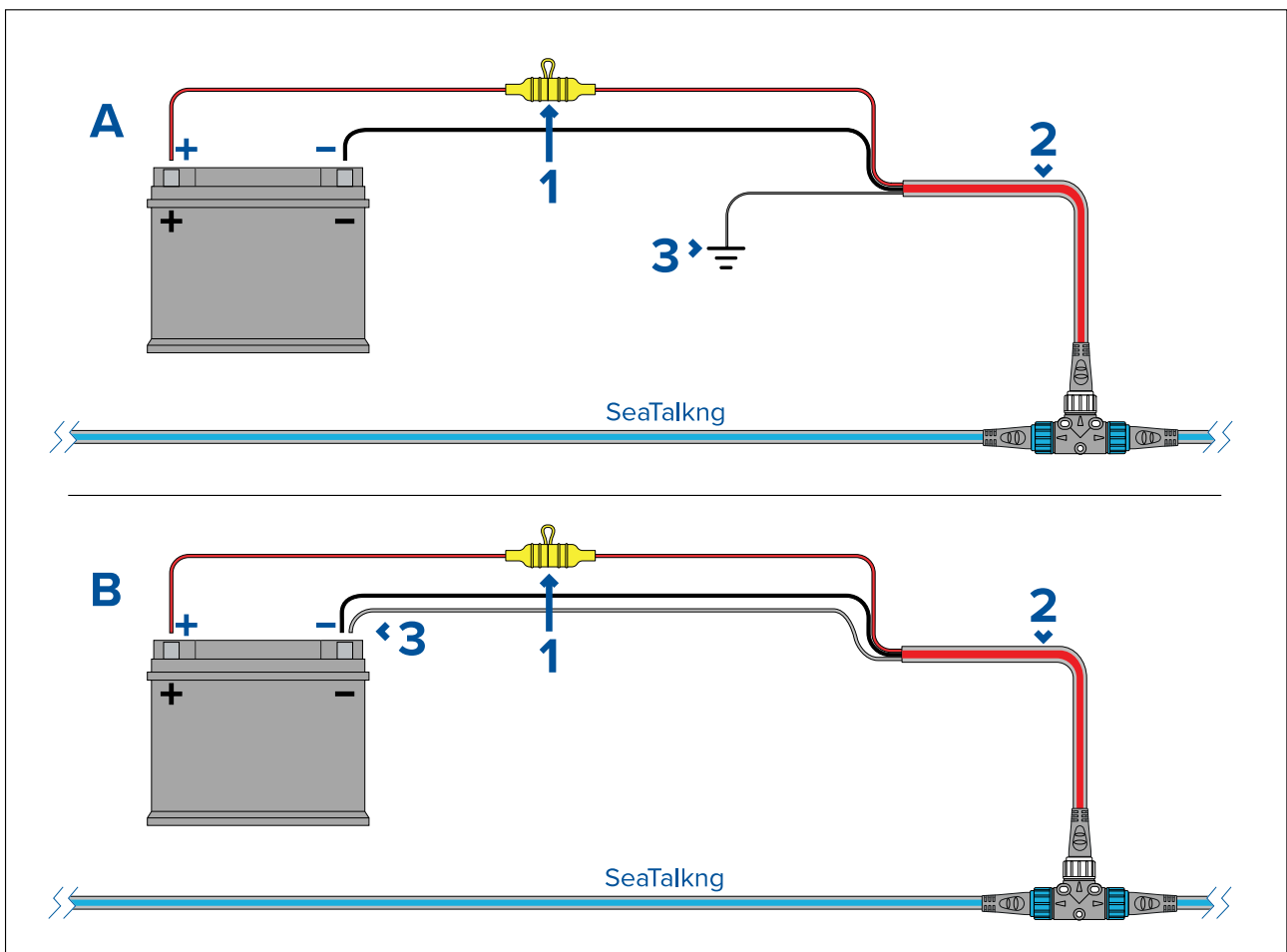
1. Positive (+) bar
2. Negative (-) bar
3. Circuit breaker
4. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).

### 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<sup>®</sup> 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<sup>®</sup> backbone's power connection.



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
2. SeaTalkng<sup>®</sup> 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<sup>®</sup> Power cable extension

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

- For power cable extensions, a **minimum** wire gauge of 16 AWG (1.31 mm<sup>2</sup>) 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<sup>2</sup>), or 12 AWG (3.31 mm<sup>2</sup>)).
- 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.

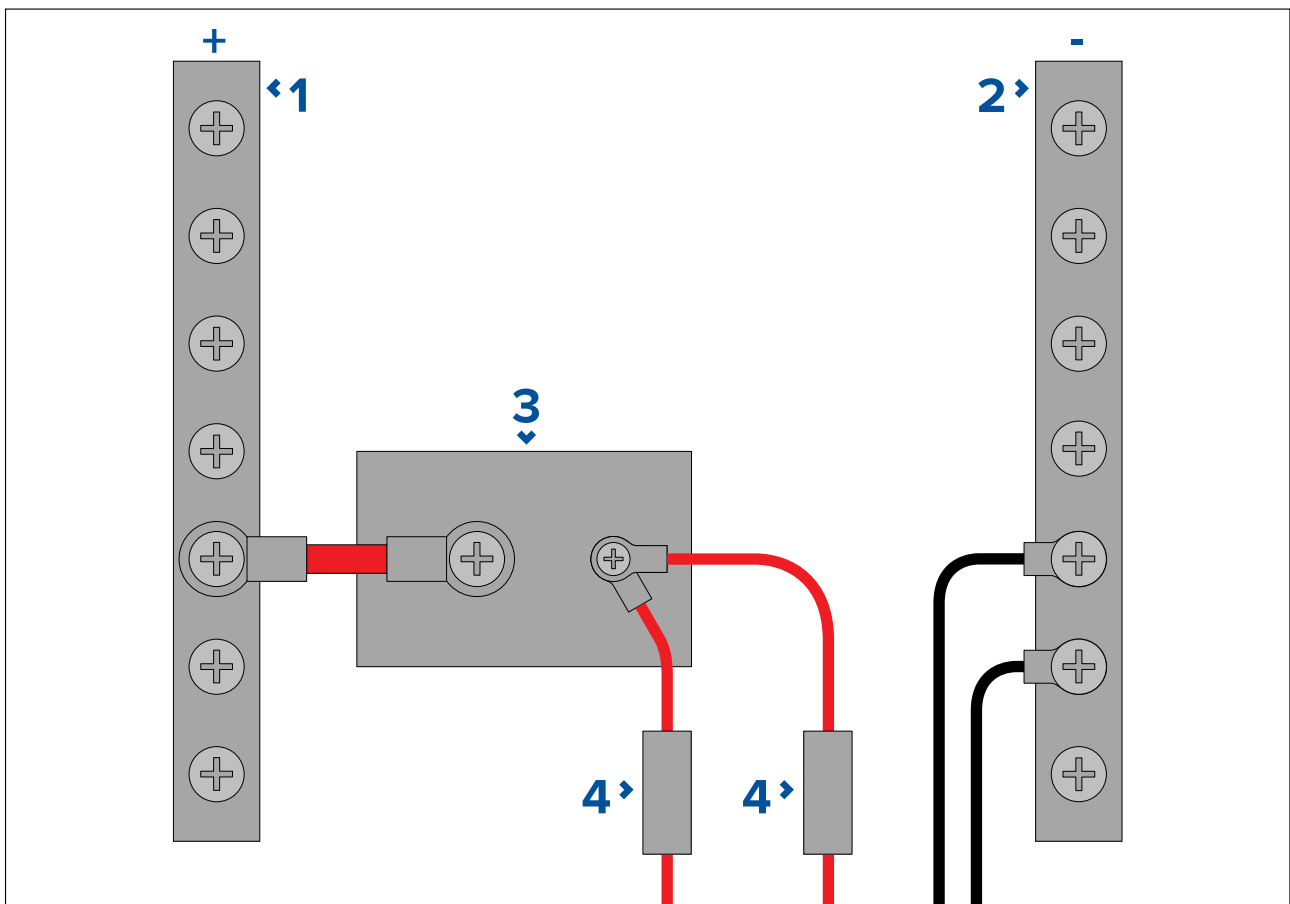
**More information**

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.

