Raymarine®



SHD / HD DIGITAL

OPEN ARRAY RADAR

Installation instructions

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Chapter 1: Important information

Certified Installation

Raymarine recommends certified installation by a Raymarine approved installer. A certified installation qualifies for enhanced product warranty benefits. Contact your Raymarine dealer for further details, and refer to the separate warranty document packed with your product.



Warning: Product installation and operation

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



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: 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 *Technical specification* section for voltage rating.



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.

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.



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: Radar scanner safety

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



Warning: Radio frequency radiation hazard

The radar scanner transmits electromagnetic energy at microwave frequencies which can be harmful, particularly to the eyes. Do NOT look at the scanner from close range. Ensure personnel are clear of the scanner when it is powered on.

For safety reasons, the radar must be installed above head height, out of range of personnel.

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.

Transmitted power density levels

- A power density level of 10 W/m^2 is likely at distances of 34 cm or less from the radar scanner.
- A power density level of 100 W/m^2 does not occur at any point.

IEEE statement

IEEE C95.1 – 2005 – Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

ICNIRP Guidelines

When properly installed and operated, the use of this Radar conforms to: ICNIRP Guidelines 1998 - International Commission on Non-Ionising Radiation Protection: Guidelines for limiting exposure to time-varying electric, magnetic and electro-magnetic fields (up to 300 GHz) 1998.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the stated water ingress protection standard (refer to the product's *Technical Specification*), water intrusion and subsequent equipment failure may occur if the product is subjected to high-pressure washing. Raymarine will not warrant products subjected to high-pressure washing.

Disclaimer

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

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

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.

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 should aim to maintain the maximum possible distance from any compasses. Typically this distance should be at least 1 m (3.3 ft) in all directions. However 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 state.

Declaration of conformity

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

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

Connections to other equipment

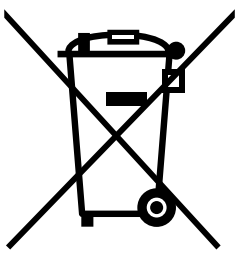
Requirement for ferrites on non-Raymarine cables

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.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

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



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

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.

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.

Radar licensing

Installation and operation of this radar may be subject to individual licensing of the equipment, operator or vessel. You are strongly advised to check with the requirements of the licensing authority of your national administration. In case of any difficulties, contact your local Raymarine dealer.

FCC Notice - Radar

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

MSIP Warning Statement for Radio Devices (Korea only)

- 제작자 및 설치자는 해당 무선설비가 전파혼신 가능성이 있으므로 안전 인명과 관련된
- 서비스는 할 수 없음을 사용자 설명서 등을 통하여 운용자 및 사용자에게 충분히 알릴 것
- 법에 의해 전 방향 전파 발사 및 동일한 정보를 동시에 여러 곳으로 송신하는 점-대-다지점 서비스에의 사용은 금지되어 있습니다.

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.

Operation instructions

For detailed operation instructions for your product, refer to the documentation that accompanies your display.

All product documentation is available to download from the Raymarine website: www.raymarine.com/manuals.

Chapter 2: Product and system overview

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- 2.1 Handbook information on page 14
- 2.2 Radar scanner feature compatibility on page 14
- 2.3 Display compatibility on page 15

2.1 Handbook information

This handbook contains important information regarding the HD and SuperHD Digital Open Array range of radar scanners.

The handbook is for use with the following models:

- 48” and 72” 4kW HD Digital Open Array.
- 48” and 72” 12kW HD Digital Open Array.
- 48” and 72” 4kW SuperHD Digital Open Array.
- 48” and 72” 12kW SuperHD Digital Open Array.

2.2 Radar scanner feature compatibility

The following table lists the features supported by the Digital Open Array radar scanner variants.

Feature	All HD variants	All SuperHD variants
Gain presets:		
— Buoy	✓	✓
— Harbor	✓	✓
— Coastal	✓	✓
— Offshore	✓	✓
— Bird Mode	✗	✓
Antenna Boost	✗	✓
Power Boost	✗	✓
Enhance echoes:		
— Interference Rejection	✓	✓
— Expansion	✓	✓
— Wakes	✓	✓
Dual Range	✓	✓
Scanner rotation speed:		
24 RPM	✓	✓
48 RPM	✗	✓

2.3 Display compatibility

Connection via RayNet	Connection via SeaTalkhs
a Series LightHouse MFD	E-Series Classic E80, E120
c Series LightHouse MFD	G-Series (GPM400)
e Series LightHouse MFD	C-Series Widescreen C90W, C120W, C140W
eS Series LightHouse MFD	E-Series Widescreen E90W, E120W, E140W
gS Series LightHouse MFD	
Axiom / Axiom+ LightHouse 3 MFD	
Axiom Pro / Pro-S LightHouse 3 MFD	
Axiom XL LightHouse 3 MFD	

Display software

After installing a Digital Radar scanner, i.e. before it is used, you must ensure that any associated multi-function display (MFD) is using the **latest** software version.

To check the MFD software version, switch on the MFD and check the version number on the navigation warning screen. Note that if a scanner is not connected, the version number will only be displayed for 10 seconds.

