RNS-8

PoE Gigabit Network Switch

INSTALLATION INSTRUCTIONS

English (en-US)
Date: 09-2023
Document number: 87455 (Rev 1)

Raymarine®

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Document number: 87455 (Rev 1)
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CHAPTER 1: IMPORTANT INFORMATION

Safety warnings

Warning: Product installation and operation

- This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your vessel and/or poor product performance.
- Certified installation by an approved installer is recommended. A certified installation qualifies for enhanced product warranty benefits. Contact your dealer for further details.

Warning: Switch off power supply

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

Product warnings

Warning: Product grounding

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

Warning: Positive ground systems

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

Warning: Power supply voltage

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

Caution: Power supply protection

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

Caution: Service and maintenance

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

Regulatory notices

Disclaimer

Raymarine does not warrant that this product is error-free or that it is compatible with products manufactured by any person or entity other than Raymarine.

Raymarine is not responsible for damages or injuries caused by your use or inability to use the product, by the interaction of the product with products manufactured by others, or by errors in information utilized by the product supplied by third parties.

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

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EMC installation guidelines

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

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

Note:

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

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

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

Note:

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

Suppression ferrites

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

Connections to other equipment

Requirement for ferrites on non-Raymarine cables:

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

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

Declaration of Conformity

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

- RNS–8 Network Switch, part number: A80732

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

Warranty registration

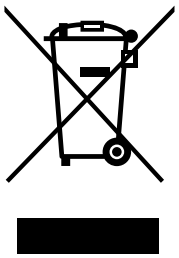
To register your Raymarine product ownership, please visit www.raymarine.com and register online.

It is important that you register your product to receive full warranty benefits. Your unit package includes a bar code label indicating the serial number of the unit. You will need this serial number when registering your product online. You should retain the label for future reference.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

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



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

IMO and SOLAS

The equipment described within this document is intended for use on leisure marine boats and workboats NOT covered by International Maritime Organization (IMO) and Safety of Life at Sea (SOLAS) Carriage Regulations.

Technical accuracy

To the best of our knowledge, the information in this document was correct at the time it was produced. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without notice. As a result, Raymarine cannot accept liability for any differences between the product and this document. Please check the Raymarine website (www.raymarine.com) to ensure you have the most up-to-date version(s) of the documentation for your product.

Publication copyright

CHAPTER 2: DOCUMENT INFORMATION

CHAPTER CONTENTS

2.1 Applicable products

This document is applicable to the following products:

RNS–8 Network Switch (**A80732**) — 8–port Gigabit PoE network switch.

2.2 Product documentation

The following documentation is applicable to your product:

- **87455** — RNS–8 Network Switch Installation Instructions (this document).
- **87434** — RNS–8 Network Switch Mounting Template.

2.3 Document illustrations

Your product and if applicable, its user interface may differ slightly from that shown in the illustrations in this document, depending on product variant and date of manufacture.

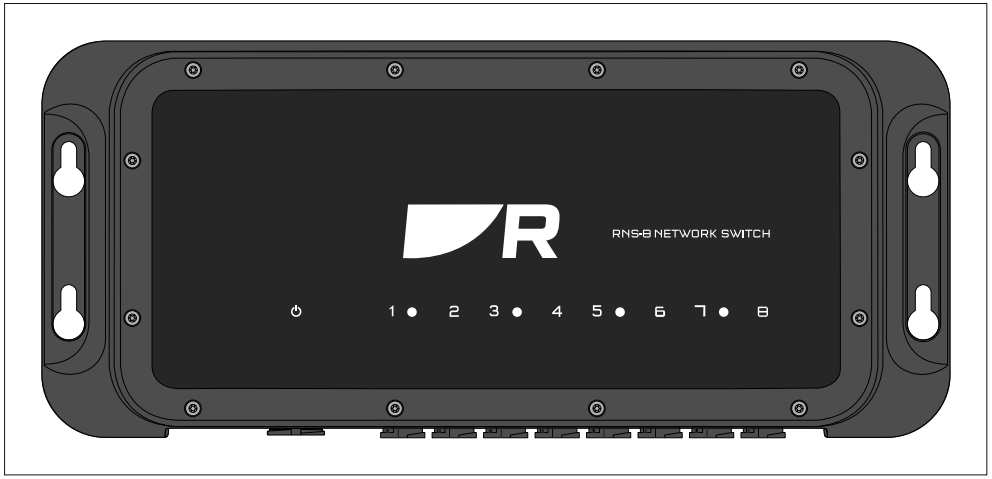
All images are provided for illustration purposes only.

CHAPTER 3: PRODUCT AND SYSTEM OVERVIEW

CHAPTER CONTENTS

3.1 Product overview

The Raymarine® RNS-8 network switch enables you to connect and share data between multiple devices featuring a RayNet connector (or RJ45 / SeaTalkhs ® connector, connected via adapter cables), at up to speeds of one Gigabit per second. The switch also supports Power over Ethernet (PoE), which allows power and data to be shared across a single cable to a PoE compatible device.



The network switch has the following key features:

- 8x Ethernet ports (4x PoE ports, each supporting up to 30W PoE, Classes 0 to 4), using waterproof RayNet connectors.
- Ability to mix a combination of PoE and non-PoE devices simultaneously, for **a total of 8 devices** (maximum PoE devices = 4; maximum non-PoE devices = 8).
- Each port can transfer data at the following speeds: 10/100/1000 Mbits/s.
- Multiple switches can be connected together in a “daisy chain” for expanded systems.
- Rugged enclosure — waterproof to IPx6 and IPx7 standard.
- Ignition protection to EN ISO 8846:2017 standard.
- Status and speed LED indicators for each port.
- Compatible with devices featuring any of the following connectors:
  - RayNet.
  - RJ45 (SeaTalkhs ®), via adapter cables (available separately).
  - RJ45, via adapter cables (available separately).
- Examples of devices that can be networked together include:
  - Radar scanner.
  - Sonar module.
  - Thermal camera.
  - Multifunction display.

Note:

Connections to equipment with RJ45 or SeaTalkhs ® connectors must be made via adapter cables (available separately). For suitable adapter cables, refer to the following section: **p.57 — RayNet to RJ45 adapter cables**

Power over Ethernet (PoE)

Power over Ethernet (PoE) is a system which allows both power and data to be passed along a single Cat 6 Ethernet cable.

There are 2 main types of PoE device:

- **Power Sourcing Equipment (PSE)** — this PoE system component provides electrical power over a Cat 6 Ethernet cable.
- **Powered Device (PD)** — this PoE system component is powered by the electrical power provided by the Power Sourcing Equipment (PSE).

The RNS-8 Network Switch is a PSE (Power Sourcing Equipment) device, which can supply both data and power to a maximum of 4x connected Powered Devices (PD). Each Powered Device (PD) can be PoE Class 0 to 4, and can draw a maximum of 30 W power.

When a Powered Device (PD) is connected to one of the Network Switch’s PoE RayNet network ports, it is first checked to establish whether it is PoE compatible, and if so, what class of device it is. If a connected Powered Device (PD) requires more power than the port’s maximum power output (30 W), then it will not be powered.

Before connecting a Powered Device (PD) to the network switch, ensure that the maximum power output of the switch’s PoE port (30 W) will not be surpassed.

Note:

- For more information on the power requirements of the different PoE classes, refer to: **p.34 — Power over Ethernet (PoE)**
- For more information on PoE requirements, refer to: **p.52 — Power specification**

3.2 Required additional components

Network switches must be used in conjunction with the following items, available separately from Raymarine®

Network cables

For information on the cables that are suitable for your product, refer to the following section: **p.30 — Network connections**

Cable extensions

Some installations may also require extensions to network or power cables. For further information on cable extensions, refer to the following sections:

- **p.30 — Network connections**
- **p.33 — Power connections**
- **p.54 — Spares and accessories**

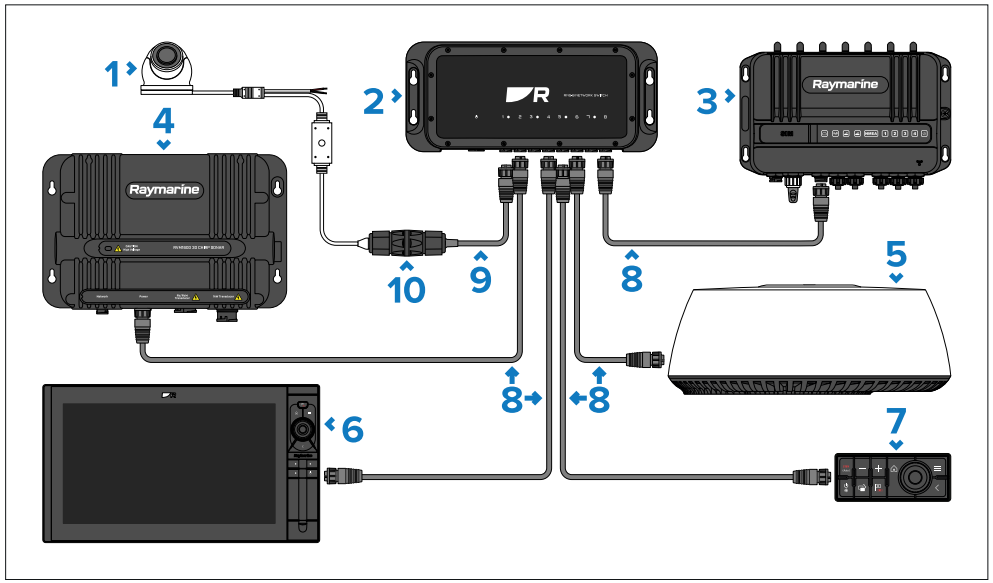
3.3 System overview

The following example provides an overview of a typical system, including the available connections and the types of devices that can be connected to your network switch.

Note:

The following system is shown **as an example only**, and may differ from your planned installation.

Example: typical system



1. IP camera, powered via PoE.
2. RNS-8 network switch.
3. Marine router.
4. Sonar module.
5. Radar scanner.
6. Multifunction display.
7. Remote keypad, powered via PoE.
8. RayNet (female) to RayNet (female) network cable (**not supplied**).
9. RayNet (female) to RJ45 (male) network cable (**not supplied**).
10. RJ45 to RJ45 waterproof coupler. (part number 4115028, **not supplied**).

Note:

For information on how to connect your products, refer to the following sections:

- **p.25 — Cables and connections — General information**
- **p.30 — Network connections**
- **p.33 — Power connections**

For information on the available cables and accessories, refer to the following section: **p.54 — Spares and accessories**

3.4 Compatible network devices

Your network switch is compatible with the following network devices:

- Any Raymarine® products featuring RayNet connectors can be connected to the network switch via the use of a RayNet to RayNet network cable.
- Any Raymarine® products featuring RJ45 (SeaTalkhs ®) connectors can be connected to the network switch via the use of a RayNet to RJ45 (SeaTalkhs ®) network adapter cable.
- Any Raymarine® / non-Raymarine® product featuring an RJ45 connector can be connected to the network switch via the use of a RayNet to RJ45 network adapter cable.