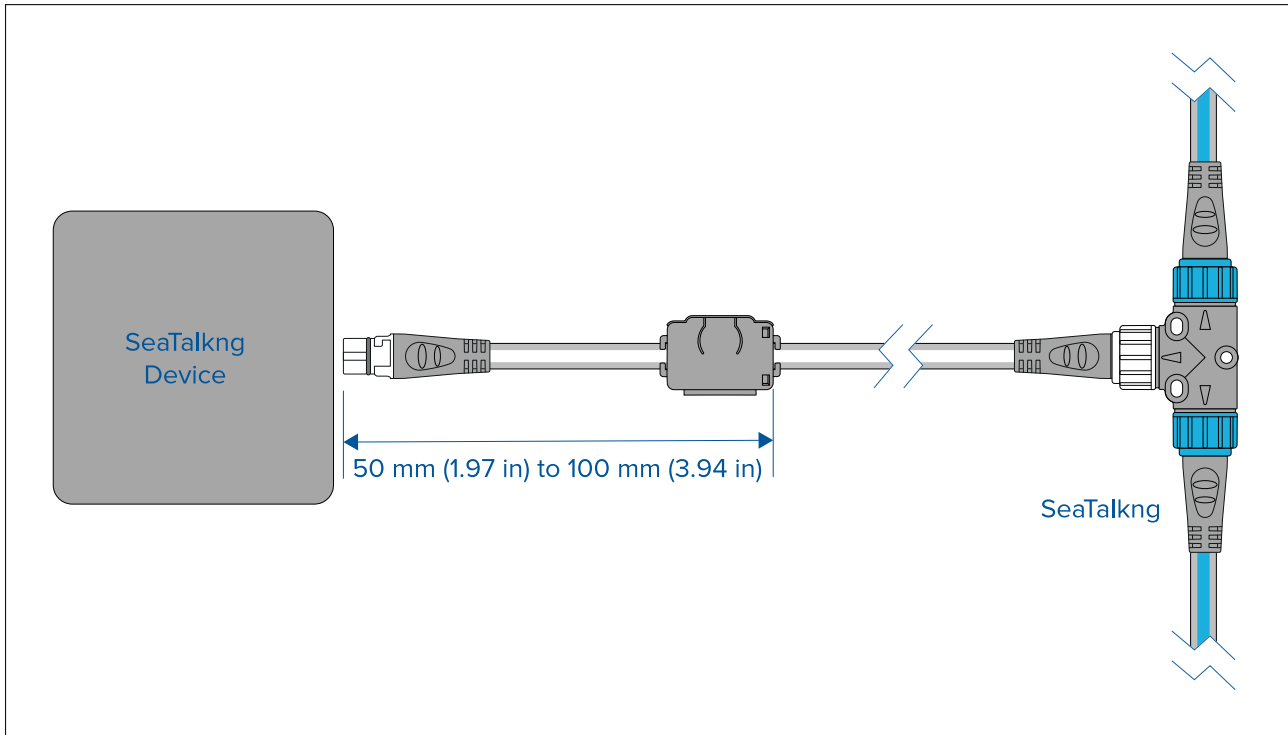


### Warning: Positive ground systems

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

## 4.4 Cable ferrite installation

Your product is supplied with a suppression ferrite clamp. To ensure EMC Compliance, the supplied ferrite must be fitted to the cable according to the following instructions.

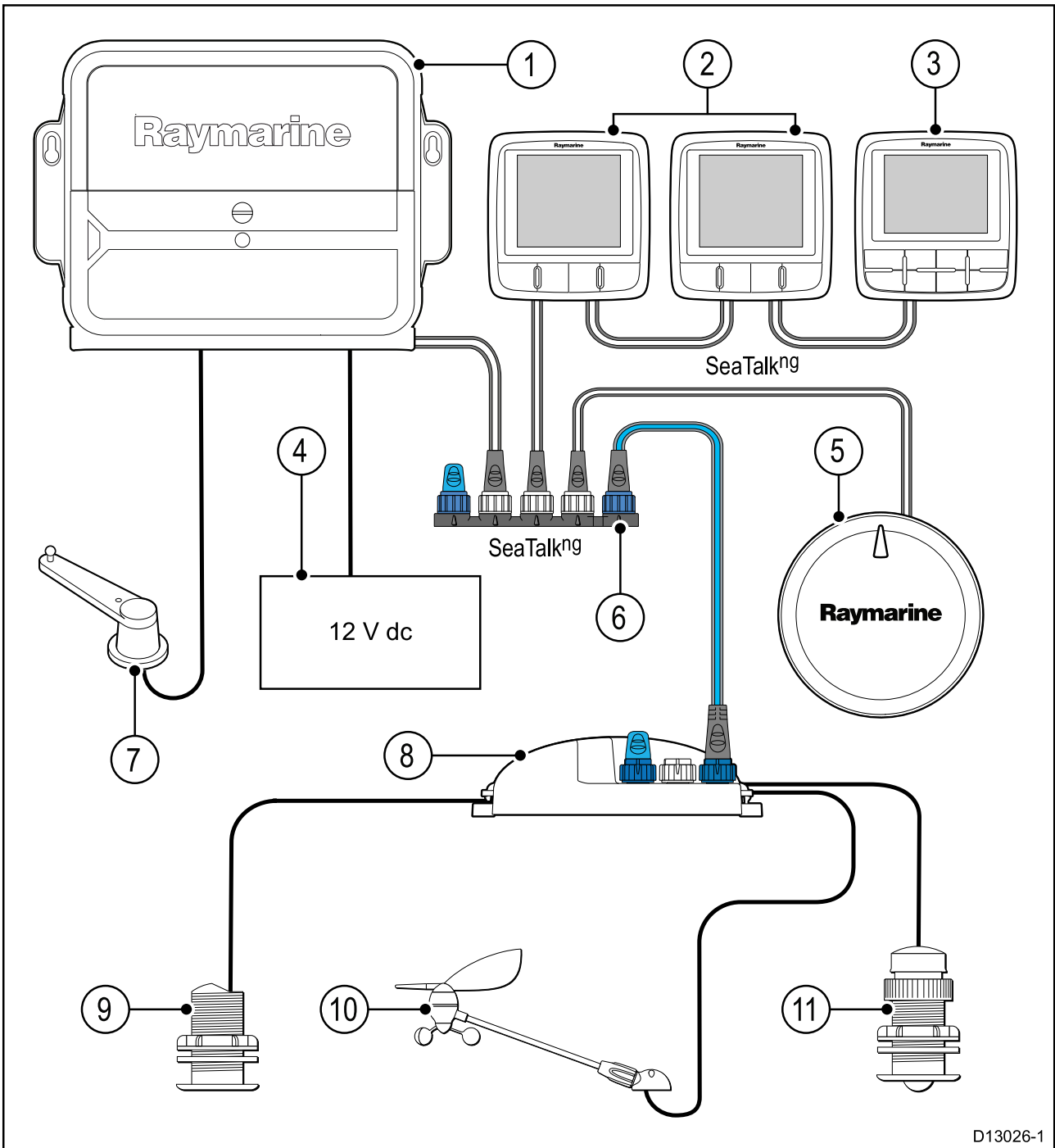


1. The ferrite must be fitted to the end of the SeaTalkng™ spur cable closest to the device.
2. The ferrite must be fitted at the distance specified in the illustration above.
3. Ensure a tight and secure fit so that the ferrite will not move up or down the cable.

