

Raymarine®

ELEMENT

Installation Instructions

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CHAPTER 1: IMPORTANT INFORMATION

Safety warnings

Warning: Product installation and operation

• This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury or damage to your vessel. It may also cause poor product performance or invalidate the product warranty.

• Raymarine highly recommends certified installation by a Raymarine approved installer. A certified installation qualifies for enhanced product warranty benefits. Register your warranty on the Raymarine website: www.raymarine.com/warranty

Warning: Switch off power supply

Ensure that 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 to do so in this document.

Warning: High voltage

This product contains high voltage. Do NOT remove covers or attempt to access internal components, unless specifically instructed in the documentation provided.

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: Ensure safe navigation

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

Product warnings

Warning: 12 Volt dc only

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

Regulatory notices

Declaration of conformity

Raymarine UK Ltd declares that the radio equipment type product listed below is in conformity with the relevant sections of the listed designated standards and / or other normative documents:

- Element™ 7 HV, part numbers E70532
- Element™ 7 S, part numbers E70531
- Element™ 9 HV, part numbers E70534
- Element™ 9 S, part numbers E70533
- Element™ 12 HV, part numbers E70536
- Element™ 12 S, part numbers E70535

Region	Standard	Mark
UK	EMC Regulations 2016	UKCA
EU	Radio Equipment Directive 2014/53/EU	CE

The original Declaration of Conformity certificates may be obtained via the documentation page at www.bit.ly/element-docs

PSTI Compliance

For products sold into the United Kingdom (UK), use the following link to obtain the product's Statement of Compliance with the *Product Security and Telecommunications Infrastructure* (PSTI) Regulations:

Visit the following web address and enter the product's model name or number (SKU) into the provided search field:

- www.bit.ly/rym-sec-com

RF exposure

This equipment complies with FCC / ISED RF exposure limits for general population / uncontrolled exposure. The wireless LAN / Bluetooth antenna is mounted behind the front facia of the display. This equipment should be installed and operated with a minimum distance of 1 cm (0.39 in) between the device and the body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

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.

Innovation, Science and Economic Development Canada (ISED)

This device complies with 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(B) / NMB-003(B).

Innovation, Sciences et Développement économique Canada (Français)

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

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.

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.

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Electronic chart data

Raymarine does not warrant the accuracy of such information, and is not responsible for damages or injuries caused by errors in chart data or information utilized by the product and supplied by third parties. Use of electronic charts provided by third parties is subject to the supplier's End-User License Agreement (EULA).

Warranty policy and registration

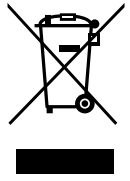
Visit the Raymarine website to **read the latest warranty policy**, and **register** your product's warranty online: www.bit.ly/rym-warranty

It is important that you register your product to receive full warranty benefits. Your product package includes a barcode label indicating the serial number of the unit. This serial number is also provided on a label affixed to the product itself. You will need this serial number when registering your product online.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

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



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

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CHAPTER 2: DOCUMENT INFORMATION

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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.bit.ly/rym-docs

2.2 Applicable products

This document is applicable to the following products:

Part number	Description
E70532 / E70644	Element™ 7 HV — HyperVision™ sonar / GPS combo with Wi-Fi.
E70531	Element™ 7 S — Conical sonar / GPS combo with Wi-Fi.
E70534 / E70645	Element™ 9 HV — HyperVision™ sonar / GPS combo with Wi-Fi.
E70533	Element™ 9 S — Conical sonar / GPS combo with Wi-Fi.
E70536 / E70646	Element™ 12 HV — HyperVision™ sonar GPS combo with Wi-Fi.
E70535	Element™ 12 S — Conical sonar GPS combo with Wi-Fi.

2.3 Product documentation

The following documentation is applicable to your product:

Part number	Description
87360	Element™ Sonar / GPS Combo Installation Instructions (this document)
81384	LightHouse™ Sport Basic Operation instructions.
81388	LightHouse™ Sport Advanced Operation instructions.
87362	HV-100 Transom Mount Plastic Transducer Installation Instructions
87391	HV-300TH / HV-300THP / HV-300THP-P / HV-300THP-S Thru-hull, Plastic Transducer Installation instructions
87202	ECI-100 Engine Gateway Installation Instructions
87270	Quantum™ Wi-Fi guidance

All documents are available to download as PDFs from www.raymarine.com/manuals

LightHouse™ Sport operation instructions

For operation instructions for your product, please refer to the LightHouse™ Sport operation instructions.

QR Code	Link
	The Basic (81384) and Advanced (81388) LightHouse™ Sport operation instructions can be downloaded from the Raymarine website: www.raymarine.com/manuals. Please check the website to ensure you have the complete and most recent documentation for your product.

2.4 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.

CHAPTER 3: PRODUCT AND SYSTEM OVERVIEW

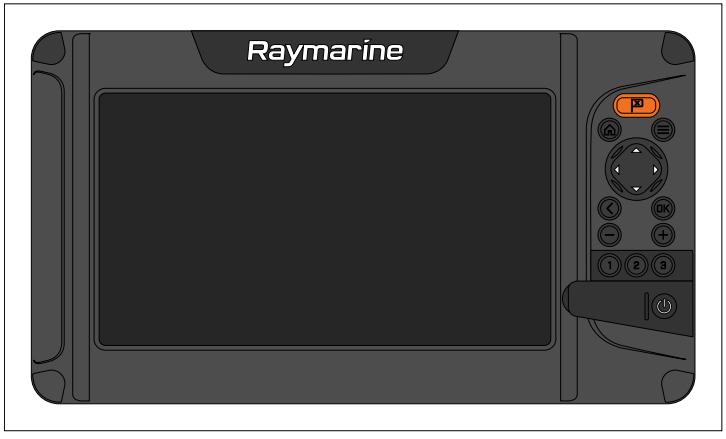
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3.1 Product overview

Element™ displays are combination fishfinder / chartplotting displays that can be connected to a NMEA 2000 or SeaTalkng ® network and display vessel data and data from compatible sensors and devices. Element displays are available with either a built-in HyperVision™ sonar module (Element™ HV), or a built-in conical sonar module (Element™ S).

Important:
An Element display can NOT be connected to the same SeaTalkng ® backbone as a Multifunction display. Examples of MFDs include Axiom, or a Series, c Series, e Series, eS Series, or gS Series displays. Further, because the Element display does NOT have a RayNet connection, it is not possible to network it in any way with a Multifunction display (MFD).



Element™ displays include the following features:

- New simple-to-use LightHouse™ Sport operating system optimized for fishing.
- Sunlight-viewable LCD.
- Built in GPS / GNSS receiver.
- Supports wireless Quantum™ radar scanner connection.
- Send navigation data to connected autopilot.
- Supports AIS connection.
- Personal sonar mapping using Raymarine RealBathy™.
- Compatible with LightHouse NC2 charts with Fishing Hot Spots®, Navionics and C-MAP cartography.
- 3 user programmable Quicklaunch buttons.
- Share waypoints between networked Element™ displays.
- Supports display of data from up to 2 standard NMEA 2000–compliant trim tabs.
- Supports display of data from compatible networked (NMEA 2000 / SeaTalkng ®) devices and sensors.
- Supports display of data from compatible engines when connected via an ECI-100.
- Transmit position data to a VHF radio connected to the same NMEA 2000 / SeaTalkng ® backbone.

Element™ displays are available with and without built-in Wi-Fi. Displays that include Wi-Fi can connect to the internet and perform over the air software updates.

Element™ HV

Element™ HV display's HyperVision™ 1.2 MHz CHIRP sonar technology increases sonar image resolution, providing a higher level of precision for bottom structure, vegetation and fish identification.

When connected to a HyperVision™ transducer, the following fishfinder channels are available:

- RealVision™ 3D (Hyper 1.2 MHz)
- RealVision™ 3D (Standard 350 kHz)
- SideVision™ (Hyper 1.2 MHz)
- SideVision™ (Standard 350 kHz)
- DownVision™ (Hyper 1.2 MHz)
- DownVision™ (Standard 350 kHz)
- Sonar Conical high CHIRP (200 kHz)

Element™ S

When connected to a CPT-S transducer, only the traditional conical high CHIRP (200 kHz) fishfinder channel is available.

3.2 Optional additional components

The following optional products and devices can be used with or connected to your display.

- **MicroSD memory / electronic cartography card** — Inserting a compatible memory card into the card reader enables:
  - display of compatible electronic cartography.
  - collection and display of Realbathy™ personal sonar data.
  - Back up and restore of user data and settings.
  - saving screenshot image files.
- **EV-1 Heading sensor** (E70096) — Connecting the display to a NMEA 2000 / SeaTalkng ® backbone that includes an EV-1 enables vessel heading data to be available, regardless of vessel movement.
- **Quantum™ radar scanner** (E70344, E70210 and E70498) — Connecting the display to a compatible radar scanner using Wi-Fi enables use of the Radar app.
- **Evolution™ autopilot system** — Connecting the display to the same network as an Evolution autopilot system enables navigation data to be sent to a compatible autopilot controller. For further information on compatible autopilot controllers, refer to: **p.44 —** Compatible autopilot controllers
- **ECI-100** (E70227) — Connecting the display to a NMEA 2000 / SeaTalkng ® backbone that includes an ECI-100 enables display of compatible engine data. For further information on compatible engines refer to: **p.17 —** Compatible engine systems
- **Third-party tank level sensors** — Connecting the display to a NMEA 2000 or SeaTalkng ® backbone that includes standard third-party NMEA 2000 tank level sensors enables the display of tank level sensor data . For further details on tank level sensors refer to: **p.17 —** Compatible tank level sensors
- **VHF radio** — Connecting the display to a NMEA 2000 or SeaTalkng ® backbone can provide position data to a compatible VHF radio.
- **RS150 GNSS receiver** (E70310) — Connecting an external GNSS / GPS receiver can provide more accurate position tracking.
- **AIS700 / AIS650 / AIS350** (E70476 / E32158 / E32157) — Connecting compatible AIS hardware allows AIS targets to be tracked in the chart app.
- **iTC-5** (E70010) — Connecting the display to a NMEA 2000 / SeaTalkng ® backbone that includes analog transducers connected via an iTC-5 enables the display of transducer sensor data (depth, speed, wind, water temperature etc.))in databoxes and the dashboard app.Refer to the iTC-5 installation instructions (87138) for further information on connecting analog transducers via an iTC-5.

Note:
Transducer calibration is not supported by the display and must be performed on an appropriate SeaTalkng ® instrument display such as the i70S multifunction instrument display.

- **Airmar** *[NMEA 2000]* **smart sensors** — Connecting an Airmar smart sensor such as a DST800 or P79.

Quantum software compatibility

When connecting a Quantum or Quantum 2 radar scanner to an MFD / chartplotter via a Wi-Fi connection, both the radar scanner and MFD / chartplotter must be running the minimum software version stated below.

Quantum software version	MFD / chartplotter software version
v2.52 or later.	• Axiom-Series — v4.6.148 or later. • Axiom 2-Series — v4.6.148 or later. • Element-Series — v3.19.17 or later.

Note:
This information does not apply to a Quantum / Quantum 2 radar scanner connected to an MFD / chartplotter via a **wired** connection.

NMEA 2000 data compatibility

In addition to products listed as compatible in this document, your product can also receive and display data from other NMEA 2000 devices.

For data to be displayed onscreen, the display must receive data from NMEA 2000 devices using supported NMEA 2000 PGN messages.

A list of NMEA 2000 PGN messages that are supported by your display can be found in the *Appendix* of this document. **p.78 — SeaTalk NG** cables and accessories

Compatible engine systems

When connected to an NMEA 2000 / SeaTalkng ® backbone via an ECI-100 engine gateway (E70227), engine data for up to two compatible engines can be displayed. The following engine systems are supported.

- Volvo Penta Electronic Vessel Control (EVC) systems
- Yamaha Marine Command Link
- Yamaha Marine Command Link Plus
- Yanmar engine systems
- Honda engines
- Caterpillar engine systems (must include MPD, MPD color or mini MPD)
- Other engine systems which use standard NMEA 2000 protocols.

Note:
For more information on connecting the ECI-100 to engine systems, including a list of supported NMEA 2000 messages, refer to the *ECI-100 Installation instructions* (87202).

Compatible tank level sensors

When connected to an NMEA 2000 / SeaTalkng ® backbone, tank level sensor data can be displayed. The majority of NMEA 2000-compliant tank level sensors are supported. If in doubt as to whether your level sensor is compatible, contact Raymarine product support.

Data can be displayed for:

- Up to 2 x fuel level tank sensors
- Up to 2 x fresh water level tank sensors
- Up to 2 x live well level tank sensors
- 1 x Gray water level tank sensor
- 1 x Black water level tank sensor

Note: A list of NMEA 2000 PGNs that are supported by the display is provided in the appendix: **p.83 —** NMEA 2000 PGNs

CHAPTER 4: PARTS SUPPLIED

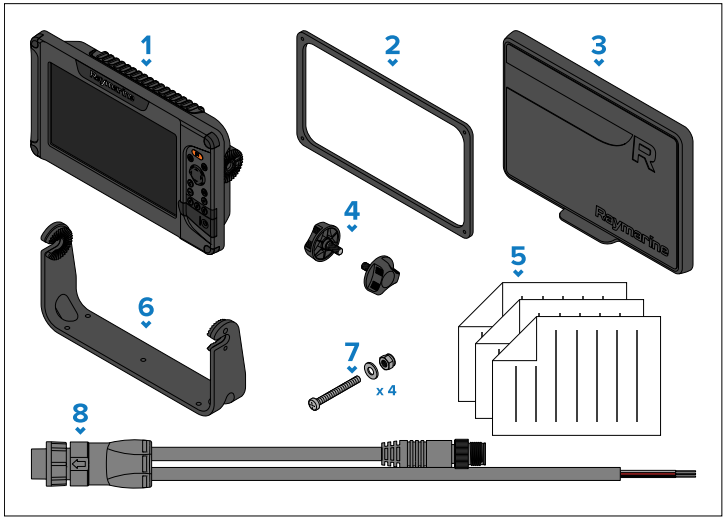
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- 4.2 Inline fuse requirement — page 19

4.1 Parts supplied

The following parts are supplied in the box.

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

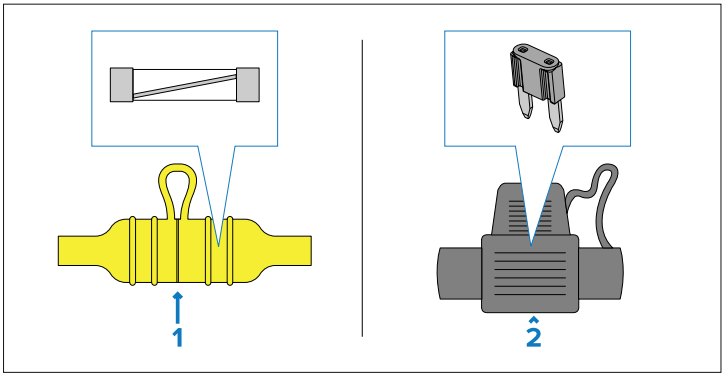


1. Element™ display.
2. Surface mount gasket.
3. Suncover.
4. Trunnion knobs x 2.
5. Documentation pack
6. Trunnion bracket
7. Surface mount stainless steel fixings x 4 (M4 x 40 machine screw, M4 flat washer, M4 locking nut)
8. Power / NMEA 2000 cable (includes 1.5 m (4.92 ft) power lead and 0.5 m (1.64 ft) NMEA 2000 lead).

4.2 Inline fuse requirement

If your product is NOT supplied with an inline fuse (whether separately or fitted to the power cable), you MUST fit a suitably-rated inline fuse to your product's red power wire, housed in a waterproof fuse holder.