CHAPTER 4: PARTS SUPPLIED

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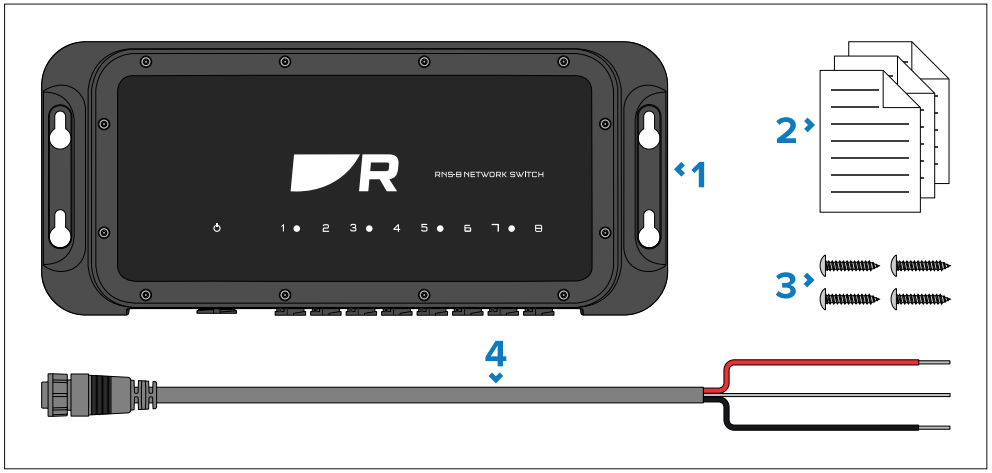
4.1 Parts supplied

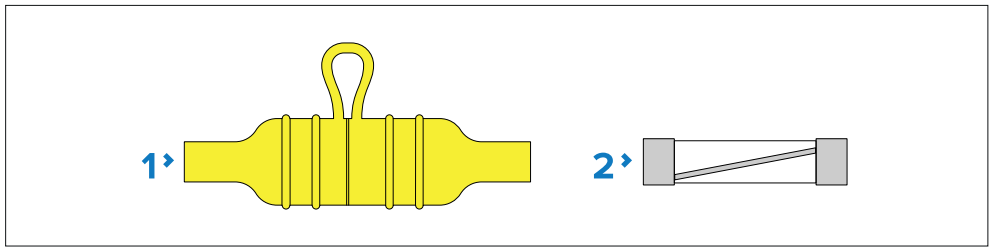


Item	Part description
1	RNS-8 Network switch.
2	Documentation pack.
3	Fixing screws, x4 (M4, 8.94 x 25 mm).
4	Power cable, 1.5 m (4.9 ft).

4.2 Inline fuse requirement

Your product requires a suitably-rated inline fuse to be fitted to the red power wire, housed in a waterproof fuse holder.

This fuse and its fuse holder are **NOT supplied** with your product, and must be obtained separately, from a marine or electrical retailer.



1. Waterproof fuse holder.
2. Suitably-rated 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 listed below.

Inline fuse and thermal breaker ratings

The following inline fuse and thermal breaker ratings apply to your product:

Inline fuse rating	Thermal breaker rating
• **12 V**: 15 A	• **12 V**: 20 A
• **24 V**: 8 A	• **24 V**: 10 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.

CHAPTER 5: PRODUCT DIMENSIONS

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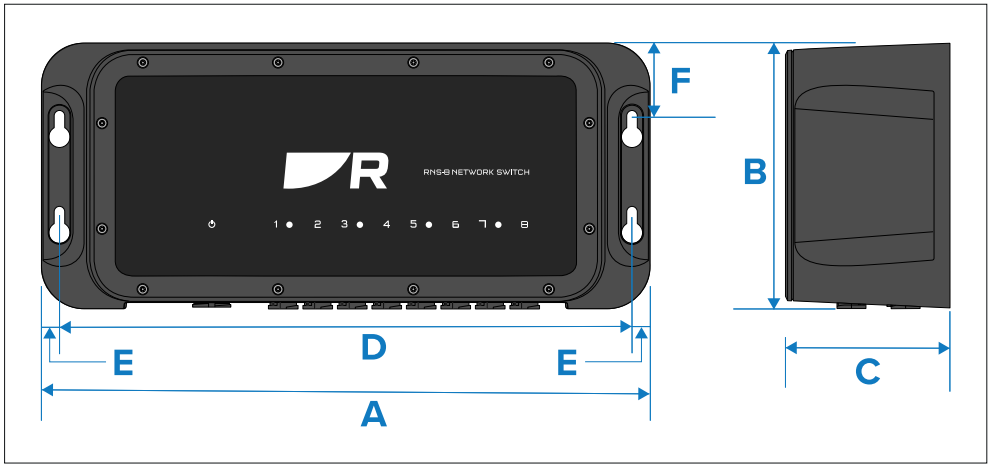
5.1 Product dimensions



Item	Dimension
A	287.63 mm (11.32 in).
B	125.50 mm (4.94 in).
C	78.00 mm (3.07 in).
D	270.63 mm (10.65 in).
E	8.50 mm (0.33 in).
F	34.31 mm (1.35 in).

CHAPTER 6: LOCATION REQUIREMENTS

CHAPTER CONTENTS

6.1 Warnings and cautions

Important:

Before proceeding, ensure that you have read and understood the warnings and cautions provided in the following section of this document:
p.7 — Important information

6.2 General location requirements

When selecting a location for your product it is important to consider a number of factors.

Factors for consideration:

- **Ventilation** — To ensure adequate airflow:
  - Ensure that product is mounted in a compartment of suitable size.
  - Ensure that ventilation holes are not obstructed. Allow adequate separation of all equipment.

  Any specific requirements for each system component are provided later in this chapter.
- **Mounting surface** — Ensure product is adequately supported on a secure surface. Do not mount units or cut holes in places which may damage the structure of the vessel.
- **Cabling** — Ensure the product is mounted in a location which allows proper routing, support and connection of cables:
  - Minimum bend radius of 100 mm (3.94 in) unless otherwise stated.
  - Use cable clips to prevent stress on connectors.
  - If your installation requires multiple ferrites to be added to a cable then additional cable clips should be used to ensure the extra weight of the cable is supported.
- **Water ingress** — The product is suitable for mounting both above and below decks. Although the unit is waterproof, it is good practice to locate it in a protected area away from prolonged and direct exposure to rain and salt spray.
- **Electrical interference** — Select a location that is far enough away from devices that may cause interference, such as motors, generators and radio transmitters / receivers.
- **Power supply** — Select a location that is as close as possible to the vessel's DC power source. This will help to keep cable runs to a minimum.

6.3 Ignition Protection

This product is certified to the EN ISO 8846:2017 Ignition Protection standard.

6.4 EMC installation guidelines

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

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

Note:

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

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

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

Note:

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

6.5 Connections to other equipment

Requirement for ferrites on non-Raymarine cables:

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

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

6.6 Compass safe distance

When choosing a suitable location for your product you should aim to maintain the maximum possible distance between the product and any installed compass. This distance should be at least 1 m (3.3 ft) in all directions. For smaller vessels it may not be possible to achieve this distance. In this situation ensure that the compass is not affected by the product when it is powered on.

CHAPTER 7: MOUNTING

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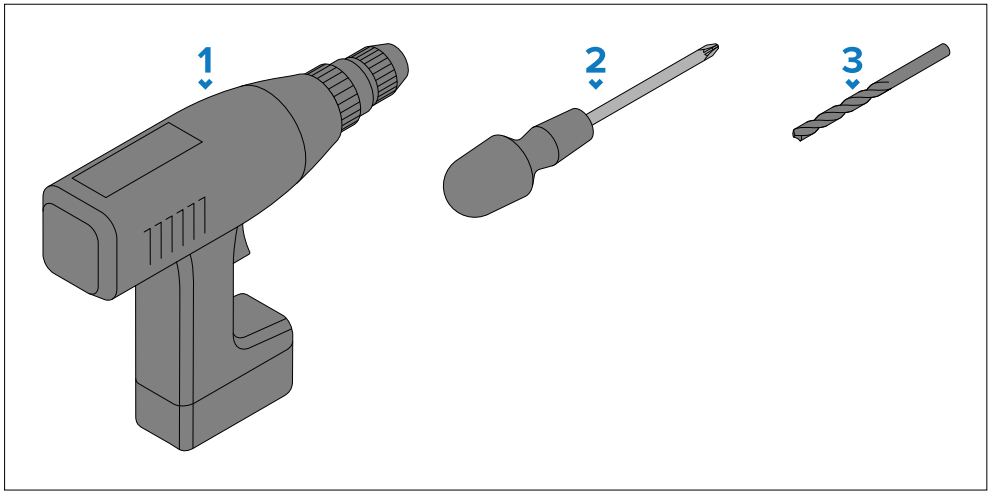
7.1 Tools required

Product installation requires the following tools:



1. Power drill
2. Pozidrive screwdriver
3. Drill bit

Note:

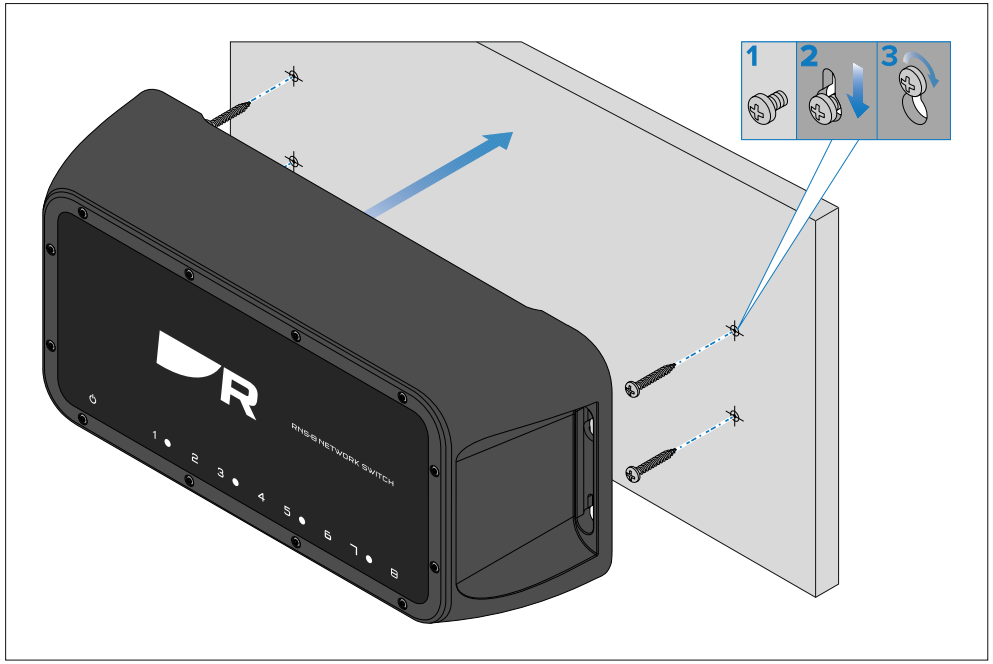
The appropriate drill bit size is dependent on the thickness and material of the mounting surface.

7.2 Mounting the unit

Follow the instructions below to mount the unit to a surface.

Before mounting the product, ensure that you have:

- Selected a suitable location, based on the location requirements found in this document.
- Identified the relevant cable connections and the route that the cables will take.



1. Prepare the mounting surface:
   i. Fix the supplied mounting template to the chosen location, using masking or self-adhesive tape.
   ii. Drill 4 holes as indicated on the template to accept the fixings.
   iii. Remove the mounting template.
   iv. Screw the fixings approximately half way into the holes in the mounting surface.
2. Place the unit over the fixings screws and push down to engage the keyhole slots.
3. Fully tighten the screws.

CHAPTER 8: CABLES AND CONNECTIONS — GENERAL INFORMATION

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8.1 General cabling guidance

Cable types and length

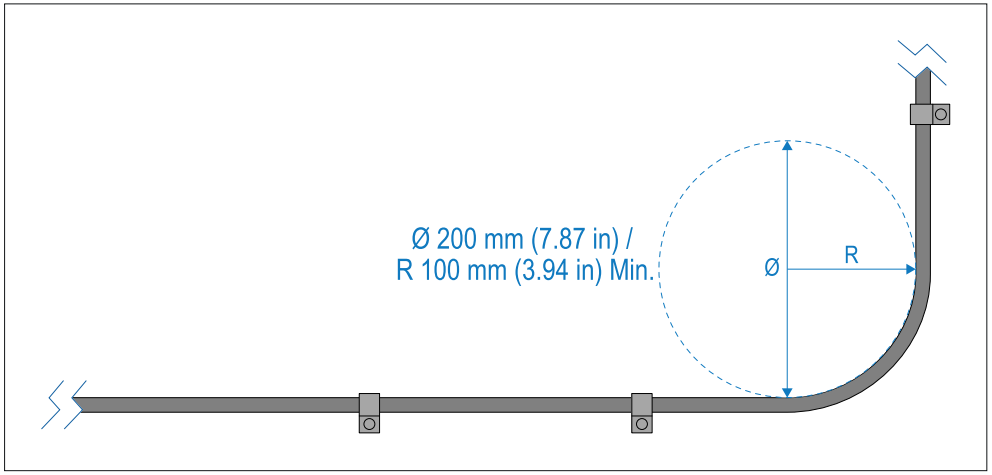
It is important to use cables of the appropriate type and length.