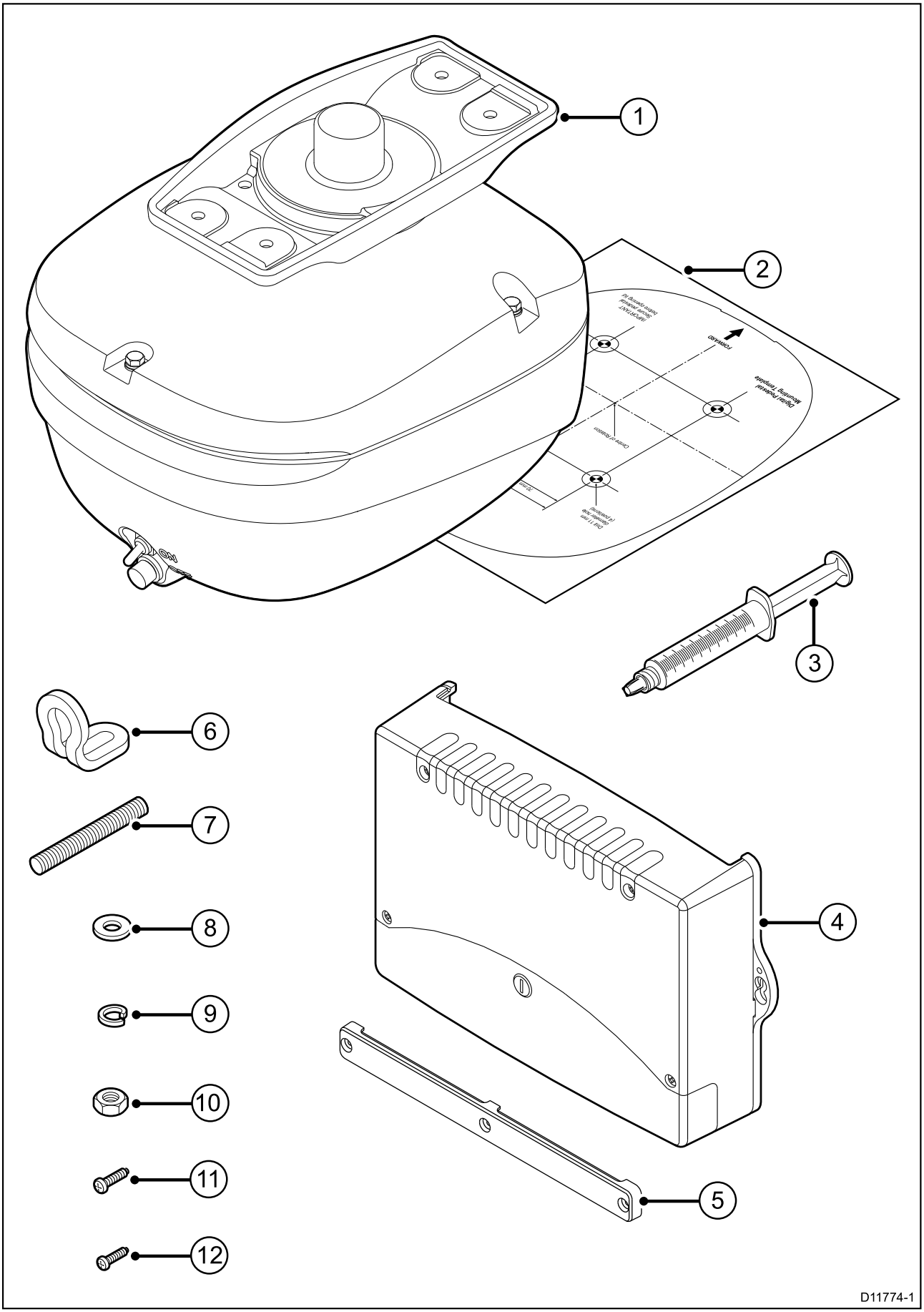
You can download the latest MFD software, from the Raymarine website, at www.raymarine.com/software. Information on how to update the MFD software, is also available on the Raymarine website. Additional support information is available from Raymarine technical support.

Chapter 3: Parts supplied

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3.1 Pack contents



Item	Description	Quantity
1	Pedestal	1
2	Mounting template	1

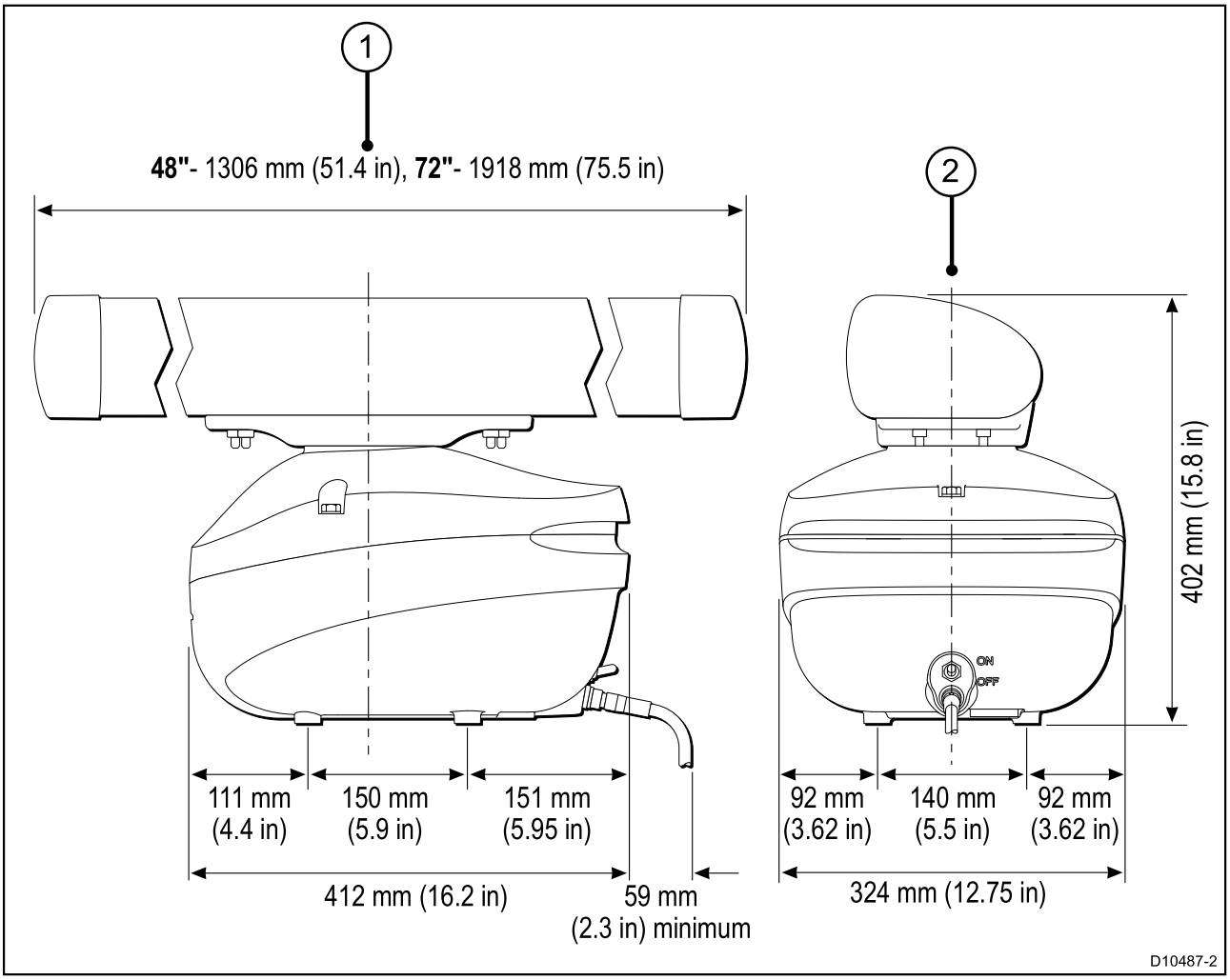
Item	Description	Quantity
3	Denso paste	1
4	VCM100 Voltage Converter Module	1
5	VCM100 cable clamp	1
6	Lifting eye	3
7	Stud	4
8	Plain washer	4
9	Spring washer	4
10	Nut	8
11	VCM100 mounting screw	2
12	VCM100 cable clamp mounting screw	3

Chapter 4: Product dimensions

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4.1 Radar scanner dimensions



Item	Description
1	Maximum rotation
2	Center of rotation

Chapter 5: Location requirements

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- 5.6 Radar scanner mounting surface on page 26
- 5.7 Radar scanner mounting angle on page 27

5.1 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).

5.2 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.

5.3 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 should aim to maintain the maximum possible distance from any compasses. Typically this distance should be at least 1 m (3.3 ft) in all directions. However 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 state.

5.4 VCM100 location requirements

When selecting a mounting location it is important to consider a number of factors.

Ventilation

- Ensure that equipment is mounted in a compartment of suitable size.
- Ensure that ventilation holes are not obstructed. Allow adequate separation of equipment.