The illustration below shows the two main types of inline fuse with waterproof holder, for use in marine electronics installations. Fuses in a variety of ratings are widely available at chandleries and marine electrical retailers.
Select one of the following fuse types to protect your product:



1. Waterproof fuse holder containing a "glass"-type inline fuse.
2. Waterproof fuse holder containing a "blade"-type inline fuse.

Fuse ratings:

- *Voltage rating* — must be equal to or greater than the voltage of your vessel's power supply.
- *Current rating* — refer to the *Inline fuse and thermal breaker rating* section in this document.

In-line fuse and thermal breaker ratings

The following in-line fuse and thermal breaker ratings apply to your product:

In-line fuse rating	Thermal breaker rating
5 A	3 A

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.

• Your product's power cable may have an in-line fuse fitted, if not then you must add an in-line fuse / breaker to the positive wire of your product's power connection.

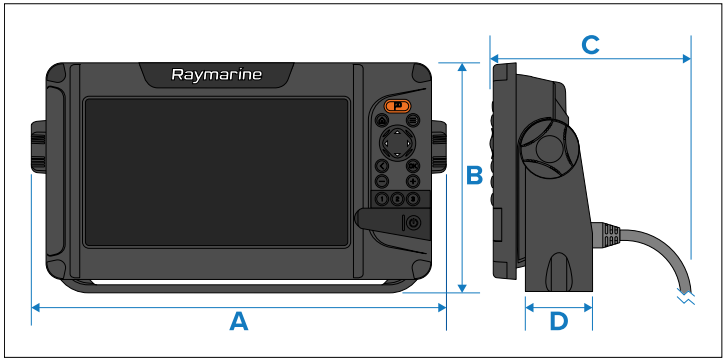
CHAPTER 5: PRODUCT DIMENSIONS

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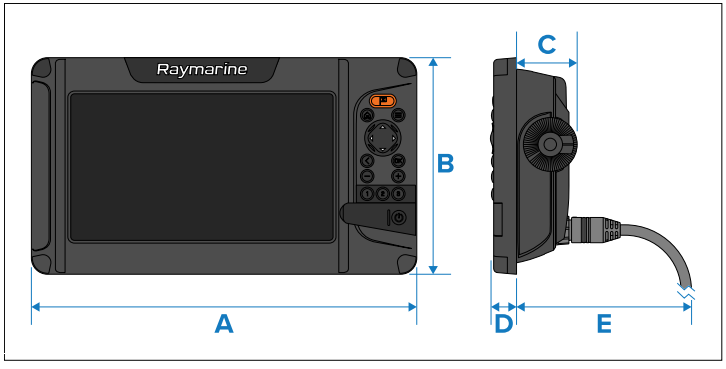
5.1 Product dimensions

Trunnion mount dimensions



	Element 7	Element 9	Element 12
A	263.85 mm (10.39 in)	308.40 mm (12.14 in)	373.40 mm (14.70 in)
B	162.59 mm (6.40 in)	171.00 mm (6.73 in)	225.19 mm (8.87 in)
C	149.40 mm (5.88 in)	149.40 mm (5.88 in)	149.40 mm (5.88 in)
D	60.84 mm (2.40 in)	50.11 mm (1.97 in)	55.00 mm (2.17 in)

Surface mount dimensions



	Element 7	Element 9	Element 12
A	239.60 mm (9.43 in)	286.50 mm (11.28 in)	357.20 mm (14.06 in)
B	135.10 mm (5.32 in)	161.00 mm (6.34 in)	215.20 mm (8.47 in)
C	45.00 mm (1.77 in)	45.00 mm (1.77 in)	46.00 mm (1.81 in)
D	19.40 mm (0.76 in)	19.40 mm (0.76 in)	19.40 mm (0.76 in)
E	130.00 mm (5.12 in)	130.00 mm (5.12 in)	130.00 mm (5.12 in)

CHAPTER 6: COMPATIBLE TRANSDUCERS

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- 6.2 Compatible transducers - Element S displays — page 25

6.1 Compatible transducers - Element HV displays

HyperVision™ transducers

The following HyperVision™ transducers can be connected to Element™ HV displays:

Part number	Description
E70643 / A80603	**HV-100** — HyperVision™ Transom mount, Plastic transducer (direct connection).
A80604	**HV-300TH** — HyperVision™ All-in-one, Thru-hull, Plastic transducer (direct connection).
T70448	**HV-300THP** — HyperVision™ Pair, Thru-hull, Plastic transducers (direct connection using supplied cables).
R70725	**HV-300THP-P** Split, Port side, Thru-hull, Plastic transducer (Requires 'Y' cable (A80605) to connect split pair transducers, and extension cable (A80562) to connect to display).
R70726	**HV-300THP-S** Split, Starboard side, Thru-hull, Plastic transducer (Requires 'Y' cable (A80605) to connect split pair transducers, and extension cable (A80562) to connect to display).

Third party transducers

The third party transducers listed below can be connected to Element™ HV using adaptor cables.

Adaptor cable	Transducer
A80560	**MinnKota** Embedded, 83 kHz /200 kHz transducer.
A80606	**MotorGuide** Embedded, 83 kHz / 200 kHz transducer.

Note:
When using third party transducers only the 200 kHz channel will be available.

Compatible legacy transducers

DownVision™ transducers

The following DownVision™ transducers can be connected to Element™ HV displays using the CPT-S / DownVision 9–pin adaptor cable (A80559):

Part number	Description
A80507	**CPT-90 DVS** — DownVision™, Transom mount, Plastic transducer.
A80351	**CPT-100 DVS** — DownVision™, Transom mount, Plastic transducer. Replaced A80270.
A80277	**CPT-110** — DownVision™, Thru-hull, Plastic transducer with fairing block.
A80350	**CPT-120** — DownVision™, Thru-hull, Bronze transducer with fairing block. Replaced A80271.

Dragonfly® transducers

The following Dragonfly® transducers can be connected to Element™ HV displays using the Dragonfly 10–pin adaptor cable (A80558):

Part number	Description
R70374	**CPT-DVS** — DownVision™, Transom mount, Plastic transducer.
A80278	**CPT-70** — DownVision™, Thru-hull, Plastic transducer with fairing block.
A80349	**CPT-80** — DownVision™, Thru-hull, Bronze transducer with fairing block.

High CHIRP sonar transducers

The following conical beam, high CHIRP sonar transducers can be connected to Element™ HV displays using the CPT-S/DownVision 9–pin adaptor cable (A80559):

Part number	Description
E70342	**CPT-S** High CHIRP, Transom mount, Plastic transducer.
E70339	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Plastic transducer.
A80448	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Plastic transducer.
A80447	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Plastic transducer.
A80446	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Bronze transducer.
E70340	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Bronze transducer.
E70341	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Bronze transducer.

Legacy transducer extension cables

When connecting a compatible legacy transducer to an Element display, using an adaptor cable: if the cable run requires extending, you must use an extension cable which is compatible with your transducer.

Important:
The HyperVision™ extension cable cannot be used to extend the cable run of legacy transducers.

Legacy transducer	Compatible extension cable
Dragonfly® transducers	**A80312** — 4 m (13.1 ft) Dragonfly® transducer extension cable. **Note:** Power supply wires should be isolated and protected from shorting or water ingress.
DownVision™ transducers	**E66074** — 3 m (9.84 ft) DownVision™ transducer extension cable.
High CHIRP sonar transducers	**A80273** — 4 m (13.1 ft) CPT-S transducer extension cable.

6.2 Compatible transducers - Element S displays

High CHIRP sonar transducers

The following conical beam, high CHIRP sonar transducers can be connected to Element™ S displays:

Part number	Description
E70342	**CPT-S** High CHIRP, Transom mount, Plastic transducer.
E70339	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Plastic transducer.
A80448	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Plastic transducer.
A80447	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Plastic transducer.
A80446	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Bronze transducer.
E70340	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Bronze transducer.
E70341	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Bronze transducer.

CHAPTER 7: LOCATION REQUIREMENTS

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- 7.1 Selecting a location — page 27

7.1 Selecting a location



Warning: Switch off power supply

Ensure that 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 to do so in this document.



Warning: Potential ignition source

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

General location requirements

When selecting a location for the unit it is important to consider a number of factors.

To ensure optimum performance, it is recommended that the display is temporarily powered up and tested, at the chosen location, prior to installation.

Ventilation requirements

To provide adequate airflow around the product ensure that it is adequately separated from other equipment or sources of heat.

Mounting surface requirements

When selecting a mounting surface, ensure that:

- The product will be adequately supported on a secure, flat surface. Do NOT mount units or cut holes in places which may damage the structure of the vessel.
- Sufficient space is available around the product.
- There is nothing behind the mounting surface that may be damaged when drilling.

Cable routing requirements

Ensure you have identified the route that all required cables will take and that sufficient space is available to allow connection of cables:

- Unless otherwise stated, a minimum cable bend radius of 100 mm (3.94 in) is required.
- Where necessary, cable supports should be used to prevent stress on connectors.

Electrical interference

Select a location that is far enough away from equipment that may cause interference, such as motors, generators and radio transmitters/receivers.

Compass safe distance

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

When choosing a suitable location for the product you must aim to maintain a distance of at least 1 m (3.3 ft) in all directions from any compasses.

For some smaller vessels it may not be possible to locate the product this far away from a compass. In this situation, when choosing the installation location for your product, ensure that the compass is not affected by the product when it is in a powered on state.

Viewing angle considerations

Display contrast and color are effected by the angle the display is viewed from., If you intend to surface mount the display, it is recommended that you temporarily power up the display at the desired location before installation.

GPS/GNSS location requirements

Your product includes a built in GPS/GNSS antenna. Ensure you consider the following before choosing a location for you product:

Mounting location

It is recommended that the product is installed above decks as this will provide optimal GPS/GNSS performance. Below decks installation may impact GPS/GNSS performance.

Vessel construction

The construction of your vessel can have an impact on GPS/GNSS performance. For example, the proximity of heavy structures such as bulkheads, may result in a reduced GPS/GNSS signal.

Prevailing conditions

Weather conditions and the geographic location of the vessel can effect GPS/GNSS performance. Typically calm clear conditions provide a more accurate position fix. Vessels at extreme northerly or southerly latitudes may also receive a weaker GPS/GNSS signal. Product mounted below decks will be more susceptible to performance issues related to the prevailing conditions.

Wireless location requirements for optimum performance

All wireless devices in your system must be located in such a way that they can reliably receive and/or transmit wireless signals.

A number of factors can influence wireless performance. For example, physical obstacles and certain vessel structures and materials can all negatively impact wireless performance. Therefore, **it's important to check a product's wireless performance at the desired installation location before drilling any mounting holes**.

Vessel construction and materials

Wherever possible, mount products on surfaces constructed from GRP (e.g. fiberglass resin, or foam), or on dry wooden bulkheads. **Conductive materials in the signal path can have a significant impact on wireless signal performance**. Reflective surfaces such as metal surfaces, some types of glass and even mirrors can drastically affect performance or even block the wireless signal. Installation locations that are in close proximity to these materials should be avoided. **Do NOT mount wireless products directly to conductive materials.** This includes any mounting surface or enclosure/pod. Examples of conductive materials include, but are not limited to:

- carbon fibre, kevlar, or aramid (including sails made from these materials)
- aluminium
- steel

In installations with conductive materials, if available, mount the wireless product using an accessory pole mount or deck mounting kit. A clearance of at least 10 cm (3.9 in) is required to minimize the ground effect from conductive materials. This applies to transmitters as well as displays. If moving the product fixes the problem, consider cutting an antenna clearance hole behind the unit (once the product position and mounting have been finalized).

Wireless performance can also be degraded in locations where the wireless signal passes through a bulkhead containing power cables. Crew members (especially when wet) can also be obstructive to wireless signals, if their bodies pass through the signal area between wireless sensor and any associated displays.

Checking and optimizing signal strength

It may be necessary to experiment with the location of your wireless products to achieve optimal wireless performance and a clear signal path.
The distance between wireless products should always be kept to a minimum. Do not exceed the maximum stated range of your wireless product (maximum range will vary for each device).
Wireless performance degrades over distance, so products farther away will receive less network bandwidth. Products installed close to their maximum wireless range may experience slow connection speeds, signal dropouts, or not being able to connect at all.
For best results, the wireless product should have a clear, direct line-of-sight to the product it will be connected to. Any physical obstructions can degrade or even block the wireless signal.
Some wireless products feature a signal strength indicator to assist in the process of determining the location with the best wireless performance. Choose the location with the highest and most consistently strong direct signal reading, during a 5 minute monitoring period. Try alternative locations for the transmitter to maximize the signal strength to the displays; e.g. try locations below a hatch or skylight or near to a window. A small change in product position can result in a significant change in the signal strength.

Note:
Some wireless products (e.g. a Hull Transmitter) will not transmit data unless a transducer is connected. Also consider that an NMEA or SeaTalk NG product (e.g. an interface) will not transmit data unless an appropriate data source is connected.

Interference and other equipment

Interference from other people's wireless devices can cause interference with your products. You can use a third-party wireless analyzer tool / smartphone app to assess the best wireless channel to use (e.g. a channel not in use or one used by the least number of devices).
Wireless products should be installed at least 1 m (3 ft) away from:

- Other wireless-enabled products
- Transmitting products that send wireless signals in the same frequency range
- Other electrical, electronic or electromagnetic equipment that may generate interference.

Software updates

It's also important to ensure all your wireless products are running the latest software versions, as improvements are made over time to wireless performance.

EMC installation guidelines

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

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

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

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

- Raymarine equipment and cables connected to it are:
  - At least 1 m (3.28 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (6.6 ft).
  - More than 2 m (6.56 ft) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The product is supplied from a separate battery from that used for engine start. This is important to prevent erratic behavior and data loss which can occur if the engine start does not have a separate battery.
- Raymarine specified cables are used.
- Cables are not cut or extended, unless doing so is detailed in the installation manual.

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

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.

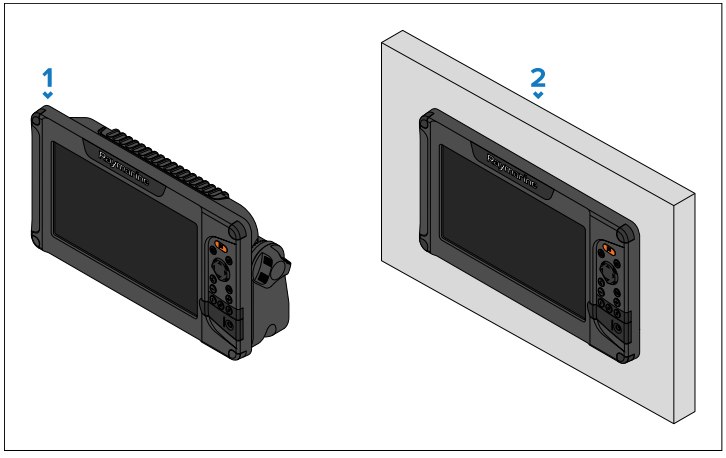
CHAPTER 8: MOUNTING

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- 8.1 Mounting options — page 31
- 8.2 Trunnion bracket mounting — page 31
- 8.3 Surface mounting — page 32

8.1 Mounting options

Element displays can be either trunnion mounted or surface mounted.