## 4.5 SeaTalk<sup>ng</sup> connection

**Note:** In the example below, if an **ACU-100** was used, the SeaTalk<sup>ng</sup> network would require a dedicated 12 V dc power supply because the **ACU-100** does not supply power to the SeaTalk<sup>ng</sup> network.

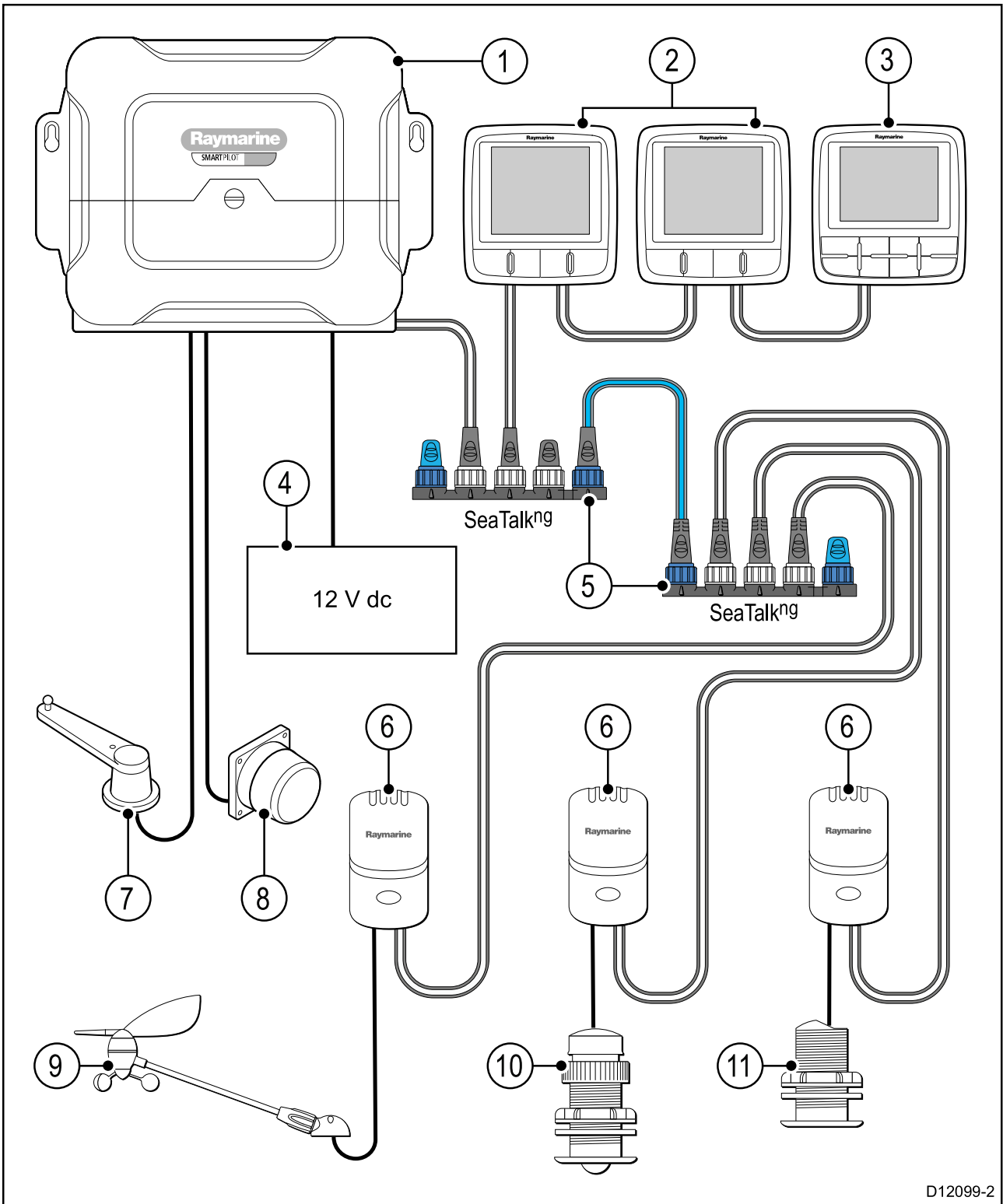
**Example: SeaTalk<sup>ng</sup> Evolution system with iTC-5**



D13026-1

1	ACU unit
2	2 x Instruments
3	Pilot controller
4	Vessel's 12 V dc power supply
5	EV unit
6	SeaTalk <sup>ng</sup> 5-way connector
7	Rudder reference transducer
8	iTC-5 converter
9	Depth transducer
10	Wind transducer
11	Speed transducer

**Example: SeaTalk<sup>ng</sup> SPX system with transducer pods**



D12099-2

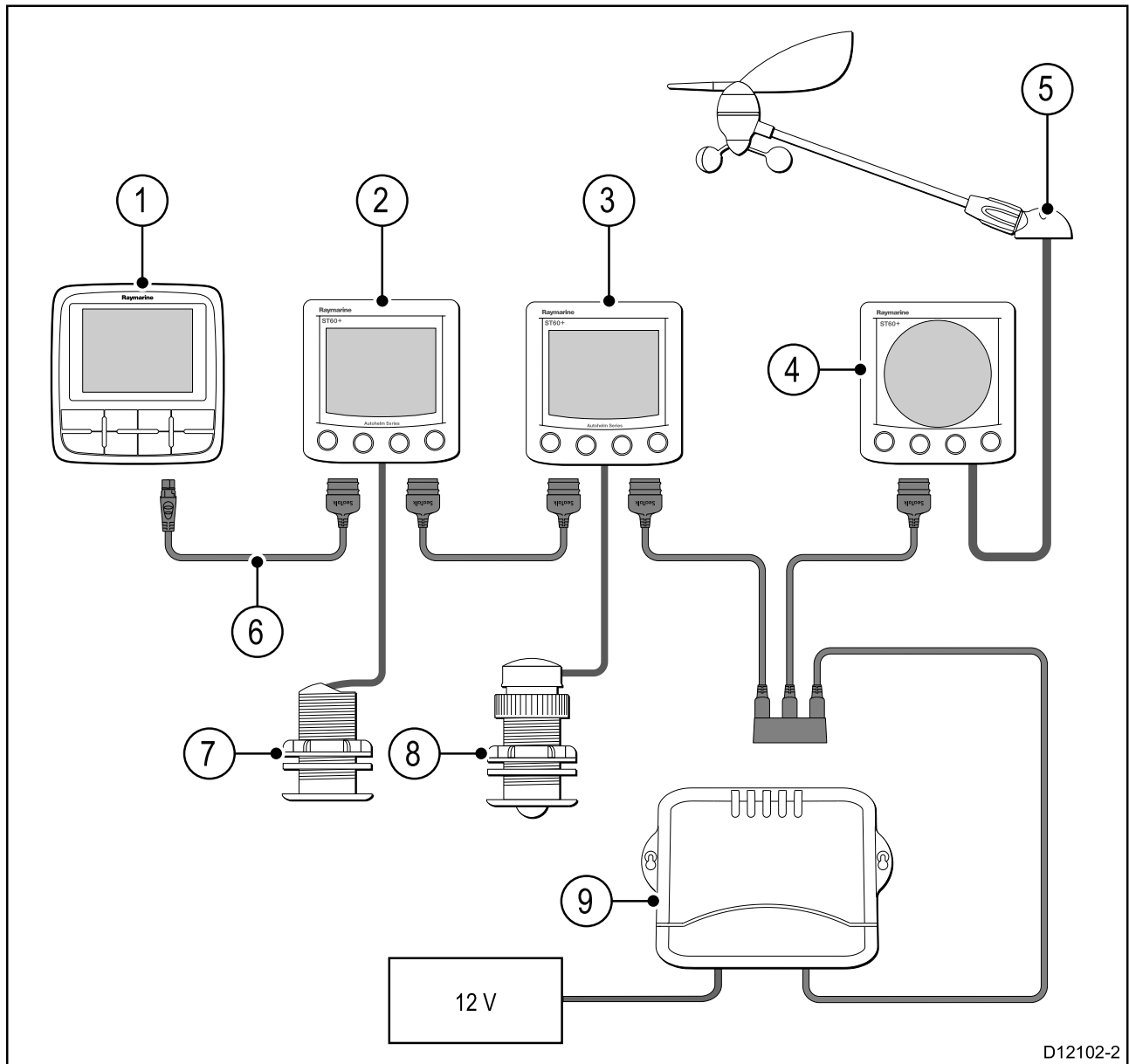
Item	Description
1	SPX (supplying 12V to SeaTalk <sup>ng</sup> network.)
2	2 x Instruments
3	p70 / p70R Pilot controller
4	Vessel's 12 V dc power supply
5	SeaTalk <sup>ng</sup> 5-way connectors with terminators
6	Transducer pods
7	Rudder reference transducer
8.	Fluxgate compass



