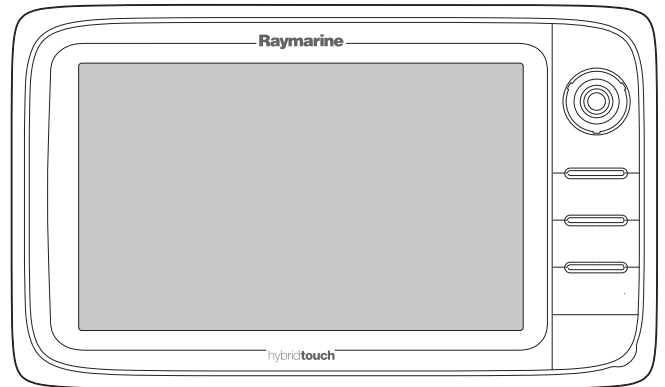


# New a Series New c Series New e Series



## Installation and operation instructions

### English

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# Chapter 1: Important information



## 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.



## 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: High voltages

This product contains high voltages. Do NOT remove any covers or otherwise attempt to access internal components, unless specifically instructed in this document.



## Warning: Product grounding

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



## 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: FCC Warning (Part 15.21)

Changes or modifications to this equipment not expressly approved in writing by Raymarine Incorporated could violate compliance with FCC rules and void the user's authority to operate the equipment.



## Warning: Radar scanner safety

Before rotating the radar scanner, ensure all personnel are clear.



## Warning: Radar transmission safety

The radar scanner transmits electromagnetic energy. Ensure all personnel are clear of the scanner when the radar is transmitting.



## Warning: Sonar operation

- NEVER operate the sonar with the vessel out of the water.
- NEVER touch the transducer face when the sonar is powered on.
- SWITCH OFF the sonar if divers are likely to be within 7.6 m (25 ft) of the transducer.



## Warning: Touchscreen display

When exposed to prolonged periods of direct sunlight, the touchscreen display can get very hot. In such conditions, avoid using the touchscreen display or use the unit's physical keys and buttons instead if available.



## Warning: Touchscreen display

Exposure to prolonged rain may cause erroneous touch performance, in these situations keep touch activity to a minimum and wipe the screen with a dry non-abrasive cloth before using the touchscreen.

## Caution: Transducer cable

Do NOT cut, shorten, splice the transducer cable or remove the connector. If the cable is cut, it cannot be repaired. Cutting the cable will also void the warranty.

## Caution: Power supply protection

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

## Caution: Care of chart and memory cards

To avoid irreparable damage to and / or loss of data from chart and memory cards:

- Ensure that chart and memory cards are fitted the correct way around. DO NOT try to force a card into position.
- DO NOT save data (waypoints, routes, and so on) to a chart card, as the charts may be overwritten.
- DO NOT use a metallic instrument such as a screwdriver or pliers to insert or remove a chart or memory card.
- Safe removal. Always power the unit off before inserting or removing a chart or memory card.

## Caution: Ensure chart card door is securely closed

To prevent water ingress and consequent damage to the display, ensure that the chart card door is firmly closed. This can be confirmed by an audible click.

## Caution: Sun covers

- To protect your product against the damaging effects of ultraviolet (UV) light, always fit the sun covers when the product is not in use.
- Remove the sun covers when travelling at high speed, whether in water or when the vessel is being towed.

## Caution: Cleaning

When cleaning this product:

- Do NOT wipe the display screen with a dry cloth, as this could scratch the screen coating.
- Do NOT use abrasive, or acid or ammonia based products.
- Do NOT use a jet wash.

## 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 IPX6 standard, water intrusion and subsequent equipment failure may occur if the product is subjected to commercial high-pressure washing. Raymarine will not warrant products subjected to high-pressure washing.

## Disclaimers

This product (including the electronic charts) is intended to be used only as an aid to navigation. It is designed to facilitate use of official government charts, not replace them. Only official government charts and notices to mariners contain all the current information needed for safe navigation, and the captain is responsible for their prudent use. It is the user's responsibility to use official government charts, notices to mariners, caution and proper navigational skill when operating this or any other Raymarine product. This product supports electronic charts provided by third party data suppliers which may be embedded or stored on memory card. Use of such charts is subject to the supplier's End-User Licence Agreement included in the documentation for this product or supplied with the memory card (as applicable).

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.

This product uses digital chart data, and electronic information from the Global Positioning System (GPS) which may contain errors. Raymarine does not warrant the accuracy of such information and you are advised that errors in such information may cause the product to malfunction. 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 chart data or information utilized by the product and supplied by third parties.

## Chart cards and memory cards

Memory cards are used for archiving data and chart cards provide additional or upgraded charts.

### Compatible cards

The following types of memory or chart card are compatible with your Raymarine product:

- micro Secure Digital Standard-Capacity (microSDSC)
- micro Secure Digital High-Capacity (microSDHC)

**Note:** The maximum card capacity supported is 32 GB.

### Chart cards

Your product is pre-loaded with electronic charts (worldwide base map). If you wish to use different chart data, you can insert compatible chart cards into the unit's card slot.

### Use branded chart cards and memory cards

When archiving data, Raymarine recommends the use of quality branded memory cards. Some brands of memory card may not work in your unit. Please contact customer support for a list of recommended cards.

## 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.

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

- Raymarine equipment and cables connected to it are:

- At least 1 m (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 7 ft (2 m).
- More than 2 m (7 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 exposure

This transmitter with its antenna is designed to comply with FCC / IC RF exposure limits for general population / uncontrolled exposure. The WiFi / Bluetooth antenna is mounted behind the front fascia on the left hand side of the screen. It is recommended to maintain a safe distance of at least 1 cm from the left hand side of the screen.

## FCC

### Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

### FCC Interference Statement (Part 15.105 (b))

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio / TV technician for help.

## Industry Canada

This device complies with Industry Canada License-exempt RSS standard(s).

Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

This Class B digital apparatus complies with Canadian ICES-003.

## Industry Canada (Français)

Cet appareil est conforme aux normes d'exemption de licence RSS d'Industry Canada.

Son fonctionnement est soumis aux deux conditions suivantes:

1. cet appareil ne doit pas causer d'interférence, et
2. cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

## Third party software license agreements

This product is subject to certain third party software license agreements as listed below:

- GNU — LGPL/GPL
- JPEG libraries
- OpenSSL
- FreeType

The license agreements for the above can be found on the documentation CD which accompanies this product.

## Suppression ferrites

Raymarine cables may be fitted with suppression ferrites. These are important for correct EMC performance. 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 authorized dealers.

## Connections to other equipment

Requirement for ferrites on non-Raymarine cables

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

## Declaration of conformity

Raymarine UK Ltd. declares that this product is compliant with the essential requirements of R&TTE directive 1999/5/EC.

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

## Product disposal

Dispose of this product in accordance with the WEEE Directive.



■ The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment. Whilst the WEEE Directive does not apply to some Raymarine products, we support its policy and ask you to be aware of how to dispose of this product.

## Pixel defect policy

In common with all TFT units, the screen may exhibit a few wrongly-illuminated ("dead") pixels. These may appear as black pixels in a light area of the screen or as colored pixels in black areas.

If your display exhibits MORE than the number of wrongly-illuminated pixels stated below, please contact your local Raymarine service center for further advice.

	a65 / a67	e7 / e7D	c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 / e165
Maximum acceptable wrongly-illuminated pixels	5	7	8

## 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: Handbook information

## Chapter contents

- [2.1 Handbook information on page 14](#)
- [2.2 Product information on page 15](#)
- [2.3 Handbook illustrations on page 16](#)
- [2.4 Handbook conventions on page 17](#)
- [2.5 Touch and non-touch operations on page 19](#)

## 2.1 Handbook information

This handbook contains important information regarding your multifunction display.

The handbook is for use with the following Raymarine multifunction displays:

- New a Series
- New c Series
- New e Series

### About this handbook

This handbook describes how to operate your multifunction display in conjunction with compatible electronic cartography and peripheral equipment.

It assumes that all peripheral equipment to be operated with it is compatible and has been correctly installed. This handbook is intended for users of varying marine abilities, but assumes a general level of knowledge of display use, nautical terminology and practices.

### Handbooks

The following handbooks are applicable to your multifunction display:

#### Handbooks

All documents are available to download as PDFs from [www.raymarine.com](http://www.raymarine.com)

#### New a Series Handbooks

Description	Part number
New a Series Mounting and getting started guide	88012
New a Series / New c Series / New e Series Installation and operation handbook	81337
a65 / a67 Mounting template	87165

#### New c Series Handbooks

Description	Part number
New c Series / New e Series Mounting and getting started guide	88001
New a Series / New c Series / New e Series Installation and operation handbook	81337
e95 / e97 / c95 / c97 Mounting template	87144
e125 / e127 / c125 / c127D Mounting template	87145

#### New e Series Handbooks



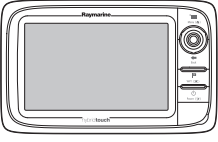

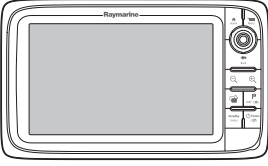

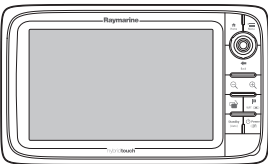

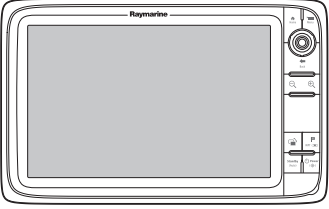

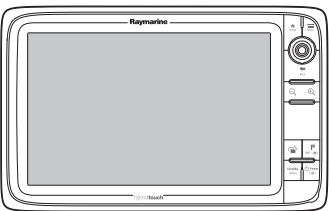

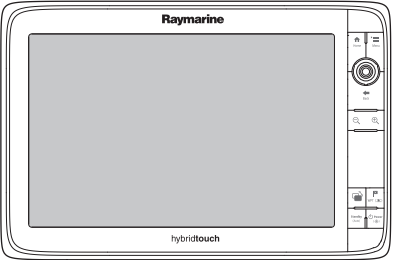

Description	Part number
e7 / e7D Mounting and getting started guide	88011
New c Series / New e Series Mounting and getting started guide	88001
New a Series / New c Series / New e Series Installation and operation handbook	81337
e7 / e7D Mounting template	87137
e95 / e97 / c95 / c97 Mounting template	87144
e125 / e127 / c125 / c127D Mounting template	87145
e165 Mounting template	87166

#### Additional handbooks

Description	Part number
SeaTalk <sup>ng</sup> reference manual	81300

## 2.2 Product information

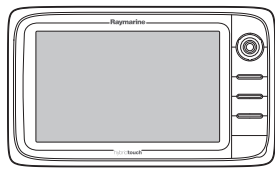
The following Raymarine multifunction display variants are available

	Non-sonar variant	Sonar variant	Series	Controls	Features
	a65	a67	New a Series	 Touchscreen only	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Internal GPS.</li> </ul>
	e7	e7D	New e Series	 HybridTouch (Touchscreen and physical buttons)	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Wi-Fi</li> <li>• NMEA 0183</li> <li>• NMEA 2000 (via SeaTalk<sup>ng</sup>)</li> <li>• Internal GPS.</li> <li>• Video input.</li> </ul>
	c95	c97	New c Series	 Physical buttons only	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Wi-Fi</li> <li>• NMEA 0183</li> <li>• NMEA 2000 (via SeaTalk<sup>ng</sup>)</li> <li>• Internal GPS.</li> <li>• Video input.</li> </ul>
	e95	e97	New e Series	 HybridTouch (Touchscreen and physical buttons)	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Wi-Fi</li> <li>• NMEA 0183</li> <li>• NMEA 2000 (via SeaTalk<sup>ng</sup>)</li> <li>• Internal GPS.</li> <li>• Video input x2.</li> <li>• Video output.</li> </ul>
	c125	c127	New c Series	 Physical buttons only	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Wi-Fi</li> <li>• NMEA 0183</li> <li>• NMEA 2000 (via SeaTalk<sup>ng</sup>)</li> <li>• Internal GPS.</li> <li>• Video input.</li> </ul>
	e125	e127	New e Series	 HybridTouch (Touchscreen and physical buttons)	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Wi-Fi</li> <li>• NMEA 0183</li> <li>• NMEA 2000 (via SeaTalk<sup>ng</sup>)</li> <li>• Internal GPS.</li> <li>• Video input x2.</li> <li>• Video output.</li> </ul>
	e165	n/a	New e Series	 HybridTouch (Touchscreen and physical buttons)	<ul style="list-style-type: none"> <li>• Bluetooth.</li> <li>• Wi-Fi</li> <li>• NMEA 0183</li> <li>• NMEA 2000 (via SeaTalk<sup>ng</sup>)</li> <li>• Video input x2.</li> <li>• Video output.</li> </ul>

## 2.3 Handbook illustrations

The illustrations and screenshots used in this handbook may differ slightly from your display model.

The illustration of the multifunction display below is used throughout this manual and unless otherwise stated can apply to all variants of multifunction display (i.e. New a series, New c Series and New e Series).









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## 2.4 Handbook conventions

The following conventions are used throughout this handbook when referring to:

Type	Example	Convention
Icons		<p>The term "<b>select</b>" is used in procedures involving icons to refer to the action of selecting an on-screen icon, either using touch or physical buttons:</p> <ul style="list-style-type: none"> <li>• <b>Touch</b> — Press your finger on the icon to select.</li> <li>• <b>Physical buttons</b> — Use the <b>Joystick</b> to highlight the icon and press the <b>Ok</b> button.</li> </ul>
Menus		<p>The term "<b>select</b>" is used in procedures involving menus to refer to the action of selecting a menu item, either using touch or physical buttons:</p> <ul style="list-style-type: none"> <li>• <b>Touch</b> — Press your finger on the icon to select.</li> <li>• <b>Physical buttons</b> — Use the <b>Joystick</b> to highlight the icon and press the <b>Ok</b> button.</li> </ul>
		<p>The term "<b>scroll</b>" is used in procedures involving menus and dialogs to refer to the action of scrolling a list or menu, either by touch or physical buttons:</p> <ul style="list-style-type: none"> <li>• <b>Touch</b> — Press your finger on the menu and slide up or down to scroll.</li> <li>• <b>Physical buttons</b> — Turn the Rotary control clockwise or anti-clockwise to scroll.</li> </ul>
Applications		<p>The term "<b>select</b>" is used in procedures involving applications to refer to the action of selecting a location, object or target on-screen using touch or physical buttons:</p> <ul style="list-style-type: none"> <li>• <b>Touch</b> — Press and hold your finger on a location to select, or</li> <li>• <b>Touch</b> — Press and release your finger on an object or target.</li> <li>• <b>Physical buttons</b> — Use the <b>Joystick</b> to highlight the location, object or target and press the <b>Ok</b> button.</li> </ul>
Numeric adjust controls		<p>The term "<b>adjust</b>" is used in procedures involving numerical adjust controls to refer to the action of changing the numeric value using touch or physical buttons:</p> <ul style="list-style-type: none"> <li>• <b>Touch</b> — Press your finger on the up or down arrow to increase or decrease the numeric value.</li> <li>• <b>Physical buttons</b> — Use the <b>Rotary control</b> to increase or decrease the numeric value.</li> </ul> <p>With the Numeric adjust control displayed you can also select on the <b>keypad</b> icon or press and hold the <b>Ok</b> button to open a numeric keypad to enter a new value for the setting.</p>
Slider bar controls		<p>The term "<b>adjust</b>" is used in procedures involving slider bar controls to refer to the action of changing the associated numeric value using touch or physical buttons:</p> <ul style="list-style-type: none"> <li>• <b>Touch</b> — Press your finger on the up or down arrow to increase or decrease the numeric value.</li> <li>• <b>Physical buttons</b> — Use the <b>Rotary control</b> to increase or decrease the numeric value.</li> </ul>

## Waypoint (MOB) button / icon

Depending on the multifunction display variant there will be either a Waypoint (MOB) button or an on-screen icon.