Mounting surface

Ensure equipment is adequately supported on a secure surface. Do not mount units or cut holes in places which may damage the structure of the vessel.

Cables

Ensure the unit is mounted in a location which allows proper routing and connection of cables:

- Minimum bend radius of 100 mm (3.94 in) unless otherwise stated.
- Use cable supports to prevent stress on connectors.
- The maximum length of cable between the battery and the VCM100 should not normally exceed 19.6 ft. (6 M). All power cable lengths should be kept as short as possible.

Water ingress

The VCM100 is splashproof, and suitable for mounting below decks only.

Electrical interference

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

Magnetic compass

Mount the VCM100 at least 3 ft (1 m) away from a magnetic compass.

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.

5.5 Radar scanner location requirements

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

Horizontal position

The radar scanner should be positioned as near as possible to your vessel's centerline.

Height

The radar scanner should normally be mounted as high as practical above the waterline:

- Mount the scanner above head height out of range of personnel, to avoid mechanical danger and minimize exposure to electromagnetic radiation.
- Radar operates at the line-of-sight, so a high mounting position gives better long range performance.
- Surrounding large objects, in the same horizontal plane, can interfere with the radar signal and cause blind areas or shadow sectors and false targets on the radar display (see below).

Do not mount the radar scanner so high that it is affected by the pitching and rolling of the vessel.

Shadow areas and false echoes

Mount the radar scanner away from large structures or equipment, such as engine stacks, searchlights, horns, or masts. These objects may cause shadow areas and false echoes. For example, if you mount the radar scanner on a mast, echoes from other targets may be reflected from the mast. Wet sails may also cause shadow areas, so radar performance may be reduced in the rain. It is particularly important to avoid shadow areas near the bow. Raising or even lowering the radar scanner may help to reduce these effects.

In shadow areas beyond the obstruction there will be a reduction of the beam intensity. There may be a blind sector if the beam intensity is not sufficient to obtain an echo from an object. This may occur even at close range. For this reason the angular width and relative bearing of any shadow area must be determined at installation.

You may be able to detect shadow areas or false echoes on your multifunction display. For example, sea clutter can be used as a good indicator of blind arcs. Dark sectors on the radar display indicate possible shadowed areas. This information should be posted near the display unit and operators must be alert for targets in these blind areas.

Access

The radar scanner should be easily accessible to allow maintenance to be carried out safely. Sufficient clearance must be allowed to fully open the scanner unit for maintenance and service.

Mounting platform

The radar scanner must be mounted on a rigid and stable platform. The platform must be capable of supporting the mass and inertia of the radar scanner under seagoing conditions. The platform should not twist (causing bearing errors) or be subject to excessive vibration or shock.

The platform must be free-draining, to prevent the pooling of water beneath the radar scanner.

The mounting site must be clear of the following:

- Ropes.
- Moving rigging.
- Heat.
- Fumes.
- People.

Magnetic compass

Mount the radar scanner at least 1 m away from a magnetic compass.

Multiple radar scanners

If two radar scanners are installed at different locations in a dual radar system, care should be taken to allow for the difference in position of the radars when switching between the two on your multifunction display. This is especially noticeable at short ranges on larger vessels.

To reduce possible interference between radar scanners in a dual radar system:

- Maximise the spacing between the scanners.
- If possible, locate the scanners so that they are aligned vertically, one directly above the other, with a minimum of 2 metres vertical separation.
- If the scanners can't be aligned one directly above the other, locate each scanner the same distance from the bow your vessel. Interference is more likely if the scanners are installed one in front of the other, even when separated vertically.

Cables

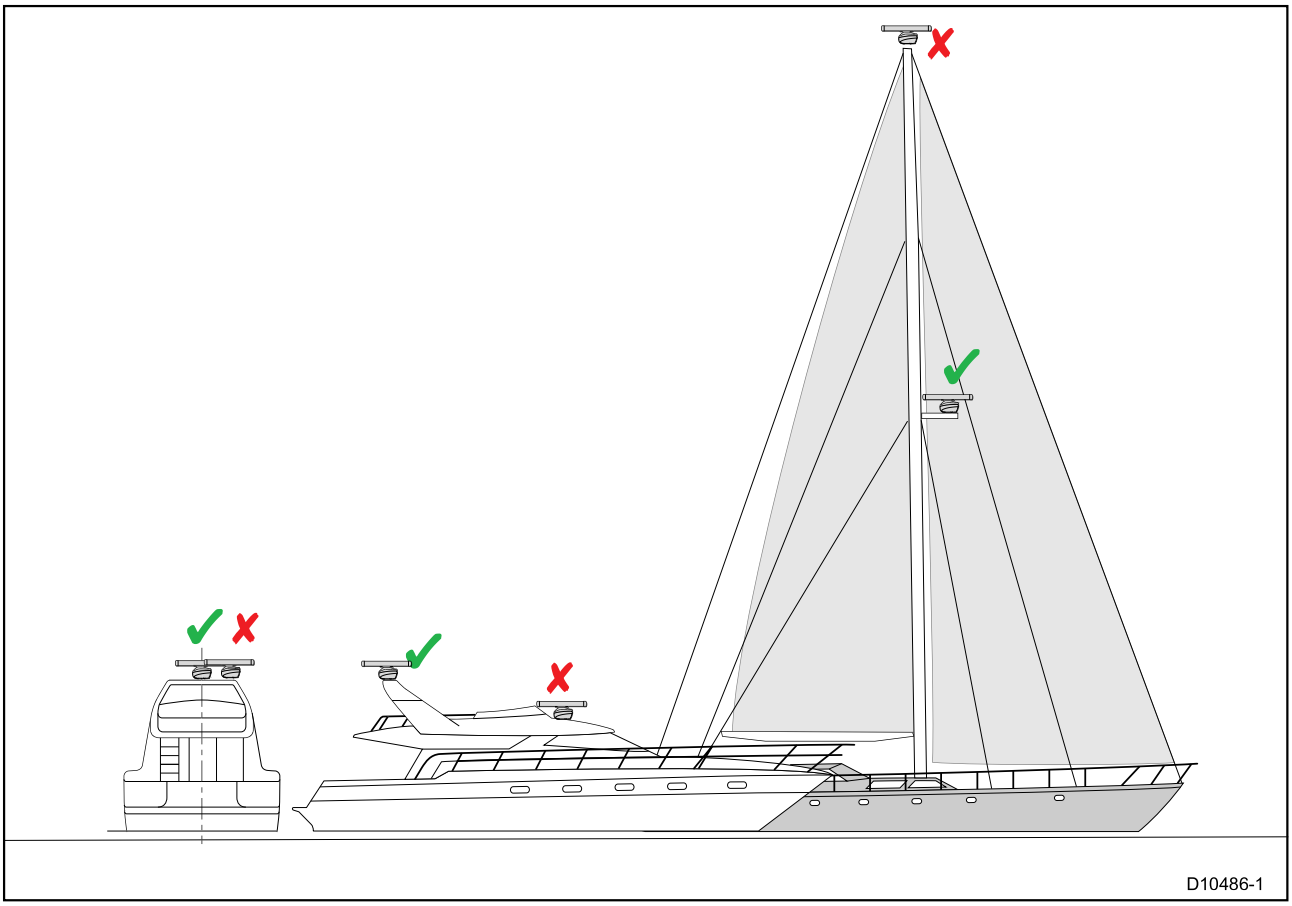
- All cables should be adequately clamped and protected from physical damage and exposure to heat. Avoid running cables through bilges or doorways, or close to moving or hot objects.
- Where a cable passes through an exposed bulkhead or deckhead, use a watertight feed-through.