Item	Description
9	Wind transducer
10	Speed transducer
11	Depth transducer

## 4.6 SeaTalk connection

Connections to a SeaTalk network are made using a SeaTalk to SeaTalk<sup>ng</sup> adaptor cable (not supplied).



Item	Description
1.	p70 Pilot controller
2.	ST60+ Depth instrument
3.	ST60+ Speed instrument
4.	ST60+ Wind instrument
5.	Wind transducer
6.	SeaTalk <sup>ng</sup> to SeaTalk Adaptor cable
7.	Depth transducer

Item	Description
8.	Speed transducer
9.	Course computer (supplying 12V to SeaTalk network.)

For SeaTalk cables and extensions, use Raymarine SeaTalk cable accessories.

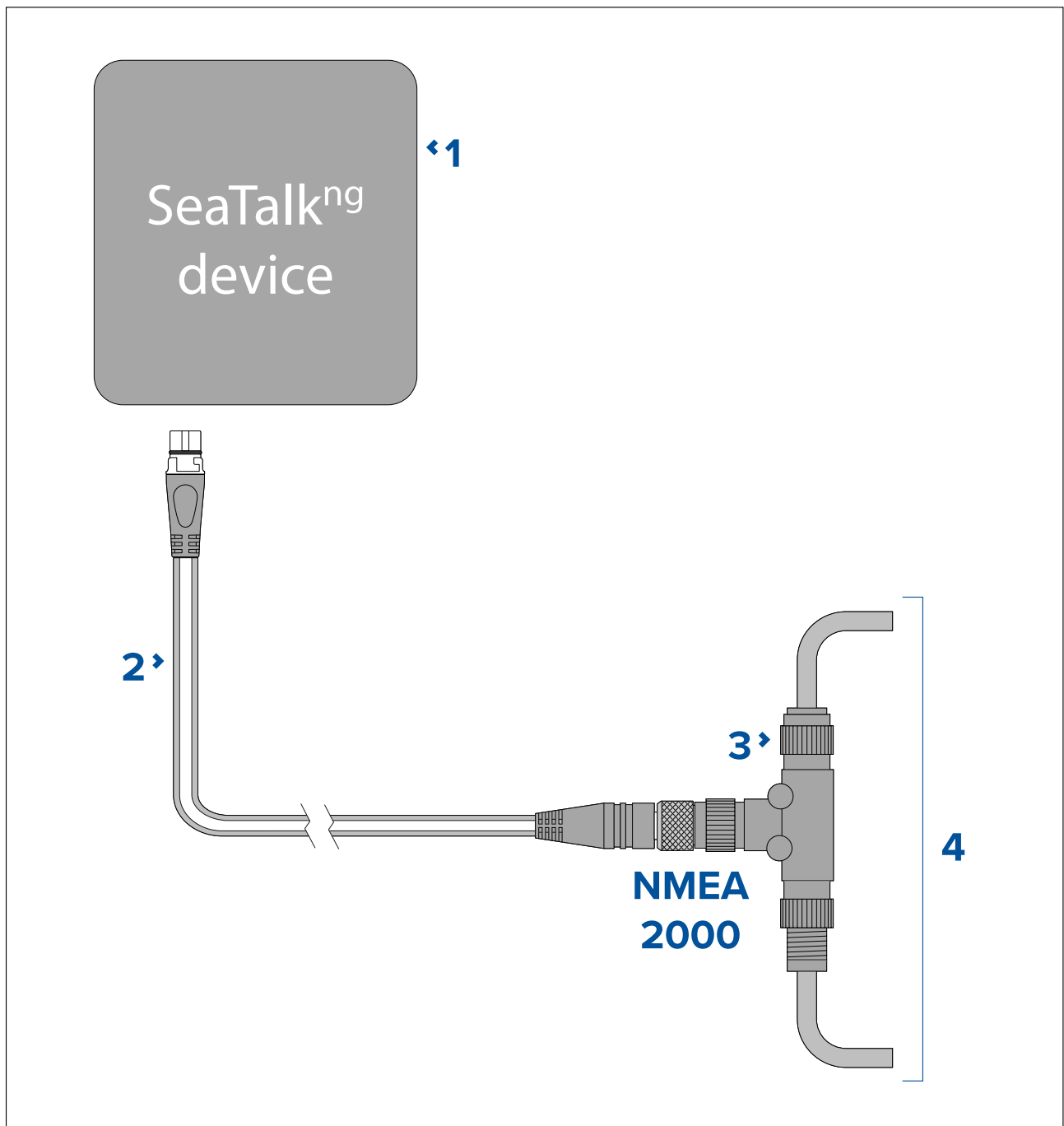
### SeaTalk power protection

The power supply must be protected by a 5 A fuse or a circuit breaker providing equivalent protection.

Raymarine recommends that the power is connected to a SeaTalk system in such a way that the current drawn on each side of the power connection point is equal.

## 4.7 NMEA 2000 network connection

Your **SeaTalk<sup>ng</sup>** device can be connected to a **DeviceNet / NMEA 2000** network.



1. **SeaTalk<sup>ng</sup>** device
2. **SeaTalk<sup>ng</sup>** to **DeviceNet** adaptor cable (A06045)
3. **DeviceNet** T-piece
4. **NMEA 2000** backbone

## Chapter 5: Maintenance

### Chapter contents

- 5.1 Routine equipment checks on page 42
- 5.2 Product cleaning on page 42
- 5.3 Cleaning the display screen on page 42
- 5.4 Cleaning the display case on page 42
- 5.5 Cleaning the sun cover on page 42

## 5.1 Routine equipment checks

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

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

## 5.2 Product cleaning

Best cleaning practices.

When cleaning products:

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

## 5.3 Cleaning the display screen

A coating is applied to the display screen. This makes it water repellent, and prevents glare. To avoid damaging this coating, follow this procedure:

1. Switch off the power to the display.
2. Rinse the screen with fresh water to remove all dirt particles and salt deposits.
3. Allow the screen to dry naturally.
4. If any smears remain, very gently wipe the screen with a clean microfibre cleaning cloth.

## 5.4 Cleaning the display case

The display is a sealed unit and does not require regular cleaning. If it is necessary to clean the display, follow this basic procedure:

1. Switch off the power to the display.
2. Wipe the case with a clean, lint-free cloth.
3. If necessary, use a mild detergent to remove grease marks.

## 5.5 Cleaning the sun cover

The supplied sun cover features an adhesive surface. In certain conditions unwanted contaminants may stick to this surface. To avoid damaging the monitor display, clean the sun cover regularly following this procedure:

1. Carefully remove the sun cover from the display.
2. Rinse the sun cover with fresh water to remove all dirt particles and salt deposits.
3. Allow the sun cover to dry naturally.