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

Cable routing

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

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



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

Strain relief

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

Circuit isolation

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

- Always use isolating transformers or a separate power-inverter to run PCs, processors, displays and other sensitive electronic instruments or devices.
- If using Weather FAX audio cables, always use an isolating transformer.
- If using a third-party audio amplifier, always use an isolated power supply.
- If using an RS232/NMEA converter, always ensure optical isolation on the signal lines.
- Always ensure that PCs or other sensitive electronic devices have a dedicated power circuit.

Cable shielding

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

Suppression ferrites

- Raymarine® cables may be pre-fitted or supplied with suppression ferrites. These are important for correct EMC performance. If ferrites are supplied separately to the cables (i.e. not pre-fitted), you must fit the supplied ferrites, using the supplied instructions.
- If a ferrite has to be removed for any purpose (e.g. installation or maintenance), it must be replaced in the original position before the product is used.

- Use only ferrites of the correct type, supplied by Raymarine® or its authorized dealers.
- Where an installation requires multiple ferrites to be added to a cable, additional cable clips should be used to prevent stress on the connectors due to the extra weight of the cable.

Warning: Positive ground systems

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

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.

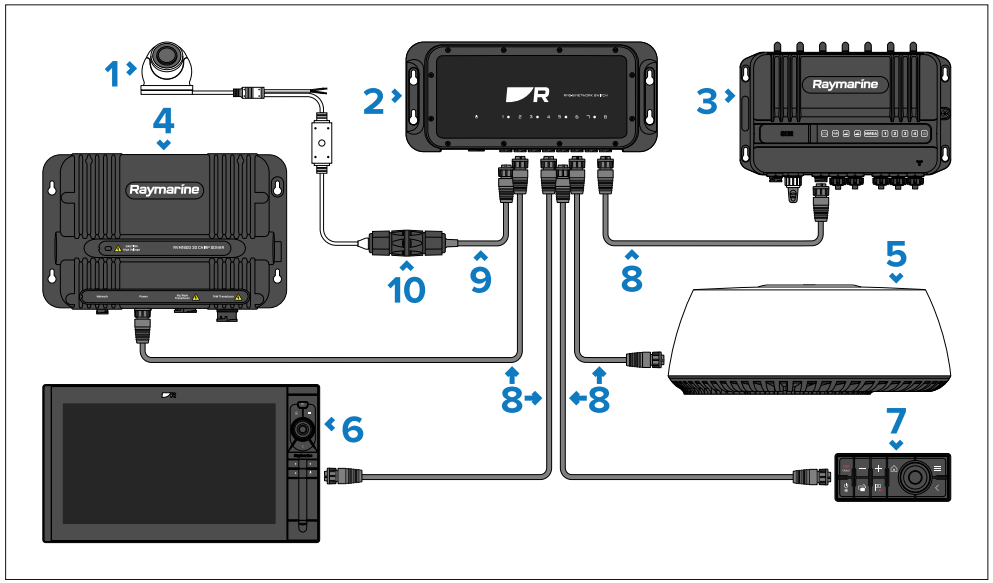
8.2 System overview

The following example provides an overview of a typical system, including the available connections and the types of devices that can be connected to your network switch.

Note:

The following system is shown **as an example only**, and may differ from your planned installation.

Example: typical system



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2. RNS-8 network switch.
3. Marine router.
4. Sonar module.
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8. RayNet (female) to RayNet (female) network cable (**not supplied**).
9. RayNet (female) to RJ45 (male) network cable (**not supplied**).
10. RJ45 to RJ45 waterproof coupler. (part number 4115028, **not supplied**).

Note:

For information on how to connect your products, refer to the following sections:

- **p.25 — Cables and connections — General information**
- **p.30 — Network connections**
- **p.33 — Power connections**

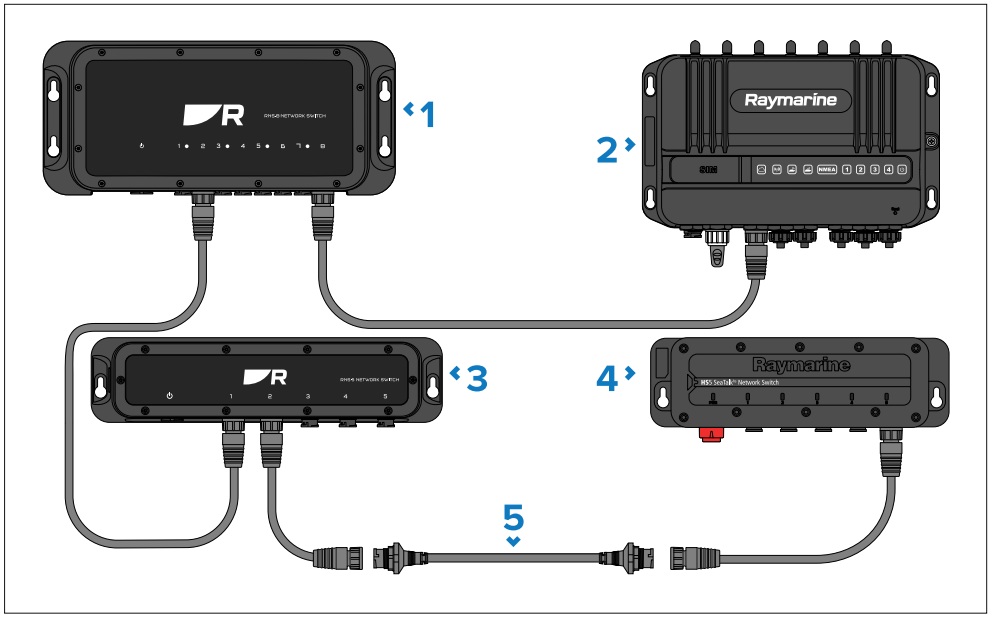
For information on the available cables and accessories, refer to the following section: **p.54 — Spares and accessories**

8.3 Multiple switches

Systems with more than 8 devices will require more than one network switch. Network switches can be connected together (daisy-chained) for this purpose.

The network switch can be connected (daisy-chained) to another network switch via any of the network connection ports.

Example: daisy-chain connection scenario



Note:

It is recommended that a maximum of 8 network switches are daisy-chained together at one time.

Note:

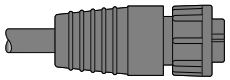
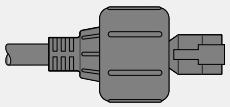
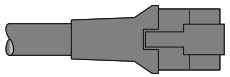
If daisy-chaining four or more network switches together within a system, it is recommended that one network switch is used as a central connection point. This will ensure that the effect from connection issues (such as faulty cabling or slow connection speeds) are minimized within your system.

1. RNS-8 network switch.
2. Marine router.
3. RNS-5 network switch.
4. HS5 network switch.
5. RayNet (male) to RayNet (male) adapter cable (A80162) (100 mm (3.94 in)). Suitable for joining (female) RayNet cables together for longer cable runs.

For further information on additional cabling options, refer to the following section: **p.54 — Spares and accessories**

8.4 Network cable connector types

There are 3 types of network cable connectors — RayNet, RJ45 (SeaTalkhs ®), and RJ45.

Connector	Description
	RayNet
	RJ45 (SeaTalkhs ®) for connection to (legacy) Raymarine equipment featuring a SeaTalkhs ® connector.
	RJ45

8.5 SeaTalk hs

SeaTalk hs is a high speed ethernet based marine network which allows compatible equipment (such as devices with a RayNet or RJ45 SeaTalkhs ® connector) to communicate rapidly and share large amounts of data.

Information shared via the SeaTalk hs network includes:

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

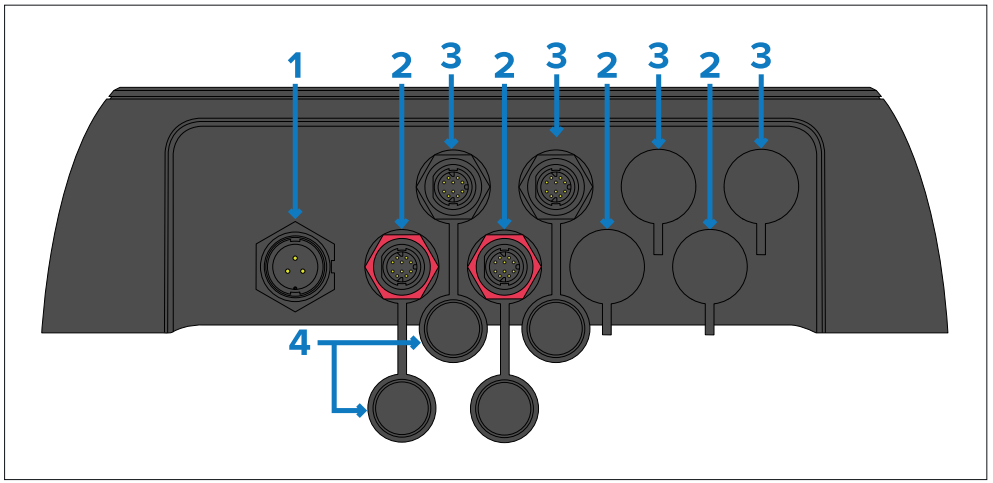
8.6 Connections overview

The RNS-8 network switch includes the following connections:

Note:

The network switch is supplied with protective caps fitted to the network connection ports.

The protective caps should remain in place until connections are made. If a connection is not required then the protective cap should not be removed.



1. 3-pin power connection port.
2. 4x PoE (Classes 0 to 4, – 30 W maximum per port) RayNet network connection ports (10/100/1000 Mbits/s). PoE ports 1, 3, 5 and 7 (from left to right) can be easily identified via their **red** locking nuts.
3. Non-PoE RayNet network connection port (10/100/1000 Mbits/s). Non-PoE ports 2, 4, 6 and 8 (from left to right) can be easily identified via their **black** locking nuts.
4. Protective cap.

Note:

You can mix a combination of PoE and non-PoE devices simultaneously, for *a total of 8 devices* (maximum PoE devices = 4; maximum non-PoE devices = 8).

For further network or power connection information, refer to the following sections:

- **p.30 — Network connections**
- **p.33 — Power connections**

Note:

When attempting to view your network switch's port diagnostic information, it is vital to know the associated port number for each port.

For further port identification information, refer to the following section:
p.44 — RNS-8 Port identification

CHAPTER 9: NETWORK CONNECTIONS

CHAPTER CONTENTS

9.1 Equipment connections

Equipment is connected to the network switch using either a RayNet cable, a RayNet to RJ45 adapter cable, or a RayNet to RJ45 (SeaTalkhs ®) adapter cable.

The following section will provide two different scenarios that may be applicable when connecting your equipment to the RNS-8 Network Switch:

1. **p.31 — PoE network connections**
2. **p.31 — Non-PoE network connections**

9.2 PoE network connections

Connecting the RNS-8 network switch to Raymarine® equipment via a PoE RayNet connector.