5.6 Radar scanner mounting surface

Suitable radar scanner mounting surfaces include a mast platform, an arch, or a bridge structure.

If mounting the radar scanner on a sailboat, it may be necessary to install a radar guard to prevent the sails or any rigging coming into contact with the radar scanner or mounting platform. Without a proper radar guard the mounting platform and the radar scanner could be severely damaged.

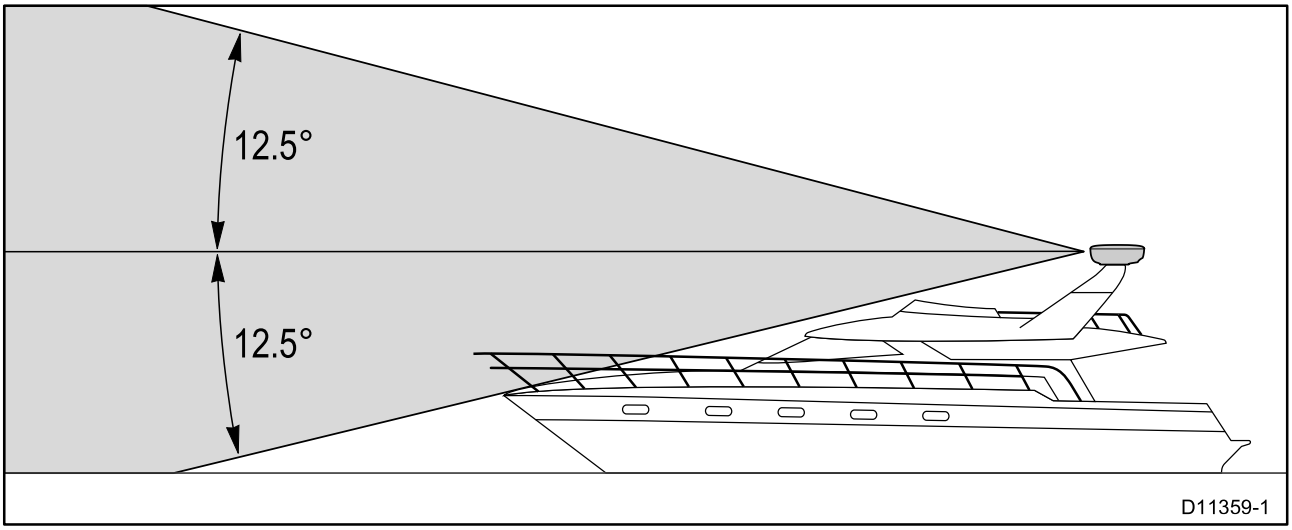
The following diagram illustrates suitable mounting surfaces for the radar scanner:



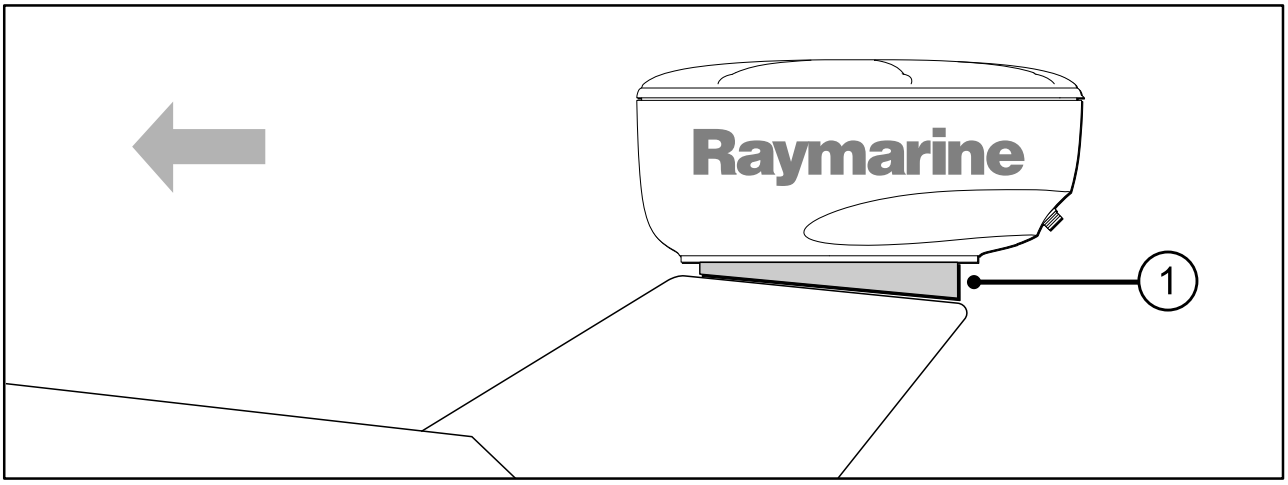
5.7 Radar scanner mounting angle

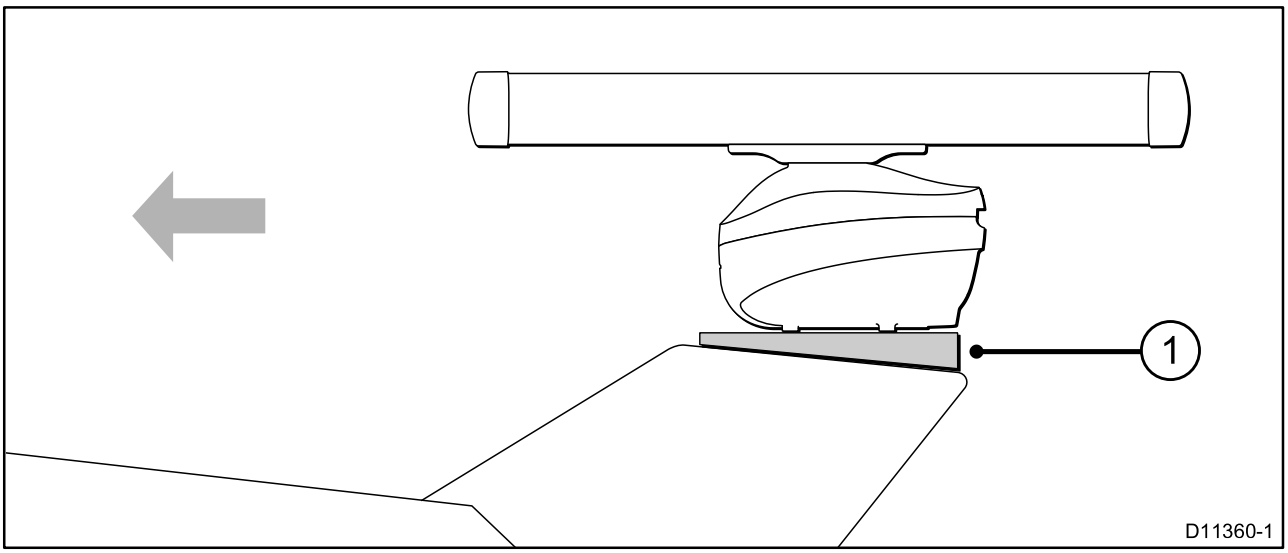
Ensure the radar scanner rotates parallel to the water line.