WPT button		<ul style="list-style-type: none"><li>• New c Series</li><li>• New e Series</li></ul>
WPT icons		<ul style="list-style-type: none"><li>• New a Series</li></ul>

Throughout this manual the term: Select **WPT**, refers to pressing the physical **WPT** button or pressing the on-screen **WPT** icon.

## 2.5 Touch and non-touch operations

This handbook applies to New a Series, New c Series and New e Series multifunction displays. All features and functions can be accessed using physical buttons (non-touch) on New c Series and New e Series displays or by using the touchscreen on New a Series and New e Series displays.

This handbook uses icons throughout to identify whether a particular task is a touch or a non-touch operation.

	Touch (Touchscreen operation) — Touch operations apply to New a Series and New e Series multifunction displays.
	Non-touch (physical button operation) — Non-touch operations apply to New c Series and New e Series multifunction displays.

**Note:** Where a task does not have a touch or non-touch icon then the task applies to all display variants.



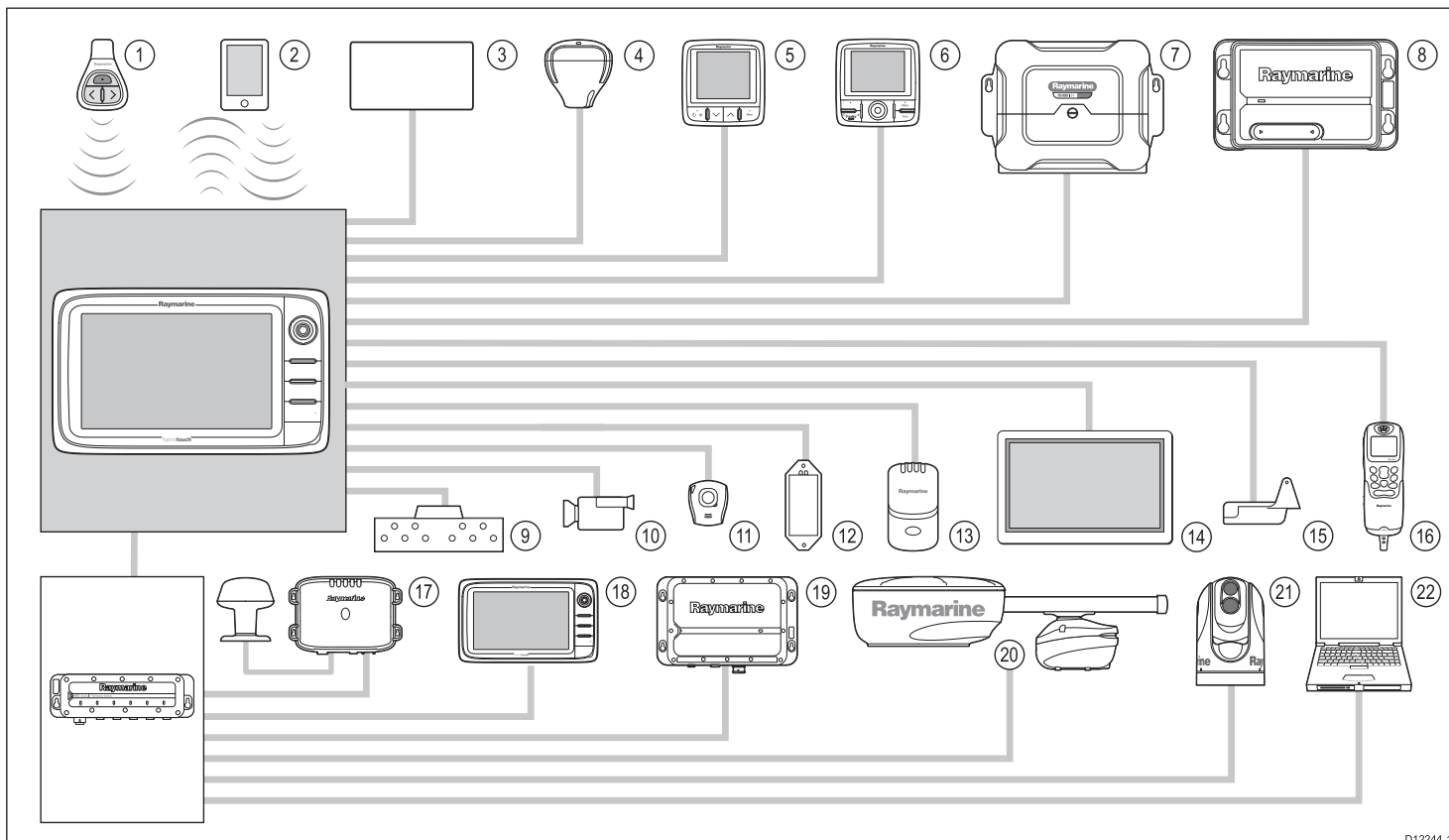
# Chapter 3: Planning the installation

## Chapter contents

- [3.1 System integration on page 22](#)
- [3.2 Installation checklist on page 26](#)
- [3.3 System Limits on page 26](#)
- [3.4 Multiple data sources \(MDS\) overview on page 27](#)
- [3.5 Identifying your display variant on page 27](#)
- [3.6 Networking constraints on page 28](#)
- [3.7 Typical systems on page 29](#)
- [3.8 System protocols on page 32](#)
- [3.9 Data master on page 33](#)
- [3.10 New a Series parts supplied on page 33](#)
- [3.11 e7 / e7D Parts supplied on page 34](#)
- [3.12 New c Series and New e Series parts supplied on page 34](#)
- [3.13 Tools required for installation on page 35](#)

## 3.1 System integration

Your multifunction display is compatible with a wide range of marine electronics devices.



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The display uses a number of protocols to transfer data between the various devices in your system. The following table details which devices may be connected to your display, and the type of connections (in terms of protocols and physical interfaces):

Item	Device Type	Maximum quantity	Suitable Devices	Connections
1	Remote control	1 per multifunction display.	Raymarine RCU-3	Bluetooth
2	Smartphone / Tablet device	1 per multifunction display.	<p>For Raymarine wireless video streaming and remote control apps:</p> <ul style="list-style-type: none"> <li>• Apple iPhone 4 (or later) or iPad 2 (or later)</li> <li>• Android device with minimum 1GHz processor and running android 2.2.2 (or later)</li> <li>• Amazon Kindle Fire</li> </ul> <p>For chartplotter sync with Navionics Marine app:</p> <ul style="list-style-type: none"> <li>• Apple iPhone or iPad.</li> <li>• Android-compatible smartphone or tablet.</li> </ul> <p>For media player control (New e Series only):</p> <ul style="list-style-type: none"> <li>• Any Bluetooth-enabled device supporting Bluetooth AVRCP version 2.1 or higher.</li> </ul>	<ul style="list-style-type: none"> <li>• Chartplotter sync with Navionics Marine app: Wi-Fi.</li> <li>• Video streaming and remote control: Wi-Fi.</li> <li>• Media player control: Bluetooth AVRCP 2.1 or later.</li> </ul>
3	Vessel tank sensors — third-party	<ul style="list-style-type: none"> <li>• Up to 3 x fuel.</li> <li>• 1 x fresh water.</li> <li>• 1 x waste water.</li> <li>• 1 x sewage.</li> <li>• 1 x bait / fish.</li> </ul>	Third-party NMEA 2000 interfaces.	NMEA 2000 (via optional DeviceNet adaptor cables).
4	GPS (external) — Raymarine	1	<p>Any combination of the following:</p> <ul style="list-style-type: none"> <li>• Raystar125 GPS.</li> <li>• Raystar125+ GPS (via optional SeaTalk to SeaTalk<sup>ng</sup> converter).</li> <li>• RS130</li> </ul>	SeaTalk, SeaTalk <sup>ng</sup> , or NMEA 0183.

Item	Device Type	Maximum quantity	Suitable Devices	Connections
5	Instruments — Raymarine	As determined by SeaTalk <sup>ng</sup> bus bandwidth and power loading.	SeaTalk (via optional SeaTalk to SeaTalk <sup>ng</sup> converter): <ul style="list-style-type: none"> <li>• ST40 Wind, Speed, Depth, Rudder, or Compass.</li> <li>• ST60+ Wind, Speed, Depth, Rudder, or Compass.</li> <li>• i40 Wind, Speed, Depth, or Bidata.</li> </ul> SeaTalk <sup>ng</sup> : <ul style="list-style-type: none"> <li>• ST70.</li> <li>• ST70+.</li> <li>• ST70+ keypads.</li> <li>• i50 Depth, Speed, or Tridata</li> <li>• i60 Wind, CH Wind</li> <li>• i70.</li> </ul>	SeaTalk, SeaTalk <sup>ng</sup> .
6	Pilot control heads — Raymarine	As determined by SeaTalk or SeaTalk <sup>ng</sup> bus bandwidth and power loading, as appropriate.	SeaTalk (via optional SeaTalk to SeaTalk <sup>ng</sup> converter): <ul style="list-style-type: none"> <li>• ST6002.</li> <li>• ST7002.</li> <li>• ST8002.</li> </ul> SeaTalk <sup>ng</sup> : <ul style="list-style-type: none"> <li>• ST70. (SeaTalk<sup>ng</sup> course computer only.)</li> <li>• ST70+. (SeaTalk<sup>ng</sup> course computer only.)</li> <li>• p70.</li> <li>• p70R.</li> </ul>	SeaTalk, SeaTalk <sup>ng</sup> .
7	Course computer — Raymarine	1	SeaTalk (via optional SeaTalk to SeaTalk <sup>ng</sup> converter): <ul style="list-style-type: none"> <li>• ST1000.</li> <li>• ST2000.</li> <li>• S1000.</li> <li>• S1.</li> <li>• S2.</li> <li>• S3.</li> </ul> SeaTalk <sup>ng</sup> : <ul style="list-style-type: none"> <li>• All SPX course computers.</li> </ul>	SeaTalk, SeaTalk <sup>ng</sup> , or NMEA 0183.
8	AIS — Raymarine	1	<ul style="list-style-type: none"> <li>• AIS 250.</li> <li>• AIS 500.</li> <li>• AIS 350.</li> <li>• AIS 650.</li> <li>• AIS 950</li> </ul>	SeaTalk <sup>ng</sup> , or NMEA 0183.
8	AIS — third-party	1	Third-party NMEA 0183-compatible AIS Class A or Class B receiver / transceiver.	NMEA 0183
9	Vessel trim tabs — third-party	1 pair	Third-party NMEA 2000 interfaces.	NMEA 2000 (via optional DeviceNet adaptor cables).
10	Video / camera	<ul style="list-style-type: none"> <li>• New a Series = 0</li> <li>• e7, e7D, New c Series = 1</li> <li>• New e Series (excluding e7 and e7D) = 2</li> </ul>	Composite PAL or NTSC video source.	BNC connectors.
10	IP camera	Only 1 camera may be viewed at a time.	Third party IP camera	Via SeaTalk <sup>hs</sup> network.
11	Lifetag (Man overboard alert)	1 basestation	All Raymarine Lifetag basestations.	SeaTalk (via optional SeaTalk to SeaTalk <sup>ng</sup> converter)

Item	Device Type	Maximum quantity	Suitable Devices	Connections
12	Engine interface — third-party	1	Third-party NMEA 2000 interfaces.	NMEA 2000 (via optional DeviceNet adaptor cables).
13	Transducers and sensors — Raymarine	1	Analog transducers: <ul style="list-style-type: none"> <li>• Wind.</li> <li>• Speed.</li> <li>• Depth.</li> </ul>	SeaTalk <sup>ng</sup> (via optional transducer pods).
13	Transducers and sensors — Airmar	1	<ul style="list-style-type: none"> <li>• DT800 Smart Sensor.</li> <li>• DST800 Smart Sensor.</li> <li>• PB200 weather station.</li> </ul>	SeaTalk <sup>ng</sup> (via optional transducer pods).
14	Video out	New e Series (excluding e7 and e7D) = 1	External display.	15 pin D-Type connector (VGA Style).
15	Sonar transducer	1	<p>Direct connection to display (Sonar variant displays only):</p> <ul style="list-style-type: none"> <li>• Raymarine P48.</li> <li>• Raymarine P58.</li> <li>• Raymarine P74.</li> <li>• Raymarine B60 20°</li> <li>• Raymarine B60 12°</li> <li>• Raymarine B744V</li> </ul> <p>; OR:</p> <ul style="list-style-type: none"> <li>• Any 600 watt / 1Kw compatible transducer (via optional E66066 adaptor cable).</li> </ul> <p>; OR:</p> <ul style="list-style-type: none"> <li>• Any Minn Kota transducer (via optional A62363 adaptor cable).</li> </ul> <p>Connection via external Raymarine Sonar Module:</p> <ul style="list-style-type: none"> <li>• Any sonar module-compatible transducer.</li> </ul>	Raymarine transducer connection, OR Minn Kota transducer connection.
16	VHF radio — Raymarine	1	All Raymarine DSC VHF radios.	NMEA 0183 only (No SeaTalk support).
17	Sirius Weather receiver — Raymarine (North America only)	1	<p>SeaTalk<sup>hs</sup>:</p> <ul style="list-style-type: none"> <li>• SR100.</li> <li>• SR6.</li> </ul> <p>SeaTalk<sup>ng</sup>:</p> <ul style="list-style-type: none"> <li>• SR50.</li> </ul>	SeaTalk <sup>hs</sup> , SeaTalk <sup>ng</sup> .
18	Additional multifunction display(s) — Raymarine	5	<p>SeaTalk<sup>hs</sup> (recommended):</p> <ul style="list-style-type: none"> <li>• New a Series multifunction displays.</li> <li>• New c Series multifunction displays.</li> <li>• New e Series multifunction displays.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p><b>Note:</b> You can connect Raymarine multifunction displays using NMEA 0183 or SeaTalk<sup>ng</sup> but not all functions are supported.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p><b>Note:</b> Visit <a href="http://www.raymarine.com">www.raymarine.com</a> to download the latest software version for your display.</p> </div>	SeaTalk <sup>hs</sup> .
18	Additional multifunction display(s) — third-party	<ul style="list-style-type: none"> <li>• Connections to multifunction display NMEA outputs: 4.</li> <li>• Connections to multifunction display NMEA inputs: 2</li> </ul>	NMEA 0183-compatible chartplotters and multifunction displays.	NMEA 0183



Item	Device Type	Maximum quantity	Suitable Devices	Connections
19	Fishfinder (Sonar Module) — Raymarine	1	<ul style="list-style-type: none"> <li>• CP450C</li> <li>• DSM30.</li> <li>• DSM300.</li> </ul>	SeaTalk <sup>hs</sup> .
20	Radar — Raymarine	1	<p>All Raymarine Non-HD Digital Radomes and HD or SuperHD radar scanners.</p> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Please ensure your radar scanner is using the latest software version.</p> </div>	SeaTalk <sup>hs</sup> .
21	Thermal camera — Raymarine	1	<p>All Raymarine thermal cameras.</p> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> New a Series multifunction displays do not support thermal cameras.</p> </div>	SeaTalk <sup>hs</sup> (for control), BNC connector (for video).
22	PC / laptop	1	Windows-compatible PC or laptop running Raymarine Voyager planning software.	SeaTalk <sup>hs</sup>
	Cartography — included		Embedded (internal) Navionics world base map.	Internal storage.
	Cartography — optional		<p>External MicroSD, or MicroSDHC chart cards:</p> <ul style="list-style-type: none"> <li>• Navionics Ready to Navigate.</li> <li>• Navionics Silver</li> <li>• Navionics Gold</li> <li>• Navionics Gold+</li> <li>• Navionics Platinum</li> <li>• Navionics Platinum+</li> <li>• Navionics Fish'N Chip</li> <li>• Navionics Hotmaps</li> </ul> <p>Refer to the Raymarine website (<a href="http://www.raymarine.com">www.raymarine.com</a>) for the latest list of supported chart cards.</p>	Card slot.