## Chapter 6: System checks and troubleshooting

### Chapter contents

- [6.1 Troubleshooting on page 44](#)
- [6.2 Power up troubleshooting on page 44](#)
- [6.3 System data troubleshooting on page 45](#)
- [6.4 Miscellaneous troubleshooting on page 45](#)

## 6.1 Troubleshooting

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

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

## 6.2 Power up troubleshooting

### Product does not turn on or keeps turning off

- **Blown fuse / tripped breaker.**
  1. Check condition of the SeaTalkng backbone power connection 5 A fuse and if applicable distribution panel breaker, replace if necessary.
  2. If the fuse keeps blowing check for cable damage, broken connector pins or incorrect wiring.
- **Poor / damaged / insecure SeaTalkng cabling and connections**
  1. Check the vessel's battery voltage and the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion. Replace if necessary.
  2. Check the SeaTalkng power cable and power supply connection for signs of damage or corrosion, and replace if necessary.
  3. Check the SeaTalkng backbone cabling and connectors for signs of damage or corrosion, and replace if necessary.
  4. Check the SeaTalkng power, backbone and product spur cable connectors are correctly orientated, fully inserted into the spur connectors and in the locked position.
  5. With the display turned on, try flexing the display's spur cable near to the display's connector to see if this causes the display to restart or lose power. Replace if necessary.
  6. With the product under load, using a multi-meter, check for high voltage drop across all connectors / fuses etc, and replace if necessary.
- **Incorrect power connection**
  1. The power supply may be wired incorrectly, ensure the SeaTalkng power connection instructions have been followed and that the backbone has one single source of 12 V dc power..

### Product will not start up (restart loop)

- **Power supply and connection**
  1. Refer to 'Product does not turn on or keeps turning off' information above.
- **Software corruption**
  1. In the unlikely event that the product's software has become corrupted, try downloading and installing the latest software from the Raymarine website. refer to your Multifunction Display's operation instructions for details on updating software for SeaTalkng devices.
  2. In the case of a restart loop attempt a factory reset using the following instructions:  
[p.44 – Performing a Factory Reset](#)

## Performing a Factory Reset

To reset your unit to factory default settings follow the steps below.

**Note:** Performing a factory reset will erase all saved data and customized settings.

1. Press the **Menu** button.
2. Select **Set Up**.
3. Select **Factory Reset**.

#### 4. Select **Yes**.

Your unit will now reset itself to factory default settings.

## 6.3 System data troubleshooting

Aspects of the installation can cause problems with the data shared between connected equipment. Such problems, their possible causes and solutions are described here.

### **Transducer, instrument, engine or other system data is unavailable at all displays.**

- **Data is not being received at the display.**

1. Check the relevant product and or network cabling and connections (e.g. SeaTalkng backbone) for signs of damage or corrosion, and replace if necessary.

- **Data source (e.g. instrument display or engine interface) is not operating.**

1. Check the source of the missing data (e.g. transducer or engine interface) for signs of damage or corrosion, and replace if necessary.
2. If possible, check that the data source is correctly powered and operational.
3. Refer to the instructions provided with the equipment to ensure it has been correctly installed.

- **Software mismatch between equipment may prevent communication.**

1. Ensure all products have the latest software installed.

### **Transducer, instrument or other system data is missing from some but not all displays.**

- **Connection problem.**

1. Check the product's SeaTalkng spur cable and connections for signs of damage or corrosion, and replace if necessary.

- **Software corruption.**

1. In the unlikely event that the product's software has become corrupted, try downloading and installing the latest software from the Raymarine website. refer to your Multifunction Display's operation instructions for details on updating software for SeaTalkng devices.
2. In the case of a restart loop attempt a factory reset using the following instructions:  
[p.44 — Performing a Factory Reset](#)

- **Software mismatch between equipment may prevent communication.**

1. Ensure all products have the latest software installed.

### **Incorrect data reported.**

- Transducer calibration error

1. Switch off power supply to system and switch back on again.
2. Re-calibrate or re-configure data source following instructions provided with the relevant devices.

## 6.4 Miscellaneous troubleshooting

Miscellaneous problems and their possible causes and solutions are described here.

### **Display behaves erratically.**

Frequent unexpected resets or system crashes and other erratic behavior:

- **Intermittent problem with power to the display.**

1. Check relevant fuses and breakers.
2. Check that the power supply cable is sound and that all connections are tight and free from corrosion.
3. Check that the power source is of the correct voltage and sufficient current.

- **Software mismatch between equipment may prevent communication.**

1. Ensure all products have the latest software installed.

- **Corrupt data / other unknown issue.**



1. In the unlikely event that the product's software has become corrupted, try downloading and installing the latest software from the Raymarine website. refer to your Multifunction Display's operation instructions for details on updating software for SeaTalkng devices.
2. Check the data source for correct operation.

## Chapter 7: Technical specification

### Chapter contents

- [7.1 Technical specification on page 48](#)

## 7.1 Technical specification

Nominal supply voltage	12 V dc
Operating voltage range	9 to 16 V dc
Current	132 mA
Power consumption	1.6 W
LEN (Refer to the SeaTalk <sup>ng</sup> reference manual for further information.)	3
Environmental	<p>Operating temperature: -25°C to 55°C (-13°F to 131°F)</p> <p>Storage temperature range: -30°C to 70°C (-22°F to 158°F)</p> <p>Relative humidity: max: 93%</p> <p>Water proof to IPX6</p>
Display screen	<p>TFT LCD display, 16bit color (64k colors)</p> <p>Resolution: 320x240</p> <p>Brightness: 700 cd/m<sup>2</sup></p>
Data connections	<p>2 x SeaTalk<sup>ng</sup> ports (fulling compliant with NMEA2000 &amp; SeaTalk specifications).</p>
Conformance	<ul style="list-style-type: none"> <li>• Europe 2004/108/EC</li> <li>• Australia and New Zealand C-Tick, compliance level 2</li> </ul>

## Chapter 8: Technical support

### Chapter contents

- 8.1 Raymarine product support and servicing on page 50
- 8.2 Learning resources on page 51

## 8.1 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](mailto:emea.service@raymarine.com)
- Tel: +44 (0)1329 246 932

#### **United States (US):**

- E-Mail: [rm-usrepair@flir.com](mailto: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](mailto:aus.support@raymarine.com)
- Tel: +61 2 8977 0300

#### **France (Raymarine subsidiary):**

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

#### **Germany (Raymarine subsidiary):**

- E-Mail: [support.de@raymarine.com](mailto:support.de@raymarine.com)
- Tel: +49 40 237 808 0

#### **Italy (Raymarine subsidiary):**

- E-Mail: [support.it@raymarine.com](mailto:support.it@raymarine.com)
- Tel: +39 02 9945 1001

#### **Spain (Authorized Raymarine distributor):**

- E-Mail: [sat@azimut.es](mailto:sat@azimut.es)

- Tel: +34 96 2965 102

**Netherlands (Raymarine subsidiary):**

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

**Sweden (Raymarine subsidiary):**

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

**Finland (Raymarine subsidiary):**

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

**Norway (Raymarine subsidiary):**

- E-Mail: [support.no@raymarine.com](mailto:support.no@raymarine.com)
- Tel: +47 692 64 600

**Denmark (Raymarine subsidiary):**

- E-Mail: [support.dk@raymarine.com](mailto:support.dk@raymarine.com)
- Tel: +45 437 164 64

**Russia (Authorized Raymarine distributor):**

- E-Mail: [info@mikstmarine.ru](mailto:info@mikstmarine.ru)
- Tel: +7 495 788 0508

## Viewing product information

1. Press the **Menu** button.
2. Select **Set-up**.
3. Select **Diagnostics**.
4. Select **About Display**.  
A range of information is displayed, including the software version and Serial number.
5. Use the **Up** and **Down** buttons to cycle through the information.