The radar beam from the radar scanner is approximately 25° wide in the vertical direction, to give good target detection even when your vessel pitches and rolls.



Planing hull vessels, and some displacement hull vessels, adopt a higher bow angle when the vessel is at cruising speed. This may raise the radar's main radiation angle, and can cause poor detection of nearby targets. It may be necessary to compensate for the bow rise to ensure optimum target detection. This can be achieved by fitting a wedge or washers between the mounting platform and the base of the radar scanner, so that the radar beam remains parallel to the water line when the vessel's bow rises at cruising speed.





Item	Description
1	Wedge or washers

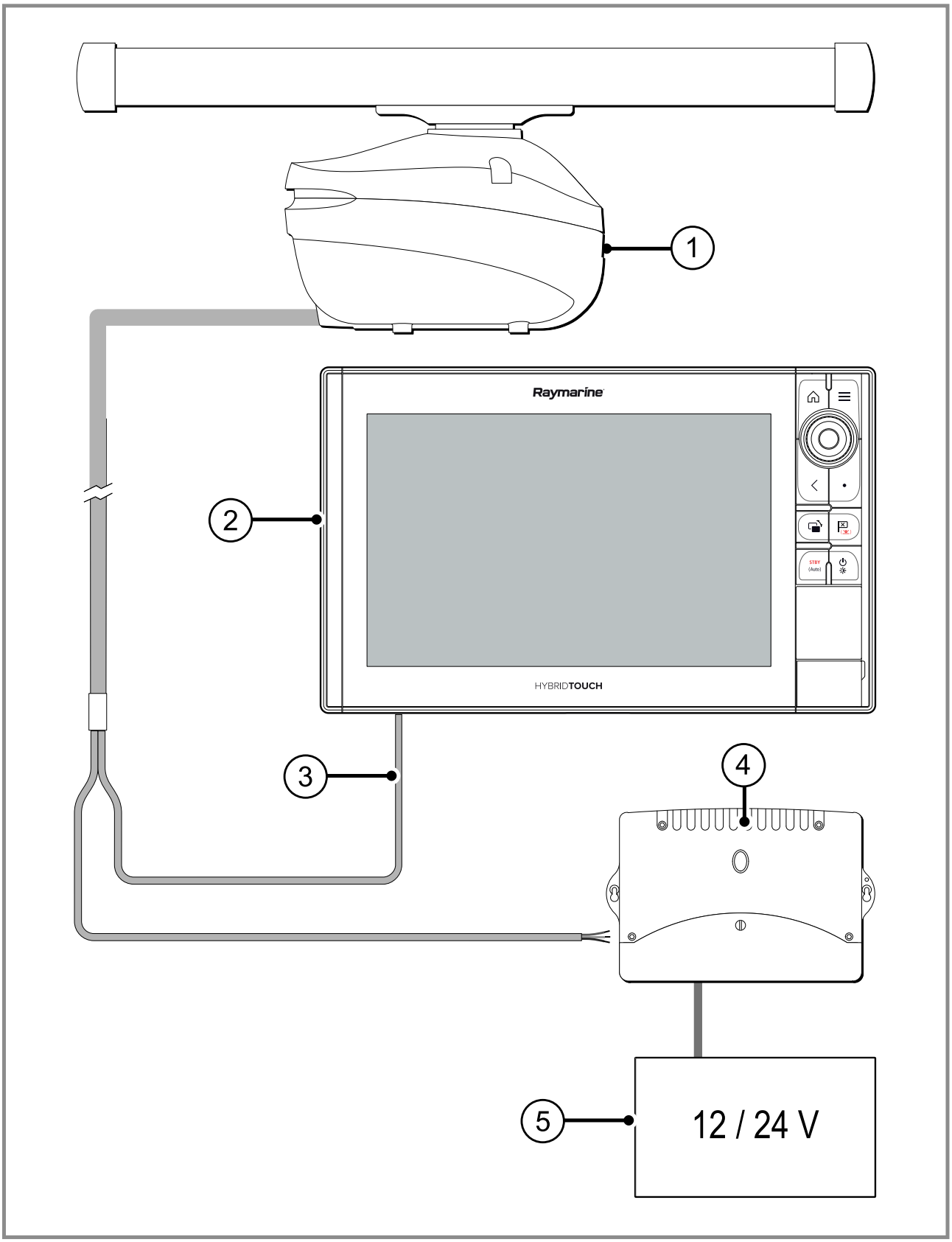
Chapter 6: Typical system examples - RayNet displays

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6.1 Direct connection to RayNet display

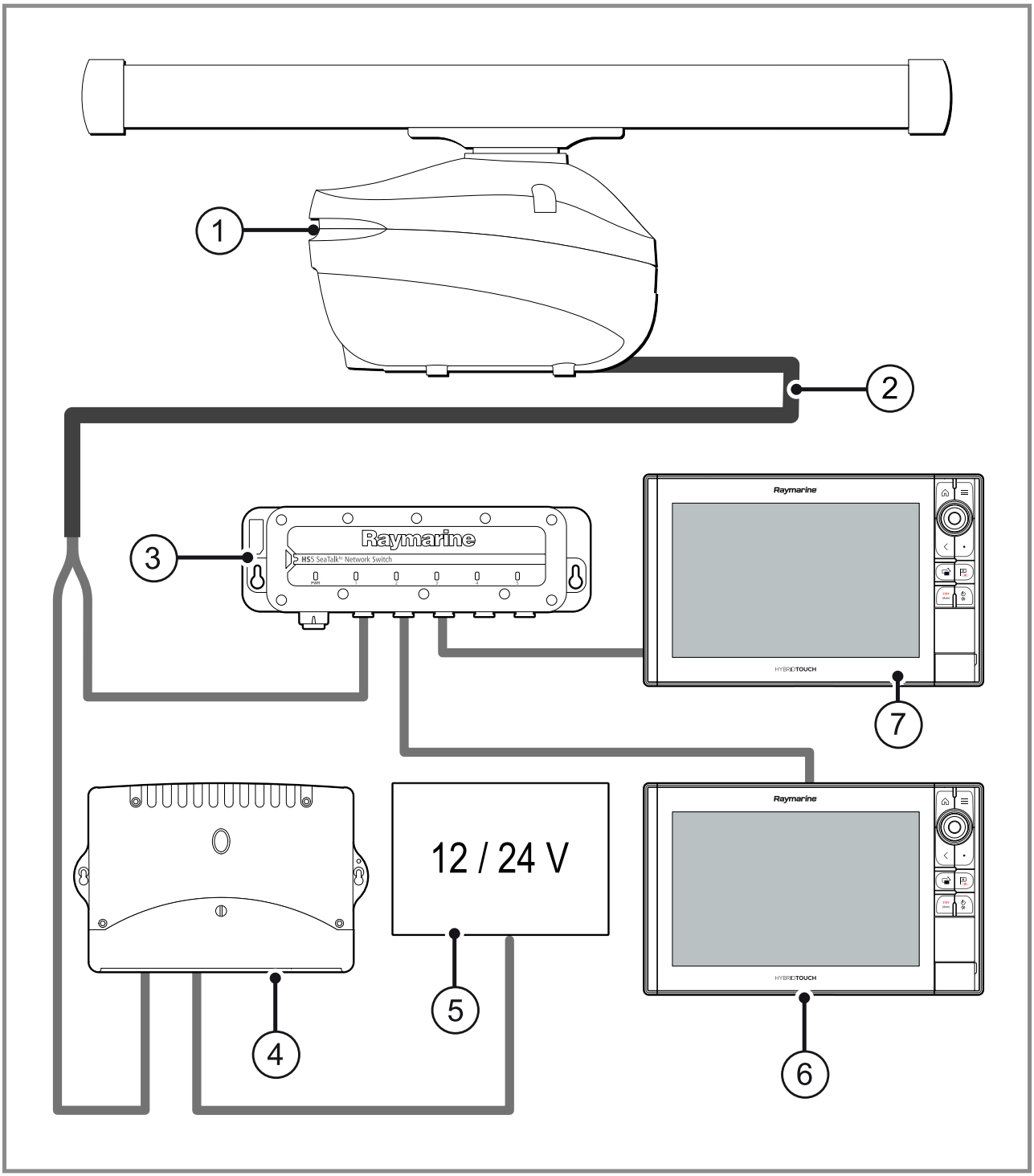
The Digital Open Array radar scanner can be connected to a variety of equipment as part of your marine electronics system.