## 3.2 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.

## 3.3 System Limits

The following limits apply to the number of system components that can be connected in a Raymarine multifunction display system.

Component	Maximum
Maximum number of SeaTalk <sup>hs</sup> devices	25
Maximum number of SeaTalk <sup>ng</sup> devices	50
New a Series / New c Series / New e Series multifunction displays	6

## 3.4 Multiple data sources (MDS) overview

Installations that include multiple instances of data sources can cause data conflicts. An example is an installation featuring more than one source of GPS data.

MDS enables you to manage conflicts involving the following types of data:

- GPS Position.
- Heading.
- Depth.
- Speed.
- Wind.

Typically this exercise is completed as part of the initial installation, or when new equipment is added.

If this exercise is NOT completed the system will automatically attempt to resolve data conflicts. However, this may result in the system choosing a source of data that you do not want to use.

If MDS is available the system can list the available data sources and allow you to select your preferred data source. For MDS to be available all products in the system that use the data sources listed above must be MDS-compliant. The system can list any products that are NOT compliant. It may be necessary to upgrade the software for these non-compliant products to make them compliant. Visit the Raymarine website ([www.raymarine.com](http://www.raymarine.com)) to obtain the latest software for your products. If MDS-compliant software is not available and you do NOT want the system to automatically attempt to resolve data conflicts, any non-compliant product(s) can be removed or replaced to ensure the entire system is MDS-compliant.

## 3.5 Identifying your display variant

To discover which model display you have follow the steps below:

From the homescreen:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Diagnostics**.
4. Select **Select Device**.
5. Search the Network column for the '**This Device**' entry.
6. The Device column for this record will list the model of your display.

## 3.6 Networking constraints

New a Series, New c Series and New e Series displays can be networked together and can also be networked to Raymarine's E-Series Widescreen displays and G-Series systems. Caution is advised when networking a New a Series, New c Series or New e Series to a network containing a E-Series Widescreen display or when connecting to a G-Series system as there are networking constraints and restrictions which apply.

### General

- Multifunction displays should be connected together using SeaTalk<sup>hs</sup>.
- Multifunction displays can also be connected via SeaTalk<sup>ng</sup> or NMEA 0183, but not all functions are supported.
- All networked New a Series, New c Series and New e Series displays must contain software version V4.xx or later.

**Note:** The New a Series cannot be networked using NMEA 0183.

### Master / repeater operation

- Any network featuring more than 1 multifunction display must have 1 of the displays designated as the data master.
- The data master display will receive data through NMEA 0183 and / or SeaTalk<sup>ng</sup>, and bridge the data over SeaTalk<sup>hs</sup> to other networked displays.
- When networking a New a Series, New c Series or New e Series multifunction display to an E-Series Widescreen display or G-Series system the New a Series, New c Series or New e Series displays must be put into compatibility mode. Compatibility mode can be accessed from the Set-up Menu from the homescreen: **Set-up > Maintenance > Compatibility**.
- Any network containing a G-Series system must have the G-Series (GPM400) set as the data master.

**Note:** Connected E-Series Widescreen displays and G-Series system will reset once compatibility mode has been selected.

### Legacy multifunction display support (E-Series Widescreen and G-Series system)

- A G-Series (GPM400) system operating with software version V4.xx or later will permit the connection of up to 2 New a Series, New c Series or New e Series displays or 2 E-Series Widescreen displays or 1 of each (e.g. 1 New e Series and 1 E-Series Widescreen display).

**Note:** Master / repeater operation applies.

- A network featuring a New a Series, New c Series or New e Series displays and either an E-Series Widescreen or G-Series system must be connected using SeaTalk<sup>hs</sup> only.

An incompatibility message is displayed on-screen when a multifunction display is connected which is not supported.

### Homescreen sharing

- When networked, New a Series, New c Series or New e Series displays can share homescreens.
- New a Series, New c Series and New e Series cannot share homescreens with an E-Series Widescreen display or G-Series system.

### Cartography sharing

- The cartography contained on chart cards is always used in preference to embedded cartography when a chart card is inserted into a card slot.
- Chart card cartography can be shared between New a series, New c Series, New e Series, E-Series Widescreen and G-Series systems.

### Radar operation

- New a Series, New c Series or New e Series systems support the use of 1 radar scanner at a time.

- The data supplied by a connected radar scanner is repeated to any networked displays.

### Sonar operation

- You can connect an external sonar module unit to New a Series, New c Series or New e Series displays via SeaTalk<sup>hs</sup> / RayNet.
- a67, e7D, e97, e127, c97, c127 models include a 600 W built-in sonar module and the display can be directly connected to a compatible sonar transducer.
- If connecting an external sonar module unit to a a67, e7D, e97, e127, c97 or c127 then the internal sonar must be switched off. From the fishfinder application goto **Menu > Set-up > Sounder Set-up > Internal Sounder > Off**.
- You can only use 1 sonar transducer at any one time.
- The data supplied by an internal or external sonar module is repeated to any networked displays.

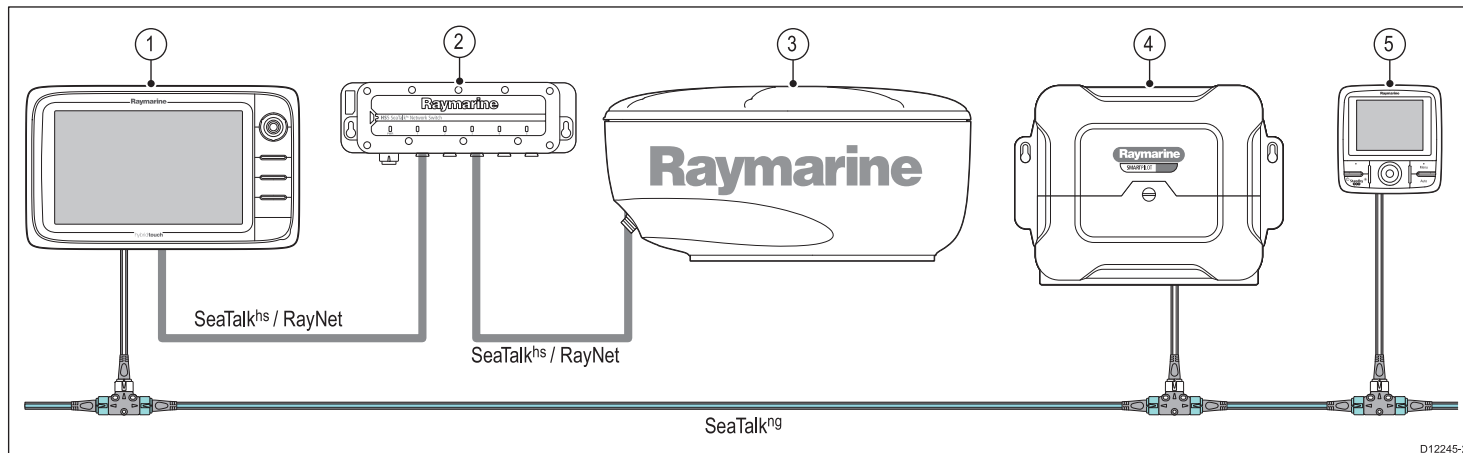
### 3.7 Typical systems

The illustrations below show examples of possible system configurations, for more details on compatible devices please refer to the *System integration* section.

**Note:** In the examples below the multifunction display(s) could be any of the following:

- New a Series
- New c Series
- New e Series

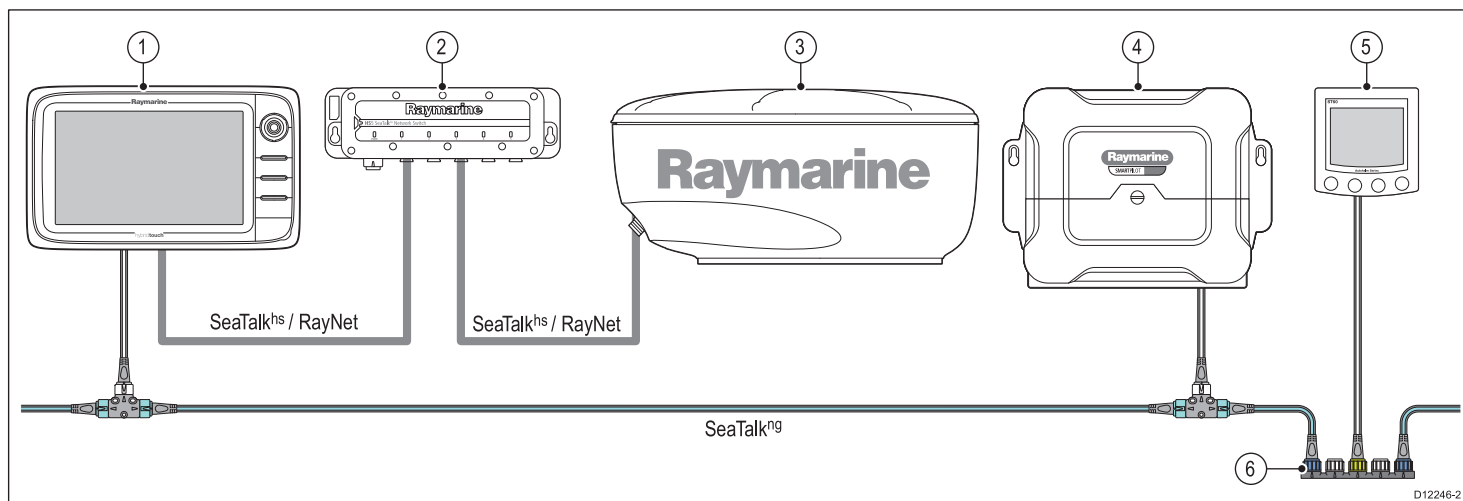
#### Example: Basic system



1. Raymarine Multifunction display.
2. Raymarine network switch.
3. Raymarine radar scanner.
4. SPX course computer.
5. SeaTalk<sup>ng</sup> Pilot controller.

**Note:** A network switch is only required if multiple devices are connected using SeaTalk<sup>hs</sup> / RayNet.

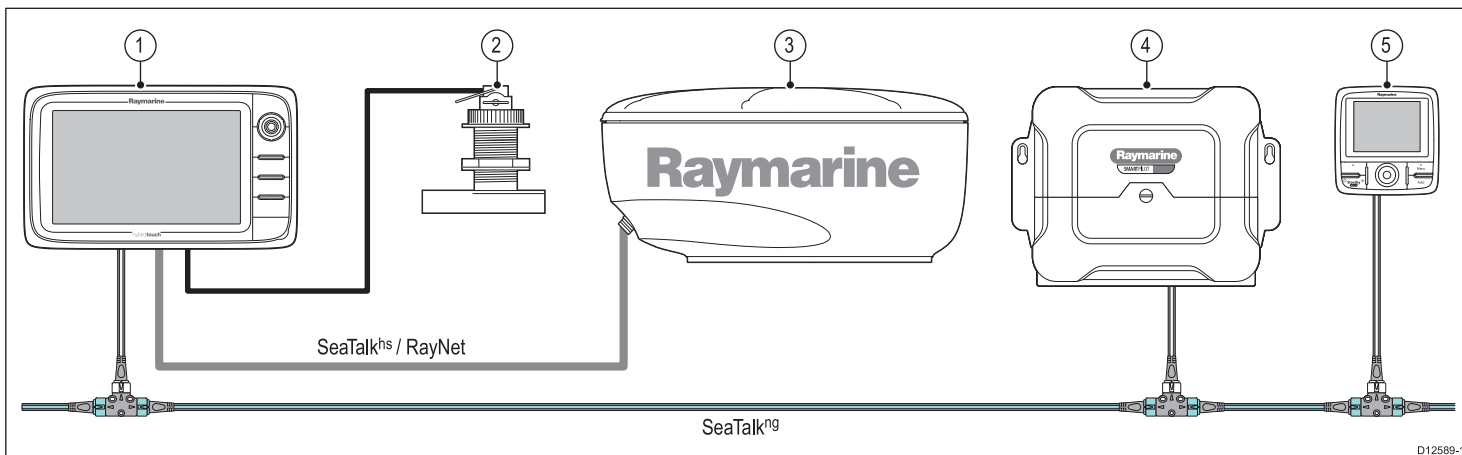
#### Example: Basic system with SeaTalk equipment



1. Multifunction display
2. Network switch.
3. Radar scanner.
4. SPX course computer.
5. SeaTalk pilot controller.
6. SeaTalk to SeaTalk<sup>ng</sup> converter.