Required cabling / connectors:

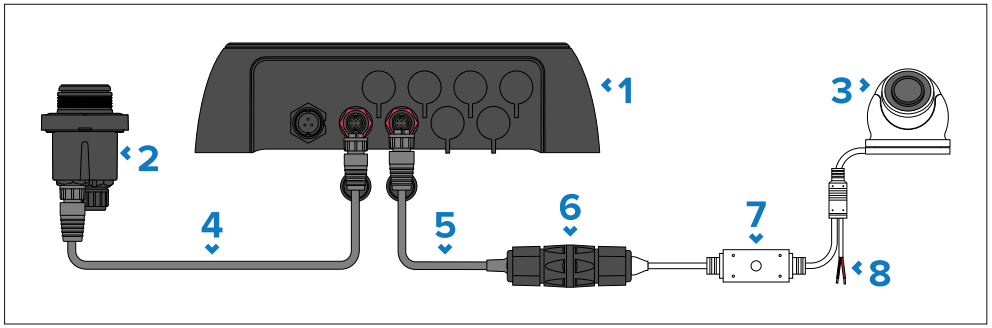
- RayNet (female) to RayNet (female) cable (**not supplied**).

OR:

- RayNet (female) to RJ45 (male) network cable (**not supplied**).
- RJ45 to RJ45 waterproof coupler. (**not supplied**).

For further information on the cabling required, refer to the following section:
p.54 — Spares and accessories

Example: PoE network connection scenario



1. RNS-8 network switch.
2. Remote keypad (supplied power via PoE).
3. IP camera (supplied power via PoE).
4. RayNet (female) to RayNet (female) network cable (**not supplied**).
5. RayNet (female) to RJ45 (male) network cable (**not supplied**).
6. RJ45 to RJ45 waterproof coupler. (**not supplied**).
7. IP camera RJ45 (male) cable.
8. IP camera power cable (**if powering the camera via PoE, do NOT connect this to a 12 V dc feed**).

9.3 Non-PoE network connections

Connecting the RNS-8 network switch to Raymarine® equipment via a non-PoE RayNet connector.

Required cabling / connectors:

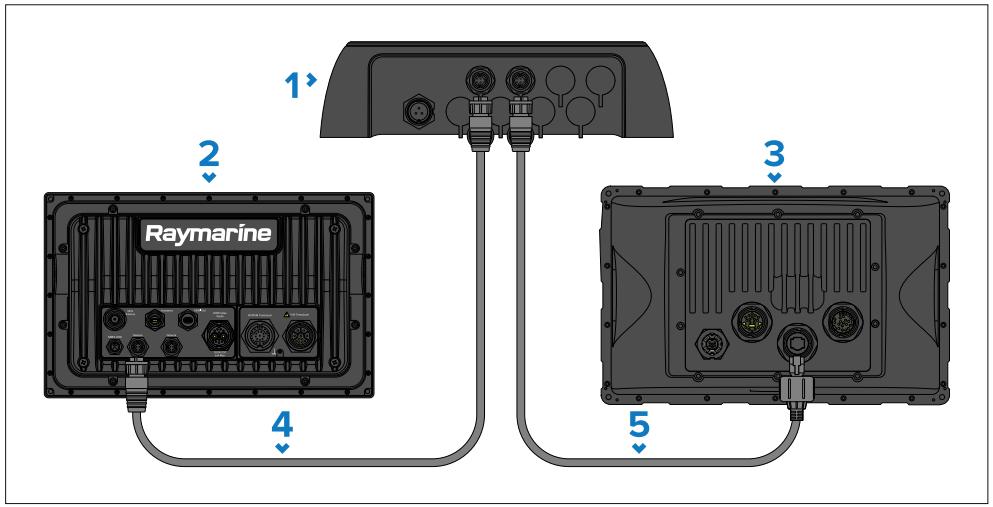
- RayNet (female) to RayNet (female) network cable (**not supplied**).

OR:

- RayNet (female) to RJ45 (SeaTalkhs ®) (male) adapter cable (**not supplied**).

For further information on the cabling required, refer to the following section:
p.57 — RayNet to RJ45 adapter cables

Example: RJ45 (SeaTalkhs ®) cable connection scenario



1. RNS-8 network switch.
2. RayNet equipment featuring a RayNet connector, such as Axiom series multifunction displays.

3. SeaTalkhs ® equipment featuring an RJ45 (SeaTalkhs ®) connector, such as C-Series Widescreen, E-Series Widescreen, G-Series and E-Series Classic multifunction displays.
4. RayNet (female) to RayNet (female) network cable (**not supplied**).
5. RayNet (female) to RJ45 (SeaTalkhs ®) waterproof plug (male) adapter cable (**not supplied**).

9.4 Network cable extensions

If you wish to extend the length of a network cable connected to your product, you can refer to the following section for further information:
p.54 — Spares and accessories

CHAPTER 10: POWER CONNECTIONS

CHAPTER CONTENTS

10.1 Power over Ethernet (PoE)

Your network switch is a PSE (Power Sourcing Equipment) device which supplies power over its bottom row of network ports to connected PoE Powered Devices (PD). The network switch can output a maximum of 120 Watts, for consumption by up to 4 PoE Powered Devices (PD) (i.e. 30 W maximum *per Powered Device*).

The following PoE device classes are supported:

PoE device class	PSE (power sourcing equipment) — display	PD (Power required by device)
Class 1 (Very low power)	4 W	3.84 W
Class 2 (Low power)	7 W	6.49 W
Class 3 (Mid power)	15.4 W	12.95 W
Class 4 (High power)	30 W	25.5 W
Class 0 (Classification unimplemented)	15.4 W	12.95 W

When a device is connected to one of the switch's PoE ports, it is checked to establish if the device is a PoE Powered Device, and if so, which class of device it is. The maximum power for that device class (shown in the PSE column above) is then assigned to that PoE network connection and deducted from the remaining power output (e.g. class 2 device = 7 W allocated, leaving 25 W remaining, for that particular port).

If a PoE Powered Device is connected that will take the total assigned power over 30 W, then the device will not be allocated PoE power.

Warning: Powering PoE devices

PoE devices can often be powered via an ethernet connection (PoE) OR via a dedicated power cable.

NEVER connect a PoE device's dedicated power cable when it is being supplied PoE.

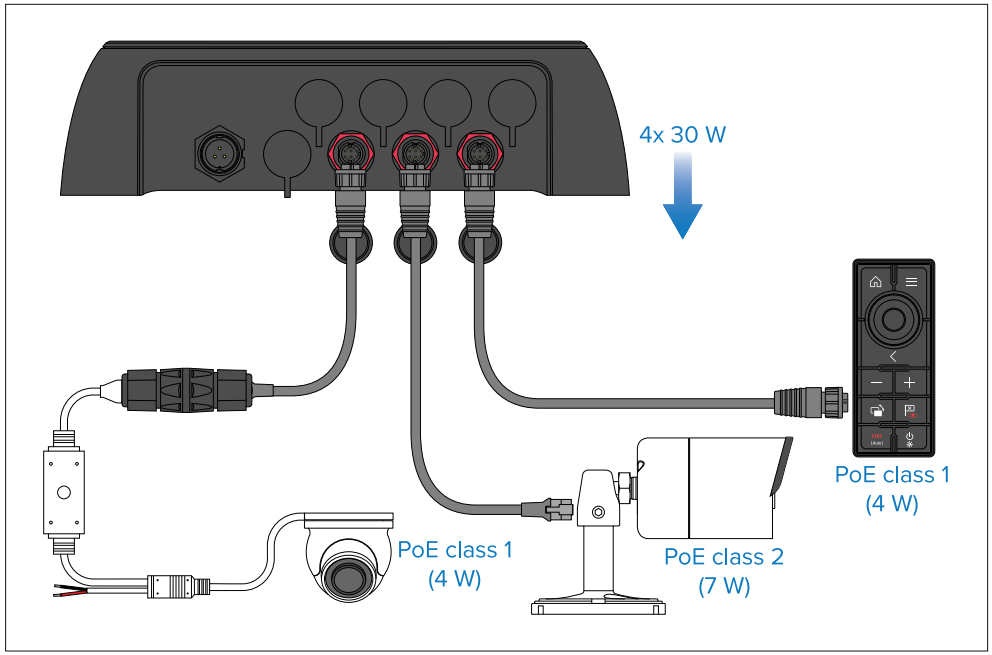
When the PoE device's dedicated power cable is not connected, any bare end wire connections must be separately covered with insulation.

Power over Ethernet (PoE) power output

Your PoE devices can be powered via one of the RNS-8 network switch's PoE ports, located on the bottom connector row on the rear of the unit. PoE ports can be easily identified via their red locking nuts.

In the example below, the power requirements of each of the 3 PoE devices do not exceed the 30 watt maximum power provided by each PoE port. All 3 devices can therefore be powered by the network switch, via PoE.

Example PoE connections



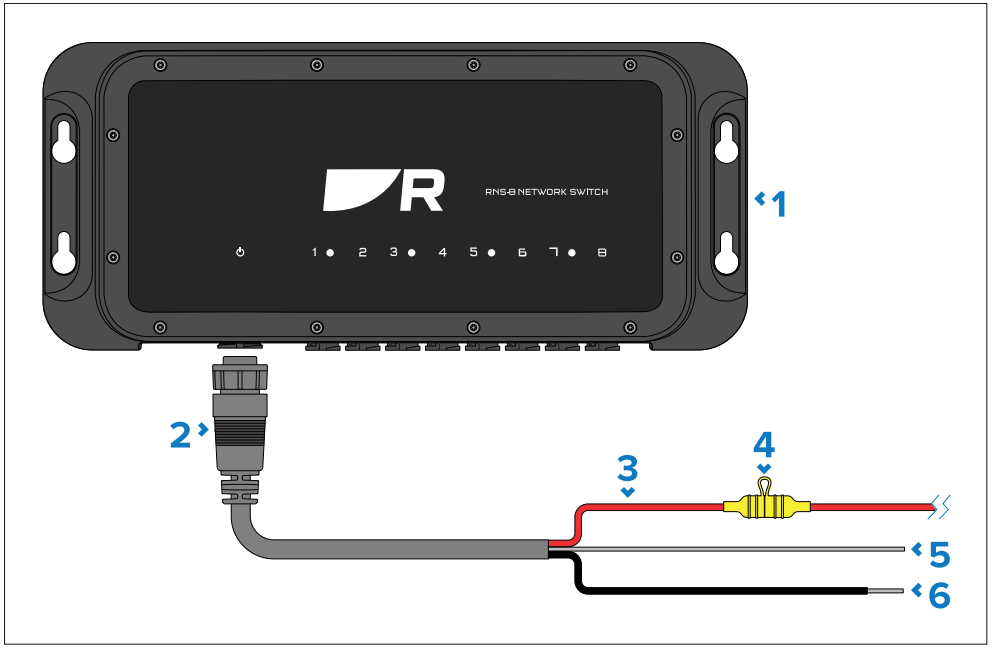
Note:

- The PoE devices should be connected using RayNet to RayNet cables or RayNet to RJ45 cables. For more information on the cabling required, refer to the documentation supplied with your PoE device.
- Any suppression ferrites supplied with the powered device must be used on the network cable connecting the powered device to the network switch.
- In order to sufficiently power PoE devices, the network switch's power supply must exceed 10.8 V dc.

10.2 Power connection

The power for the network switch is provided directly by a 12 V or 24 V power source.

The network switch is supplied with a power cable with bare stripped wires, suitable for direct connection to a 12 V or 24 V power supply:



1. RNS-8 Network Switch.
2. 1.5 m (4.9 ft) Power cable (supplied).
3. Red wire (positive) — connects to the power supply's positive terminal.
4. Waterproof fuse holder containing a suitably-rated inline fuse (**not supplied**), which must be fitted to the red positive wire — refer to the fuse ratings below.
5. Gray wire (drain) — connects to the vessel RF ground (if available), or the negative battery terminal.
6. Black wire (negative) — connects to the power supply's negative terminal.

Note:

In order to sufficiently power PoE devices, the network switch's power supply must exceed 10.8 V dc.

Inline fuse and thermal breaker ratings

The following inline fuse and thermal breaker ratings apply to your product:

Inline fuse rating	Thermal breaker rating
• **12 V**: 15 A	• **12 V**: 20 A
• **24 V**: 8 A	• **24 V**: 10 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.