1. Digital Open Array radar scanner
2. RayNet multifunction display
3. RayNet cable
4. VCM100 power converter
5. Power supply

For information on suitable cables, refer to: **p.56 — Radar cables**

6.2 Connection to networked RayNet displays



1. Digital Open Array radar scanner
2. Digital power and data cable
3. RayNet network switch
4. VCM100 power converter
5. Power supply
6. Networked RayNet multifunction display
7. Networked RayNet multifunction display

For information on suitable cables, refer to: **p.56 — Radar cables**

Chapter 7: Typical system examples - legacy SeaTalkhs displays

Chapter contents

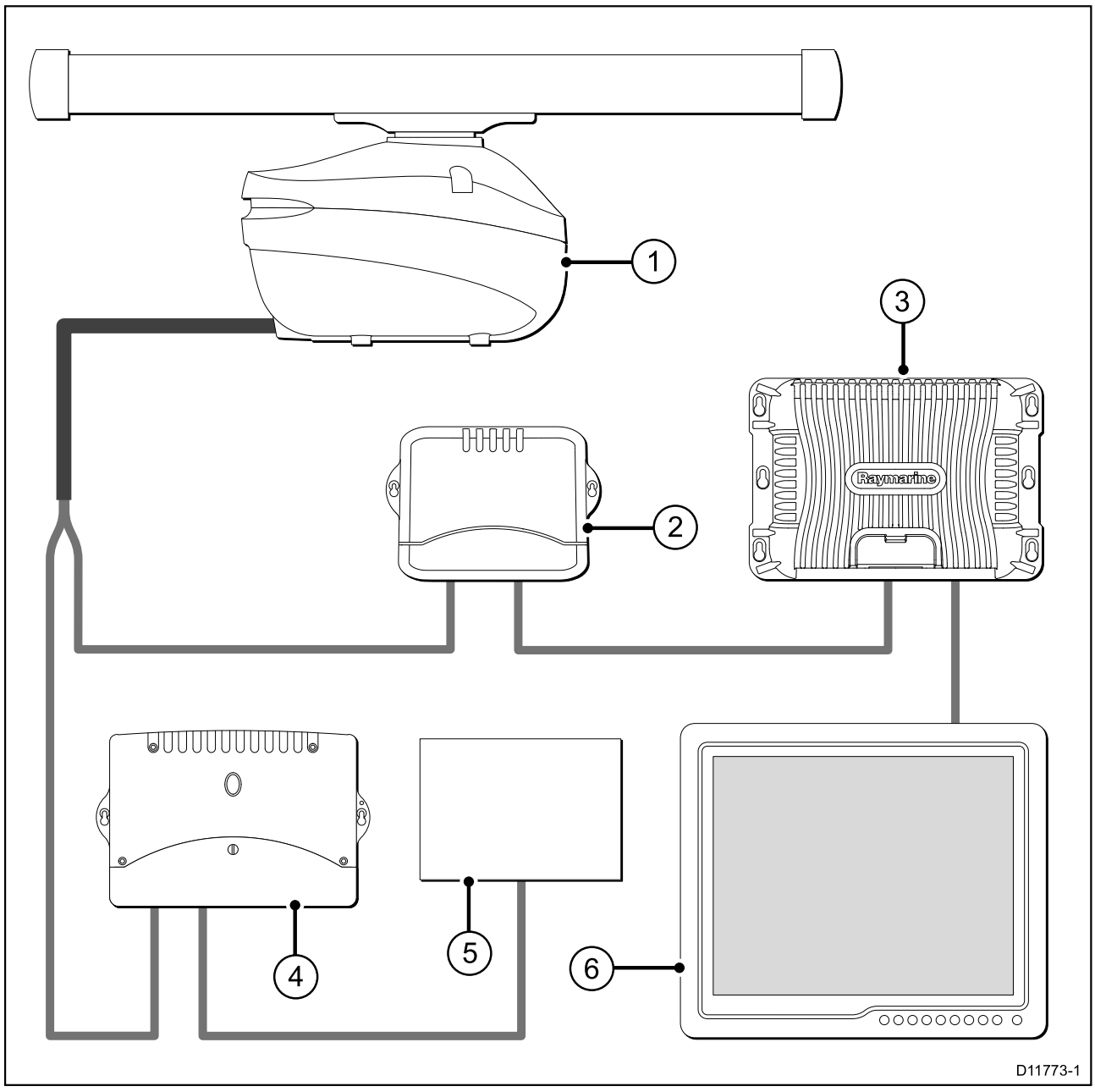
- 7.1 Typical (legacy) system examples on page 34

7.1 Typical (legacy) system examples

The Digital Open Array radar scanner can be connected to a variety of equipment as part of your marine electronics system.