1. Trunnion mounted.
2. Surface mounted.

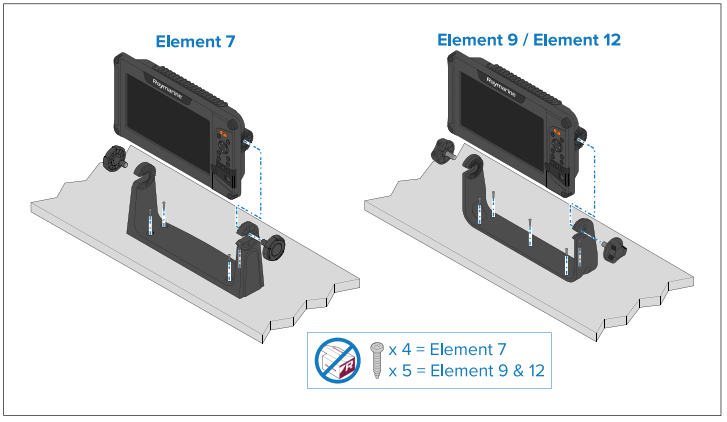
8.2 Trunnion bracket mounting

The supplied trunnion bracket can be used to mount your display on a horizontal surface.

Ensure you have chosen a suitable mounting location for your display, with sufficient headroom to allow the display's angle to be adjusted or the display to be removed if necessary. If installing 'above head', take extra care to ensure the knobs are tightened sufficiently to prevent them coming undone due to vibration when underway.

Important:
Trunnion bracket fixings are NOT supplied.
Before mounting the display, ensure you have sourced suitable fixings for mounting the display's trunnion bracket to the desired mounting surface. Fixing type will be determined by the mounting location, and the material type and thickness of the mounting surface.

- Element™ 7: Requires 4 x fixings. The Trunnion bracket's mounting hole diameter is 4.2 mm (0.17 in).
- Element™ 9 and Element™ 12 require 5 x fixings. The Trunnion bracket's mounting hole diameter is 5.75 mm (0.23 in).



1. Using the Bracket as a template, mark and drill pilot holes in the mounting surface.
2. Using appropriate fixings (not supplied), secure the trunnion bracket to the mounting surface.

   If the mounting surface is too thin for the screws provided, use stainless steel machine screws, washers and locking nuts. Alternatively, reinforce the rear of the mounting surface.
3. Using the bracket knobs, secure the display to the Bracket, ensuring the ratchet teeth are correctly engaged.

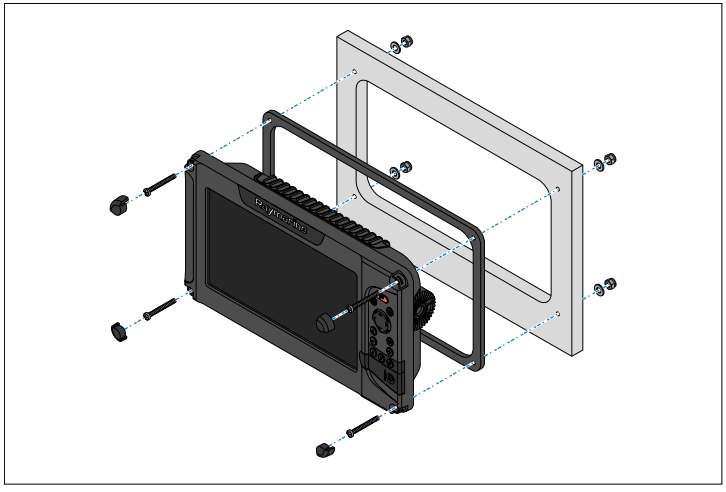
   The knobs should be tightened by hand, sufficiently to prevent the display from moving whilst your vessel is underway.
4. Route and connect necessary cables.

8.3 Surface mounting

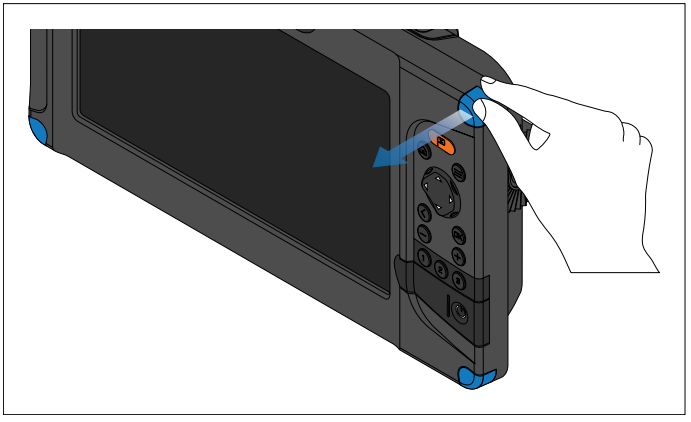
The supplied mounting gasket and fixings can be used to surface mount the display.

Before mounting the display, ensure that you have:

- chosen a suitable location, using the guidance provided;
- identified the required cable connections and routed the cables to the mounting location.



1. Remove the 4 screw covers from the corners of the display.



2. Check the chosen mounting location. A clear, flat area with suitable clearance behind the panel is required.
3. Fix the supplied mounting template to the chosen location using masking or self-adhesive tape.
4. Using a suitable hole saw (the size is indicated on the template), make a hole in each corner of the cut-out area.
5. Using a suitable saw, cut along the inside edge of the cut-out line.
6. Ensure that the unit fits into the removed area and then file around any rough edges until smooth.
7. Drill 4 holes as indicated on the template to accept the fixings.
8. Place the gasket onto the rear of the display and press firmly onto the flange.
9. Connect the power, data and other cables.
10. Slide the unit into place and secure using the fixings provided.
11. Refit the screw covers.

Note:
The supplied gasket provides a seal between the unit and a suitably flat and stiff mounting surface or binnacle. If the mounting surface or binnacle is not entirely flat and stiff or has a rough surface finish, in addition to using the mounting gasket it may also be necessary to use marine-grade sealant.

CHAPTER 9: CABLES AND CONNECTIONS — GENERAL INFORMATION

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- 9.1 General cabling guidance — page 34
- 9.2 Connections overview — page 35

9.1 General cabling guidance

Cable types and length

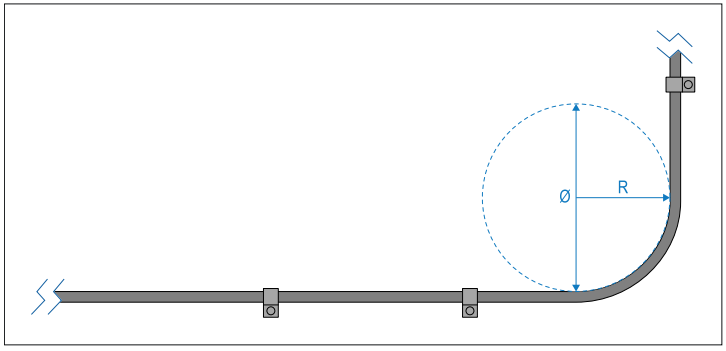
It is important to use cables of the appropriate type and length.

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

Cable routing and bend radius

To maximize cable performance and lifespan, it's important to ensure that all cables are routed correctly and adequate space is provided to allow for each cable's minimum bend radius.

Minimum cable bend radius



Do NOT bend cables excessively. Wherever possible, ensure that your chosen product installation location allows enough clearance for the minimum cable bend diameter specified in the following table:

	Description	Value
Ø	Cable minimum bend **diameter**.	200 mm (7.87 in.)
R	Cable minimum bend **radius**.	100 mm (3.94 in.)

Note:
For products where multiple different cable types are connected, each with a different minimum cable bend radius, the higher figure is provided in the table above (i.e. the cable with the greatest minimum bend radius is specified).

Cable routing — best practices

- 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 (conduit).
- Do NOT run cables near to engines or fluorescent lights.
- Always route data cables as far away as possible from:
  - Other equipment and cables.
  - High current-carrying AC and DC power lines.
  - Antennas.

Strain relief

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

Cable shielding

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

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

Connecting cables

Follow the steps below to connect the cable(s) to your product.

1. Ensure that the vessel's power supply is switched off.
2. Ensure that the device being connected has been installed in accordance with the installation instructions supplied with that device.
3. Ensuring correct orientation, push cable connectors fully onto the corresponding connectors.
4. Engage any locking mechanism to ensure a secure connection (e.g.: turn locking collars clockwise until tight, or in the locked position).
5. Ensure any bare ended wire connections are suitably insulated to prevent shorting and corrosion due to water ingress.

Bare-ended wire connections

You must ensure that any bare-ended wires are adequately protected from short circuit and water ingress.

Bare-ended wire connections

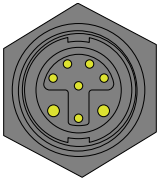
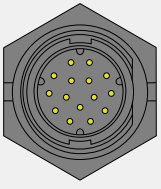
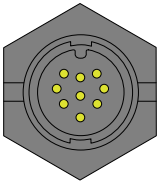
It is recommended that bare-ended wire connections are made by soldering or using crimp connectors, and then protected by wrapping the connection in electrical insulation tape.

Unused bare-ended wires

Any unused bare-ended wires should be folded back and wrapped in electrical insulation tape.

9.2 Connections overview

The various connections available are provided on the rear of the display.

Connector	Connection
	Power and NMEA 2000 8-pin connector. Use the supplied power and data cable to connect to: • 12 V DC power supply. Refer to: **p.46 — Power connection** • NMEA 2000 or SeaTalkng ® backbone. Refer to: **p.40 — SeaTalkng® connection** **Important:** An Element display can NOT be connected to the same SeaTalkng ® backbone as a Multifunction display. Examples of MFDs include Axiom, or a Series, c Series, e Series, eS Series, or gS Series displays. Further, because the Element display does NOT have a RayNet connection, it is not possible to network it in any way with a Multifunction display (MFD).
	HyperVision™ transducer 15-pin connector — **available on Element™ HV variant displays only**. Connects to a HyperVision transducer's cable or a compatible transducer extension cable. Refer to: **p.38 — Element™ HV transducer connection**
	CPT-S transducer 9-pin connector — **available on Element™ S variant displays only**. Connects to a CPT-S transducer's cable or a compatible transducer extension cable. Refer to: **p.40 — Element™ S transducer connection**

Wireless connections

Connector	Connection
	Wi-Fi connection. Use Wi-Fi to connect wirelessly to a Quantum™ radar scanner.

CHAPTER 10: NETWORK CONNECTIONS

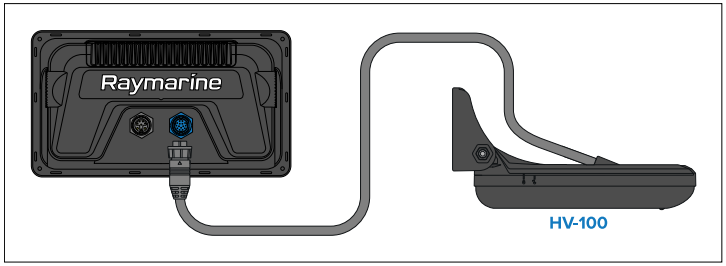
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- 10.4 SeaTalkng® connection — page 40
- 10.5 SeaTalkng® system example — page 41
- 10.6 Pairing a Quantum-Series Radar scanner — page 42
- 10.7 Element autopilot connection — page 43

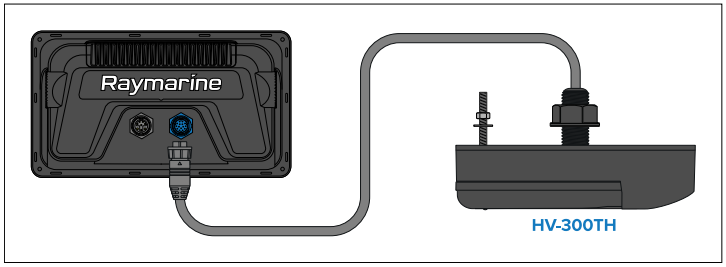
10.1 Element™ HV transducer connection

HV-series transducers can be connected directly to Element™ HV displays.

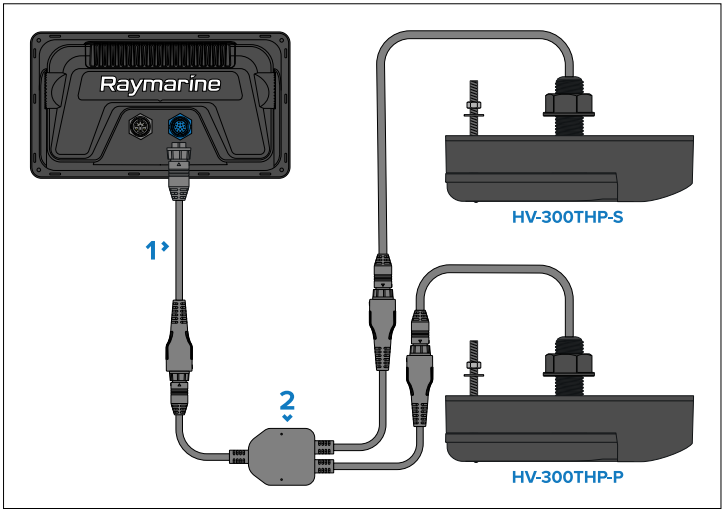
HV-100 connection



HV-300THP (all-in-one) connection



HV-300THP-P and HV-300THP-S (split pair) connection



1. Extension cable (supplied with split pair sets of transducers).
2. Y-cable (supplied with split pair sets of transducers).

You can extend the length of transducer cables using a transducer extension cable.

HV–100 transducer extension cable

For best performance, cable runs should be kept to a minimum. However, for some installations it may be necessary to extend the transducer cable.

A 4 m (13.12 ft) HyperVision™ transducer extension cable (A80562) is available
It is recommended that a maximum of one cable extensions is used, with the total cable length not exceeding 10 m (32.81 ft).

Note:
The HyperVision™ transducer extension cable can only be used to connect a HV series transducer.

HV–300 transducer extension cable

For best performance, cable runs should be kept to a minimum. However, for some installations it may be necessary to extend the transducer cable.

A 4 m (13.12 ft) HyperVision™ transducer extension cable (A80562) is available

It is recommended that a maximum of one cable extensions is used, with the total cable run to each transducer not exceeding 6.3 m (20.67 ft).

Note:
The HyperVision™ transducer extension cable can only be used to connect a HV series transducer.

Caution: Transducer cable

• Do NOT use the transducer cable to lift or suspend the transducer; always support the transducer body directly during installation.

• Do NOT cut, shorten, or splice the transducer cable.

• Do NOT remove the connector.

If the cable is cut, it cannot be repaired. Cutting the cable will also void the warranty.

Cable routing

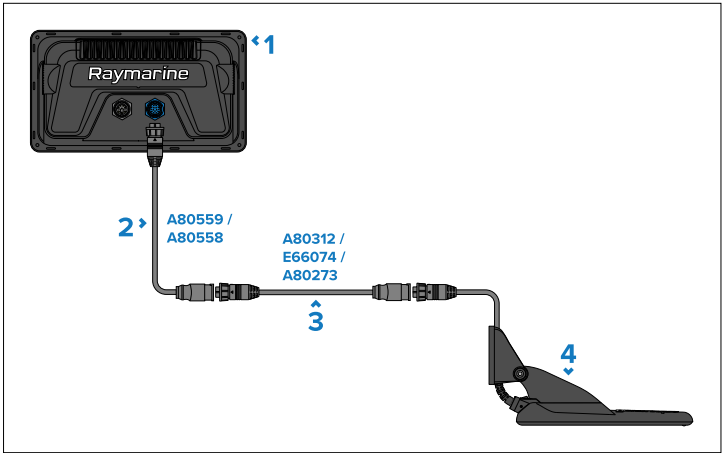
Cable routing requirements for the transducer cable.

Important:
To avoid interference, the cable must be routed as far away from VHF radio antenna devices and cables as possible.