## 8.2 Learning resources

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

### Video tutorials

**Raymarine official channel on YouTube:**

- [YouTube](#)

### Training courses

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

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

### Technical support forum

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

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



## Chapter 9: Spares and accessories

### Chapter contents

- [9.1 Spares and accessories on page 54](#)
- [9.2 SeaTalkng<sup>®</sup> cables and accessories on page 54](#)



## 9.1 Spares and accessories

Part number	Description
R22168	Spare bezel
R22169	p70 Sun cover
R22174	p70r Sun cover

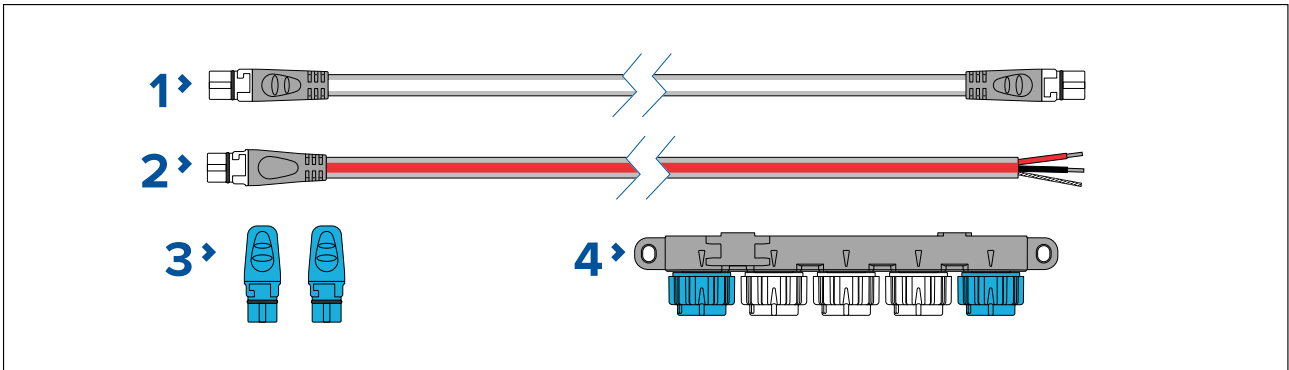
## 9.2 SeaTalkng<sup>®</sup> cables and accessories

SeaTalkng<sup>®</sup> cables and accessories for use with compatible products.

### SeaTalkng<sup>®</sup> kits

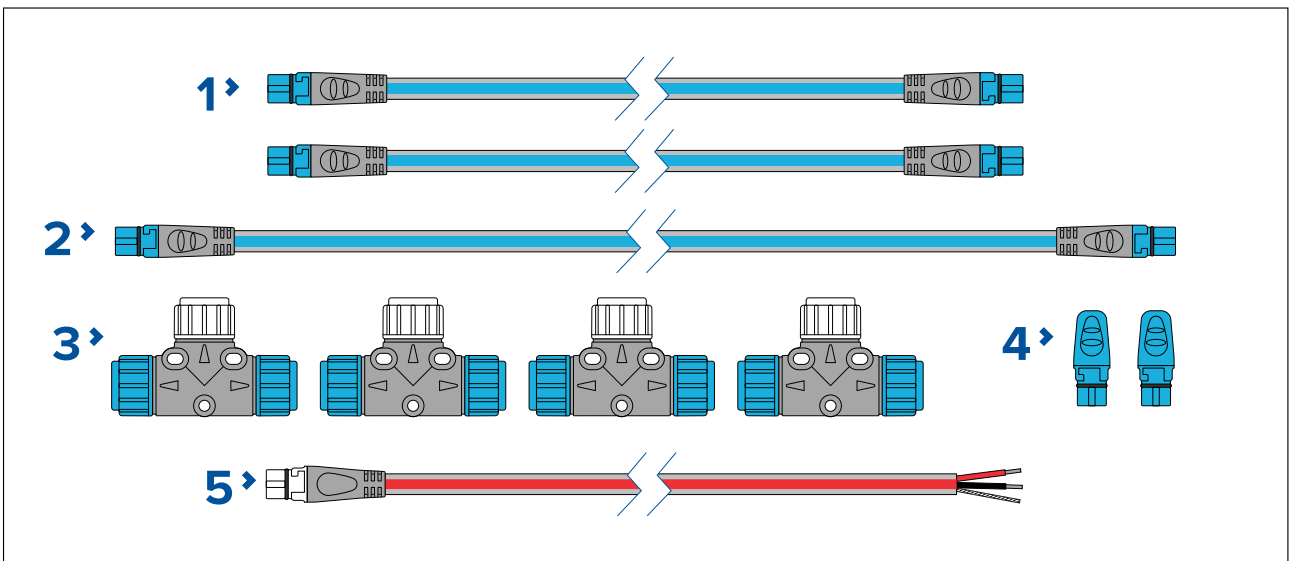
SeaTalkng kits enable you to create a simple SeaTalkng backbone.

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



- 1 x 3 m (9.8 ft) Spur cable (**A06040**). Used to connect device to the SeaTalkng backbone.
- 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.
- 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.
- 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.

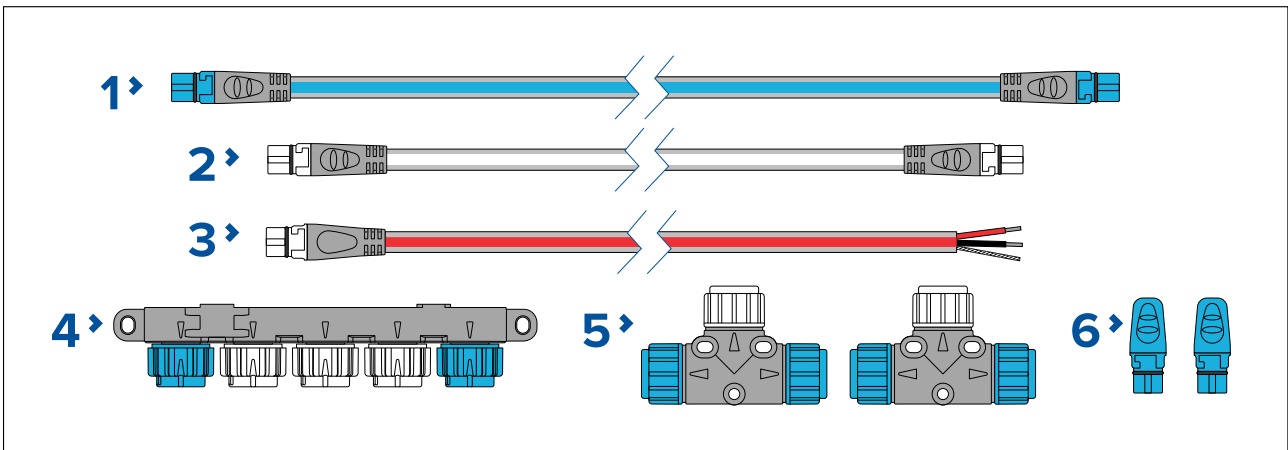
**Backbone kit (A25062)** consists of:



- 2 x 5 m (16.4 ft) Backbone cables (**A06036**). Used to create and extend the SeaTalkng backbone.
- 1 x 20 m (65.6 ft) Backbone cable (**A06037**). Used to create and extend the SeaTalkng backbone.
- 4 x T-piece (**A06028**). Each T-piece allows connection of one SeaTalkng device. Multiple T-pieces can be 'daisy chained' together.