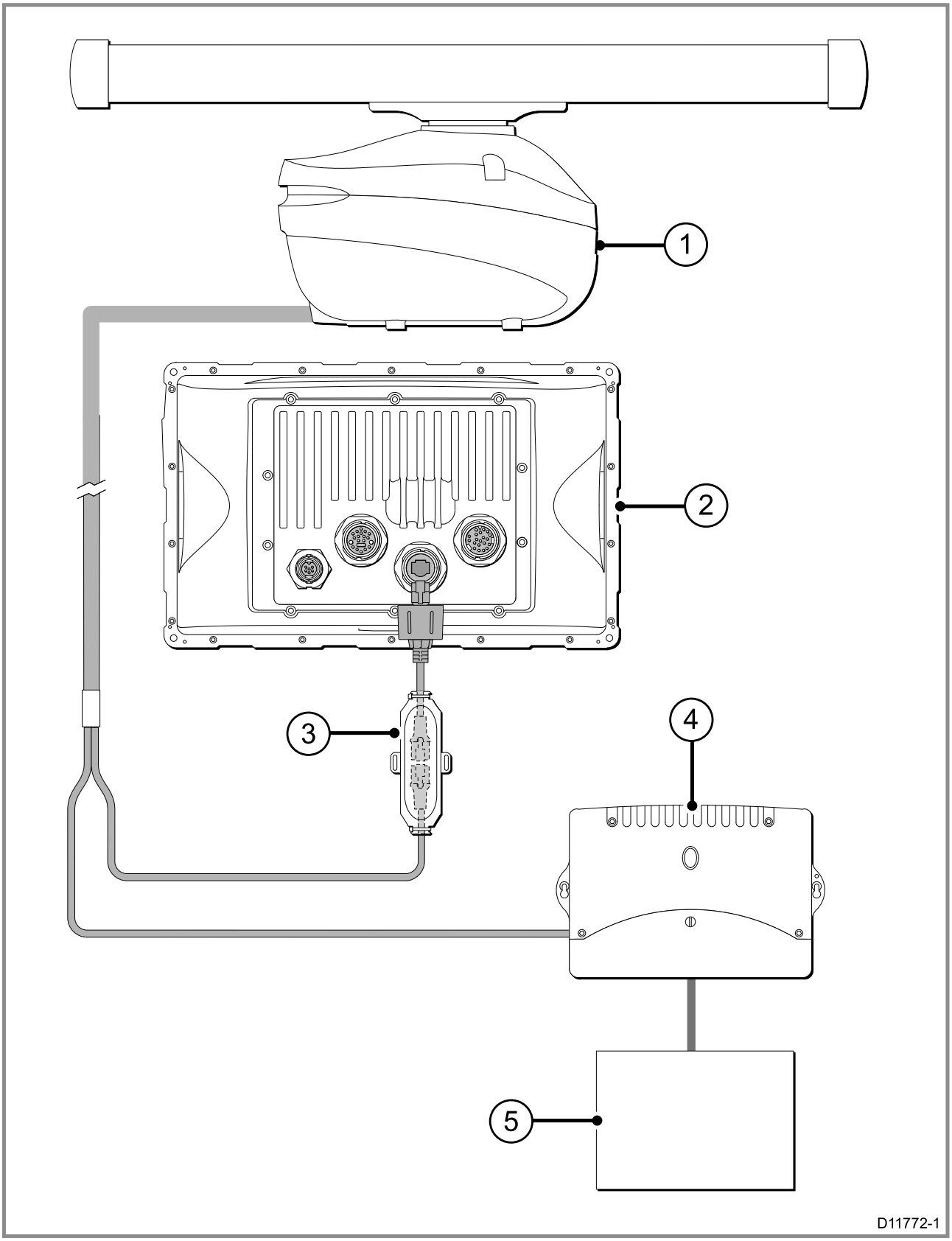
For information on suitable cables, refer to: **p.56 — Radar cables**

Radar connected to legacy SeaTalkhs system, via a SeaTalk hs switch



1. Digital Open Array radar scanner
2. SeaTalk hs switch
3. GPM400 G-Series processor
4. VCM100 power converter
5. Power supply
6. G-Series display

Radar connected directly to legacy SeaTalkhs multifunction display



1. Digital Open Array radar scanner
2. SeaTalkhs multifunction display
3. Crossover coupler
4. VCM100 power converter
5. Power supply

Chapter 8: Installation

Chapter contents

- 8.1 Product grounding on page 38
- 8.2 Positive ground systems on page 38
- 8.3 Tools on page 38
- 8.4 Radar scanner installation procedures on page 39
- 8.5 Mounting the VCM100 on page 39
- 8.6 Securing the pedestal to the mounting platform on page 40
- 8.7 Removing the radar pedestal lifting eyes on page 45
- 8.8 Securing the radar antenna to the pedestal on page 45

8.1 Product grounding

Important safety information for connections to ground.

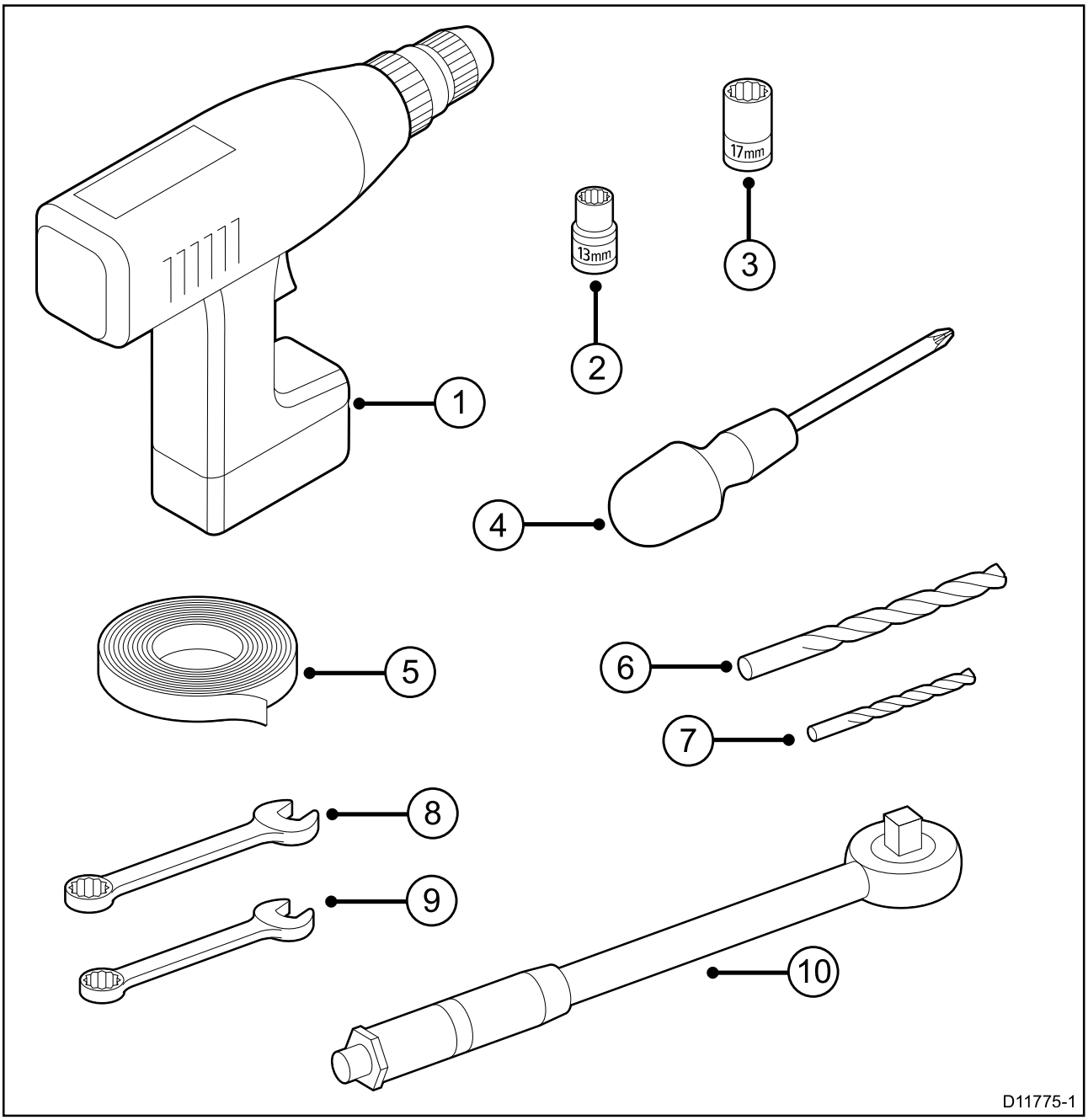
Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions provided.