- Check that the cable is long enough to reach the display it will be connected to. Optional extension cables are available, if required.
- Ensure there is enough slack in the transducer cable, at the transducer end, to allow the transducer to pivot up and down during adjustment.
- If you intend to route the cable through the transom then you must ensure the hole is as high as possible above the waterline and use the supplied escutcheon plate to cover the hole.
- Secure the cable at regular intervals using the supplied cable clips.
- Any excess cable should be coiled up at a convenient location.

10.2 Element™ HV legacy transducer connection

When connecting a legacy transducer you must use the correct adaptor cable and, where required an extension cable that is compatible with the legacy transducer.



1. Element™ HV display — Connects to adaptor cable..
2. Adaptor cable (i.e.: A80559 or A80558) — Connects to the display and extension cable or transducer.
3. Extension cable (i.e.: A80312, E66074 or A80273) — Connects between transducer and adaptor cable.
4. Example legacy transducer — Connects to adaptor cable or extension cable.

Legacy transducer extension cables

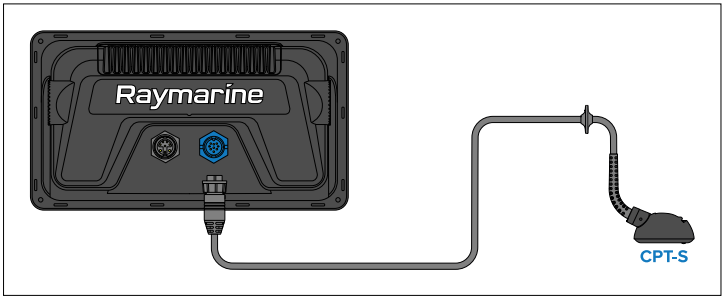
When connecting a compatible legacy transducer to an Element display, using an adaptor cable: if the cable run requires extending, you must use an extension cable which is compatible with your transducer.

Important:
The HyperVision™ extension cable cannot be used to extend the cable run of legacy transducers.

Legacy transducer	Compatible extension cable
Dragonfly® transducers	**A80312** — 4 m (13.1 ft) Dragonfly® transducer extension cable. **Note:** Power supply wires should be isolated and protected from shorting or water ingress.
DownVision™ transducers	**E66074** — 3 m (9.84 ft) DownVision™ transducer extension cable.
High CHIRP sonar transducers	**A80273** — 4 m (13.1 ft) CPT-S transducer extension cable.

10.3 Element™ S transducer connection

Conical high CHIRP sonar transducers can be connected directly to Element™ S variant displays.

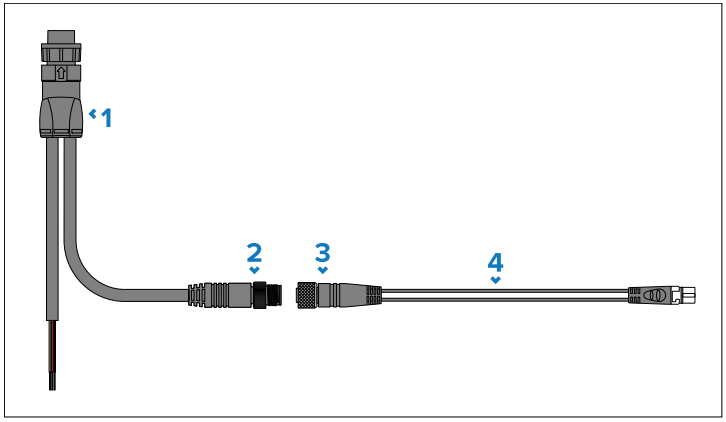


You can extend the length of CPT-S transducer cables using a transducer extension cable A80273 (4 m (13.1 ft) CPT-S transducer extension cable).

10.4 SeaTalkng® connection

The display can be connected to a SeaTalkng ® backbone, using the DeviceNet connector included in the Power/NMEA 2000 cable and an adaptor cable (not supplied).

Important:
An Element display can NOT be connected to the same SeaTalkng ® backbone as a Multifunction display. Examples of MFDs include Axiom, or a Series, c Series, e Series, eS Series, or gS Series displays. Further, because the Element display does NOT have a RayNet connection, it is not possible to network it in any way with a Multifunction display (MFD).



1. Supplied power/NMEA 2000 cable.
2. DeviceNet (Micro-C 5–pin male) cable connector.
3. DeviceNet (5–pin female) cable connector.
4. SeaTalkng ® to DeviceNet adaptor cable (A06045 / A06075) connects to SeaTalkng ® backbone.

Note:

1. SeaTalkng ® devices must be connected to a correctly terminated backbone that the display is also connected to. Products cannot be connected directly to the display.
2. Refer to the instructions supplied with your SeaTalkng ® product for details on creating a backbone.

NMEA 2000 data compatibility

In addition to products listed as compatible in this document, your product can also receive and display data from other NMEA 2000 devices.

For data to be displayed onscreen, the display must receive data from NMEA 2000 devices using supported NMEA 2000 PGN messages.

A list of NMEA 2000 PGN messages that are supported by your display can be found in the *Appendix* of this document. **p.78 — SeaTalk NG** cables and accessories

NMEA 2000 connection

The display can be connected directly to a NMEA 2000 backbone, using the DeviceNet connector included as part of the supplied Power / NMEA 2000 cable.

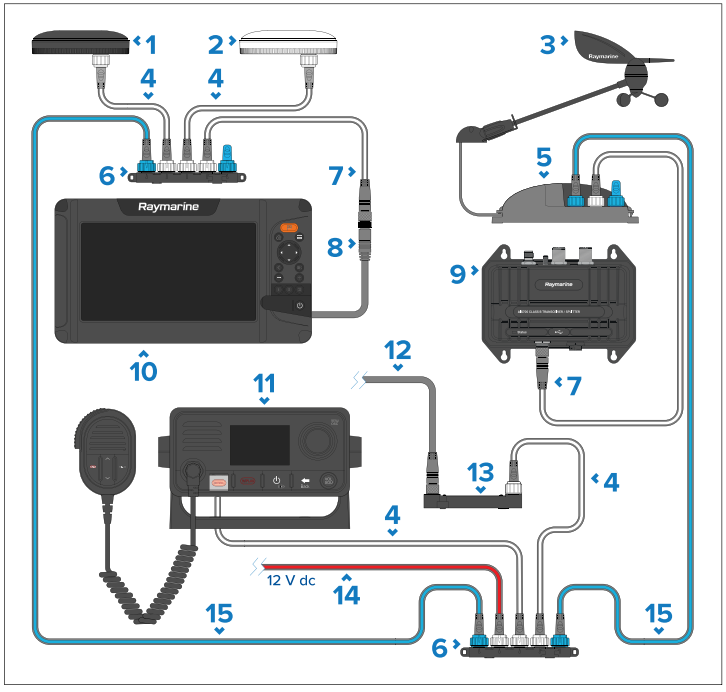
Connection to a NMEA 2000 backbone enables supported data to be transmitted and / or received by the display.

Supported SeaTalkng ® products can be connected to a NMEA 2000 network using SeaTalkng ® to DeviceNet adaptor cables, available separately.

10.5 SeaTalkng® system example

An example SeaTalkng ® system is provided below. Connection to a network provides the display with data from other connected devices.

Note:
The details below are provided as an example only and does not reflect all products that may be present on the SeaTalkng ® network; e.g.: in order to calibrate wind data an instrument display would be required.



1. EV-1 heading sensor.
2. RS150 GNSS receiver.
3. Wind vane transducer.
4. SeaTalkng ® spur cables.
5. iTC-5 convertor.
6. SeaTalkng ® 5-way connector block.
7. DeviceNet to SeaTalkng ® adaptor cable.
8. DeviceNet connection on display's power / NMEA 2000 cable.
9. AIS700.
10. Element™ display.
11. SeaTalkng ® / NMEA 2000 VHF DSC Radio (GPS / GNSS position data can be transmitted from the display and used by a compatible VHF DSC radio).
12. DeviceNet connection to vessel's engine management system.
13. ECI-100.
14. SeaTalkng ® power cable (connects to vessel's 12 V dc power supply).
15. SeaTalkng ® backbone cables.

Important:

• SeaTalkng ® instrument displays and pilot controllers can be present on the same backbone; however data will NOT be synchronized with the Element display.

• Up to 2 Element displays can be present on the same backbone; however data will NOT be synchronized between Element displays.

• An Element display can NOT be connected to the same SeaTalkng ® backbone as a Multifunction display. Examples of MFDs include Axiom, or a Series, c Series, e Series, eS Series, or gS Series displays. Further, because the Element display does NOT have a RayNet connection, it is not possible to network it in any way with a Multifunction display (MFD).

For a list of SeaTalkng ® cables and accessories refer to **p.78 — SeaTalk NG** cables and accessories.

10.6 Pairing a Quantum-Series Radar scanner

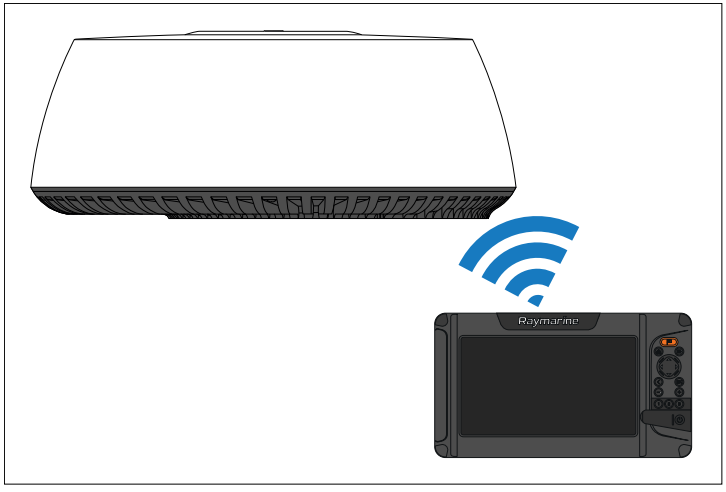
You can connect a Quantum-Series Radar scanner to your display using the Wi-Fi connection.

Pre-requisites:

- Ensure you have installed and connected your Quantum-Series Radar scanner to a power supply in accordance with the instructions supplied with the Radar scanner.
- Ensure you know your Quantum-Series Radar scanner's SSID and passcode.

Important:
Ensure that the software installed on your Quantum-Series Radar scanner is compatible with your MFD / chartplotter.

• Due to a software security update, Quantum-Series Radar scanners running v2.52 software (or later) require your Element-Series MFD / chartplotter to be running LightHouse Sport v3.19.17 (or later).



1. Select *[Pair with Quantum]* from the *[This display]* tab: *[Homescreen > Settings > This display > Quantum Radar: > Pair with Quantum]*.
2. Enter the SSID and passcode for your Quantum-Series Radar scanner.
3. Select *[Connect]*.
4. Follow any onscreen instructions to continue pairing with your Quantum-Series Radar scanner.

   The pairing process may take several minutes to complete.

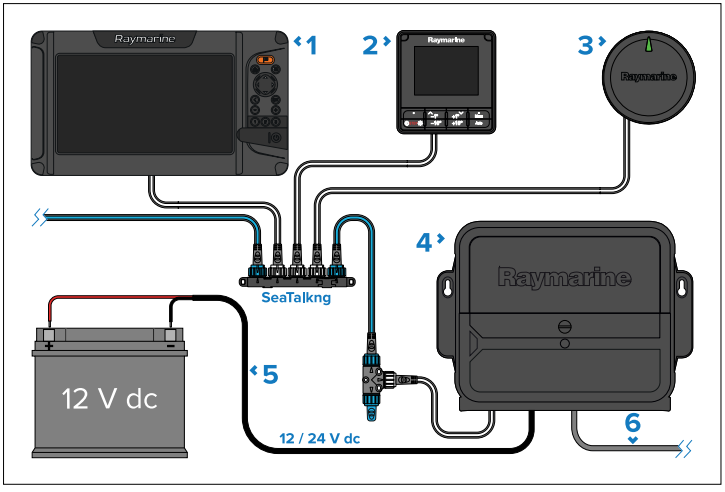
   For more information on the Quantum-Series Radar scanner pairing process (including troubleshooting information), refer to your Quantum-Series Radar Installation Instructions document.

10.7 Element autopilot connection

You can connect an Element™ display to the same network as an Evolution™ autopilot system.

An Element™ display can send navigation commands / data to a compatible autopilot controller.

Note:
Navigation commands require acknowledgement from the autopilot controller.



1. Element™ display.
2. Pilot controller (e.g.: p70s)
3. EV sensor (e.g.: EV-1)
4. ACU (e.g.: ACU-200)
5. Power supply to ACU, also supplies 12 V dc to SeaTalkng ™ network..
6. Cable to drive unit.

Compatible autopilot controllers

A SeaTalk NG autopilot controller is required to operate your autopilot system. A SeaTalk autopilot controller can be used when connected via a SeaTalk to SeaTalk NG converter, but may have limited functionality.

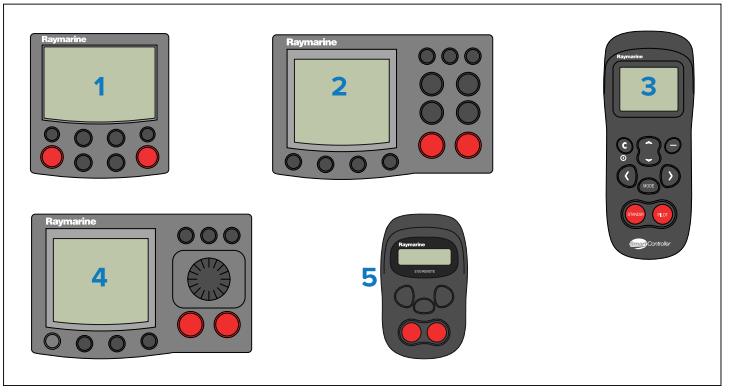
It is also possible to use more than one autopilot controller to control your autopilot system.

SeaTalk NG autopilot controllers



	Description
1	p70s (E70328)
2	p70Rs (E70329)
3	p70 (E22166)
4	p70R (E22167)
5	ST70 (E22105)
6	ST70+ (E22115)

SeaTalk® autopilot controllers



	Description
1	ST6002 (E12098–P / E12100–P)
2	ST7002 (E12099–P / E12182)
3	ST8002 (E12119–P / E12183)
4	S100 (repeat controller only) (E15024)
5	SmartController (repeat controller only) (E15023)

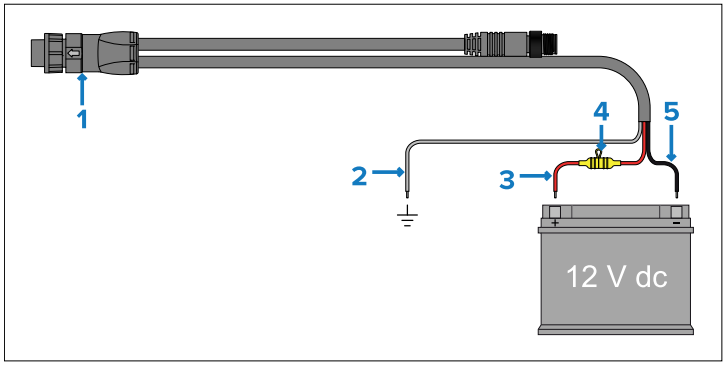
CHAPTER 11: POWER CONNECTIONS

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- 11.1 Power connection — page 46

11.1 Power connection

The power cable must be connected to a 12 V dc power supply, this can be achieved by connecting directly to a battery, or via the distribution panel. The product is protected against reverse polarity.



1. Power/NMEA 2000 cable connects to the rear of the display.
2. Ground wire connects to RF ground point, if no ground point is available connect to the battery negative (-) terminal.
3. Positive (Red) wire connects to battery positive (+) terminal.
4. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
5. Negative wire connects to battery negative (-) terminal.