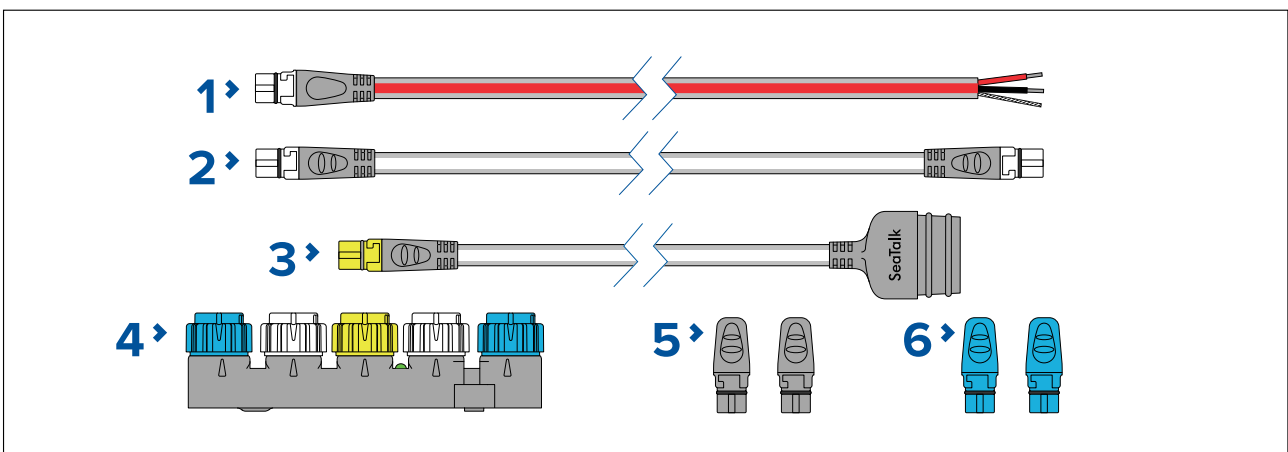
4. 2 x Backbone terminators (**A06031**). Terminators must be fitted to both ends of the SeaTalkng backbone.
5. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.

**Evolution autopilot cable kit (R70160)** consists of:



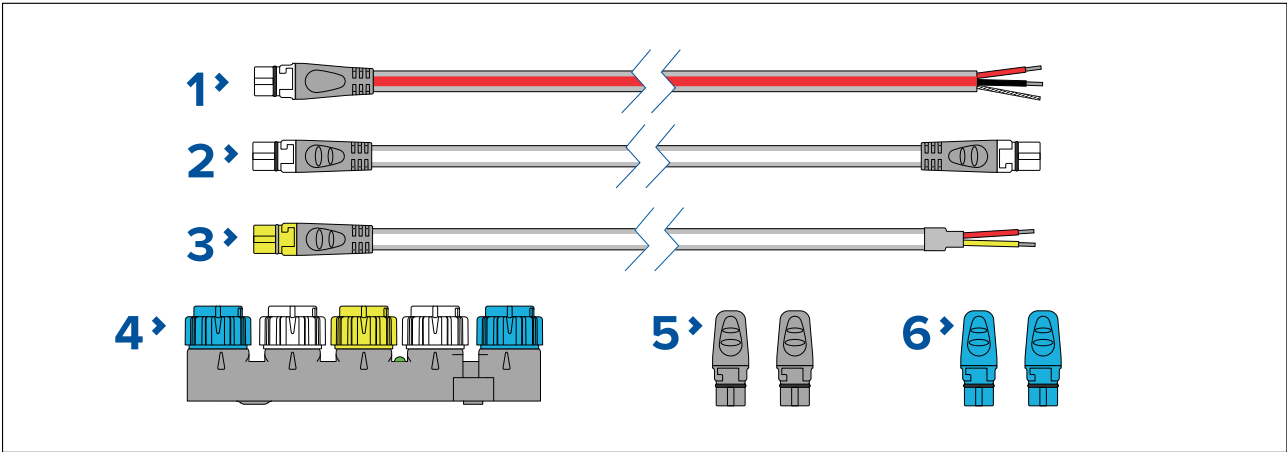
1. 1 x 5 m (16.4 ft) Backbone cable (**A06036**). Used to create and extend the SeaTalkng backbone.
2. 1 x 1 m (3.3 ft) Spur cable (**A06040**). Used to connect device to the SeaTalkng backbone.
3. 1 x 2 m (6.6 ft) Power cable (**A06049**). Used to provide 12 V dc power to the SeaTalkng backbone.
4. 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.

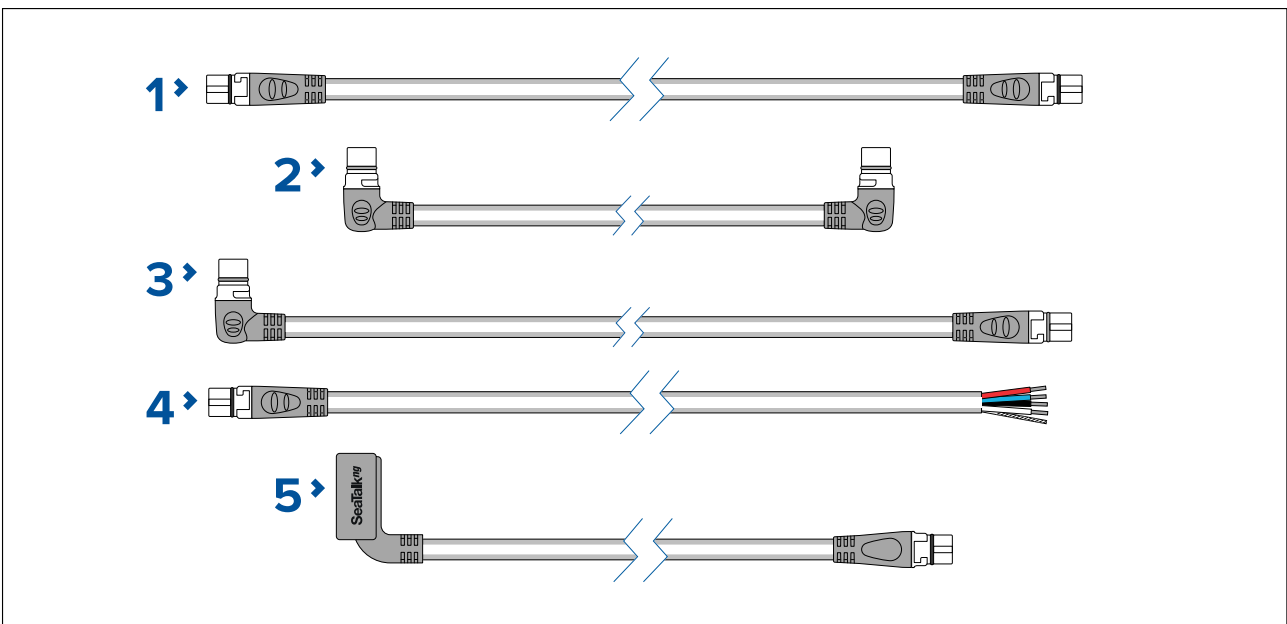
**NMEA 0183 VHF 2 wire to SeaTalkng converter kit (E70196)** consists of:



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<sup>®</sup> spur cables

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

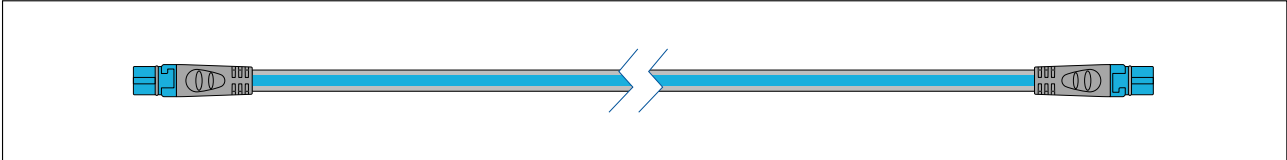


1. SeaTalkng spur cables:
  - 0.4 m (1.3 ft) Spur cable (**A06038**).
  - 1 m (3.3 ft) Spur cable (**A06039**).
  - 3 m (9.8 ft) Spur cable (**A06040**).
  - 5 m (16.4 ft) Spur cable (**A06041**).
2. 0.4 m (1.3 ft) Elbow (right angled) to elbow spur cable (**A06042**). Used in confined spaces where a 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