10.3 Power distribution

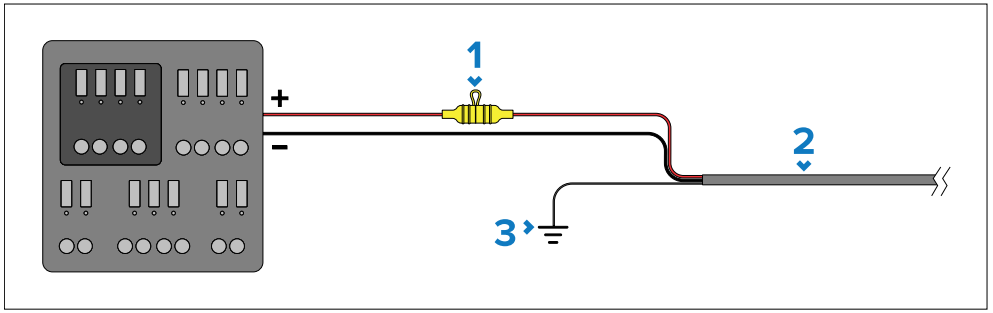
Recommendations and best practice for the power connection of products supplied with a drain wire as part of the supplied power cable.

- 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:

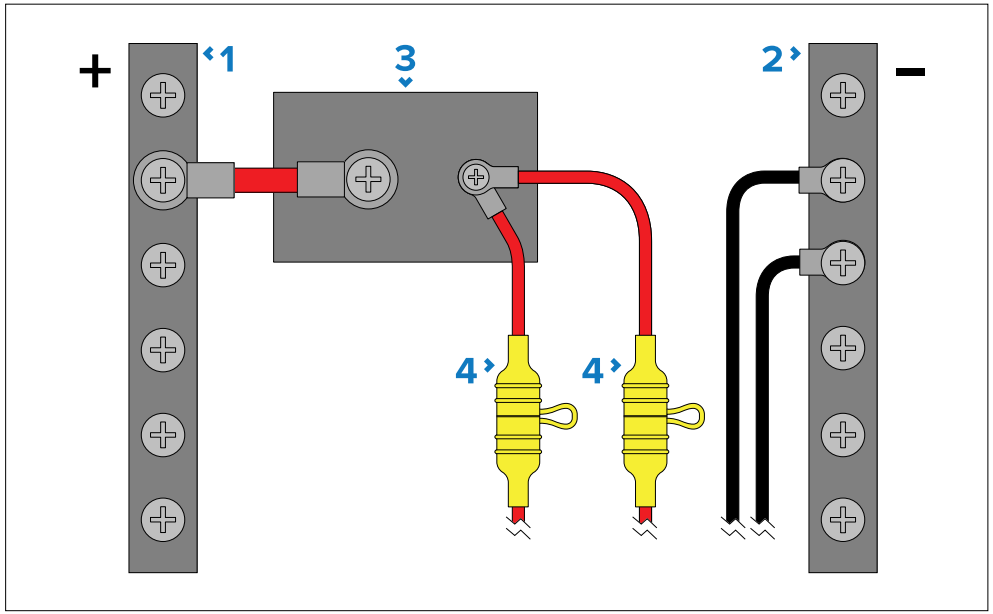
- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for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



Item	Description
1	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	Drain 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 mm²) cable.
- Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 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 drain wire, which must be connected to the vessel's common RF ground.

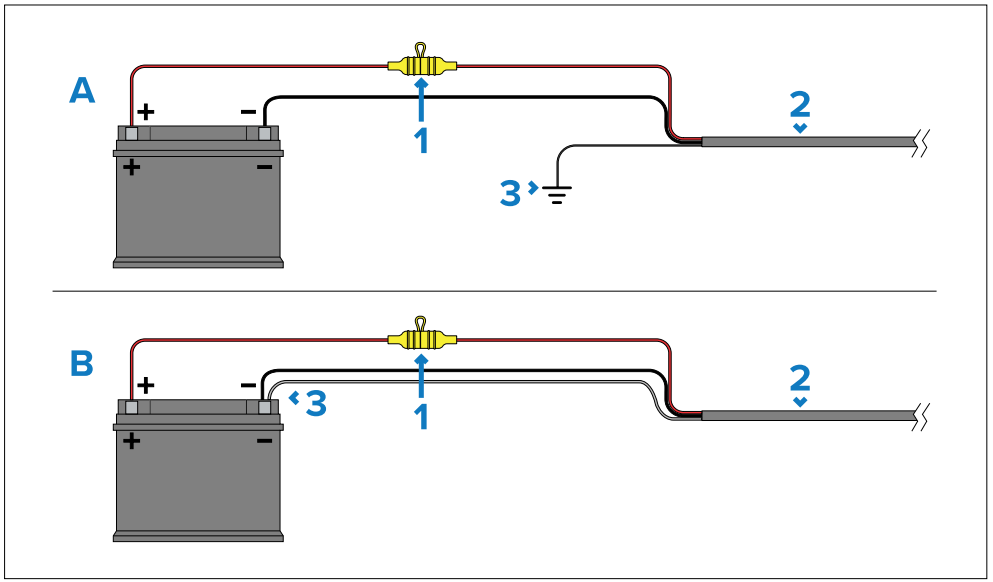


Item	Description
1	Positive (+) bar
2	Negative (-) bar
3	Circuit breaker
4	Waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.

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.
- 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.

Item	Description
1	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	Drain wire connection point.

Battery connection scenario A:

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

Battery connection scenario B:

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

Grounding

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

10.4 Power cable extension (12 / 24 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 and the total load of the device and the length of the cable run. 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	Wire gauge in AWG (mm^2) for 24 V supply
<8 (<25)	16 (1.31 mm^2)	18 (0.82 mm^2)
16 (50)	14 (2.08 mm^2)	18 (0.82 mm^2)

Cable length in meters (feet)	Wire gauge in AWG (mm^2) for 12 V supply	Wire gauge in AWG (mm^2) for 24 V supply
24 (75)	14 (2.08 mm^2)	16 (1.31 mm^2)
>32 (>100)	14 (2.08 mm^2)	16 (1.31 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.)

10.5 Power cable drain wire connection

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

The purpose of the drain wire is to drain excess voltage from the cable shield, giving it a path to safety. The drain wire protects the cable's inner signal conductors from electrical noise emitted by other cables and devices.

Although the drain wire is not intended to ground the product's internal circuits, it's important that the drain wire is connected to the vessel's common RF ground point, which should be used for all equipment in your system. If several items require grounding, the drain wires and dedicated ground connections (if available) of all equipment should first be connected 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 drain wires and dedicated ground connections (if available) 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 (3.3 ft), use 6 mm2 (10 AWG) or greater.
- for runs of >1 m (3.3 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 11: TROUBLESHOOTING

CHAPTER CONTENTS

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

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

11.2 Power up troubleshooting

Before troubleshooting problems with your power connection, ensure that you have followed the power connection guidance provided in the product's installation instructions and performed a power cycle/reboot of the device. The troubleshooting information below can be used if you are experiencing problems with powering up your product.

Blown fuse / tripped breaker

1. Check the fuse, located inline with the power cable. Ensure that it has the correct rating (refer to *Connections* chapter), as an under-rated fuse can affect the power supplied to the product. If the fuse has blown, replace with a new fuse.
2. Check the condition of relevant / additional fuses and breakers and connections; replace if necessary.
3. 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 fully inserted into the unit and locked in position.
2. Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary.
3. With the unit turned on, try flexing the power cable near to the connector to see if this causes the unit to re-boot/lose power; replace if necessary.
4. 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.

Incorrect power connection

The power supply may be wired incorrectly, ensure the installation instructions have been followed.

Power source insufficient

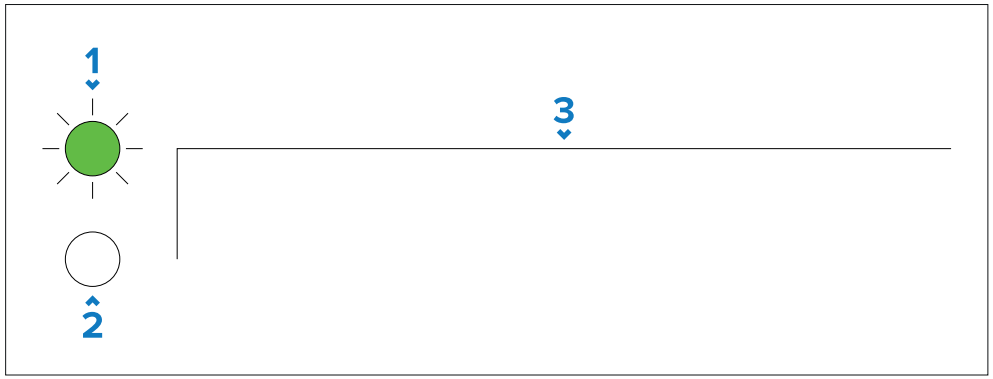
Check that your power supply (battery or distribution panel) is providing a minimum of 10.8 V to each component in the system.

11.3 LED diagnostic guidance

Your product has diagnostic LEDs which can be used to identify the unit's status and to help troubleshoot any potential issues that may occur.

The following section provides two basic examples of how to interpret the LED diagnostic patterns included in this publication.

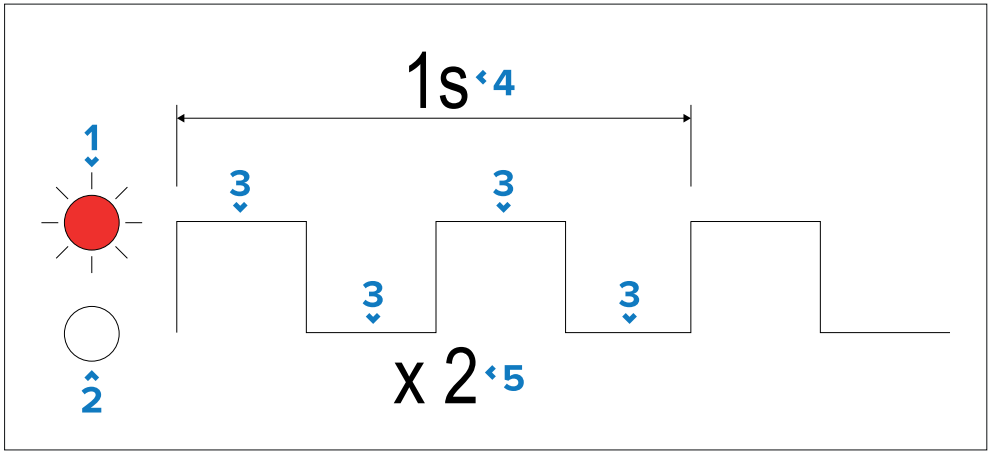
Example solid LED diagnostic pattern:



1. **LED ON** — Indicates the color assigned to the unit's diagnostic LED, and confirms that the diagnostic LED is active (switched **on**).
2. **LED OFF** — Indicates that the unit's diagnostic LED is inactive (switched **off**).
3. **Diagnostic pattern** — Indicates a diagnostic pattern based on the number and duration of *peaks* (indicating LED is switched **on**) and *troughs* (indicating LED is switched **off**) generated within the duration of

the diagnostic pattern. In the example shown, a continuous peak occurs, indicating that the LED is permanently **on**.