**Note:** A network switch is only required if more than one device is connected using SeaTalk<sup>hs</sup> / RayNet.

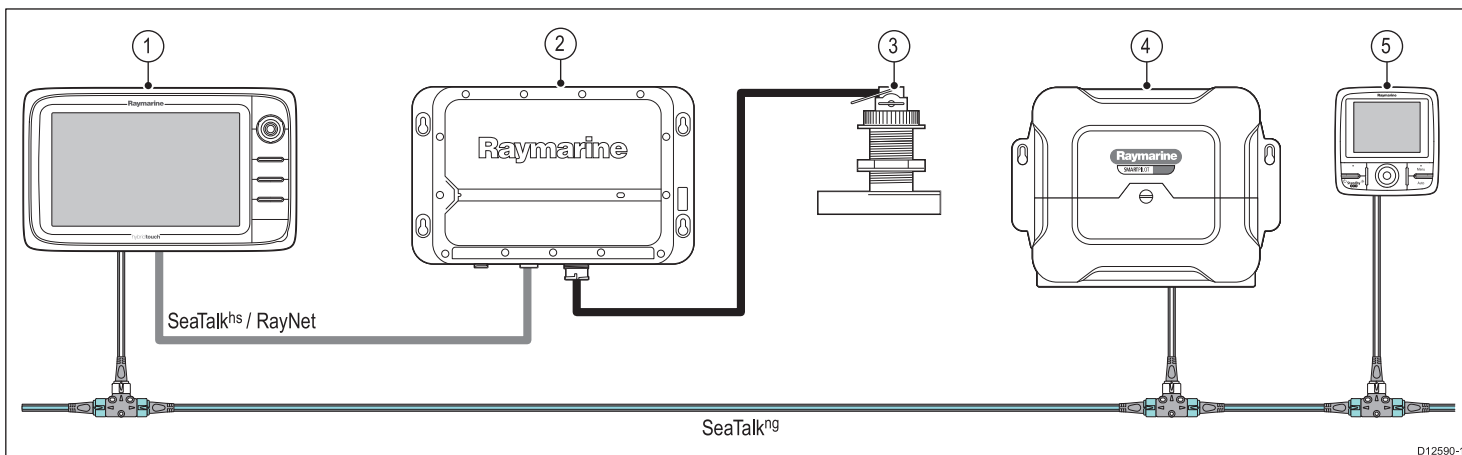
**Example: Basic system with sonar variant display**



D12589-1

1. Multifunction display
2. Sonar transducer.
3. Radar scanner.
4. SPX course computer.
5. SeaTalk<sup>ng</sup> pilot controller.

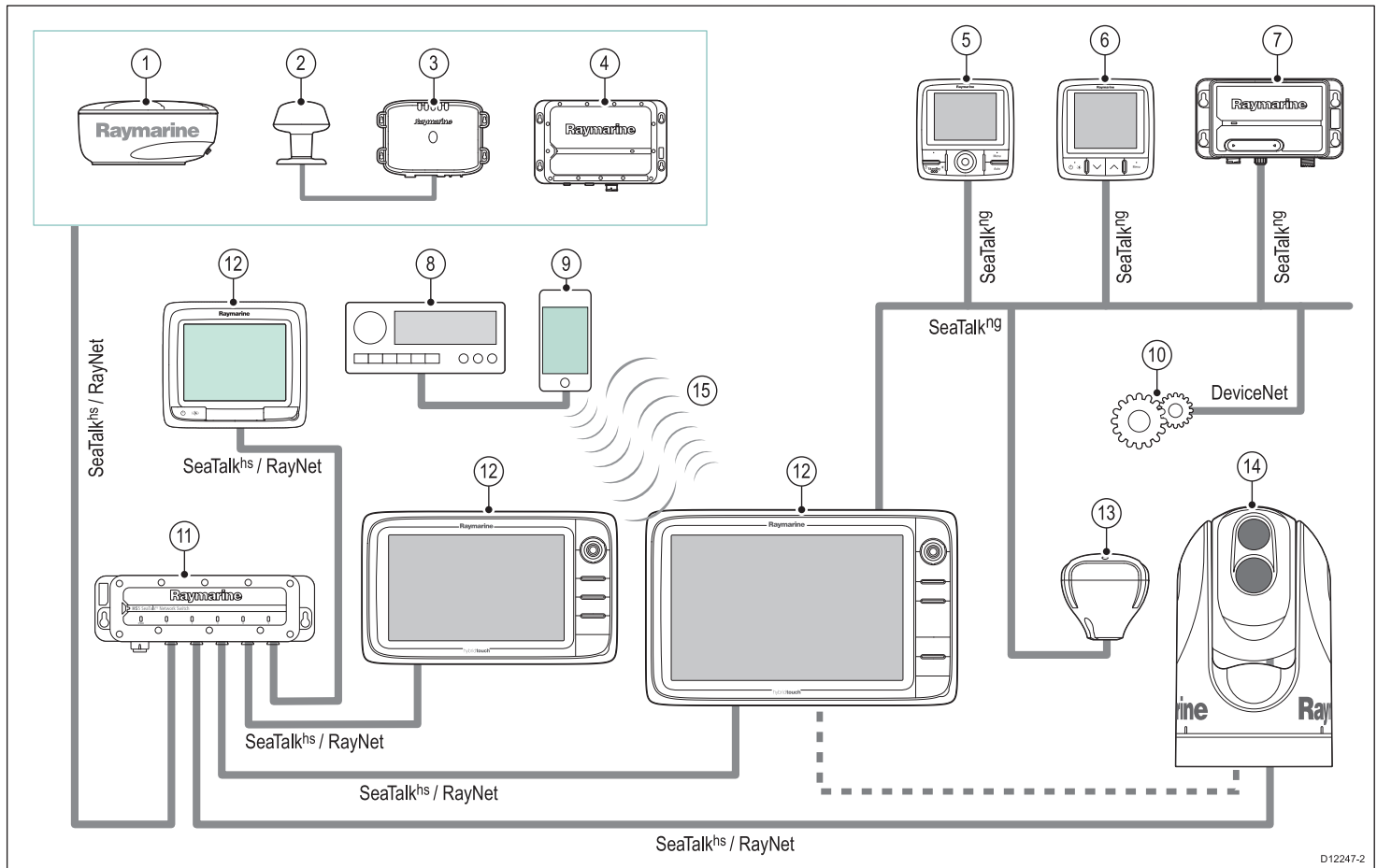
**Example: Basic system with non-sonar variant display**



D12590-1

1. Multifunction display.
2. Sonar module.
3. Sonar transducer.
4. SPX course computer.
5. SeaTalk<sup>ng</sup> pilot controller.

## Example: Expanded system



D12247-2

1. Radar scanner.
2. Weather sensor.
3. Sirius weather receiver.
4. Sonar module.
5. SeaTalk<sup>ng</sup> Pilot controller.
6. SeaTalk<sup>ng</sup> Instrument display.
7. AIS receiver / transceiver.
8. Audio system.
9. Smartphone / tablet.
10. DeviceNet spur (for NMEA 2000 devices).
11. Network switch.
12. Multifunction display.
13. GPS receiver.
14. Thermal camera.
15. Wireless connection.

## 3.8 System protocols

Your Multifunction Display can connect to various instruments and displays to share information and so improve the functionality of the system. These connections may be made using a number of different protocols. Fast and accurate data collection and transfer is achieved by using a combination of the following data protocols:

- SeaTalk<sup>hs</sup>
- SeaTalk<sup>ng</sup>
- NMEA 2000
- SeaTalk
- NMEA 0183

**Note:** You may find that your system does not use all of the connection types or instrumentation described in this section.

### SeaTalk<sup>hs</sup>

SeaTalk<sup>hs</sup> is an ethernet based marine network. This high speed protocol allows compatible equipment to communicate rapidly and share large amounts of data.

Information shared using the SeaTalk<sup>hs</sup> network includes:

- Shared cartography (between compatible displays).
- Digital radar data.
- Sonar data.

### Seatalk<sup>ng</sup>

SeaTalk<sup>ng</sup> (Next Generation) is an enhanced protocol for connection of compatible marine instruments and equipment. It replaces the older SeaTalk and SeaTalk<sup>2</sup> protocols.

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

SeaTalk<sup>ng</sup> is a proprietary extension to NMEA 2000 and the proven CAN bus technology. Compatible NMEA 2000 and SeaTalk / SeaTalk<sup>2</sup> devices can also be connected using the appropriate interfaces or adaptor cables as required.

### NMEA 2000

NMEA 2000 offers significant improvements over NMEA 0183, most notably in speed and connectivity. Up to 50 units can simultaneously transmit and receive on a single physical bus at any one time, with each node being physically addressable. The standard was specifically intended to allow for a whole network of marine electronics from any manufacturer to communicate on a common bus via standardized message types and formats.

### SeaTalk

SeaTalk is a protocol which enables compatible instruments to connect to each other and share data.

The SeaTalk cable system is used to connect compatible instruments and equipment. The cable carries power and data and enables connection without the need for a central processor.

Additional instruments and functions can be added to a SeaTalk system, simply by plugging them into the network. SeaTalk equipment can also communicate with other non-SeaTalk equipment via the NMEA 0183 standard, provided a suitable interface is used.

### NMEA 0183

The NMEA 0183 Data Interface Standard was developed by the National Marine Electronics Association of America. It is an international standard to enable equipment from many different manufacturers to be connected together and share information.

The NMEA 0183 standard carries similar information to SeaTalk. However it has the important difference that one cable will only carry information in one direction. For this reason NMEA 0183 is generally used to connect a data receiver and a transmitter together, e.g. a compass sensor transmitting heading to a radar display. This

information is passed in 'sentences', each of which has a three letter sentence identifier. It is therefore important when checking compatibility between items that the same sentence identifiers are used some examples of which are:

- VTG - carries Course and Speed Over Ground data.
- GLL - carries latitude and longitude.
- DBT - carries water depth.
- MWV - carries relative wind angle and wind speed data.

### NMEA Baud rates

The NMEA 0183 standard operates at a number of different speeds, depending upon the particular requirement or equipment capabilities. Typical examples are:

- 4800 baud rate. Used for general purpose communications, including FastHeading data.
- 38400 baud rate. Used for AIS and other high speed applications.



### 3.9 Data master

Any system containing more than one networked multifunction display must have a designated data master.

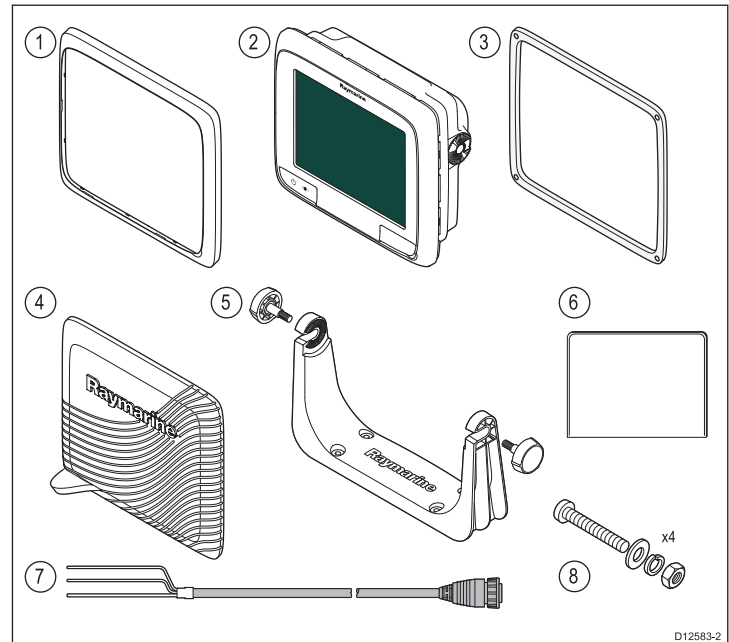
The data master is the display which serves as a primary source of data for all displays, it also handles all external sources of information. For example the displays may require heading information from the autopilot and GPS systems, usually received through a SeaTalk<sup>ng</sup> or NMEA connection. The data master is the display to which the SeaTalk, NMEA and any other data connections are made, it then bridges the data to the SeaTalk<sup>hs</sup> network and any compatible repeat displays. Information shared by the data master includes:

- Cartography
- Routes and waypoints
- Radar
- Sonar
- Data received from the autopilot, instruments, the engine and other external sources.

Your system may be wired for redundancy with data connections made to repeat displays. However these connections will only become active in the event of a fault and/or reassignment of the data master.

### 3.10 New a Series parts supplied

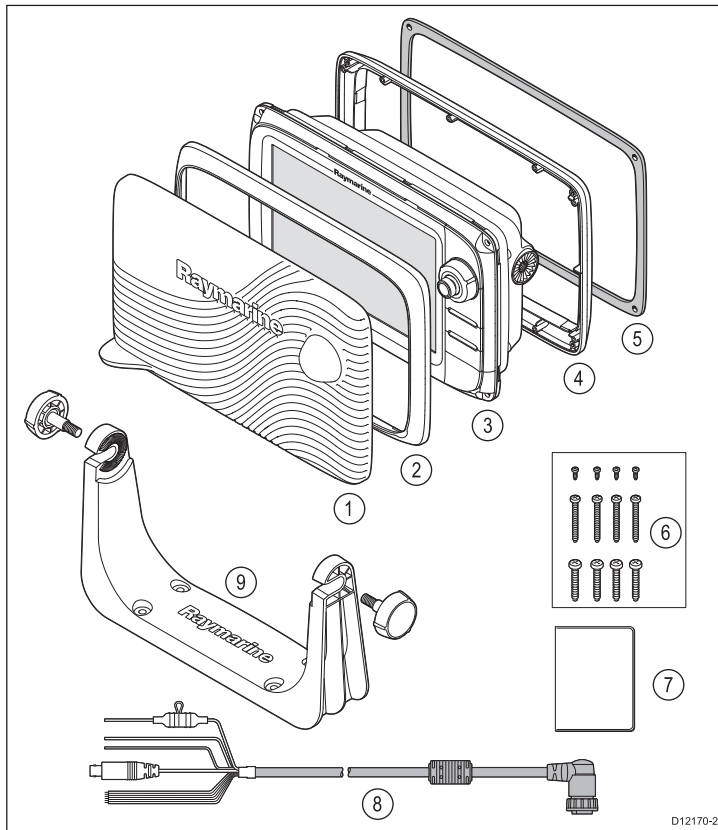
The following items are supplied with your a65 / a67 multifunction display.



1	Front bezel
2	Multifunction display
3	Flush mount gasket
4	Sun cover
5	Trunion bracket kit
6	Documentation pack
7	Power cable
8	4x Nuts, bolts, spring washers and washers (can be used for either flush or bracket mounting.)

### 3.11 e7 / e7D Parts supplied

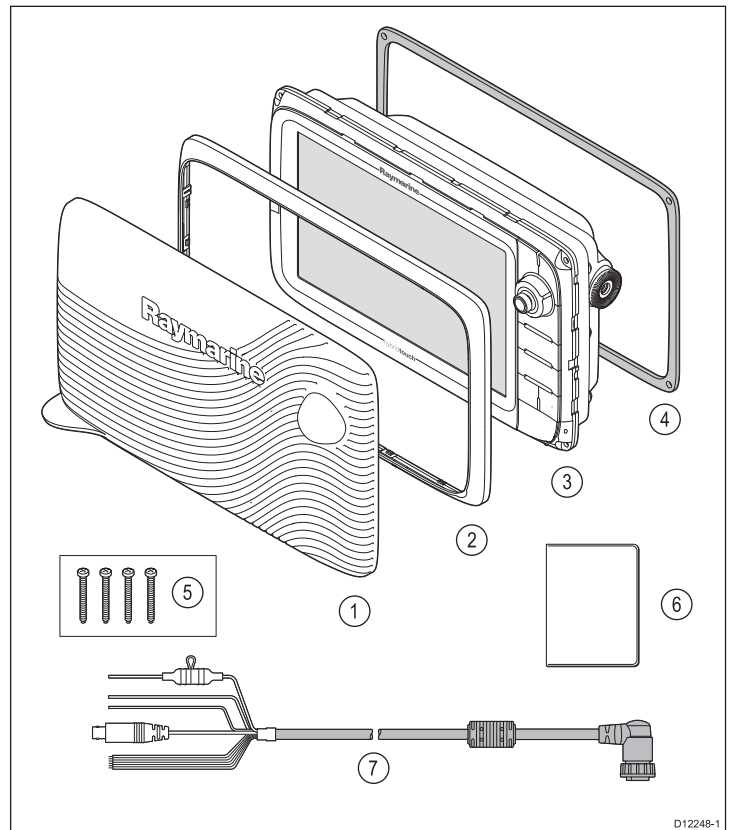
The parts shown below are supplied with the e7 / e7D multifunction display.