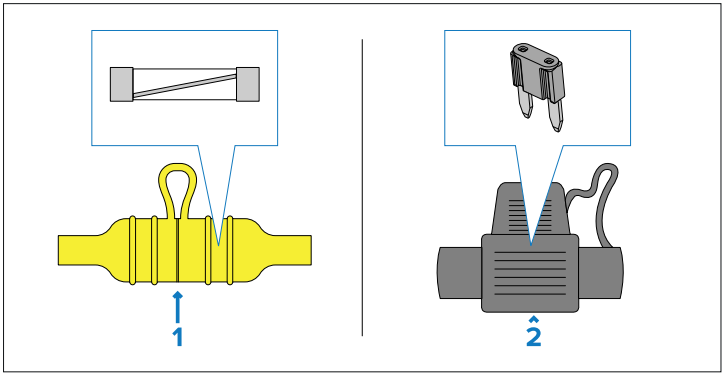
Important:
To prevent erratic behavior and potential data loss, ensure the product is supplied from a separate battery from that used for engine start.

Inline fuse requirement

If your product is NOT supplied with an inline fuse (whether separately or fitted to the power cable), you MUST fit a suitably-rated inline fuse to your product's red power wire, housed in a waterproof fuse holder.

The illustration below shows the two main types of inline fuse with waterproof holder, for use in marine electronics installations. Fuses in a variety of ratings are widely available at chandleries and marine electrical retailers.

Select one of the following fuse types to protect your product:



1. Waterproof fuse holder containing a "glass"-type inline fuse.
2. Waterproof fuse holder containing a "blade"-type inline fuse.

Fuse ratings:

- *Voltage rating* — must be equal to or greater than the voltage of your vessel's power supply.
- *Current rating* — refer to the *Inline fuse and thermal breaker rating* section in this document.

In-line fuse and thermal breaker ratings

The following in-line fuse and thermal breaker ratings apply to your product:

In-line fuse rating	Thermal breaker rating
5 A	3 A

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.

• Your product's power cable may have an in-line fuse fitted, if not then you must add an in-line fuse / breaker to the positive wire of your product's power connection.

Caution: Power supply protection

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

Warning: Product grounding

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

Warning: Positive ground systems

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

Power distribution

Recommendations and best practice for the power connection of products supplied with a ground wire as part of the supplied power cable.

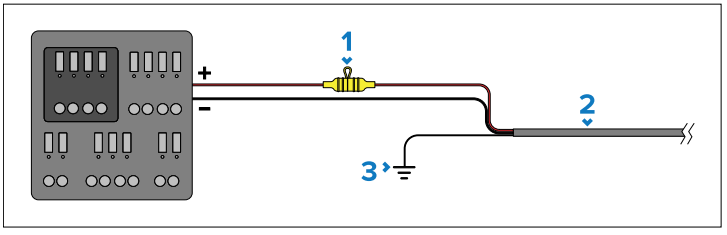
- The product is supplied with a power cable, either as a separate item or a captive cable permanently attached to the product. Only use the power cable supplied with the product. Do NOT use a power cable designed for, or supplied with, a different product.
- Refer to the *Power connection* section for more information on how to identify the wires in your product's power cable, and where to connect them.
- 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.

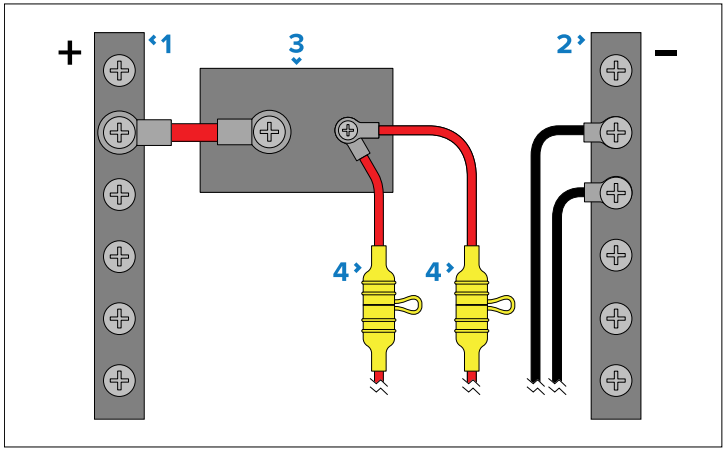
• The information provided below is for guidance only, to help protect your product. It covers common vessel power arrangements, but does NOT cover every scenario. If you are unsure how to provide the correct level of protection, please consult an authorized dealer or a suitably qualified professional marine electrician.

Implementation — connection to distribution panel (Recommended)



	Description
1	If not supplied already fitted to the power cable, a waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.
2	Product power cable.
3	Ground wire connection point.

- It is recommended that the supplied power cable is connected to a suitable breaker or switch on the vessel's distribution panel or factory-fitted power distribution point.
- The distribution point should be fed from the vessel's primary power source by 8 AWG (8.36 mm^2) cable.
- Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 1 item of equipment shares a breaker, use individual inline fuses for each power circuit to provide the necessary protection.
- **The power cable supplied with your product includes a separate ground wire, which must be connected to the vessel's common RF ground.** For more information, refer to: **p.50** — Power cable ground wire connection

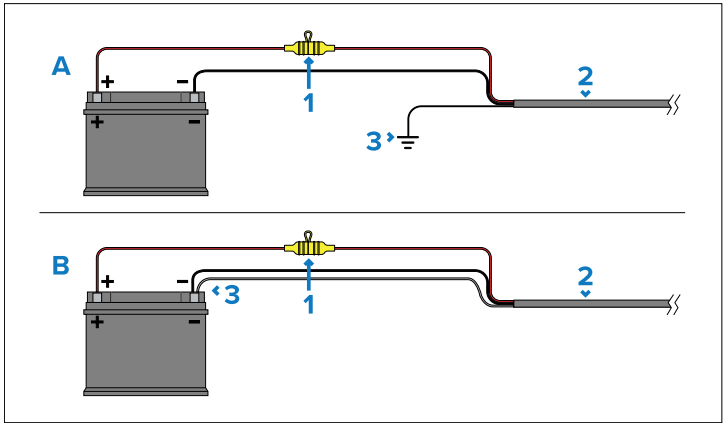


	Description
1	Positive (+) bar
2	Negative (-) bar
3	Circuit breaker
4	If not supplied already fitted to the power cable, a waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.

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

Implementation — direct connection to battery

- Where connection to a power distribution panel is not possible, the power cable supplied with your product may be connected directly to the vessel's battery, via a suitably rated fuse or breaker.
- The power cable supplied with your product includes a separate ground wire, which must be connected to the vessel's common RF ground (if available), or the battery's negative terminal. For more information, refer to: **p.50** — Power cable ground wire connection
- If the power cable is NOT supplied with a fitted inline fuse, 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 supplied with your product, ensure you observe the dedicated *Power cable extensions* advice provided in the product's documentation.



	Description
1	If not supplied already fitted to the power cable, a waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.
2	Product power cable.
3	Ground wire connection point.

Battery connection scenario A:
Suitable for a vessel with a common RF ground point. In this scenario, the power cable's ground wire should be connected to the vessel's common ground point.
Battery connection scenario B:
Suitable for a vessel without a common grounding point. In this case, the power cable's ground wire should be connected to the battery's negative terminal.

Grounding

The power cable supplied with your product includes a separate ground wire, which must be connected to the vessel's common RF ground (if available), or negative battery terminal. For more information, refer to: **p.50 —** Power cable ground wire connection
Ensure that you also observe any additional grounding advice provided in the product's documentation.

More information

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

- BMEA Code of Practice for Electrical and Electronic Installations in Boats
- NMEA 0400 Installation Standard
- ISO 13297: Small craft — Electrical systems — Alternating and direct current installations
- ISO 10133: Small craft — Electrical systems — Extra-low-voltage d.c. installations
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

Power cable extension (12 V systems)

If you need to extend the length of the power cable supplied with your product, ensure you observe the following advice:

- The power cable for each unit in your system should be run as a separate, single length of 2-wire cable from the unit to the vessel's battery or distribution panel.
- Ensure that the extension cable is of a sufficient gauge for the supply voltage, the total current load of the device, and the length of the cable run — as the cable run length increases, the greater the voltage drop will be from one end of the power cable to the other.
- Refer to the following table for typical **minimum** power cable wire gauges:

Cable length in meters (feet)	Wire gauge in AWG (mm^2) for 12 V supply
<8 (<25)	16 (1.31 mm^2)
16 (50)	14 (2.08 mm^2)
24 (75)	12 (3.31 mm^2)
>32 (>100)	10 (5.26 mm^2)

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.

Important:
To ensure power cables (including any extension) are of a sufficient gauge, ensure that there is a continuous **minimum** voltage of **10.8 V dc** at the end of the cable where it enters the product's power connector, even with a fully flat battery at 11 V dc. (Do not assume that a flat battery is at 0 V dc. Due to the discharge profile and internal chemistry of batteries, the current drops much faster than the voltage. A "fully flat" battery still shows a positive voltage, even if it doesn't have enough current to power your device.)

Power cable ground wire connection

The power cable supplied with this product includes a dedicated ground wire for connection to a vessel's RF ground point (if available), or the negative battery terminal.

It is important that an effective RF ground is connected to the system. A single common ground point should be used for all equipment. If several items require grounding, each item of equipment can be grounded by connecting the ground wires first to a single local point (e.g. within a distribution panel), and then this point connected via an appropriately-rated conductor to the vessel's RF common ground point. An RF ground point is typically a circuit with a very low-impedance signal at Radio Frequency, connected to the sea via an electrode immersed in the sea, or bonded to the inner side of the hull in an area that is underwater.

On vessels without an RF ground system, the ground wires of all equipment should be connected directly to the vessel's negative battery terminal.

The dc power system should be either:

- Negative grounded ("bonded"), with the negative battery terminal connected to the vessel's RF ground.
- Floating, with neither battery terminal connected to the vessel's ground.

The preferred minimum requirement for the path to ground (bonded or non-bonded) is via a flat tinned copper braid, with a 30 A rating or greater. If this is not possible, an equivalent stranded wire conductor may be used, rated as follows:

- for runs of <1 m (3 ft), use 6 mm2 (10 AWG) or greater.
- for runs of >1 m (3 ft), use 8 mm2 (8 AWG) or greater.

In any grounding system, always keep the length of connecting braid or wires as short as possible.

CHAPTER 12: OPERATION

CHAPTER CONTENTS

- 12.1 Operation instructions — page 52

12.1 Operation instructions

For instructions on how to operate your product, refer to the separate *Operation Instructions* document.

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

Document	Number	Link
LightHouse Sport *Operation Instructions*	81388	https://bit.ly/element-docs

CHAPTER 13: TROUBLESHOOTING

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- 13.1 Troubleshooting — page 54
- 13.2 Software update download troubleshooting — page 54
- 13.3 Downgrading software — page 54
- 13.4 Power up troubleshooting — page 54
- 13.5 GNSS (GPS) troubleshooting — page 56
- 13.6 Sonar troubleshooting — page 56
- 13.7 Radar troubleshooting — page 60
- 13.8 Bearing alignment — page 61
- 13.9 Wi-Fi troubleshooting — page 61

13.1 Troubleshooting

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

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

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

13.2 Software update download troubleshooting

When downloading software updates a large file is temporarily downloaded to the display's internal storage which is automatically removed once the update process is complete.

During the software update process the display may run out of internal storage space and display a 'Not enough storage space available' message.
If this message is displayed then repeat the process with a MicroSD card inserted into the display's card reader. The display will then automatically download the file to the memory card instead of the internal storage. The download file will be removed once the update process is complete.

Note:

• It is recommended that a MicroSD card with at least 2 GB of free space is used.

13.3 Downgrading software

In the unlikely event that you need to downgrade your display's software, follow the instructions below.

1. Insert a Micro SD card containing only the downgraded software version into the display's card reader slot.
2. Select *[Update software]* from the Getting started, settings tab (*[Homescreen > Settings > Getting started]*).
3. Select *[Check SD card]*.
4. Use the *[Left]* directional button to highlight the software version and press *[OK]*.

   Details of the current and new software version are displayed.
5. Select *[Yes]*.
6. Use the *[Directional]* buttons to highlight *[Update]*, and then press the *[OK]* button.

   The software will now be downgraded, and the display will restart.

Important:
If you are downgrading from version v3.13.76 (or later) to version v3.10.10 (or earlier), **you must immediately perform a factory reset**, following the 'Factory reset' instructions:
p.55 — Performing a power on reset

13.4 Power up troubleshooting

Troubleshooting assistance with typical causes of power-related issues, and their solutions.

Product does not power up, or keeps switching off

Possible causes	Possible solutions
Blown fuse / tripped breaker:	1. Check condition of relevant fuses and breakers and connections, replace if necessary. (Refer to the *Power Connections* section of your product's Installation Instructions for fuse ratings.) 2. If fuse keeps blowing, check for cable damage, broken connector pins, or incorrect wiring.
Poor / damaged / insecure power supply cable / connections:	1. Check that the power cable connector is correctly orientated and fully inserted into the product's *Power* connector, and locked in position. 2. Check the power supply cable and connectors for signs of damage or corrosion, and replace if necessary. 3. With the product switched on, try carefully flexing the power cable near to the product's *Power* connector to see if this causes the unit to restart or lose power. Replace if necessary. 4. 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. 5. 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:	The vessel's power supply may be wired incorrectly. Ensure that the product's *Installation Instructions* have been followed completely.

Product will not start up (restart loop)

Possible causes	Possible solutions
Power supply and connection:	See possible solutions from the table above, entitled '*Product does not power up, or keeps switching off*'.
Software corruption:	1. In the unlikely event that the product's software has become corrupted, try downloading and installing the latest software from: www.bit.ly/rym-software 2. If your product includes a display: as a last resort, attempt to perform a 'Power on Reset'. Be aware that this will delete all settings / presets and user data, and revert the unit back to factory default settings.

Performing a power on reset

There may be circumstances in which it is necessary to reset your display to factory (default) settings; for example, as part of a troubleshooting activity.

Important:
Before performing a power on reset ensure you have backed up your settings and user data to a memory card.

With the display powered off:

1. Press and hold the *[Home]* button.
2. Press and hold the *[Power]* button until the display beeps.
3. Release the *[Power]* button.
4. When the Raymarine logo appears, release the *[Home]* button.
5. Use the *[Down]* button to highlight *[Wipe data/factory reset]*.
6. Press the *[OK]* button.
7. Use the *[Down]* button to highlight *[Yes]*.
8. Press the *[OK]* button.
   The display will now be reset to factory default settings, and all user data will be removed. *'Data wipe complete'* is displayed at the bottom of the screen when the reset is finished.
9. The display will then restart automatically.

13.5 GNSS (GPS) troubleshooting

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

“No Fix” status icon is displayed, or, display keeps losing position fix

Possible causes	Possible solutions
Geographic location or prevailing conditions preventing satellite fix.	Check periodically to see if a fix is obtained in better conditions or another geographic location.
Display in poor location. For example: • Below decks. • Close proximity to transmitting equipment such as VHF radio.	Ensure the display has an unobstructed view of the sky.

Note:
A GPS / GNSS status screen is accessible from the display’s Homescreen. This provides satellite signal strength and other relevant information.

13.6 Sonar troubleshooting

Problems with the sonar and their possible causes and solutions are described here.