Example flashing LED diagnostic pattern:

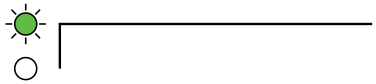
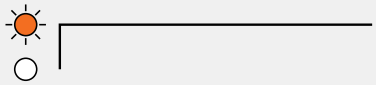
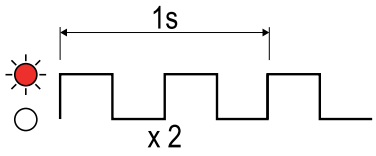
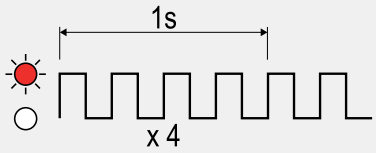


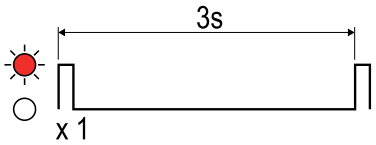
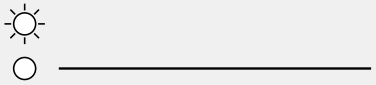
1. **LED ON** — Indicates the color assigned to the unit's diagnostic LED, and confirms that the diagnostic LED is active (switched **on**).
2. **LED OFF** — Indicates that the unit's diagnostic LED is inactive (switched **off**).
3. **Diagnostic pattern** — Indicates a diagnostic pattern based on the number and duration of *peaks* (indicating LED is switched **on**) and *troughs* (indicating LED is switched **off**) generated within the duration of the diagnostic pattern. In the example shown, a peak followed by a trough occurs and then repeats again, indicating that the LED flashes twice within a period of one second.
4. **Diagnostic pattern duration** — Indicates the total duration of the diagnostic pattern.
5. **Diagnostic pattern flash total** — Indicates the total number of flashes that occur within the diagnostic pattern.

11.4 LED diagnostics

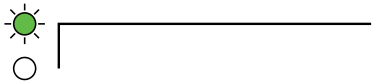
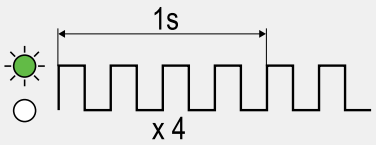
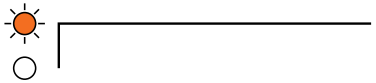
Your network switch has diagnostic LEDs on the front of the unit. These LEDs are used to identify the unit's status.

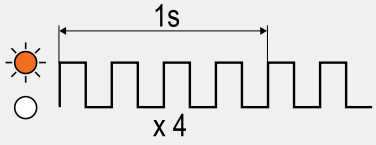
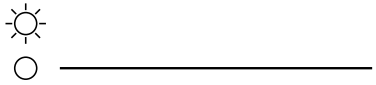
Power Port LED:

LED Indication	LED Status and applicable solutions
	(Green) Powered up / Ok Normal operation — no user action is required.
	(Amber) Low power and operational (Voltage supplied: 9 V – 10.8 V) PoE functionality is disabled for your product when the Voltage supplied is between 9 V – 10.8 V. 1. Check the cable connection for the port. 2. Ensure that more than 10.8 V is supplied to your product to utilize PoE functionality.
	(Red) Low power and non-operational (Voltage supplied: < 9 V) 1. Check the cable connection for the port. 2. Ensure that more than 10.8 V is supplied to your product.
	(Red) High power and non-operational (Voltage supplied: > 32 V) Ensure that less than 32 V is supplied to your product.

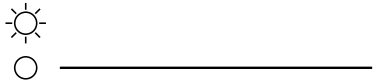
LED Indication	LED Status and applicable solutions
	(Red) Internal fault Consider contacting your local dealer or Raymarine® Product Support. For Raymarine® Product Support contact details, refer to the following section: **p.49 — Raymarine product support and servicing**
	(No color) No power Refer to the advice found within the following section: **p.40 — Power up troubleshooting**

RayNet (SeaTalk hs) Port LEDs (2 / 4 / 6 / 8):

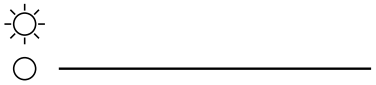
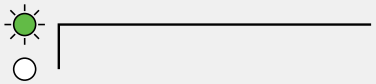
LED Indication	LED Status and applicable solutions
	(Green) 1,000 Mbits/s Ethernet Active (no transfer) Normal operation — no user action is required.
	(Green) 1,000 Mbits/s Ethernet Active (transferring) Normal operation — no user action is required.
	(Amber) 10/100 Mbits/s Ethernet Active (no transfer) Normal operation — no user action is required.

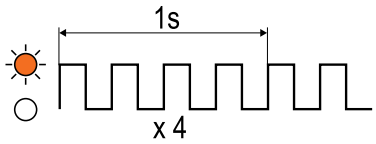
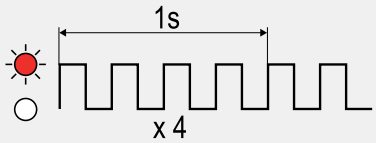
LED Indication	LED Status and applicable solutions
	(Amber) 10/100 Mbits/s Ethernet Active (transferring) Normal operation — no user action is required.
	(No color) No network activity detected 1. Check the cable connection for the port. 2. Check any additional connections. 3. Check that the unit connected to the switch is powered on. 4. Check that the unit connected to the switch is currently transferring data. This can be confirmed by performing an action on the multifunction display that will initiate data transfer for the relevant unit — for example, if you suspect a problem with the port corresponding to a connected radar scanner, range in or out in the radar application to initiate data activity.

RayNet (SeaTalk hs) PoE Port LEDs (1 / 3 / 5 / 7) — with a non-PoE device connected:

LED Indication	LED Status and applicable solutions
	(No color) 10/100/1000 Mbits/s Ethernet Active (transferring) Normal operation — no user action is required.

RayNet (SeaTalk hs) PoE Port (1 / 3 / 5 / 7) LEDs — with a PoE device connected:

LED Indication	LED Status and applicable solutions
	(No color) Not providing power 1. Ensure that the ethernet cable is connected correctly and that connections are secure. 2. Ensure you are not using a **crossover** coupler or cable as they are not appropriate for PoE applications. 3. Ensure that the network switch has sufficient remaining power allocation to power the connected device. For further information on the network switch's total power allocation, refer to the following section: **p.52 — Power specification**
	(Green) Supplying power Normal operation — no user action is required.

LED Indication	LED Status and applicable solutions
	(Amber) Connected device requires more than 30 W If a connected PoE device requires more power than the PoE port's maximum power output, then it will not be powered. 1. Attempt to reduce the connected PoE device's total power consumption. 2. Re-configure the network so that your PoE device is powered via a dedicated power supply and plugged into a non-PoE ethernet connection.
	(Red) Internal fault Consider contacting your local dealer or Raymarine® Product Support. For Raymarine® Product Support contact details, refer to the following section: **p.49 — Raymarine product support and servicing**

11.5 Diagnostic product information

Diagnostic product information can be viewed and exported from a Raymarine® LightHouse multifunction display, for supported products networked using RayNet, RJ45, or SeaTalkng ® / NMEA 2000 cables.

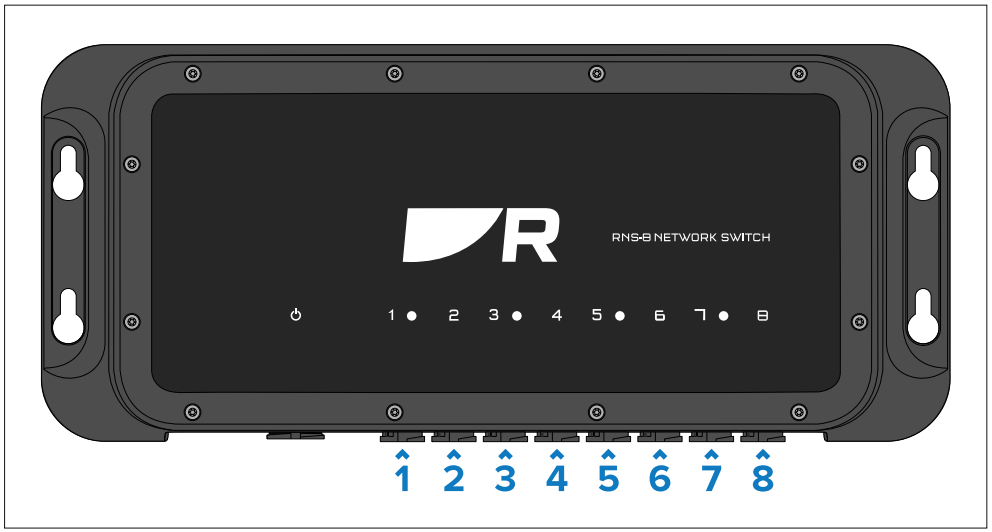
Diagnostic product information includes technical data related to the connected product, such as serial numbers, network addresses, firmware version numbers, and so on. It is useful for 2 main purposes:

1. Sending detailed product information to the Raymarine® product support team, in the event of a problem or fault with your product. The information can be exported to a MicroSD card, and you can then copy the file for the purposes of emailing it to the product support team. For contact details, refer to: **p.48 — Technical support**
2. Maintaining detailed off-boat records. This is particularly useful for vessels that have multiple Raymarine® products installed.

To view or export diagnostic product information, access the *[Diagnostics]* menu. For instructions on how to access this menu, refer to the relevant operation instructions for your multifunction display.

RNS-8 Port identification

Before attempting to view your network switch's port diagnostic information, it is vital to know the associated port number for each port.



1. Port 1 — PoE (Classes 0 to 4, – 30 W maximum) RayNet network connection port (10/100/1000 Mbits/s).
2. Port 2 — Non-PoE RayNet network connection port (10/100/1000 Mbits/s)
3. Port 3 — PoE (Classes 0 to 4, – 30 W maximum) RayNet network connection port (10/100/1000 Mbits/s).
4. Port 4 — Non-PoE RayNet network connection port (10/100/1000 Mbits/s)
5. Port 5 — PoE (Classes 0 to 4, – 30 W maximum) RayNet network connection port (10/100/1000 Mbits/s).
6. Port 6 — Non-PoE RayNet network connection port (10/100/1000 Mbits/s)
7. Port 7 — PoE (Classes 0 to 4, – 30 W maximum) RayNet network connection port (10/100/1000 Mbits/s).
8. Port 8 — Non-PoE RayNet network connection port (10/100/1000 Mbits/s)

Note:

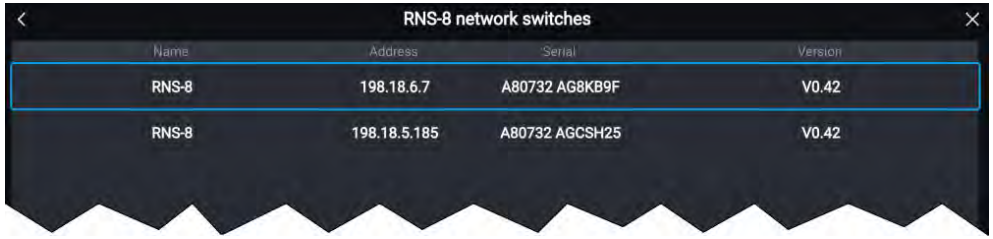
For RNS-8 product and port diagnostic information, refer to:
p.44 — RNS-8 Diagnostic information

RNS-8 Diagnostic information

The following range of diagnostic information is available for the RNS-8 Network switch, which can be displayed on LightHouse™ 4 multifunction displays running software **version 4.5 or later**.

To view RNS-8 diagnostic product information on a LightHouse™ 4 multifunction display, select *[RNS-8]* from the *[Diagnostics]* pop over menu on the multifunction display: *[Homescreen > Settings > Network > Diagnostics > RNS-8]*.

The following diagnostic information is displayed:



Diagnostic	Description
Name:	Provides the product name.
Address:	Provides the product IP address.
Serial:	Provides the product serial number.
Version:	Provides the product software version number.

Additional port diagnostic information can be displayed by tapping the row for the relevant unit and then selecting *[Port traffic]*. Once selected, the following port diagnostic information is displayed:

Diagnostic	Description
Throughput (Bytes) — (port 1–8):	Provides the current amount of data (Bytes) that is currently being transferred via your network switch from a specific port.
Total Throughput (Bytes) — (port 1–8):	Provides the total amount of data (Bytes) that has been transferred via your network switch from a specific port.
Speed (Bps) — (port 1–8):	Provides the current data transfer speed (in Bytes per second) for a specific port.
Negotiated Speed (Mbps) — (port 1–8):	Provides the port's maximum data transfer speed (10/100/1000 Mbps), which is negotiated during connection.