1. Sun cover.
2. Front bezel.
3. Multifunction display.
4. Rear bezel (required for trunnion bracket mounting).
5. Gasket (required for flush mounting).
6. Screw pack, includes:
  - 4 x rear bezel fixing screws.
  - 4 x unit mounting screws (for flush mounting).
  - 4 x unit mounting screws (for trunnion bracket mounting).
7. Documentation pack, includes:
  - Multilingual CD.
  - Mounting and getting started multilingual guide
  - Mounting template.
  - Warranty policy
8. Power and data cable.
9. Trunnion bracket kit.

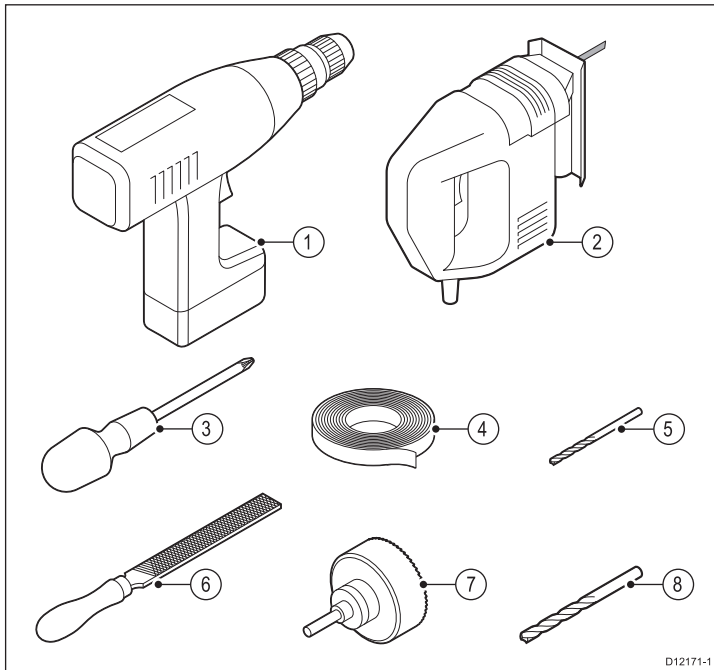
### 3.12 New c Series and New e Series parts supplied

The parts shown below are supplied with the New c Series and New e Series (Excluding e7 and e7D) multifunction displays.



1. Sun cover.
2. Front bezel.
3. Multifunction display.
4. Gasket (required for flush mounting).
5. Screw pack, includes 4 x unit mounting screws (for flush mounting).
6. Documentation pack, includes:
  - Multilingual CD.
  - Mounting and getting started multilingual guide
  - Mounting template.
  - Warranty policy
7. Power and data cable.

### 3.13 Tools required for installation



1. Power drill.
2. Jigsaw.
3. Pozidrive screwdriver.
4. Adhesive tape.
5. Drill bit for trunnion bracket mounting.
6. File.
7. Hole saw for flush mounting (For hole saw size refer to your product's mounting template).
8. Drill bit for flush mounting.



# Chapter 4: Cables and connections

## Chapter contents

- [4.1 General cabling guidance on page 38](#)
- [4.2 Connections overview on page 39](#)
- [4.3 Power connection — New a Series on page 40](#)
- [4.4 Power connection — New c Series and New e Series on page 41](#)
- [4.5 Network connections on page 43](#)
- [4.6 GPS connection on page 49](#)
- [4.7 AIS connection on page 49](#)
- [4.8 Fastheading connection on page 50](#)
- [4.9 SeaTalk<sup>ng</sup> connections on page 50](#)
- [4.10 SeaTalk connection on page 52](#)
- [4.11 NMEA 0183 connection on page 52](#)
- [4.12 NMEA 2000 connection on page 53](#)
- [4.13 Camera / Video connection on page 54](#)
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- [4.15 Bluetooth connections on page 55](#)
- [4.16 WiFi connections on page 56](#)

## 4.1 General cabling guidance

### Cable types and length

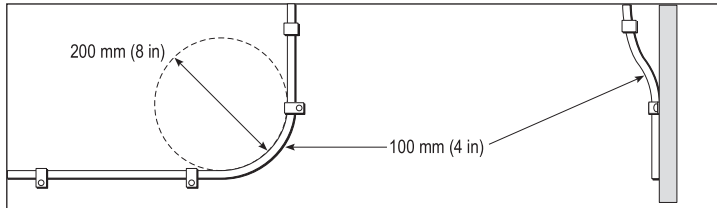
It is important to use cables of the appropriate type and length

- Unless otherwise stated use only standard cables of the correct type, supplied by Raymarine.
- Ensure that any non-Raymarine cables are of the correct quality and gauge. For example, longer power cable runs may require larger wire gauges to minimize voltage drop along the run.

### Routing cables

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

- Do NOT bend cables excessively. Wherever possible, ensure a minimum bend diameter of 200 mm (8 in) / minimum bend radius of 100 mm (4 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 tie-wraps or lacing twine. Coil any extra 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,
- antennae.

### Strain relief

Ensure adequate strain relief is provided. Protect connectors from strain and ensure they will not pull out under extreme sea conditions.

### Circuit isolation

Appropriate circuit isolation is required for installations using both AC and DC current:

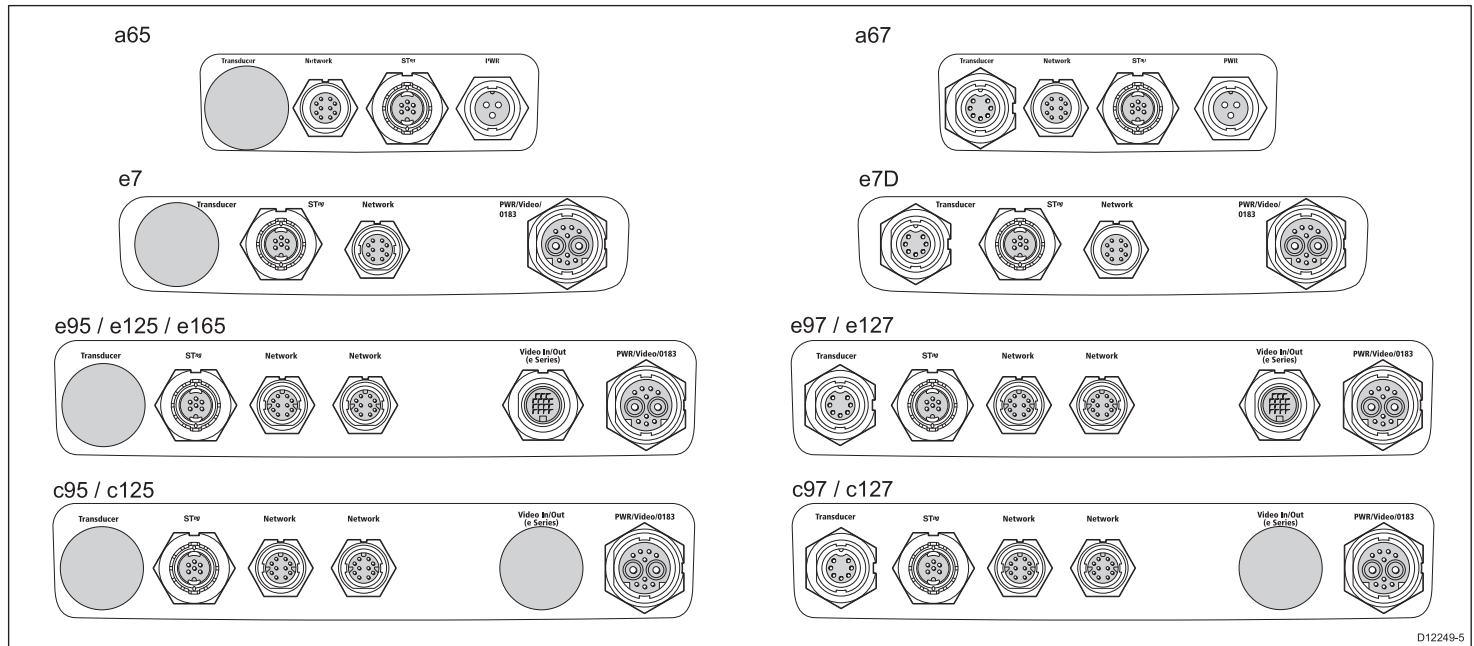
- Always use isolating transformers or a separate power-inverter to run PC's, processors, displays and other sensitive electronic instruments or devices.
- Always use an isolating transformer with Weather FAX audio cables.
- Always use an isolated power supply when using a 3rd party audio amplifier.
- Always use an RS232/NMEA converter with optical isolation on the signal lines.
- Always make sure that PC's or other sensitive electronic devices have a dedicated power circuit.

### Cable shielding

Ensure that all data cables are properly shielded that the cable shielding is intact (e.g. hasn't been scraped off by being squeezed through a tight area).

## 4.2 Connections overview

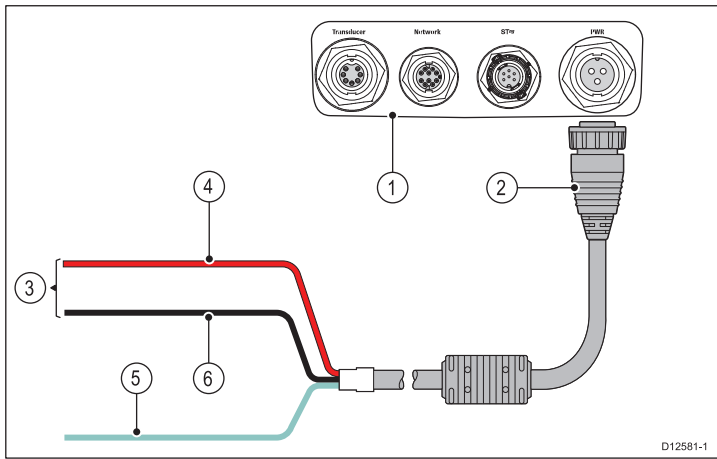
Details of the connections available on Raymarine multifunction displays are shown below.



D12249-5

	Transducer	SeaTalk <sup>ng</sup>	SeaTalk <sup>hs</sup> / RayNet Network 1	SeaTalk <sup>hs</sup> / RayNet Network 2	Video in / out	Power / Video / NMEA 0183
a65	✗	✓	✓	✗	✗	✓
a67	✓	✓	✓	✗	✗	✓
e7	✗	✓	✓	✗	✗	✓
e7D	✓	✓	✓	✗	✗	✓
e95	✗	✓	✓	✓	✓	✓
e97	✓	✓	✓	✓	✓	✓
e125	✗	✓	✓	✓	✓	✓
e127	✓	✓	✓	✓	✓	✓
e165	✗	✓	✓	✓	✓	✓
c95	✗	✓	✓	✓	✗	✓
c97	✓	✓	✓	✓	✗	✓
c125	✗	✓	✓	✓	✗	✓
c127	✓	✓	✓	✓	✗	✓

## 4.3 Power connection — New a Series



1. Multifunction display rear panel connections.
2. Power cable.
3. Connection to 12 V power supply
4. Red cable (positive).
5. Shield (drain) wire (thin black wire; must be connected to RF ground point).
6. Black cable (negative).

### Power distribution

Raymarine recommends that all power connections are made via a distribution panel.

- All equipment must be powered from a breaker or switch, with appropriate circuit protection.
- All equipment should be wired to individual breakers if possible.



### Warning: Product grounding

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

### Grounding — Dedicated drain wire

The power cable supplied with this product includes a dedicated shield (drain) wire for connection to a vessel's RF ground point.

It is important that an effective RF ground is connected to the system. A single ground point should be used for all equipment. The unit can be grounded by connecting the shield (drain) wire of the power cable to the vessel's RF ground point. On vessels without an RF ground system the shield (drain) wire should be connected directly to the negative battery terminal.

The dc power system should be either:

- Negative grounded, with the negative battery terminal connected to the vessel's ground.
- Floating, with neither battery terminal connected to the vessel's ground



### Warning: Positive ground systems

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

### Power cable

The display is supplied with a power cable, this can be extended if required..

### Power cables available

For flush mount installations a right angled power cable (not supplied) is available.

Cable	Part number	Notes
Right angled power cable	A80021	

### Cable extension

The following restrictions apply to any extension to the power cable:

- Cable must be of a suitable gauge for the circuit load.
- Each unit should have its own dedicated power cable wired back to the distribution panel.

Total length (max)	Supply voltage	Cable gauge (AWG)
0–5 m (0–16.4 ft)	12 V	18
5–10 m (16.4–32.8 ft)	12 V	14
10–15 m (32.8–49.2 ft)	12 V	12
15–20 m (49.2–65.5 ft)	12 V	12

**Note:** These distances are for a 2 wire power cable run from the battery to the display (approximately the distance from the battery to the display). To calculate the round trip length, double the figure stated here.

### Breakers, fuses and circuit protection

The unit includes an internal fuse. It is recommended that you fit an additional thermal breaker or fuse at the distribution panel.

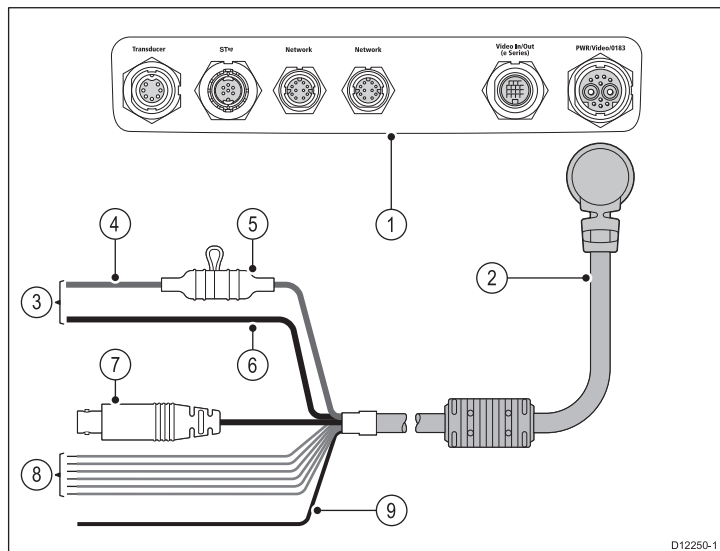
#### Thermal breaker rating

5 A (if only connecting one device)

**Note:** The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. If in doubt consult an authorized Raymarine dealer.



## 4.4 Power connection — New c Series and New e Series



1. Multifunction display connections.
2. Power and data cable.
3. Connection to 12/24 V power supply (e7/e7D is 12V only).
4. Red cable (positive).
5. Fuse.
6. Black cable (negative).
7. Video input cable.
8. NMEA 0183 data cables.
9. Shield (drain) wire (thin black wire; must be connected to RF ground point).