“No transducer connected” message displayed

Possible causes	Possible solutions
Incorrect display software version:	Display software may be incompatible with your connected transducer. Ensure that the display is running the latest available software.
Transducer not connected:	Connect compatible transducer. Ensure that the transducer cable connector is fully inserted and locked in position, and then restart the display.
Wrong transducer selected:	Transducer selection is performed as part of the initial start up wizard. If an incorrect transducer was selected, the “No transducer connected” message is displayed each time a new instance of the Fishfinder app is opened. To view the Fishfinder image, press the Menu button and select the fishfinder channel you want to view. To prevent further “No transducer connected” warnings, perform a factory reset and ensure that the correct transducer is selected from the bottom of the *Boat details* page of the startup wizard.
Damaged display connector:	Check that the transducer connector pins on the back of the display are not bent or broken / missing. If damage is detected, replace the display or send it to an authorized service agent for repair.
Damaged transducer or cable:	1. Check that the transducer cable connector is free from damage, is correctly orientated and fully inserted into the display, and that the connector is locked in position. If damage is detected, replace the transducer. 2. Check the condition of the transducer and cabling for signs of damage. If damage is detected, replace the transducer.
Wrong transducer fitted:	Check product and transducer documentation, and ensure that the transducer is compatible with your system. Replace with a compatible transducer, if necessary.

Scrolling image is not being displayed, or is intermittent

Possible causes	Possible solutions
Sonar ping disabled:	Enable sonar ping from the shortcuts page by pressing the *[Power]* button and enabling *[Sonar ping]*.
Transducer location:	Check that the transducer has been installed in accordance with the instructions provided with the transducer. The transducer must be installed where it is , always submerged, is parallel to the waterline and in an area free from turbulence and aeration.
Damaged display connector:	Check that the transducer connector pins on the back of the display are not bent or broken / missing. If damage is detected replace the display or send it to an authorized service agent for repair.
Damaged transducer or cable:	1. Check that the transducer cable connector is free from damage, is correctly orientated and fully inserted into the display and that the connector is locked in position. If damage is detected, replace the transducer. 2. Check the condition of the transducer and cabling for signs of damage. If damage is detected, replace the transducer.
Fouled transducer:	Check transducer condition, ensuring it is free from debris/fouling. If necessary, clean or replace your transducer. After cleaning or replacement coat the transducer using a water-based anti-fouling paint.
Wrong transducer fitted:	Check product and transducer documentation and ensure that the transducer is compatible with your system.
Proximity of high power cables:	If the transducer cable runs too close to engine and other high power cables the transducer signal may be interrupted causing loss of transducer connection and or electrical noise to appear onscreen. These issues may be more prevalent at higher engine revs. Move transducer cable as far away from high power cables as possible.

No depth reading / lost bottom lock

Possible causes	Possible solutions
Transducer location:	Check that the transducer has been installed in accordance with the instructions provided with the transducer.
Transducer angle:	If the transducer angle is too great, the beam can miss the bottom. Adjust transducer angle and re-check.
Transducer kicked-up:	If the transducer has a kick-up mechanism, check that it has not kicked up due to hitting an object.
Power source insufficient:	With the product under load, using a multi-meter, check the power supply voltage as close to the unit as possible, to establish actual voltage when the current is flowing. (Check your product's *Technical specification* for power supply requirements.)
Damaged or fouled transducer:	Check transducer condition, ensuring it is not damaged and is free from debris / fouling. If necessary, clean or replace your transducer. After cleaning or replacement, coat the transducer using a water-based anti-fouling paint.

Possible causes	Possible solutions
Damaged cables:	1. Check the unit's connector for broken or bent pins. 2. Check that the cable connector is fully inserted into the unit, and that the locking collar is in the locked position. 3. Check the cable and connectors for signs of damage or corrosion. Replace if necessary. 4. With the unit switched on, try flexing the power cable near to the display connector, to see if this causes the unit to re-start or lose power. Replace if necessary. 5. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion, replace if necessary. 6. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc (this can cause the Fishfinder applications to stop scrolling or the unit to reset/turn off), replace if necessary.
Vessel speed too high:	Slow vessel speed and re-check.
Bottom too shallow or too deep:	The bottom depth may be outside of the transducer's depth range. Move vessel to shallower or deeper waters as relevant, and re-check.

Poor / problematic image

Possible causes	Possible solutions
Targets will appear differently if your vessel is stationary (e.g.: fish will appear on the display as straight lines):	Increase vessel speed.
Scrolling paused or speed set too low:	Un-pause or increase sonar scrolling speed.
Sensitivity settings may be inappropriate for present conditions:	Check and adjust sensitivity settings, or perform a Sonar reset.

Possible causes	Possible solutions
Damaged cables:	1. Check the unit's connector for broken or bent pins. 2. Check that the cable connector is fully inserted into the unit, and that the locking collar is in the locked position. 3. Check the cable and connectors for signs of damage or corrosion, replace if necessary. 4. With the product switched on, try flexing the cable near to the display connector to see if this causes the product to re-start or lose power. Replace if necessary. 5. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring that connections are secure, clean and free from corrosion. Replace if necessary. 6. With the product under load, using a multi-meter, check for high voltage drop across all connectors / fuses etc (this can cause the Fishfinder applications to stop scrolling, or the unit to reset / switch off). Replace if necessary.
Transducer location:	• Check that the transducer has been installed in accordance with the instructions provided with the transducer. • If a transom mount transducer is mounted too high on the transom, it may be lifting out of the water. Check that the transducer face is fully submerged when planing and turning.
Transducer kicked-up:	If the transducer has a kick-up mechanism, check that it has not kicked up due to hitting an object.

Possible causes	Possible solutions
Damaged or fouled transducer:	• Check transducer condition, ensuring it is not damaged and is free from debris / fouling. If necessary, clean or replace the transducer. • After cleaning or replacement, coat the transducer using a water-based anti-fouling paint.
Damaged transducer cable:	Check that the transducer cable and connection is free from damage, and that the connections are secure and free from corrosion.
Turbulence around the transducer at higher speeds may affect transducer performance:	Slow vessel speed and re-check.
Interference from another transducer:	1. Switch off the transducer causing the interference. 2. Re-position the transducers so that they are farther apart.
Unit power supply fault:	Check the voltage from the power supply, if this is too low it can affect the transmitting power of the unit.

13.7 Radar troubleshooting

No connection can be made to the scanner

Possible causes	Possible solutions
Radar powered down	• Power up the Radar scanner by opening the Radar app and selecting the *[Power]* icon. • Quantum-Series Radar scanners will shut down after 30 minutes has elapsed since a Wi-Fi connection was made to an MFD / chartplotter.
Radar not transmitting	• Select *[Transmit]* for the relevant Radar scanner from the Radar app.
Missing or incorrect Wi-Fi credentials	• Check that you have entered the correct SSID and passcode for your Radar scanner. Both the SSID and passcode are provided on the Radar scanner's packaging, and are also shown on the serial number label on the underside of the product.
Damaged or disconnected Power cable	1. Check that the cable connectors are fully inserted and locked in position. 2. Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary. 3. With the product switched on, try flexing the cable near to the display's connector, to see if this causes the product to re-start or lose power; replace if necessary. 4. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring that connections are secure, clean and free from corrosion; replace if necessary. 5. With the product under load, using a multi-meter, check for high voltage drop across all connectors / fuses etc (this can cause the product to reset / power down); replace if necessary. 6. Check condition of relevant breakers and fuses, and replace if necessary. If the breaker keeps tripping or fuses keep blowing, contact a Raymarine authorized dealer for assistance.
Software mismatch between equipment may prevent communication	• Ensure that the Radar scanner's software version is compatible with the software running on your MFD / chartplotter. **Important:** • Due to a required software security update, Quantum-Series Radar scanners running v2.52 software (or later) require your Element-Series MFD / chartplotter to be running LightHouse Sport v3.19.17 (or later).

Poor image quality

Possible causes	Possible solutions
High network bandwidth usage may interfere with the Wi-Fi	• Disconnect other devices connected wirelessly. • Try power-cycling the system.

Displayed bearing is different to the true bearing

Possible causes	Possible solutions
Bearing alignment adjustment required	• Carry out the Bearing Alignment procedure. For more information, refer to: **p.61 — Bearing alignment**

13.8 Bearing alignment

The radar's bearing alignment ensures that radar echoes (objects) appear at the correct bearing relative to your vessel's bow. You should check the bearing alignment for any new installation.

Checking alignment

Align the bow with a stationary object between 0.25 nm and 2 nm away.
Reduce the gain sensitivity control to make the target as small as possible on the screen.
Note the position of the object on the screen. If the object is not under the ship's heading marker (SHM), then bearing alignment is required.

Adjusting alignment

Adjust the *[Bearing alignment]* setting until the target object appears under the SHM.
[Bearing alignment] setting can be accessed from the *[Advanced]* tab: *[Menu > Advanced > Bearing alignment]*.

13.9 Wi-Fi troubleshooting

Before troubleshooting problems with your Wi-Fi connection, ensure that you have followed the Wi-Fi location requirements guidance provided in the relevant *Installation Instructions*, and have also performed a power cycle / restart of the devices that you are experiencing problems with.

Cannot find network

Possible causes	Possible solutions
Wi-Fi not currently enabled on devices.	Ensure that Wi-Fi is enabled on both Wi-Fi devices, and then re-scan available networks.
Some devices may automatically turn off Wi-Fi when not in use to save power.	Power cycle / restart devices, and then re-scan available networks.
Device not broadcasting.	1. Enable broadcasting of the device's network using the Wi-Fi settings on the device you are trying to connect to. 2. You may still be able to connect to the device even when it is not broadcasting, by manually entering the device's Wi-Fi Name / SSID and passphrase in the connection settings of the device you are trying to connect to.
Devices out of range or signal being blocked.	Move devices physically closer together or, if possible, remove the obstructions and then re-scan available networks.

Cannot connect to network

Possible causes	Possible solutions
Some devices may automatically turn off Wi-Fi when not in use to save power.	Power cycle / restart devices, and then retry the connection.
Trying to connect to the wrong Wi-Fi network	Ensure that you are trying to connect to the correct Wi-Fi network. The Wi-Fi network's name can be found in the Wi-Fi settings on the broadcasting device (the device that you are trying to connect to).
Incorrect network credentials	Ensure that you are using the correct passphrase. The Wi-Fi network's passphrase can be found in the Wi-Fi settings on the broadcasting device (the device that you are trying to connect to).
Bulkheads, decks and other heavy structure can degrade and even block the Wi-Fi signal. Depending on the thickness and material used it may not always be possible to pass a Wi-Fi signal through certain structures	1. Try repositioning the devices so that structure is removed from the direct line of sight between the devices, or: 2. If possible, use a wired connection instead.
Interference being caused by other Wi-Fi enabled or older Bluetooth enabled devices (Bluetooth and Wi-Fi both operate in the 2.4 GHz frequency range, some older bluetooth devices may interfere with Wi-Fi signals.)	1. Change the Wi-Fi Channel of the device you are trying to connect to, and then retry the connection. You can use a free Wi-Fi analyzer app on your mobile or tablet device to help you choose a better channel (i.e. a channel with the least amount of traffic). 2. Temporarily disable each wireless device in turn until you have identified the device causing the interference.
Interference caused by other devices that use the 2.4GHz frequency band. The following common devices use the 2.4GHz frequency band: • Microwave ovens • Fluorescent lighting • Cordless phones / baby monitors • Motion sensors	Temporarily switch off each device in turn until you have identified the device causing the interference, then remove or re-position the offending device(s).
Interference caused by electrical and electronic devices and associated cabling could generate an electromagnetic field which may interfere with the Wi-Fi signal.	Temporarily switch off each item in turn until you have identified the device causing the interference, then remove or re-position the offending device(s).

Connection extremely slow and / or keeps dropping out

Possible causes	Possible solutions
Wi-Fi performance degrades over distance, resulting in products farther away receiving less network bandwidth. Products installed close to their maximum Wi-Fi range will experience slow connection speeds, signal drop-outs, or not being able to connect at all.	• Move devices physically closer together. • For fixed installations such as a Quantum Radar, enable the Wi-Fi connection on a display installed closer to the device.
Interference being caused by other Wi-Fi enabled or older Bluetooth enabled devices (Bluetooth and Wi-Fi both operate in the 2.4 GHz frequency band; some older Bluetooth devices may interfere with Wi-Fi signals.)	1. Change the Wi-Fi Channel of the device you are trying to connect to, and then retry the connection. You can use a free Wi-Fi analyzer app on your mobile or tablet device to help you choose a better channel (i.e. a channel with the least amount of traffic). 2. Temporarily switch off each device in turn until you have identified the device causing the interference, then remove or re-position the offending device(s).
Interference from devices on other vessels. When in close proximity to other vessels, such as when moored up in a marina, many other Wi-Fi signals may be present.	1. Change the Wi-Fi Channel of the device you are trying to connect to, and then retry the connection. You can use a free Wi-Fi analyzer app on your mobile or tablet device to help you choose a better channel (i.e. a channel with the least amount of traffic). 2. If possible, move your vessel to a location with less Wi-Fi traffic.

Network connection established, but no data

Possible causes	Possible solutions
Connected to the wrong network	Ensure that your device is connected to the correct network.
Device software incompatibility	Ensure both devices are running the latest available software.
The device may be defective	1. Try updating software to a later version, or: 2. Re-install the software. 3. Obtain new replacement device.

CHAPTER 14: MAINTAINING YOUR DISPLAY

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- 14.1 Service and maintenance — page 65
- 14.2 Product care — page 65

14.1 Service and maintenance

Caution: Service and maintenance

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



Warning: High voltage

This product contains high voltage. Adjustments require specialized service procedures and tools only available to qualified service technicians. There are no user serviceable parts or adjustments. The operator should never remove the cover or attempt to service the product.



Warning: FCC Warning (Part 15.21)

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

14.2 Product care

Caution: Sun covers

• Sun covers are used to protect the display screen against the damaging effects of ultraviolet (UV) light. If your product is supplied with a sun cover always ensure it is fitted when the product is not in use.

• To avoid potential loss of the sun cover, ensure that the sun cover is removed when travelling at high speed, whether in the water or when the vessel is being towed.

• To avoid potential screen damage, ensure that the rear surface of the sun cover and the display screen are clean and free from debris before placing the sun cover on the screen.

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.

Caution: Product cleaning

When cleaning products:

• Switch off power supply.

• Use a clean damp cloth to wipe clean.

• Do NOT use: abrasive, acidic, ammonia, solvent or other chemical-based cleaning products.

• Do NOT use a jet wash.

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.

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.