Diagnostic	Description
POE Class (Watts) — (PoE ports 1, 3, 5, 7):	Provides the PoE classification of a connected PoE Powered Device (PD), and, the maximum power consumption (Watts) required by the PoE classification. For more PoE classification information, refer to the following section: **p.34 — Power over Ethernet (PoE)**
Power (Watts) — (PoE ports 1, 3, 5, 7):	Provides the current power consumption (Watts) of your connected Powered Device (PD). **Note:** The network switch can output a maximum of 120 Watts, for consumption by up to 4 PoE Powered Devices (i.e. 30 W maximum *per Powered Device*).

CHAPTER 12: MAINTENANCE

CHAPTER CONTENTS

12.1 Service and maintenance

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

12.2 Routine equipment checks

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

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

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.

CHAPTER 13: TECHNICAL SUPPORT

CHAPTER CONTENTS

13.1 Raymarine product support and servicing

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

Product information

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

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

You can obtain this product information using diagnostic pages of the connected display.

Servicing and warranty

Raymarine offers dedicated service departments for warranty, service, and repairs.

Don't forget to visit the Raymarine website to register your product for extended warranty benefits: https://www.raymarine.com/en-us/support/product-registration

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

- E-Mail: emea.service@raymarine.com
- Tel: +44 (0)1329 246 932

United States (US):

- E-Mail: rm-usrepair@flir.com
- Tel: +1 (603) 324 7900

Web support

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

- **Manuals and Documents** — http://www.raymarine.com/manuals
- **Technical support forum** — https://raymarine.custhelp.com/app/home
- **Software updates** — http://www.raymarine.com/software

Worldwide support

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

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

United States (US):

- Help desk: https://raymarine.custhelp.com/app/home
- Tel: +1 (603) 324 7900 (Toll-free: +800 539 5539)

Australia and New Zealand (Raymarine subsidiary):

- E-Mail: aus.support@raymarine.com
- Tel: +61 2 8977 0300

France (Raymarine subsidiary):

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

Germany (Raymarine subsidiary):

- E-Mail: support.de@raymarine.com
- Tel: +49 40 237 808 0

Italy (Raymarine subsidiary):

- E-Mail: support.it@raymarine.com
- Tel: +39 02 9945 1001

Spain (Authorized Raymarine distributor):

- E-Mail: sat@azimut.es
- Tel: +34 96 2965 102

Netherlands (Raymarine subsidiary):

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

Sweden (Raymarine subsidiary):

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

Finland (Raymarine subsidiary):

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

Norway (Raymarine subsidiary):

- E-Mail: support.no@raymarine.com

- Tel: +47 692 64 600

Denmark (Raymarine subsidiary):

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

Russia (Authorized Raymarine distributor):

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

13.2 Diagnostic product information

Diagnostic product information can be viewed and exported from a Raymarine® LightHouse multifunction display, for supported products networked using RayNet, RJ45, or SeaTalkng ® / NMEA 2000 cables.

Diagnostic product information includes technical data related to the connected product, such as serial numbers, network addresses, firmware version numbers, and so on. It is useful for 2 main purposes:

1. Sending detailed product information to the Raymarine® product support team, in the event of a problem or fault with your product. The information can be exported to a MicroSD card, and you can then copy the file for the purposes of emailing it to the product support team. For contact details, refer to: **p.48 — Technical support**
2. Maintaining detailed off-boat records. This is particularly useful for vessels that have multiple Raymarine® products installed.

To view or export diagnostic product information, access the *[Diagnostics]* menu. For instructions on how to access this menu, refer to the relevant operation instructions for your multifunction display.

13.3 Learning resources

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

Video tutorials

Raymarine official channel on YouTube

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

Training courses

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

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

Technical support forum

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

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

CHAPTER 14: TECHNICAL SPECIFICATION

CHAPTER CONTENTS

14.1 Physical specification

Specification	
Length:	287.63 mm (11.32 in).
Height:	125.5 mm (4.94 in).
Depth:	78 mm (3.07 in).
Port separation distance:	17.38 mm (0.68 in)
Weight:	960.5 g (2.12 lbs)

14.2 Power specification

Specification	
Nominal supply voltage:	12 V or 24 V dc
Operating voltage range:	9 V to 31.2 V dc
PoE operating voltage range:	10.8 V to 31.2 V dc
Power consumption:	• 160 W (Maximum) @ 12 V dc • 150 W (Maximum) @ 24 V dc
Current:	• 13.3 A (Maximum) @ 12 V dc • 6.25 A (Maximum) @ 24 V dc
Inline fuse rating:	• 15 A @ 12 V dc • 8 A @ 24 V dc
Thermal breaker rating:	• 20 A @ 12 V dc • 10 A @ 24 V dc

14.3 Network specification

Specification	
Network connection ports:	• 4x RayNet connection ports (10/100/1000 Mbits/s) • 4x PoE RayNet connection ports (10/100/1000 Mbits/s). Each of the 4 ports supports PoE Classes 0 to 4, with 30 W maximum power available for each port.
IEEE Standard:	Conforms to IEEE 802.3at

Note:

- You can mix a combination of PoE and non-PoE devices simultaneously, for **a total of 8 devices** (maximum PoE devices = 4; maximum non-PoE devices = 8).
- In order to sufficiently power PoE devices, the network switch's power supply must exceed 10.8 V dc.

14.4 Environmental specification

Specification	
Operating temperature:	–25 °C (–13 °F) to +55 °C (131 °F)
Non-operating temperature:	–30 °C (–22 °F) to +70 °C (158 °F)
Relative humidity:	up to 93% @ 40 °C (104 °F)
Waterproof rating:	IPx6 & IPx7

14.5 Conformance specification

Specification	
Standards:	• EN 60945:2002 (Europe, Australia New Zealand) • ICES-003 (Canada) • CFR47 Part 15 (USA) • IACS section E10 (Japan / China)
Product markings:	• UKCA • CE • Australian Tick • WEEE Directive

CHAPTER 15: SPARES AND ACCESSORIES

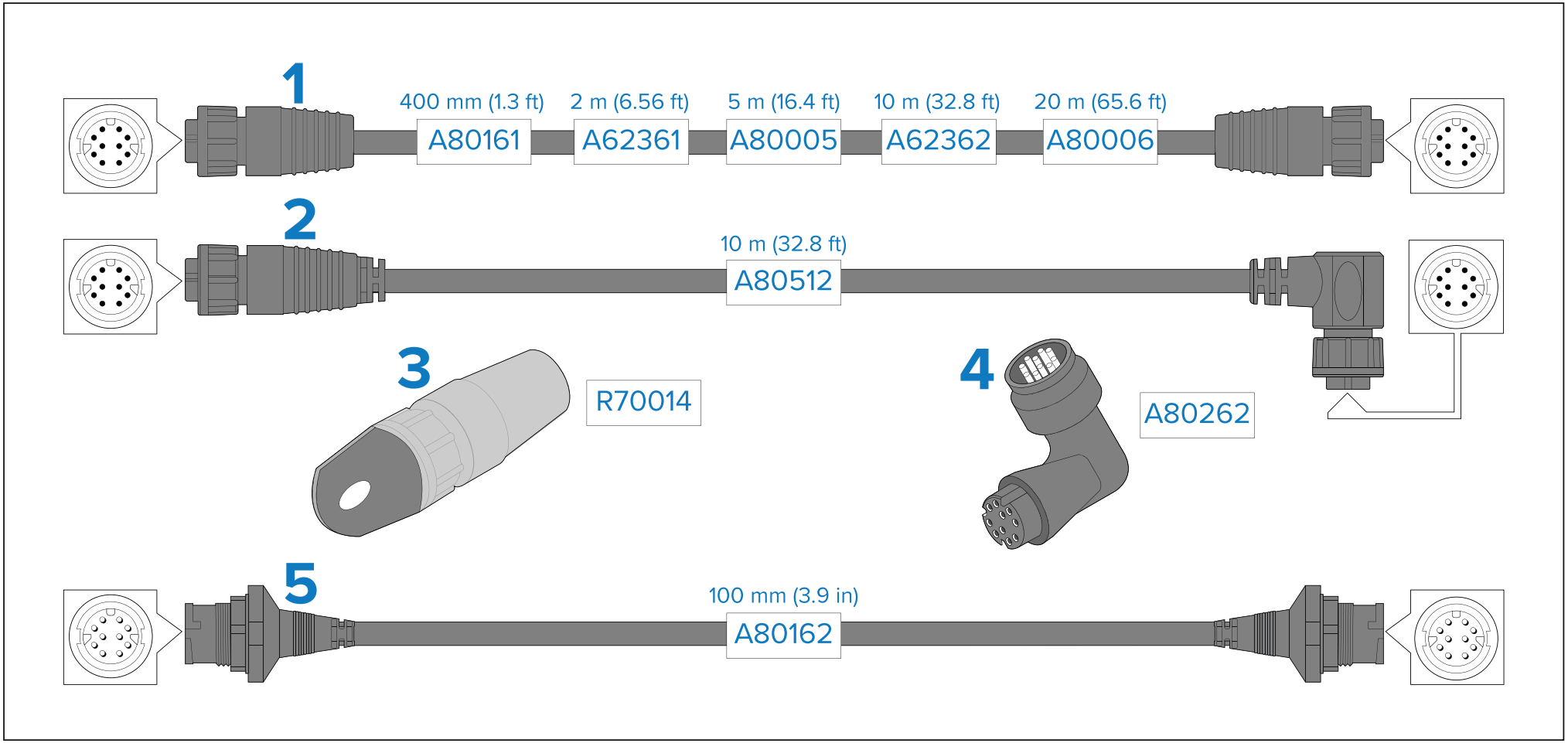
CHAPTER CONTENTS

15.1 Spares and accessories

The following spares and accessories are available for your product:

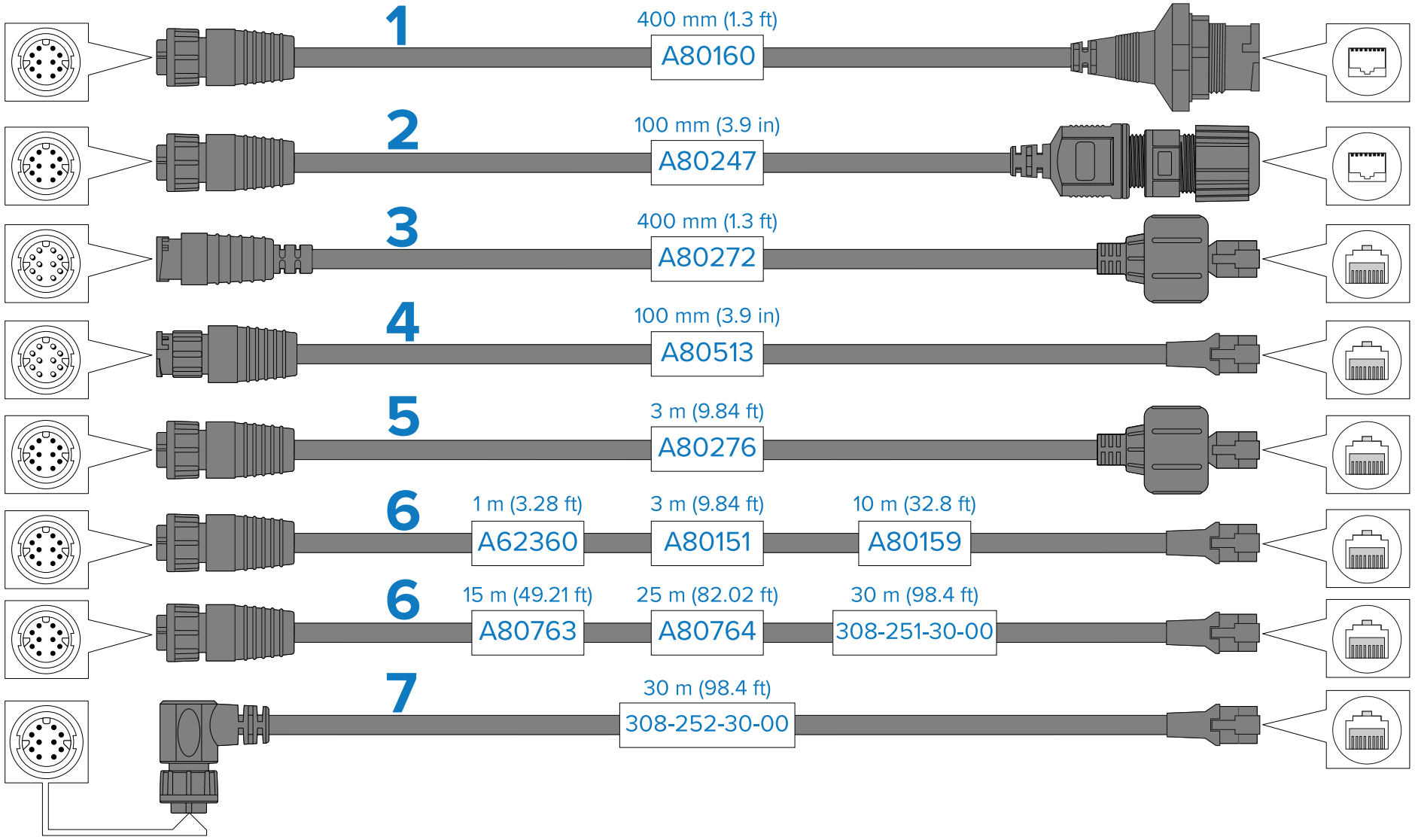
- **4115028** — RJ45 to RJ45 waterproof coupler.
- **A80346** — Power cable, 1.5 m (4.9 ft).