### Power distribution

Raymarine recommends that all power connections are made via a distribution panel.

- All equipment must be powered from a breaker or switch, with appropriate circuit protection.
- All equipment should be wired to individual breakers if possible.



### Warning: Product grounding

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

### Grounding — Dedicated drain wire

The power cable supplied with this product includes a dedicated shield (drain) wire for connection to a vessel's RF ground point.

It is important that an effective RF ground is connected to the system. A single ground point should be used for all equipment. The unit can be grounded by connecting the shield (drain) wire of the power cable to the vessel's RF ground point. On vessels without an RF ground system the shield (drain) wire should be connected directly to the negative battery terminal.

The dc power system should be either:

- Negative grounded, with the negative battery terminal connected to the vessel's ground.
- Floating, with neither battery terminal connected to the vessel's ground



### Warning: Positive ground systems

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

## Power cable

The display is supplied with a combined power and data multi cable, this can be extended if required.

### Power cables available

Cable	Part number	Notes
1.5 m (4.9 ft) Straight power and data cable	R62379	
1.5 m (4.9 ft) Right angled power and data cable	R70029	

### Cable extension

The following restrictions apply to any extension to the power cable:

- Cable must be of a suitable gauge for the circuit load.
- Each unit should have its own dedicated power cable wired back to the distribution panel.

Total length (max)	Supply voltage	Cable gauge (AWG)
0–5 m (0–16.4 ft)	12 V	18
	24 V	20
5–10 m (16.4–32.8 ft)	12 V	14
	24 V	18
10–15 m (32.8–49.2 ft)	12 V	12
	24 V	16
15–20 m (49.2–65.5 ft)	12 V	12
	24 V	14

**Note:** These distances are for a 2 wire power cable run from the battery to the display (approximately the distance from the battery to the display). To calculate the round trip length, double the figure stated here.

### Breakers, fuses and circuit protection

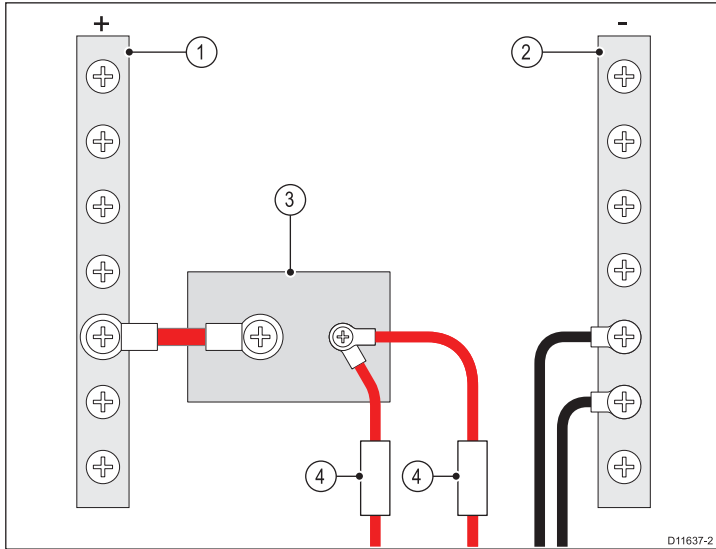
The power cable includes an in-line fuse. It is recommended that you fit an additional thermal breaker or fuse at the distribution panel.

Fuse rating	Thermal breaker rating
7 A in-line fuse fitted within power cable.	5 A (if only connecting one device)

**Note:** The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. If in doubt consult an authorised Raymarine dealer.

## 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.

## 4.5 Network connections

You can connect a number of digital devices to your multifunction display using the Network connector(s) at the rear of the unit. A typical network of digital devices may include:

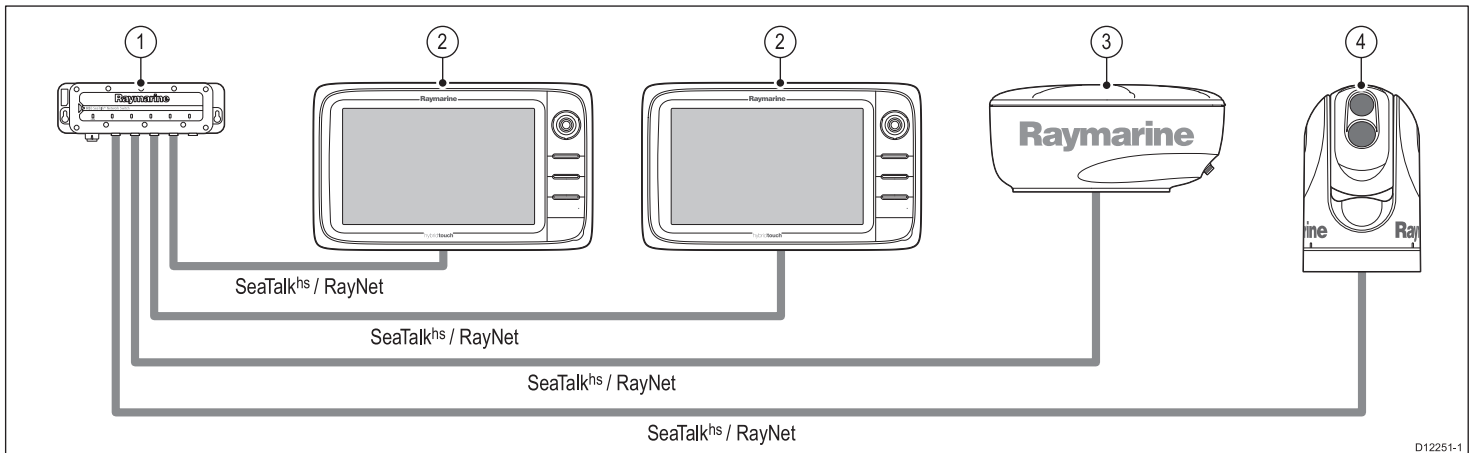
- Up to 6 Raymarine multifunction displays.
- SeaTalk<sup>hs</sup> or RayNet digital devices such as a sonar module and radar scanner.
- Ethernet IP cameras.

**Note:** Your multifunction display includes the following network connectors:

- e7, e7D, a65 and a67 = 1 x SeaTalk<sup>hs</sup> / RayNet connector.
- New c Series and New e Series (excluding the e7 and e7D) = 2 x SeaTalk<sup>hs</sup> / RayNet connectors.

Networks requiring additional network connections will require a Raymarine network switch.

### Typical SeaTalk<sup>hs</sup> network



1. Raymarine network switch.
2. Multifunction display.
3. Raymarine radar scanner.
4. Thermal camera.

**Note:** New a Series displays do not support connection to a thermal camera.

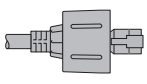
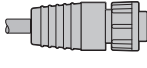
### Network hardware

Item	Part number	Notes
HS5 SeaTalk <sup>hs</sup> network switch	A80007	5-port switch for network connection of multiple SeaTalk <sup>hs</sup> devices featuring RayNet connectors. Equipment with SeaTalk <sup>hs</sup> connectors can also be connected via suitable adaptor cables.
SeaTalk <sup>hs</sup> network switch	E55058	8-port switch for network connection of multiple SeaTalk <sup>hs</sup> devices.

Item	Part number	Notes
SeaTalk <sup>hs</sup> crossover coupler	E55060	Enables direct connection of SeaTalk <sup>hs</sup> devices to smaller systems where a switch is not required. Also enables the connection of SeaTalk <sup>hs</sup> devices to an HS5 SeaTalk <sup>hs</sup> network switch (in conjunction with a RayNet to RJ45 cable).
Ethernet Coupler	R32142	Enables direct connection of ethernet or SeaTalk <sup>hs</sup> devices to smaller systems where a switch is not required. Also enables the connection of ethernet or SeaTalk <sup>hs</sup> devices to an HS5 SeaTalk <sup>hs</sup> network switch (in conjunction with a RayNet to RJ45 cable).

## Network cable connector types

There are 2 types of network cable connector — SeaTalk<sup>hs</sup> and RayNet.

	<b>SeaTalk<sup>hs</sup> connector</b> — used for connecting SeaTalk <sup>hs</sup> devices to a Raymarine network switch via SeaTalk <sup>hs</sup> cables.
	<b>RayNet connector</b> — used for connecting Raymarine network switches and SeaTalk <sup>hs</sup> devices to the multifunction display via RayNet cables. Also required for connecting a crossover coupler if only one device is being connected to the display's Network connector.

## Network cable types

There are 2 types of SeaTalk<sup>hs</sup> network cable — “patch” and “network”.

- **Patch** — for connecting the following devices to a Raymarine network switch:
  - Thermal camera via PoE injector.
  - Additional Raymarine network switch.
  - PC or laptop using Voyager planning software.
- **Network** — for connecting the following devices to a Raymarine network switch:
  - Sonar Module.
  - SR100 Sirius weather receiver.
  - Additional compatible Raymarine multifunction displays.

### RayNet connector network cables

Cable	Part number
1 m (3.28 ft) RayNet to SeaTalk <sup>hs</sup> (RJ45) cable	A62360
3 m (9.84 ft) RayNet to SeaTalk <sup>hs</sup> (RJ45) cable	A80151
10 m (32.8 ft) RayNet to SeaTalk <sup>hs</sup> (RJ45) cable	A80159
400 mm (1.3 ft) RayNet to RayNet cable	A80160
2 m (6.56 ft) RayNet to RayNet cable	A62361
5 m (16.4 ft) RayNet to RayNet cable	A80005
10 m (32.8 ft) RayNet to RayNet cable	A62362
20 m (65.6 ft) RayNet to RayNet cable	A80006
50 mm (1.97 in) RayNet (male) to RayNet (male) cable	A80162
400 mm (1.3 ft) RayNet to SeaTalk <sup>hs</sup> (female) adaptor	A80160
RayNet cable puller 5 pack	R70014

### SeaTalk<sup>hs</sup> network cables

Cable	Part number
1.5 m (4.9 ft) SeaTalk <sup>hs</sup> network cable	E55049
5 m (16.4 ft) SeaTalk <sup>hs</sup> network cable	E55050
10 m (32.8 ft) SeaTalk <sup>hs</sup> network cable	E55051
20 m (65.6 ft) SeaTalk <sup>hs</sup> network cable	E55052

### SeaTalk<sup>hs</sup> patch cables

Cable	Part number
1.5 m (4.9 ft) SeaTalk <sup>hs</sup> patch cable	E06054
5 m (16.4 ft) SeaTalk <sup>hs</sup> patch cable	E06055

Cable	Part number
10 m (32.8 ft) SeaTalk <sup>hs</sup> patch cable	E06056
15 m (49.2 ft) SeaTalk <sup>hs</sup> patch cable	A62136
20 m (65.6 ft) SeaTalk <sup>hs</sup> patch cable	E06057

## Radar connection

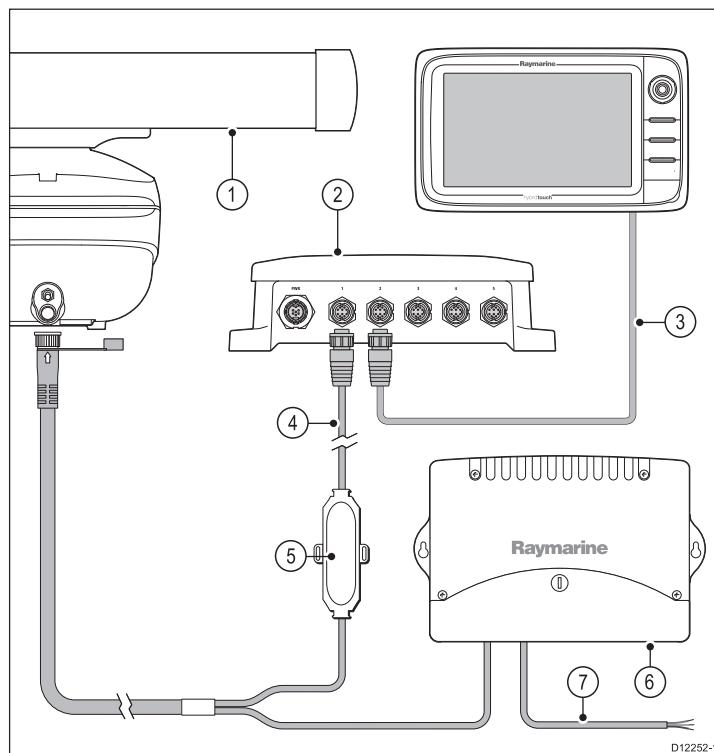
The multifunction display is compatible with Raymarine Non-HD digital radomes and HD / SuperHD radar scanners. The scanner is connected using a SeaTalk<sup>hs</sup> cable.

### Note:

- New c Series and New e Series displays (excluding the e7 and e7D) can connect 2 SeaTalk<sup>hs</sup> / RayNet devices directly to the display.
- New a Series and the e7 / e7D displays can connect 1 SeaTalk<sup>hs</sup> / RayNet device directly to the display.

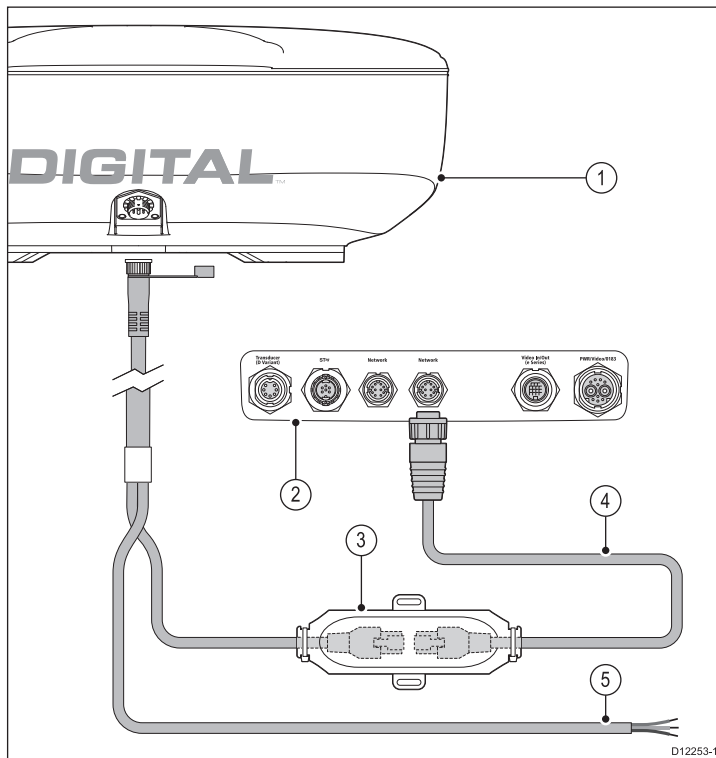
The radar is usually connected via a Raymarine network switch. On smaller systems (with only one display and no other digital devices) the radar may be connected to the display directly using a SeaTalk<sup>hs</sup> crossover coupler.