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 15: TECHNICAL SUPPORT

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- 15.2 Learning resources — page 70

15.1 Raymarine technical support and servicing

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

Product information

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

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

Servicing and warranty

Raymarine offers dedicated service departments for warranty, service, and repairs.
Visit the Raymarine website to **read the latest warranty policy**, and **register** your product's warranty online:

- www.bit.ly/rym-warranty

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

- Web: www.bit.ly/rym-service
- Tel: +44 (0)1329 246 932

United States (US):

- Web: www.bit.ly/rym-service
- Tel: +1 (603) 324 7900

Web support

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

- **Manuals and Documents** — www.bit.ly/rym-docs
- **Technical support forum** — www.bit.ly/rym-support
- **Software updates** — www.bit.ly/rym-software

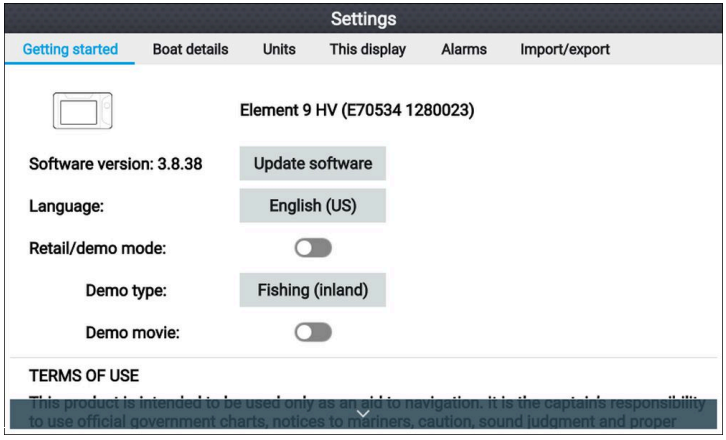
Telephone and online support

Region	Contact details
All regions	**Online support:** www.bit.ly/rym-support
United Kingdom (UK) and EMEA	**Telephone:** +44 (0)1329 246 777 **Address:** Marine House, Cartwright Drive, Fareham, PO15 5RJ, UK.
United States (US)	**Telephone:** Tel: +1 (603) 324 7900 (Toll-free: +800 539 5539) **Address:** 110 Lowell Road, Hudson, NH 03051, USA.
Australia and New Zealand (Raymarine subsidiary)	**Telephone:** +61 2 8977 0300 **Address:** Suite 1.01, 26 Rodborough Road, Frenchs Forest, NSW, 2086, Australia.
France (Raymarine subsidiary)	**Telephone:** +33 (0)1 46 49 72 30 **Address:** 35 avenue Michel Crépeau, 17000 La Rochelle - France.
Germany (Raymarine subsidiary)	**Telephone:** +49 40 237 808 0 **Address:** Atlantic-Haus, Zirkusweg 1, 20359 Hamburg.
Italy (Raymarine subsidiary)	**Telephone:** +39 02 9945 1001 **Address:** Via L. Manara 2, 20812 Limbiate (MB), Italy.
Spain (Authorized Raymarine distributor)	**Telephone:** +34 96 2965 102 **Email:** sat@azimut.es
Netherlands / Benelux (Authorized Raymarine distributor)	**Telephone:** +31 (0)26 3614 905 **Address:** Florijnweg 21G, 6883 JN VELP, Nederland.

Region	Contact details
Sweden (Raymarine subsidiary)	**Telephone:** +46 (0)317 633 670 **Address:** Bolshedens Industriväg 18, 427 50 Billdal, Sweden.
Finland (Raymarine subsidiary)	**Telephone:** +358 (0)207 619 937 **Address:** Suomalaistentie 1-3, 02270 Espoo, Finland.
Norway (Raymarine subsidiary)	**Telephone:** +47 692 64 600 **Address:** Årvollskogen 30, 1529 Moss, Norway.
Denmark (Raymarine subsidiary)	**Telephone:** +45 437 164 64 **Address:** Centervej 7, 4600 Køge, Denmark.
Russia (Distributor)	**Telephone:** Tel: +7 495 788 0508 **Email:** info@mikstmarine.ru

Viewing hardware and software details (LightHouse™ Sport)

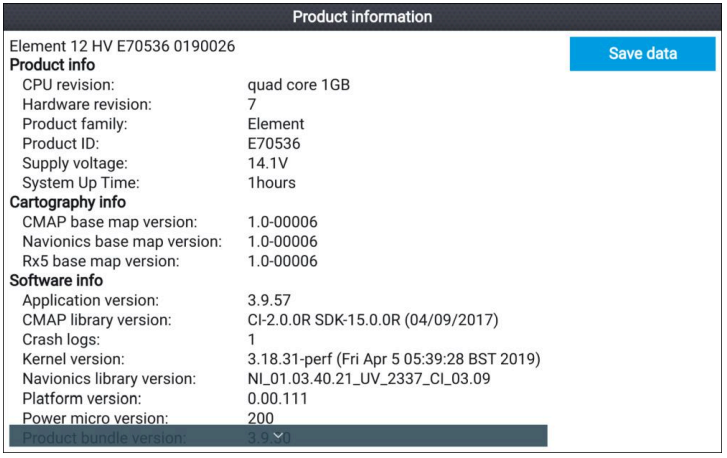
The *[Getting started]* tab in the homescreen *[Settings]* menu provides hardware and software information about your display.



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

Viewing product information

You can view detailed product information about your display.



1. Select the *[Settings]* icon from the *[Homescreen]*.
2. Select the *[This display]* tab.
3. Select *[About this product]* from the *[DIAGNOSTICS]* section.
4. If the *[Save data]* button is highlighted press the *[Left]* button.
5. Use the *[Up]* button and *[Down]* button to scroll through the available information.

Saving product information

The information displayed on the Product information page can be saved to memory card.

With the Product info page displayed:

1. Use the *[Right]* button to select *[Save data]*.
2. Enter a filename for the data using the onscreen keyboard, or keep the default filename.
3. Select *[Save]*.
4. Select *[Eject card]* to safely remove the memory card, or select *[OK]* to return to the *[Product information]* page.

15.2 Learning resources

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

Video tutorials

Raymarine official channel on YouTube

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

Training courses

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

- www.bit.ly/rym-training

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:

- www.bit.ly/rym-support

CHAPTER 16: TECHNICAL SPECIFICATION

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- 16.2 HyperVision™ technical specification — page 73
- 16.3 Internal GNSS (GPS / GLONASS) receiver specification — page 73
- 16.4 Conformance specification — page 73

16.1 Element technical specification

Power

	Element™ 7	Element™ 9	Element™ 12
Nominal supply voltage:	12 V dc		
Operating voltage range:	8 V dc to 16 V dc (protected up to 32 V dc)		
Fuse requirements:	• Inline fuse = 5 Amp, or • Thermal breaker = 3 Amp		
Power consumption: (Approximate @ 12 V dc)	• 7 HV — 16.8 Watts • 7 S — 13.2 Watts	• 9 HV — 18 Watts • 9 S — 14.4 Watts	• 12 HV — 24 Watts • 12 S — 19.2 Watts

Note:
Power consumption figures were taken at full brightness with a transducer connected and pinging.

Environmental

	Element™ 7	Element™ 9	Element™ 12
Operating temperature range:	-25°C (-13°F) to +55°C (+131°F)		
Storage temperature range:	-30°C (-22°F) to +70°C (+158°F)		
Humidity:	up to 93% @ 40°C (+104°F)		
Water ingress protection:	IPx6 and IPx7		
Weight (display only):	1.0 Kg	1.3 Kg	2.0 Kg

LCD specification

	Element™ 7	Element™ 9	Element™ 12
Size (diagonal):	7.0”	9.0”	12.1”
Type	TN (Twisted Nematic)		IPS (In-Plane Switching)
Color depth:	24 bit		
Resolution:	WVGA 800 x 480		WXGA 1280 x 800
Ratio	5:3		8:5
Maximum Illumination:	1500 nits / 1500 cd/m^2		
Viewing angle (T / B / L / R):	50° / 60° / 70° / 70°	50° / 70° / 70° / 70°	89° / 89° / 89° / 89°

Data connections

	Element™ 7	Element™ 9	Element™ 12
Transducer:	1 x 15–pin HyperVision™ connector.		
SeaTalkng ® / NMEA 2000	1 x DeviceNet female connector built into power cable		
2.4 GHz Wi-Fi:	1 x 802.11/b/g/n		
NMEA 2000 LEN (Load Equivalency Number):	1 (Based on 9 V dc nominal voltage)		

Storage

	Element™ 7	Element™ 9	Element™ 12
External:	1 x MicroSDXC card slot		

16.2 HyperVision™ technical specification

The following specification only applies to HyperVision™ products.

Sonar channels:	• Conical high CHIRP sonar • RealVision™ 3D (Hyper) • RealVision™ 3D (Standard) • SideVision™ (Hyper) • SideVision™ (Standard) • DownVision™ (Hyper) • DownVision™ (Standard)
Power:	• 1.2 MHz (Hyper) = 1000 W • 350 kHz (Standard) = 700 W • 200 kHz (Conical high CHIRP sonar) = 100 W
Frequencies:	• 1.2 MHz CHIRP • 350 kHz CHIRP • 200 kHz CHIRP
200 kHz range:	• Conical high CHIRP sonar = 0.6 M (2 ft) to 274 m (900 ft)
350 kHz (Standard) range:	• RealVision™ 3D = 0.6 M (2 ft) to 91 m (300 ft) • SideVision™ = 0.6 M (2 ft) to 91 m (300 ft) each side • DownVision™ = 0.6 M (2 ft) to 183 m (600 ft)
1.2 MHz (Hyper) range:	• RealVision™ 3D = 0.6 M (2 ft) to 38 m (125 ft) • SideVision™ = 0.6 M (2 ft) to 38 m (125 ft) each side • DownVision™ = 0.6 M (2 ft) to 38 m (125 ft)

16.3 Internal GNSS (GPS / GLONASS) receiver specification

Channels	Multiple — ability to simultaneously track up to 28 satellites
Cold start	<2 minutes
Receiver IC Sensitivity	• 165 dBm (Tracking) • 160 dBm (Acquisition) • 148 dBm (Cold start)
GNSS compatibility	• GPS • GLONASS • Beidou
SBAS compatibility	• EGNOS • GAGAN • MSAS • QZSS • WAAS
Operating frequency	1574 MHz to 1605 MHz
Signal Acquisition	Automatic
Almanac Update	Automatic
Geodetic Datum	WGS-84 (alternatives can be selected on the MFD)
Antenna	• Internal — Ceramic chip mounted near top of unit
Position Accuracy	• Without SBAS: <= 15 metres 95% of the time • With SBAS: <= 5 metres 95% of the time

16.4 Conformance specification

The display conforms to the following specifications:

- EN 60945:2002

- EMC Directive 2014/30/EU
- Australia and New Zealand C-Tick compliance level 2
- Canadian RSS 247
- FCC rules part 15

CHAPTER 17: SPARES AND ACCESSORIES

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17.1 Spares

Part number	Description
R70523	Power / NMEA 2000 cable (includes 1.5 m (4.92 ft) power lead and 0.5 m (1.64 ft) NMEA 2000 lead).
R70647	Element 7” trunnion kit
R70648	Element 9” trunnion kit
R70649	Element 12” trunnion kit
R70727	Element 7” suncover
R70728	Element 9” suncover
R70729	Element 12” suncover
A80553	Element 7” surface mount kit
A80554	Element 9” surface mount kit
A80555	Element 12” surface mount kit

17.2 Element accessories

Part number	Description
A80562	HyperVision™ transducer extension cable 4 m (13.12 ft)
A80559	CPT-S/DownVision 9–pin adaptor cable.
A80558	Dragonfly® 10–pin adaptor cable.
A80605	‘Y’ adapter cable for connecting split pair HV-300THP-P and HV-300THP-S thru-hull transducers.
A80560	**MinnKota** Embedded, 83 kHz / 200 kHz transducer.
A80606	**MotorGuide** Embedded, 83 kHz / 200 kHz transducer
E70096	EV-1 heading sensor
E70227	ECI-100 engine gateway

17.3 Compatible transducers - Element HV displays

HyperVision™ transducers

The following HyperVision™ transducers can be connected to Element™ HV displays:

Part number	Description
E70643 / A80603	**HV-100** — HyperVision™ Transom mount, Plastic transducer (direct connection).
A80604	**HV-300TH** — HyperVision™ All-in-one, Thru-hull, Plastic transducer (direct connection).
T70448	**HV-300THP** — HyperVision™ Pair, Thru-hull, Plastic transducers (direct connection using supplied cables).
R70725	**HV-300THP-P** Split, Port side, Thru-hull, Plastic transducer (Requires ‘Y’ cable (A80605) to connect split pair transducers, and extension cable (A80562) to connect to display).
R70726	**HV-300THP-S** Split, Starboard side, Thru-hull, Plastic transducer (Requires ‘Y’ cable (A80605) to connect split pair transducers, and extension cable (A80562) to connect to display).

Third party transducers

The third party transducers listed below can be connected to Element™ HV using adaptor cables.

Adaptor cable	Transducer
A80560	**MinnKota** Embedded, 83 kHz /200 kHz transducer.
A80606	**MotorGuide** Embedded, 83 kHz / 200 kHz transducer.

Note:
When using third party transducers only the 200 kHz channel will be available.

Compatible legacy transducers

DownVision™ transducers

The following DownVision™ transducers can be connected to Element™ HV displays using the CPT-S / DownVision 9–pin adaptor cable (A80559):

Part number	Description
A80507	**CPT-90 DVS** — DownVision™, Transom mount, Plastic transducer.
A80351	**CPT-100 DVS** — DownVision™, Transom mount, Plastic transducer. Replaced A80270.
A80277	**CPT-110** — DownVision™, Thru-hull, Plastic transducer with fairing block.
A80350	**CPT-120** — DownVision™, Thru-hull, Bronze transducer with fairing block. Replaced A80271.

Dragonfly® transducers

The following Dragonfly® transducers can be connected to Element™ HV displays using the Dragonfly 10–pin adaptor cable (A80558):

Part number	Description
R70374	**CPT-DVS** — DownVision™, Transom mount, Plastic transducer.
A80278	**CPT-70** — DownVision™, Thru-hull, Plastic transducer with fairing block.
A80349	**CPT-80** — DownVision™, Thru-hull, Bronze transducer with fairing block.

High CHIRP sonar transducers

The following conical beam, high CHIRP sonar transducers can be connected to Element™ HV displays using the CPT-S/DownVision 9–pin adaptor cable (A80559):

Part number	Description
E70342	**CPT-S** High CHIRP, Transom mount, Plastic transducer.
E70339	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Plastic transducer.
A80448	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Plastic transducer.
A80447	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Plastic transducer.
A80446	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Bronze transducer.
E70340	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Bronze transducer.
E70341	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Bronze transducer.

Legacy transducer extension cables

When connecting a compatible legacy transducer to an Element display, using an adaptor cable: if the cable run requires extending, you must use an extension cable which is compatible with your transducer.

Important:
The HyperVision™ extension cable cannot be used to extend the cable run of legacy transducers.

Legacy transducer	Compatible extension cable
Dragonfly® transducers	**A80312** — 4 m (13.1 ft) Dragonfly® transducer extension cable. **Note:** Power supply wires should be isolated and protected from shorting or water ingress.
DownVision™ transducers	**E66074** — 3 m (9.84 ft) DownVision™ transducer extension cable.
High CHIRP sonar transducers	**A80273** — 4 m (13.1 ft) CPT-S transducer extension cable.

17.4 Compatible transducers - Element S displays

High CHIRP sonar transducers

The following conical beam, high CHIRP sonar transducers can be connected to Element™ S displays:

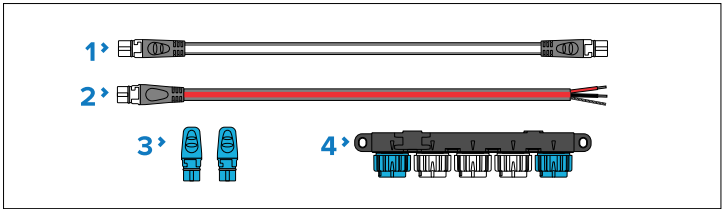
Part number	Description
E70342	**CPT-S** High CHIRP, Transom mount, Plastic transducer.
E70339	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Plastic transducer.
A80448	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Plastic transducer.
A80447	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Plastic transducer.
A80446	**CPT-S** High CHIRP, 0° angled element, Flush mount, Thru-hull, Bronze transducer.
E70340	**CPT-S** High CHIRP, 12° angled element, Flush mount, Thru-hull, Bronze transducer.
E70341	**CPT-S** High CHIRP, 20° angled element, Flush mount, Thru-hull, Bronze transducer.

17.5 SeaTalk NG cables and accessories

SeaTalk NG cables and accessories for use with compatible products.