15.2 RayNet to RayNet cables and connectors



1. Standard RayNet connection cable with a RayNet (female) socket on both ends.
2. Right-angle RayNet connection cable with a straight RayNet (female) socket on one end, and a right-angle RayNet (female) socket on the other end. Suitable for connecting at 90° (right angle) to a device, for installations where space is limited.
3. RayNet cable puller (5 pack).
4. RayNet to RayNet right-angle coupler / adapter. Suitable for connecting RayNet cables at 90° (right angle) to devices, for installations where space is limited.
5. Adapter cable with a RayNet (male) plug on both ends. Suitable for joining (female) RayNet cables together for longer cable runs.

15.3 RayNet to RJ45, and RJ45 (SeaTalkhs) adapter cables



1. Adapter cable with a RayNet (female) socket on one end, and a waterproof (female) RJ45 (SeaTalkhs ®) socket on the other end, accepting the following cables with an RJ45 (SeaTalkhs ®) waterproof locking (male) plug:
   - A62245 (1.5 m).
   - A62246 (15 m).
2. Adapter cable with a RayNet (female) socket on one end, and a waterproof (female) RJ45 (SeaTalkhs ®) socket on the other end, along with a locking gland for a watertight fit.
3. Adapter cable with a RayNet (male) plug on one end, and an RJ45 (SeaTalkhs ®) waterproof (male) plug on the other end.
4. Adapter cable with a RayNet (male) plug on one end, and an RJ45 (male) plug on the other end.
5. Adapter cable with a RayNet (female) socket on one end, and an RJ45 (SeaTalkhs ®) waterproof (male) plug on the other end.
6. Adapter cable with a RayNet (female) socket on one end, and an RJ45 (male) plug on the other end.
7. Adapter cable with a right-angled RayNet (female) socket on one end, and an RJ45 (male) plug on the other end.

Appendix A Ethernet (IPv4) networking of Raymarine devices with third-party products

Raymarine uses a custom Ethernet (IPv4) networking configuration. Use the following information to help you understand how Raymarine's Ethernet (IPv4) implementation interacts with third-party Ethernet (IPv4) devices on your vessel, such as routers, switches, Access Points (APs) etc.

Important:

- Third-party networking products such as routers, switches, and Access Points (APs) *may* work when connected to Raymarine networks, when configured correctly. However, correct operation is not guaranteed. It's important to refer to the instructions provided by the relevant third-party device manufacturer, to ensure that your intended use of a third-party device is consistent with the device's design intent.
- Raymarine does not warrant that Raymarine products are compatible with products manufactured by any person or entity other than Raymarine.
- When using third-party products in your Raymarine electronics network, you should be aware of, and understand, the concepts and limitations described in the following Disclaimer: **p.7 —** Disclaimer

Overview

- Ethernet (IPv4) networking is a method for interconnecting multiple electronic devices, allowing many devices to function in a network and share data using only a single RJ45 or RayNet connection for each device.
- In order to function correctly, every Ethernet (IPv4) device (whether Raymarine or third-party) must have a unique IP address allocated to it, and it must not conflict with that of any other device.
- IPv4 addresses can be centrally-allocated to devices either **automatically**, using a method known as *DHCP* (Dynamic Host Configuration Protocol), or **manually** (i.e. allocated a static IP address). The most common method for allocating IPv4 addresses on vessel electronics networks is *DHCP*. In this configuration, the *server* device is known as a *DHCP server*.

Client / Server device	Example(s)
Raymarine IPv4 DHCP **client**	• Radar scanner (e.g. *Quantum*) • Sonar module (e.g. *CP470*) • IP camera (e.g. *CAM300*)
Raymarine IPv4 DHCP **server** and self-addressing device	• Multifunction display (MFD / Chartplotter), running LightHouse 3 or LightHouse 4 (e.g. *Axiom*) • Marine Router (e.g. *YachtSense Link Router*)
Third-party IPv4 DHCP **client**	IP camera
Third-party IPv4 DHCP **server**	• Router • Switch • Access Point (AP)

Note:

The DHCP server maintains a pool of IP addresses and "leases" an address to any DHCP-enabled client, when the client device first powers up and announces its presence on the network. Because the IP addresses are dynamic (leased) rather than static (permanently assigned), addresses no longer in use are automatically returned to the DHCP server's pool, for subsequent reallocation.

It's also possible to have multiple DHCP servers issuing addresses on an IPv4 network, but to avoid addressing conflicts, all DHCP servers must be carefully configured to only allocate IP addresses in distinct address ranges. The *subnet mask* must also be carefully configured, to ensure that devices can correctly communicate with one another.

Implementation

- Raymarine Ethernet (IPv4) devices expect to use a private **Raymarine IPv4 network**, which is designed to be internal to the vessel only. Raymarine has carefully chosen a specific IP address range (**198.18.0.0/21**) to ensure that it does not interfere with any external IP address ranges, or other legacy and real-world addressing constraints (including but not limited to marina Wi-Fi networks).

Note: Raymarine's IP address range is for **local traffic** within the **vessel's private Raymarine network only**, and does NOT traverse across Raymarine products to external networks, or to the Internet.

- In a Raymarine Ethernet (IPv4) network, IP addresses are self-allocated by certain Raymarine equipment in the following range: **198.18.0.32 to 198.18.3.255** (inclusive). **You must avoid placing any devices in this range using manual (static) IP addresses.**
- Whether your network includes only Raymarine Ethernet (IP) devices, or a mixture of Raymarine and third-party Ethernet (IPv4) devices, you have 3 options for configuring the Ethernet (IPv4) network and managing the IP addresses for your devices:

  1. Use a Raymarine device as the sole DHCP server to allocate IP addresses automatically to all Raymarine and third-party Ethernet (IPv4) devices on the network. **For the purposes of simplicity and reliability, this is the recommended option for most vessels.** The following Raymarine devices can act as DHCP servers:

     a. **Raymarine multifunction display (MFD)** / Chartplotter, running LightHouse 3 or LightHouse 4; or:

     b. **Raymarine YachtSense Link Router**

Note: If both a Raymarine MFD **and** YachtSense Link Router are present in the same network, the YachtSense Link Router MUST be configured as the DHCP server for that network. To facilitate this, the Raymarine MFD's DHCP setting defaults to *Automatic* as standard. On power up, if the YachtSense Link is detected in the RayNet system, any MFDs in the network will disable their own *DHCP Server*, to permit the YachtSense Link to manage the network's IP addresses. Only Raymarine MFDs running **LightHouse 4** are compatible with the YachtSense Link Router. Additionally, the most recent versions of the LightHouse 4 and YachtSense Link software must be used.

  2. Use a third-party Ethernet (IPv4) device (such as a router or Access Point) to allocate IP addresses automatically, as a sole *DHCP server*. To do this, refer to the *Configuring a third-party router as DHCP server* section, below.

Note: Any Raymarine LightHouse 3 or LightHouse 4 MFDs will still self-allocate their own IP address, even if a third-party DHCP server is being used to allocate IP addresses to other Raymarine or non-Raymarine *DHCP client* devices (Camera, Radar, Sonar etc.) on the network.

  3. Manually configure static IP addresses for your devices. The address range **198.18.0.32 to 198.18.3.255** (inclusive) is used by Raymarine equipment, and any other third-party equipment on the network should not be set to a static IP address in this range. It should instead be set elsewhere in the 198.18.0.0/21 range.

Adding third-party devices to your Raymarine Ethernet (IP) network

- It is recommended that any third-party products connecting to a Raymarine Ethernet (IPv4) network (e.g., a third-party IP camera) are configured as DHCP clients, so that they automatically get allocated a correct IP address within the range used by the **Raymarine IPv4 network**. If this is not possible, (for example, in the scenario that your third-party IP Camera requires a static IP address), you should configure the product to have a static IP address within the following range: **198.18.0.1 to 198.18.0.31** (inclusive).
- Any third-party router in your network should be performing IPv4 *Network Address Translation* (NAT) from the private address to another one on an upstream interface.

Configuring a third-party router as DHCP server

In the scenario that you wish to use a third-party DHCP server to allocate the IP addresses for your vessel's IPv4 network, use the following information to help you configure the third-party DHCP server to work with Raymarine Ethernet (IPv4) client devices:

1. Configure the third-party DHCP server / router to use Raymarine's subnet details, which are as follows:

   a. Set the DHCP server's IP address to **198.18.0.1**

   b. Set the *netmask* to /21, i.e. **255.255.248.0**

   c. Set the DHCP range from **198.18.4.0 to 198.18.7.254** (inclusive). If this is not possible, ensure that the address range is smaller than this (but within the range of **198.18.4.0 to 198.18.7.254** (inclusive)).

d. The address range **198.18.0.32 to 198.18.3.255** (inclusive) is used by Raymarine equipment, and therefore you must ensure that any other third-party equipment on the network is NOT set to a static IP address in this range.

2. It may be necessary to set the DHCP setting for **all** of the MFDs on the vessel to *[Off]*. However, the default option (*[Auto]*) will likely work fine in many cases. If for any reason the third-party DHCP server starts up after the MFD starts up, the user should manually set the MFD's DHCP switch to *[Off]*. This is because, when the MFD starts up, its DHCP *[Auto]* feature tries to detect if another DHCP server is already present on the network.
3. In case of failure of the third-party device, the MFDs can be easily configured to be the DHCP server again, by setting the MFD's DHCP setting back to *[Auto]*.

Adding third-party Wi-Fi Access Points / Wi-Fi routers to your Raymarine Ethernet (IPv4) network

- There is a large volume of multicast IPv4 traffic on the Raymarine Ethernet (IPv4) network. Many consumer Wi-Fi Access Points / Wi-Fi routers simply bridge all multicast traffic from the Ethernet interface to the Wi-Fi interface when there are connected Wi-Fi clients. This will result not only in poor Wi-Fi performance but also in a reduction of usable Wi-Fi spectrum to other Wi-Fi users and vessels in the vicinity. If using a third-party Wi-Fi Access Point or Wi-Fi router, Raymarine recommends that *IGMP Snooping* is enabled on the third-party device, and additional checks are performed, in order to ensure that your device is not bridging any unexpected multicast traffic to its Wi-Fi interface from the Raymarine Ethernet (IPv4) network.
- Raymarine's YachtSense Link Router is pre-configured with IGMP Snooping enabled, and therefore does not bridge internal multicast traffic on the wired network to the Wi-Fi network. No additional configuration is required in this respect.

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