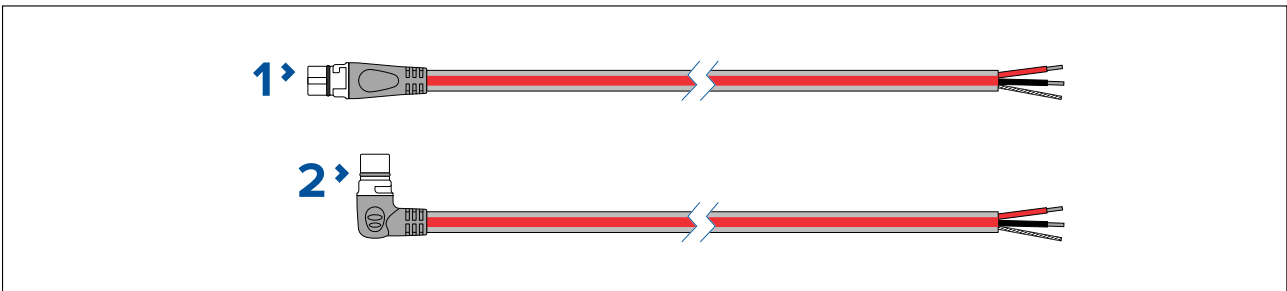
SeaTalkng backbone cables are used to create or extend a SeaTalkng backbone.



- 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

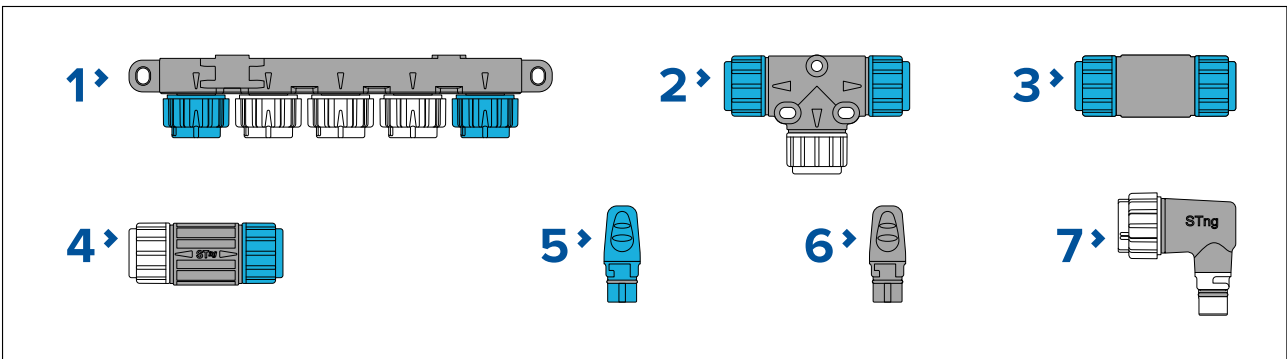
SeaTalkng power cables are used to provide the SeaTalkng backbone with a single 12 V dc power source. The power connection must include a 5 amp inline fuse (not supplied).



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.

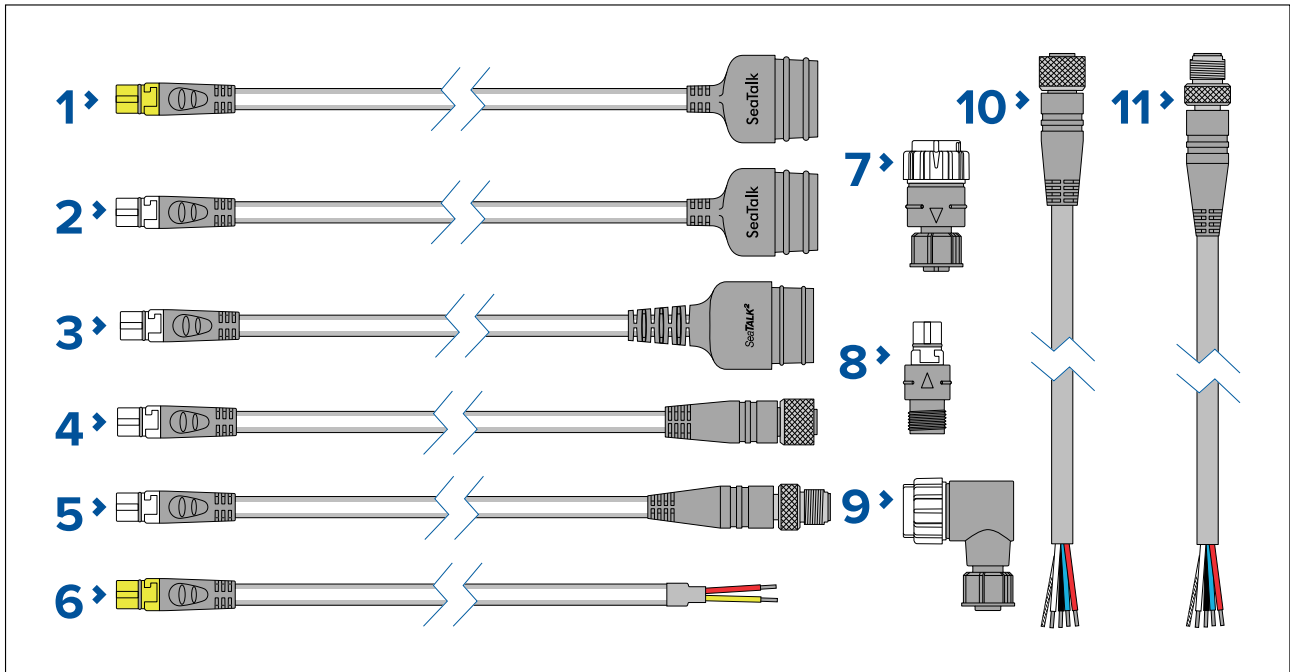


1. 5-Way connector (**A06064**). Each connector block allows connection of up to 3 SeaTalkng devices. Multiple connector blocks can be 'daisy chained' together.
2. T-piece (**A06028**). Each T-piece allows connection of one SeaTalkng device. Multiple T-pieces can be 'daisy chained' together.
3. Backbone 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 Supported NMEA 2000 PGN list

## Administration PGNs

- **59392** — ISO Acknowledge (Receive / Transmit)
- **59904** — ISO Request (Receive)
- **60928** — ISO Address Claim (Receive / Transmit)
- **126208** — NMEA — Request, Commanded, Acknowledged Group Function (Receive / Transmit)
- **126464** — PGN Transmit and Receive List (Receive / Transmit)
- **126996** — Product Information (Receive / Transmit)

Raymarine® provides field programmability of the Device and System Instances within PGN 60928 which can be commanded via use of PGN 126208 as required by the latest **NMEA 2000** standard.

## Data PGNs

- **126992** — System Time (Receive / Transmit)
- **126993** — Heartbeat (Receive / Transmit)
- **127237** — Heading/Track Control (Receive)
- **127245** — Rudder (Receive / Transmit)
- **127250** — Vessel Heading (Receive)
- **127251** — Rate of Turn (Receive)
- **127257** — Attitude (Receive)
- **127258** — Magnetic Variation (Receive / Transmit)
- **128259** — Speed, (Receive)
- **128267** — Water Depth (Receive)
- **128275** — Distance Log (Receive)
- **129025** — Position, Rapid Update (Receive)
- **129026** — COG & SOG, Rapid Update (Receive)
- **129029** — GNSS Position Data (Receive)
- **129033** — Time & Date (Receive)
- **129044** — Datum (Receive / Transmit)
- **129283** — Cross Track Error (Receive)
- **129284** — Navigation Data (Receive)
- **129291** — Set & Drift, Rapid Update (Receive)
- **130306** — Wind Data (Receive)
- **130310** — Environmental Parameters (Receive)
- **130311** — Environmental Parameters (Receive)
- **130576** — Small Craft Status (Receive)
- **130577** — Direction Data (Receive)





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