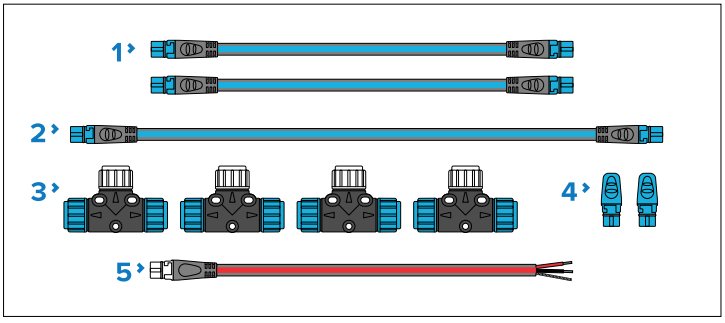
SeaTalk NG kits

SeaTalk NG kits enable you to create a simple SeaTalk NG backbone.
Starter kit (part number: T70134) consists of:



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

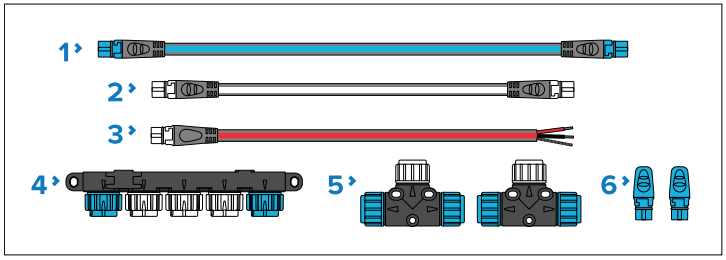
Backbone kit (part number: A25062) consists of:



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

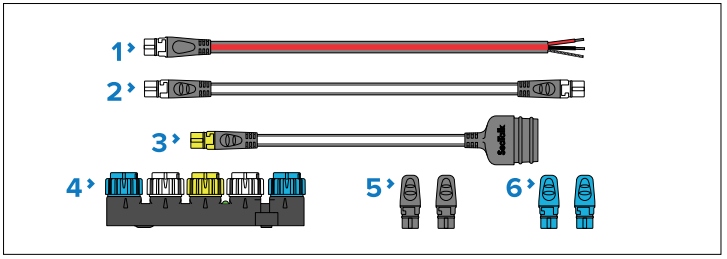
2. 1 x Backbone cable 20 m (65.6 ft) (part number: **A06037**). Used to create and extend the SeaTalk NG backbone.
3. 4 x T-piece (part number: **A06028**). Each T-piece allows connection of one SeaTalk NG device. Multiple T-pieces can be 'daisy chained' together.
4. 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.
5. 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.

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



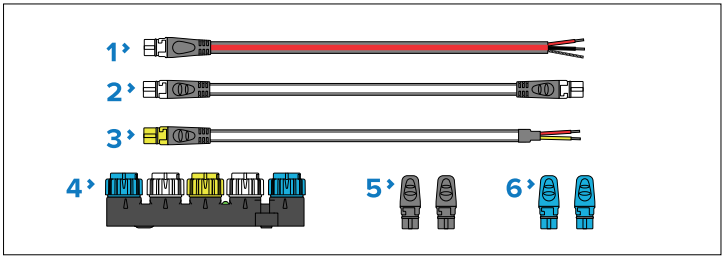
1. 1 x Backbone cable 5 m (16.4 ft) (part number: **A06036**). Used to create and extend the SeaTalk NG backbone.
2. 1 x Spur cable 1 m (3.3 ft) (part number: **A06040**). Used to connect device to the SeaTalk NG backbone.
3. 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12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

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



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

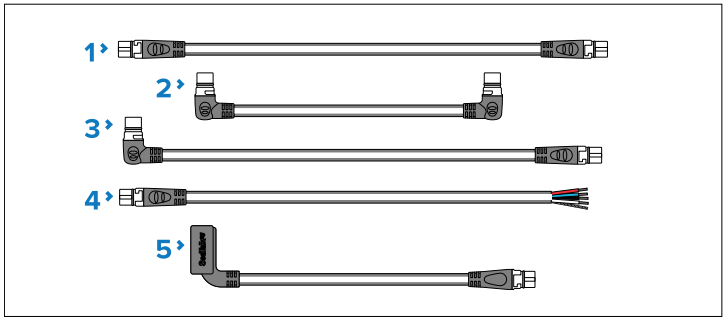
NMEA 0183 VHF 2-wire to SeaTalk NG converter kit (part number: E70196) consists of:



1. 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.
2. 1 x Spur cable 1 m (3.3 ft) (part number: **A06039**). Used to connect a device to the SeaTalk NG backbone.

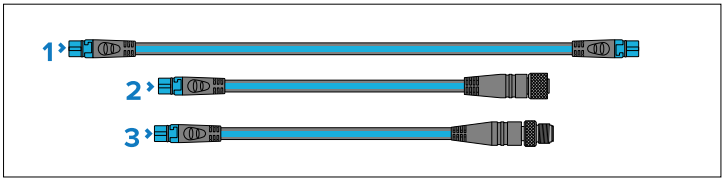
3. 1 x NMEA 0183 VHF stripped-end (2-wire) to SeaTalk NG adapter cable 1 m (3.3 ft) (part number: **A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalk NG backbone via the NMEA 0183 to SeaTalk NG converter.
4. 1 x SeaTalk 1 to SeaTalk NG converter (part number: **E22158**). Each converter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

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



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

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



1. Backbone cables:
   - Backbone cable 0.4 m (1.3 ft) (part number: **A06033**).
   - Backbone cable 1 m (3.3 ft) (part number: **A06034**).
   - Backbone cable 3 m (9.8 ft) (part number: **A06035**).
   - Backbone cable 5 m (16.4 ft) (part number: **A06036**).
   - Backbone cable 9 m (29.5 ft) (part number: **A06068**).
   - Backbone cable 20 m (65.6 ft) (part number: **A06037**).
2. SeaTalk NG to DeviceNet (female) Backbone cable 0.4 m (1.3 ft) (part number: **A80675**)
3. SeaTalk NG to DeviceNet (male) Backbone cable 0.4 m (1.3 ft) (part number: **A80674**)

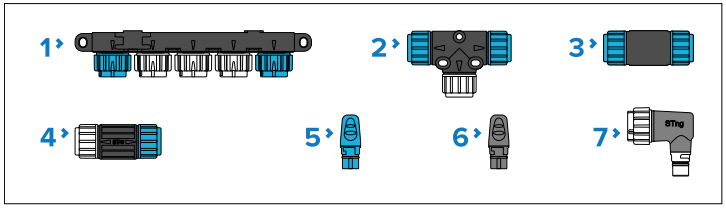
SeaTalk NG power cables
SeaTalk NG power cables are used to provide the SeaTalk NG backbone with a single 12 V dc power source. The power connection must include a 5 amp inline fuse (not supplied).



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

SeaTalk NG connectors

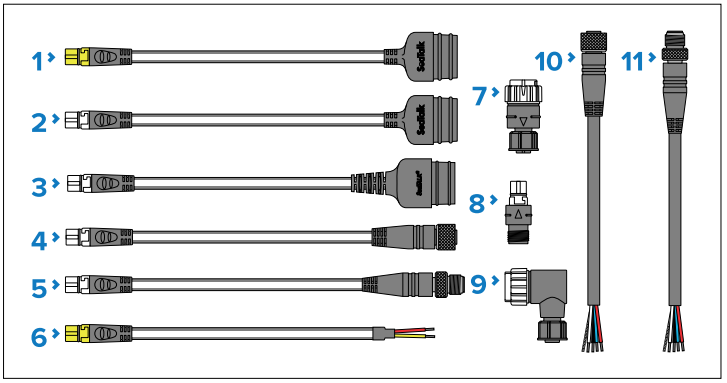
SeaTalk NG connectors are used to connect SeaTalk NG devices to the SeaTalk NG backbone and to create and extend the backbone.



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

SeaTalk NG adaptors and adaptor cables

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



1. SeaTalk 1 (3 pin) to SeaTalk NG converter cable 1 m (3.3 ft) (part number: **A22164 / A06073**). Can be used to connect a SeaTalk 1 device to a SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter, or to connect a SeaTalk NG product directly to a SeaTalk 1 network.
2. SeaTalk 1 (3 pin) to SeaTalk NG adaptor cable 0.4 m (1.3 ft) (part number: **A06047**). Can be used to connect a SeaTalk 1 device to a SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter, or to connect a SeaTalk NG product directly to a SeaTalk 1 network.
3. SeaTalk 2 (5 pin) to SeaTalk NG adaptor cable 0.4 m (1.3 ft) (part number: **A06048**). Used to connect SeaTalk 2 devices or networks to a SeaTalk NG backbone.
4. SeaTalk NG to DeviceNet (female) adaptor cables connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalk NG backbone, or connects SeaTalk NG devices to an NMEA 2000 network. The following cables are available:
   - SeaTalk NG to DeviceNet (female) adaptor cable 0.4 m (1.3 ft) (part number: **A06045**).
   - SeaTalk NG to DeviceNet (female) adaptor cable 1 m (3.3 ft) (part number: **A06075**).
5. SeaTalk NG to DeviceNet (male) adaptor cables. Connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalk NG

backbone, or connect SeaTalk NG devices to an NMEA 2000 network. The following cables are available:

- SeaTalk NG to DeviceNet (male) adaptor cable 0.1 m (0.33 ft) (part number: **A06078**).
- SeaTalk NG to DeviceNet (male) adaptor cable 0.4 m (1.3 ft) (part number: **A06074**).
- SeaTalk NG to DeviceNet (male) adaptor cable 1 m (3.3 ft) (part number: **A06076**).
- SeaTalk NG to DeviceNet (male) adaptor cable 1.5 m (4.92 ft) (part number: **A06046**).

6. NMEA 0183 stripped-end (2-wire) to SeaTalk NG adapter cable 1 m (3.3 ft) (part number: **A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalk NG backbone via the NMEA 0183 to SeaTalk NG converter.
7. SeaTalk NG (male) to DeviceNet (female) adaptor (**A06082***).
8. SeaTalk NG (female) to DeviceNet (male) adaptor (**A06083***).
9. SeaTalk NG (male) to DeviceNet (female) elbow (right-angled) adaptor (**A06084***).
10. DeviceNet (female) to stripped-end adaptor cable (0.4 m (1.3 ft)) (part number: **E05026**).
11. DeviceNet (male) to stripped-end adaptor cable (0.4 m (1.3 ft)) (part number: **E05027**).

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

Appendix A NMEA 2000 PGNs

Administration PGNs

- **59392** — ISO Acknowledge (Receive / Transmit)
- **59904** — ISO Request (Receive / Transmit)
- **60160** — ISO Transport Protocol, Data Transfer (Receive)
- **60416** — ISO Transport Protocol, Connection Management — BAM Group Function (Receive)
- **60928** — ISO Address Claim (Receive / Transmit)
- **65240** — ISO Commanded address (Receive)
- **126208** — NMEA — Request, Commanded, Acknowledged Group Function (Receive / Transmit)
- **126464** — PGN Transmit and Receive List (Receive / Transmit)
- **126996** — Product Information (Receive / Transmit)
- **126998** — Configuration Information (Receive / Transmit)

Data PGNs

- (1)**126992** — System Time (Receive / Transmit)
- **126993** — Heartbeat (Receive / Transmit)
- **127237** — Heading/Track Control (Receive)
- **127245** — Rudder (Receive)
- **127250** — Vessel Heading (Receive)
- **127251** — Rate of Turn (Receive)
- **127258** — Magnetic Variation (Transmit)
- **127488** — Engine Parameters, Rapid Update (Receive)
- **127489** — Engine Parameters, Dynamic (Receive)
- **127493** — Transmission Parameters, Dynamic (Receive)
- **127496** — Trip Parameters, Vessel (Receive)
- **127497** — Trip Parameters, Engine (Receive)
- **127498** — Engine Parameters, Static (Receive)
- **127503** — AC input status (Receive)
- **127504** — AC output status (Receive)
- **127505** — Fluid Level (Receive)
- **127506** — DC detailed status (Receive)
- **127507** — Charger status (Receive)
- **127508** — Battery status (Receive)
- **127509** — Inverter status (Receive)
- **128259** — Speed, (Receive / Transmit)
- **128267** — Water Depth (Receive / Transmit)
- **129025** — Position rapid update (Transmit)
- (1)**129026** — COG & SOG, Rapid Update (Receive / Transmit)
- (1)**129029** — GNSS Position Data (Receive / Transmit)
- (1)**129033** — Time & Date (Transmit)
- **129038** — AIS Class A Position Report (Receive)
- **129039** — AIS Class B Position Report (Receive)
- **129040** — AIS Class B Extended Position Report (Receive)
- **129041** — AIS Aids to Navigation (AtoN) Report (Receive)
- (1)**129044** — Datum (Transmit)
- **129283** — Cross Track Error (Receive / Transmit)
- **129284** — Navigation Data (Transmit)
- **129285** — Navigation — Route / WP Information (Transmit)
- **129291** — Set & Drift, Rapid Update (Receive / Transmit)
- (1)**129539** — GNSS DOPs (Receive / Transmit)
- (1)**129540** — GNSS Sats in View (Receive / Transmit)
- (1)**129542** — GNSS Pseudorange Noise Statistics (Receive / Transmit)
- (1)**129547** — GNSS Pseudorange Error Statistics (Receive / Transmit)
- **129793** — AIS UTC and Date Report (Receive)
- **129794** — AIS Class A Static and Voyage Related Data (Receive)
- **129798** — AIS SAR Aircraft Position Report (Receive)
- **129801** — AIS Addressed Safety Related Message (Receive)
- **129802** — AIS Safety Related Broadcast Message (Receive)
- **129809** — AIS Class B "CS" Static Report, Part A (Receive)

- **129810** — AIS Class B "CS" Static Report, Part B (Receive)
- **130064** — Route and WP Service — Database List (Receive / Transmit)
- **130070** — Route and WP Service — WP Comment (Receive / Transmit)
- **130072** — Route and WP Service — Database Comment (Receive / Transmit)
- **130074** — Route and WP Service — WP List — WP Name & Position (Receive / Transmit)
- **130306** — Wind Data (Receive)
- **130310** — Environmental Parameters (Receive)
- **130311** — Environmental Parameters (Receive)
- **130312** — Temperature (Receive)
- **130576** — Small Craft Status (Receive)
- **130577** — Direction Data (Receive)

Note:
(1) Only transmitted when *[Send GPS to VHF:]* setting is enabled, from the GPS / GNSS Settings menu.

Appendix B Document change history

Document details	Changes
87360-9 Date: 08–2025	• Update to visual style of tables and illustrations. • Minor editorial updates.
87360-8 Date: 05–2024	• Added Quantum software compatibility details to Handbook and product information chapter. • Added important note regarding Quantum Radar scanner software compatibility to Pairing procedure. • Added Radar troubleshooting details. • Added Downgrading software procedure.
87360-7 Date: 11-2023	• Electrical grounding advice updated.
87360-6 Date: 09-2021	• Added new HV variant display part numbers to applicable products. • Added new HV-100 part number to compatible transducers section.
87360-5 Date: 07-2020	• Updated trunnion mounting information to show Element 7. • Added troubleshooting guidance for 'Not enough storage space' message • Added compatible autopilot controller topic from LHS ops manual.
87360-4 Date: 06-2019	• Added Radar connection details. • Added Autopilot connection details. • Removed non-Wi-Fi SKUs.

Document details	Changes
87360-3 Date: 04-2019	• Updated to include details of ‘S’ variant displays and part numbers for non wi-fi enabled variant displays. • Updated to include details for expanded hardware compatibility i.e.: AIS700, iTC-5, Wind vane transducers and RS150 external GPS. • Added connections overview para 4.1. • Added dedicated grounding information. • Added document change history.
87360-2 Date: 03-2019	Updated illustrations to latest standard.
87360-1 Date: 01-2019	Initial release.

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