### Radar connected using Raymarine network switch



1. Radar scanner.
2. Raymarine network switch.
3. RayNet cable.
4. RayNet to SeaTalk<sup>hs</sup> network cable.
5. SeaTalk<sup>hs</sup> crossover coupler
6. VCM (Voltage Converter Module) — **required for Open Arrays.**
7. Power connection.

## Radars connected using crossover coupler

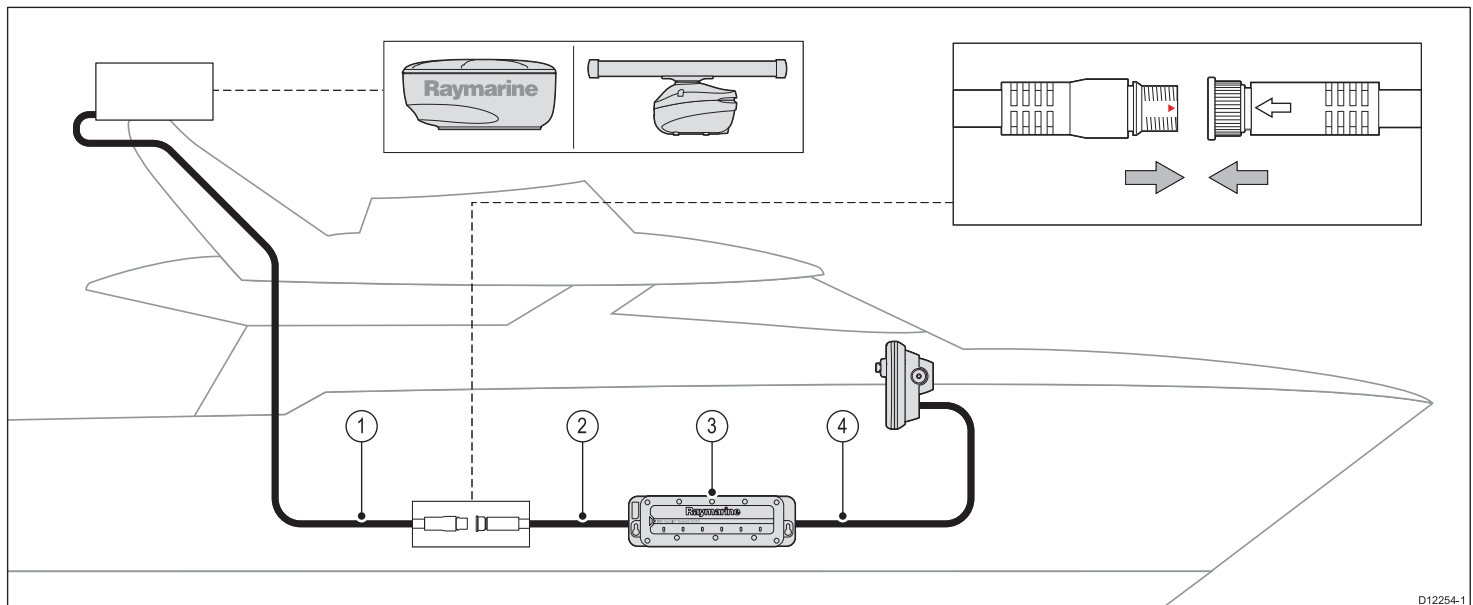


1. Radar scanner
2. Multifunction display rear connector panel.
3. SeaTalk<sup>hs</sup> crossover coupler.
4. RayNet to SeaTalk<sup>hs</sup> network cable.
5. Connection to power supply — **Open array scanners require a VCM (Voltage Converter Module).**

**Note:** The connector on the free end of the radar cable does NOT have a locking mechanism.

## Radars cable extension

For longer cable runs a radar power and data digital cable extension is required.



1. Radar extension cable.
2. Radar power and data digital cable.
3. Raymarine network switch (or crossover coupler if connecting radar directly to display).
4. RayNet cable (or RayNet to SeaTalk<sup>hs</sup> cable if connecting via crossover coupler).

**Note:** The extension cable connects to the radar scanner.

**Note:** The power connection is NOT shown in the diagram. If using an Open Array scanner a VCM (Voltage Converter Module) must be connected between the scanner and the power supply.

## Digital radar cables

You will need a dedicated radar power and data digital cable and SeaTalk<sup>h</sup>s network cables to connect your scanner to your system.

Connection	Required cable
Radar scanner to power supply and Raymarine network switch.	Power and data digital cable. For longer cable runs, extensions are available in a variety of lengths.
Raymarine network switch to multifunction display.	SeaTalk <sup>h</sup> s network cables, available in a variety of cable lengths.

## Radar power and data digital cables

These cables contain the wires for a scanner's power and data connections.

Cable	Part number
5 m (16.4 ft) Power and data digital cable	A55076D
10 m (32.8 ft) Power and data digital cable	A55077D
15 m (49.2 ft) Power and data digital cable	A55078D
25 m (82.0 ft) Power and data digital cable	A55079D

**Note:** The maximum length for the radar power and data digital cable (including any extensions) is 25 m (82 ft).

## Radar power and data digital extension cables

These cables extend the power and data digital cables for a scanner's power and data connections.

Cable	Part number
2.5 m (8.2 ft) Power and data digital cable	A92141D
5 m (16.4 ft) Power and data digital cable	A55080D
10 m (32.8 ft) Power and data digital cable	A55081D

**Note:** The maximum length for the radar power and data digital cable (including any extensions) is 25 m (82 ft).

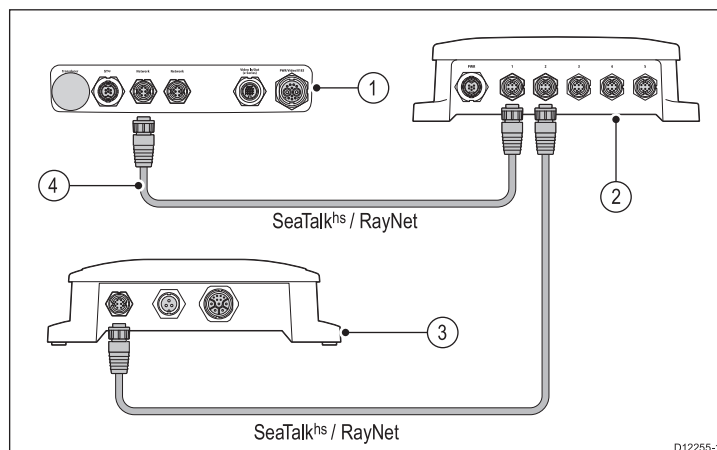
## Sonar connection

A sonar connection is required for fishfinder applications.

There are 2 types of connection required for fishfinder applications:

- **Sonar module connection** — converts the sonar signals provided by the sonar transducer into data suitable for a marine electronics system. The sonar variant multifunction displays feature a built-in sonar, enabling you to connect the display directly to a compatible sonar transducer. Non-sonar variants require a connection to an external Raymarine sonar module. Internal and external sonars require a connection to a compatible sonar transducer.
- **Sonar transducer connection** — provides sonar signals to the sonar module.

## Sonar module connection



1. Rear connector panel of multifunction display (Non-sonar variant).
2. Raymarine network switch.
3. Raymarine sonar module.
4. RayNet cable.

The multifunction display can be used with the following Raymarine sonar modules:

- CP450C
- DSM300
- DSM30

**Note:** You can also connect a sonar variant multifunction display to a Raymarine sonar module. This is useful in circumstances where you need a higher powered sonar module for example. You can only use one sonar transducer at any one time.

## Sonar connected directly to the display

On smaller systems (with only one display and no other SeaTalk<sup>h</sup>s / RayNet devices) the sonar module may be connected directly to the display without using a Raymarine network switch.

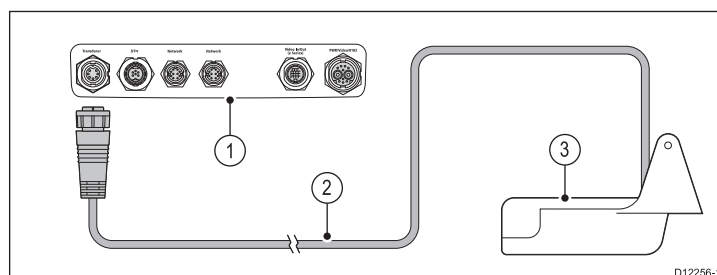
**Note:** You must ensure that the cable ends connected into the display and sonar module have a locking / weather-tight mechanism.

## Compatible sonar transducers

The multifunction display is compatible with the following sonar transducers:

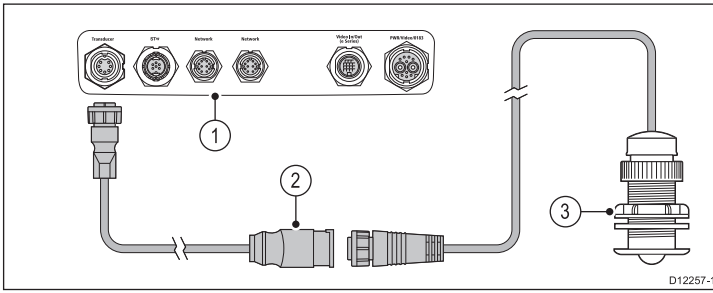
- Raymarine P48.
- Raymarine P58.
- Minn Kota transducers (Sonar variant Raymarine displays only), via optional A62363 adaptor cable.
- Any 600 watt sonar-compatible transducer, via optional E66066 adaptor cable.

## Sonar transducer connection — Sonar variant multifunction displays



1. Rear connector panel of multifunction display (Sonar variant).
2. Sonar transducer cable.
3. Sonar transducer.

## 600 watt sonar-compatible sonar transducer connection via optional adaptor — Sonar variant multifunction displays

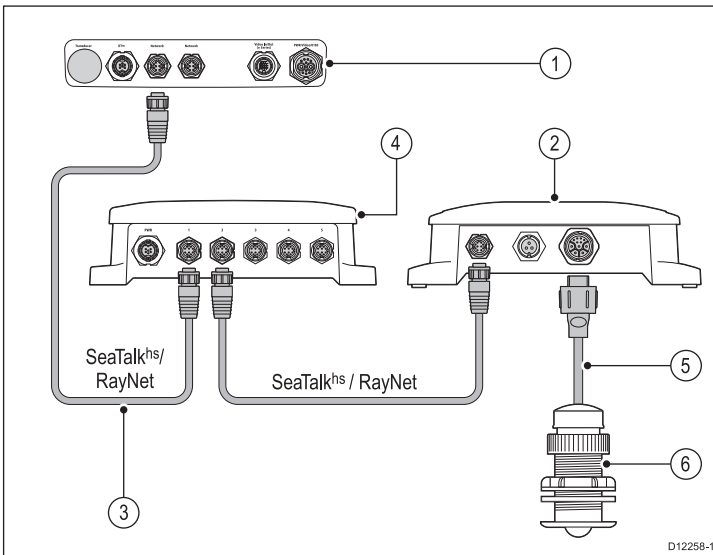


1. Rear connector panel of multifunction display (Sonar variant).
2. E66066 adaptor cable.
3. Sonar transducer.

### Transducer adaptor cable

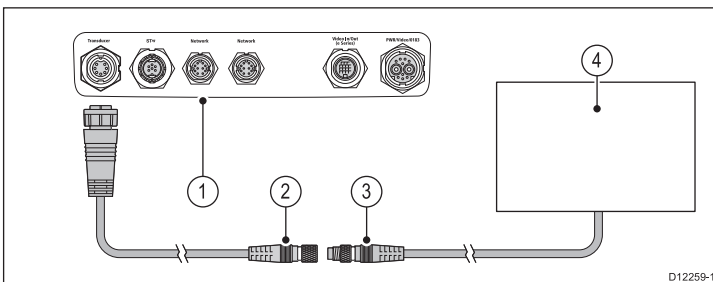
Cable	Part number
0.5 m (1.64 ft) transducer adaptor cable	E66066

## Sonar transducer connection — Non-Sonar variant multifunction displays



1. Rear connector panel of multifunction display (Non-sonar variant).
2. Raymarine network switch (only required if connecting more than one device using SeaTalk<sup>hs</sup> / RayNet).
3. RayNet cable.
4. Raymarine sonar module.
5. Sonar transducer cable.
6. Sonar transducer.

## Minn Kota sonar transducer connection via optional adaptor cable (Sonar variant multifunction displays only)



1. Rear connector panel of multifunction display (Sonar variant).
2. Minn Kota transducer adaptor cable.
3. Minn Kota transducer cable.
4. Minn Kota transducer.

## Sonar variant multifunction displays

The table below details which multifunction display variants feature a built-in sonar module and can be connected directly to compatible sonar transducers.

Sonar variants	Non-sonar variants
a67	a65
e7D	e7
c97	c95
c127	c125
e97	e95
e127	e125
	e165

### Minn Kota transducer adaptor cable

Connects a Minn Kota sonar transducer to a compatible Raymarine multifunction display.

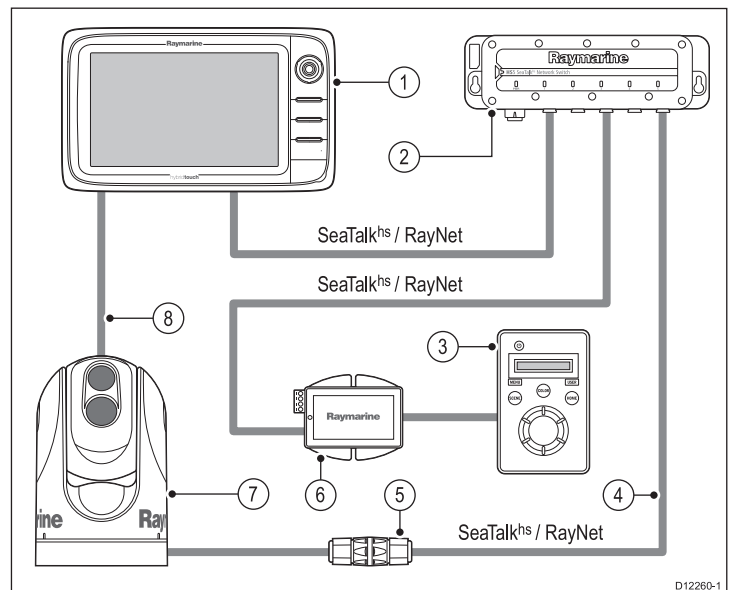
Cable	Part number
1 m (3.28 ft) Minn Kota transducer adaptor cable	A62363

## Thermal camera connection

You can connect a thermal camera to your New c Series or New e Series multifunction displays.

**Note:** New a Series does not support thermal cameras.

The camera is connected via a Raymarine network switch. If you want to use the optional Joystick Control Unit (JCU) with the camera this must also be connected to the network switch. A composite video connection is required between the camera and the multifunction display.



1. Multifunction display
2. Raymarine network switch
3. Joystick Control Unit (JCU), optional
4. SeaTalk<sup>hs</sup> to RayNet cable
5. Ethernet cable coupler.
6. PoE (Power over Ethernet) injector (only required if using the optional JCU).
7. Thermal camera
8. Video connection

### Important notes

- You can control the thermal camera using your multifunctional display. The Joystick Control Unit (JCU) is optional, but can be

used in conjunction with the multifunctional display to control the thermal camera if required.

- “Dual payload” thermal cameras include 2 independent lenses; 1 for thermal (infrared) and 1 for visible light. If you only have 1 display you should only connect the video cable labelled “VIS / IR” (visible light / infrared) to the display. If you have 2 or more displays you should connect 1 cable to each display.
- You can only view the thermal camera image on the multifunction display to which the camera is physically connected. If you want to view the thermal camera image on more than 1 display you must obtain a suitable third-party video distribution unit.
- For further information regarding the camera’s installation (including connections and mounting), refer to the installation instructions that accompany the camera.

**Thermal camera cables**

Cabling requirements for thermal cameras.

**Camera to network switch**

A network patch cable is required to connect the camera to the network switch. The connection is made between the camera cable tail and the network switch via the coupler (supplied with the camera). Network patch cables are available in a variety of lengths.

**Joystick Control Unit (JCU)**

An Ethernet (with power) cable is used to connect the JCU. The JCU is supplied with a 7.62 m (25 ft) Ethernet cable for this connection. If you require a different length contact your dealer for suitable cables.

**Power over Ethernet (PoE) injector to network switch**

A network patch cable is required for connecting the PoE injector to the network switch. Network patch cables are available in a variety of lengths.

**Video cables**

Video cables are not supplied with the product. Please contact your dealer for suitable cables and adaptors.

Raymarine recommends the use of a BNC terminated RG59 75ohm (or better) coaxial cable.

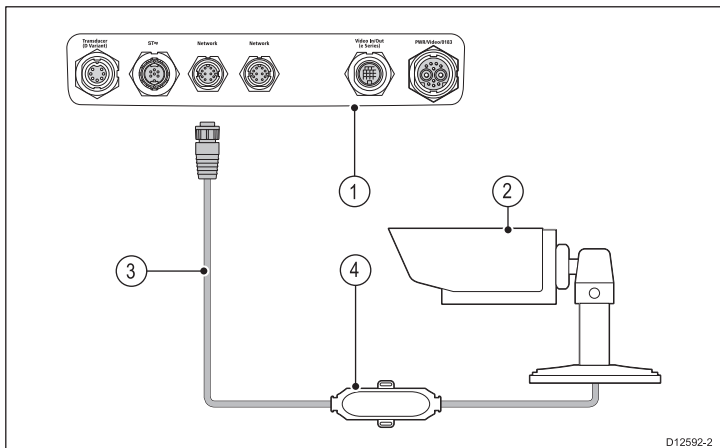
**IP Camera connections**

You can connect IP cameras to your multifunction display.

**Note:** IP cameras must be configured to automatically assign an IP address prior to connecting to your multifunction display or network. Please refer to the instructions supplied with your IP camera for configuration details.

**Note:** Your multifunction display must be powered up before power is applied to any networked IP cameras, this is to enable your multifunction display to assign the IP camera(s) a valid IP address.

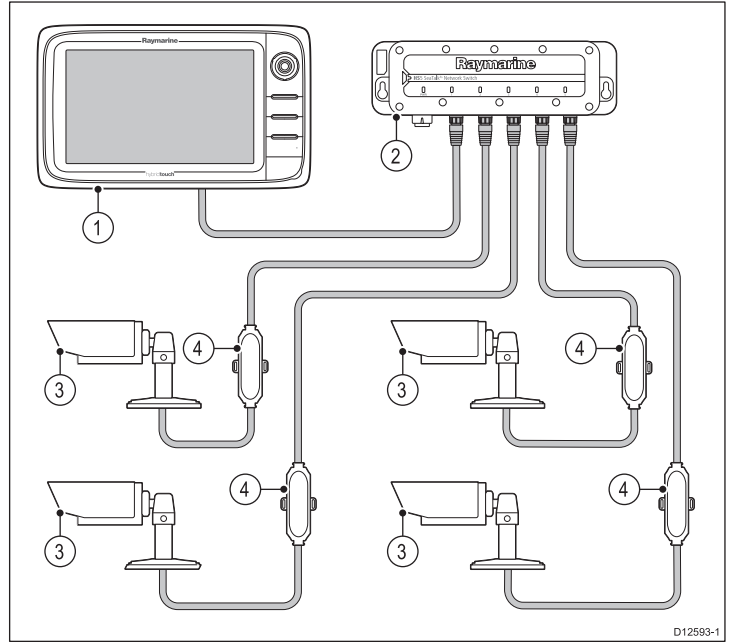
IP camera(s) can be connected directly to the SeaTalk<sup>hs</sup> RayNet connector on your multifunction display.



Item	Description
1	Multifunction display rear connector panel
2	IP camera

Item	Description
3	RayNet to RJ45 cable
4	SeaTalk <sup>hs</sup> cross over coupler

You can also connect multiple IP cameras via the SeaTalk<sup>hs</sup> network



Item	Description
1	Multifunction display
2	Raymarine network switch
3	IP cameras
4	SeaTalk <sup>hs</sup> cross over couplers

**Note:** Multifunction displays do not provide power over ethernet (PoE) connected cameras must have their own power supply.

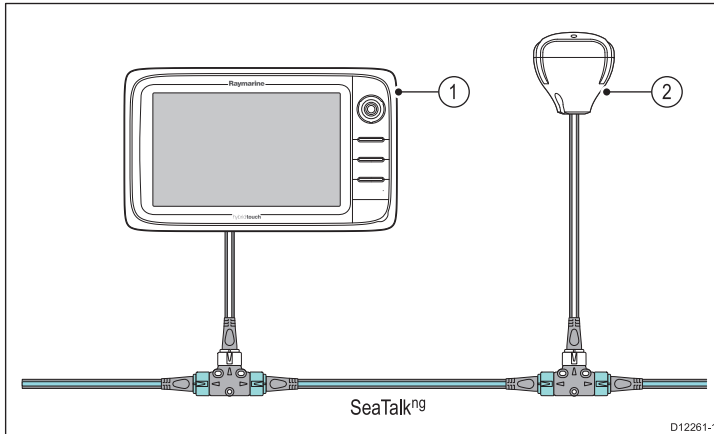
**Note:** If your IP camera(s) are not detected by your multifunction display, try power cycling the IP camera(s) whilst leaving your multifunction display powered up.



## 4.6 GPS connection

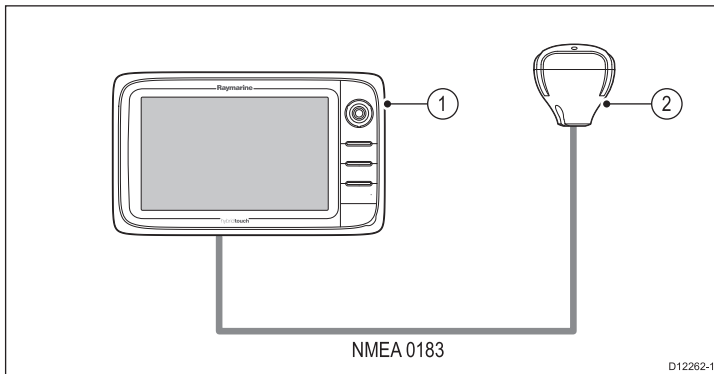
Depending on display variant, your multifunction display may include an internal GPS receiver. If required the multifunction display can also be connected to an external GPS receiver, using SeaTalk<sup>ng</sup> or NMEA 0183.

### GPS connection — SeaTalk<sup>ng</sup>



1. Multifunction display.
2. SeaTalk<sup>ng</sup> GPS receiver.

### GPS connection — NMEA 0183

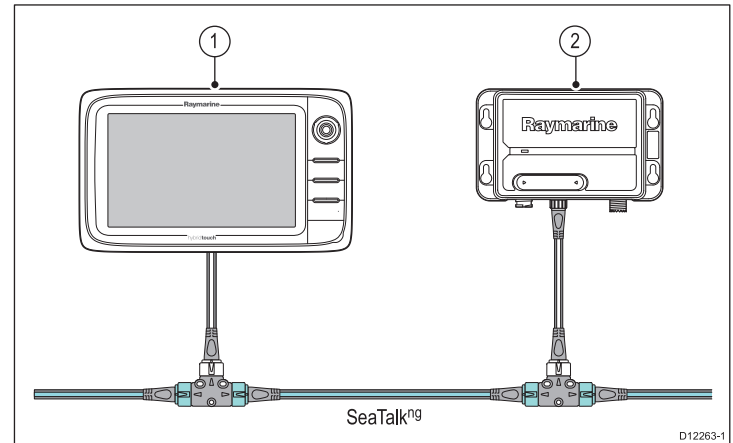


1. Multifunction display.
2. NMEA 0183 GPS receiver.

## 4.7 AIS connection

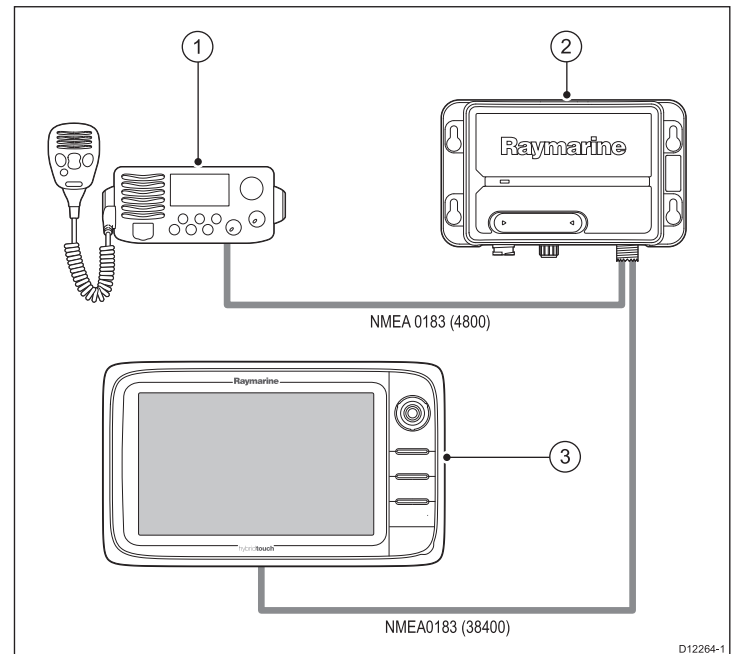
A compatible AIS can be connected using SeaTalk<sup>ng</sup> or NMEA 0183.

### Connection using SeaTalk<sup>ng</sup>



1. Multifunction display.
2. SeaTalk<sup>ng</sup> AIS receiver / transceiver.

### Connection using NMEA 0183



1. VHF radio.
2. AIS unit.
3. Multifunction display.

## 4.8 Fastheading connection

If you wish to use MARPA (radar target acquisition) functions on your multifunction display you need either:

- An autopilot connected to the multifunction display via SeaTalk<sup>ng</sup> or NMEA 0183. The compass is connected to the course computer and calibrated via the pilot control head; or:
- A Raymarine or third-party fastheading sensor connected to the multifunction display via NMEA 0183.

**Note:** Please contact your dealer or Raymarine technical support for more information.

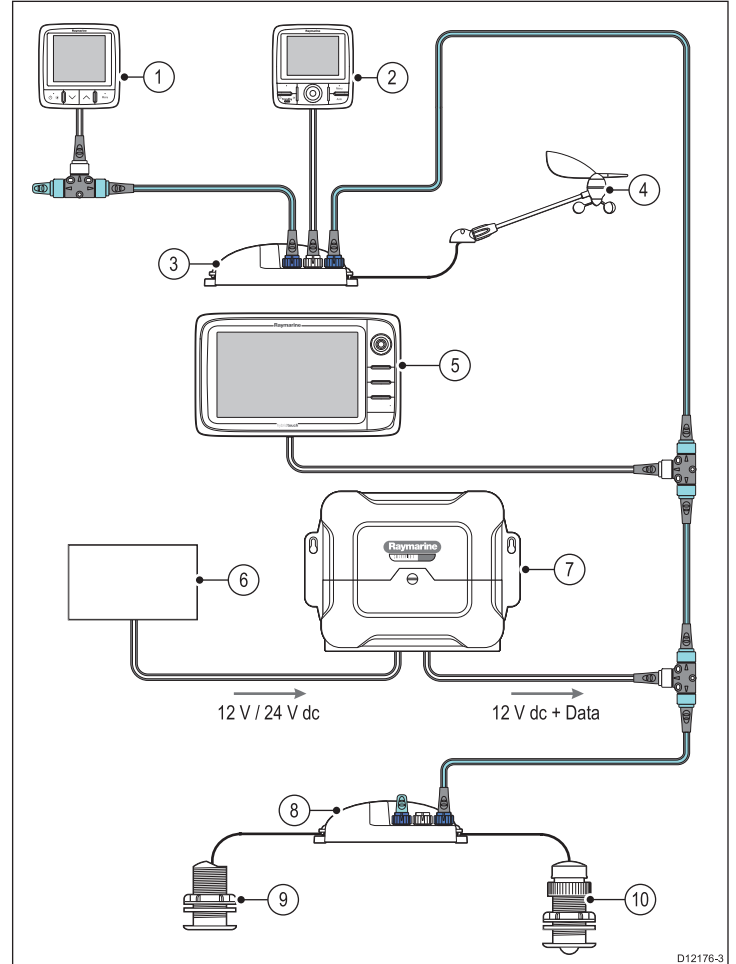
## 4.9 SeaTalk<sup>ng</sup> connections

The display can connect to a SeaTalk<sup>ng</sup> system.

The display can use SeaTalk<sup>ng</sup> to communicate with:

- SeaTalk<sup>ng</sup> instruments (for example, i70).
- SeaTalk<sup>ng</sup> autopilots (for example, p70 with SmartPilot SPX course computer).
- SeaTalk equipment via the optional SeaTalk to SeaTalk<sup>ng</sup> converter.
- NMEA 2000 equipment via optional DeviceNet adaptor cables.

### Typical SeaTalk<sup>ng</sup> system



1. SeaTalk<sup>ng</sup> instrument — for example, i70.
2. SeaTalk<sup>ng</sup> pilot control head — for example, p70.
3. iTC-5 converter.
4. Wind transducer.
5. SeaTalk<sup>ng</sup> multifunction display.
6. Power supply.
7. SeaTalk<sup>ng</sup> course computer — for example, SPX-30.
8. iTC-5 converter.
9. Depth transducer.
10. Speed transducer.

### SeaTalk<sup>ng</sup> power requirements

The SeaTalk<sup>ng</sup> bus requires a 12 V power supply.

Power may be provided from:

- Raymarine equipment with a regulated 12 V power supply (for example, a SmartPilot SPX course computer); or:
- Other suitable 12 V power supply.

**Note:** SeaTalk<sup>ng</sup> does NOT supply power to multifunction displays and other equipment with a dedicated power supply input.