8.2 Positive ground systems

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

8.3 Tools

Tools required for installation



Item	Description
1	Power drill
2	13 mm socket

Item	Description
3	17 mm socket
4	Screwdriver (“Pozidrive” head)
5	Adhesive tape
6	11 mm drill bit
7	3 mm drill bit
8	17 mm spanner
9	13 mm spanner
10	Torque wrench

8.4 Radar scanner installation procedures

Important installation information.

The radar scanner is supplied in 3 parts, each involving a separate installation procedure:

1. Install the VCM100 voltage converter module.
2. Secure the radar pedestal to a suitable mounting platform.
3. Attach the antenna to the pedestal.

8.5 Mounting the VCM100

Before mounting the unit, ensure that you have:

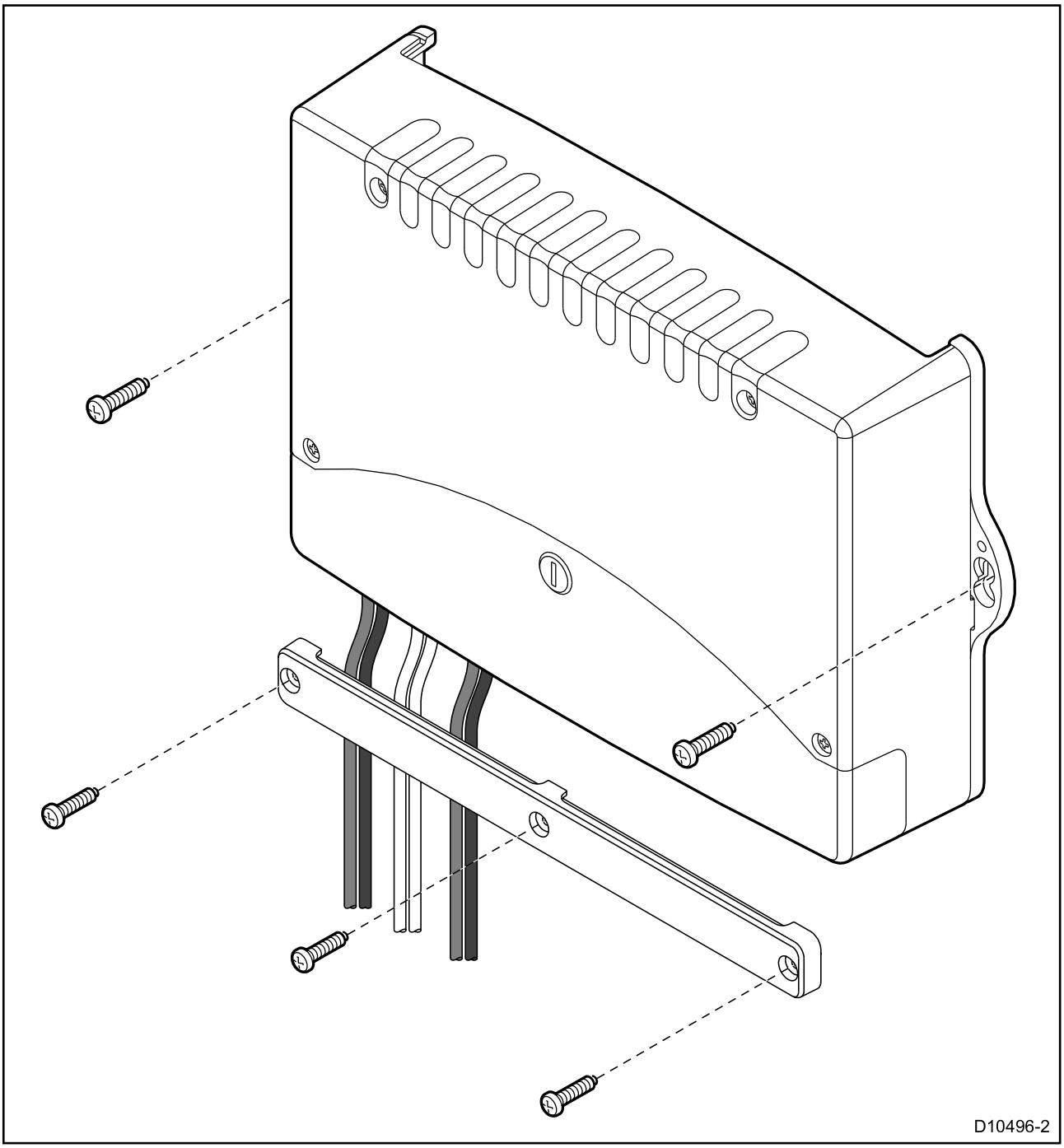
- Selected a suitable location. See 5.4 **VCM100 location requirements**

Note: The VCM100 is splashproof, and suitable for mounting below decks only.

- Identified the cable connections and route that the cables will take.

Note: Do NOT connect any cables to the power supply until the following steps have been completed.

1. Check the selected location for the unit. The VCM100 requires a clear, flat area with suitable space for routing the cables below the unit.
2. Hold the VCM100 in place in the required mounting location.
3. Using a pencil, mark the drilling area inside the mounting lug on each side of the VCM100 unit.
4. Using a 3 mm drill bit, drill a hole through the pencil marks.
5. Align the VCM100 mounting lugs with the drill holes.
6. Hold the VCM100 in place.
7. Using a suitable screwdriver, screw the self-tapping mounting screws through the mounting lug holes, into the drilled holes.
8. Connect the cables, according to the instructions provided in this handbook.
9. Hold the cable clamp in place over the cables, approximately 50 mm (2”) below the mounted VCM100 unit.
10. Using a pencil, mark the drilling area inside each mounting bracket hole.
    ENSURE THE CABLES DO NOT COVER THE HOLES.
11. Using a 3 mm drill bit, drill a hole through the pencil marks.
12. Hold the cable clamp in place, each hole aligned with the drill holes.
13. Using a suitable screwdriver, screw the self-tapping mounting screws through the bracket holes, into the drilled holes.



8.6 Securing the pedestal to the mounting platform

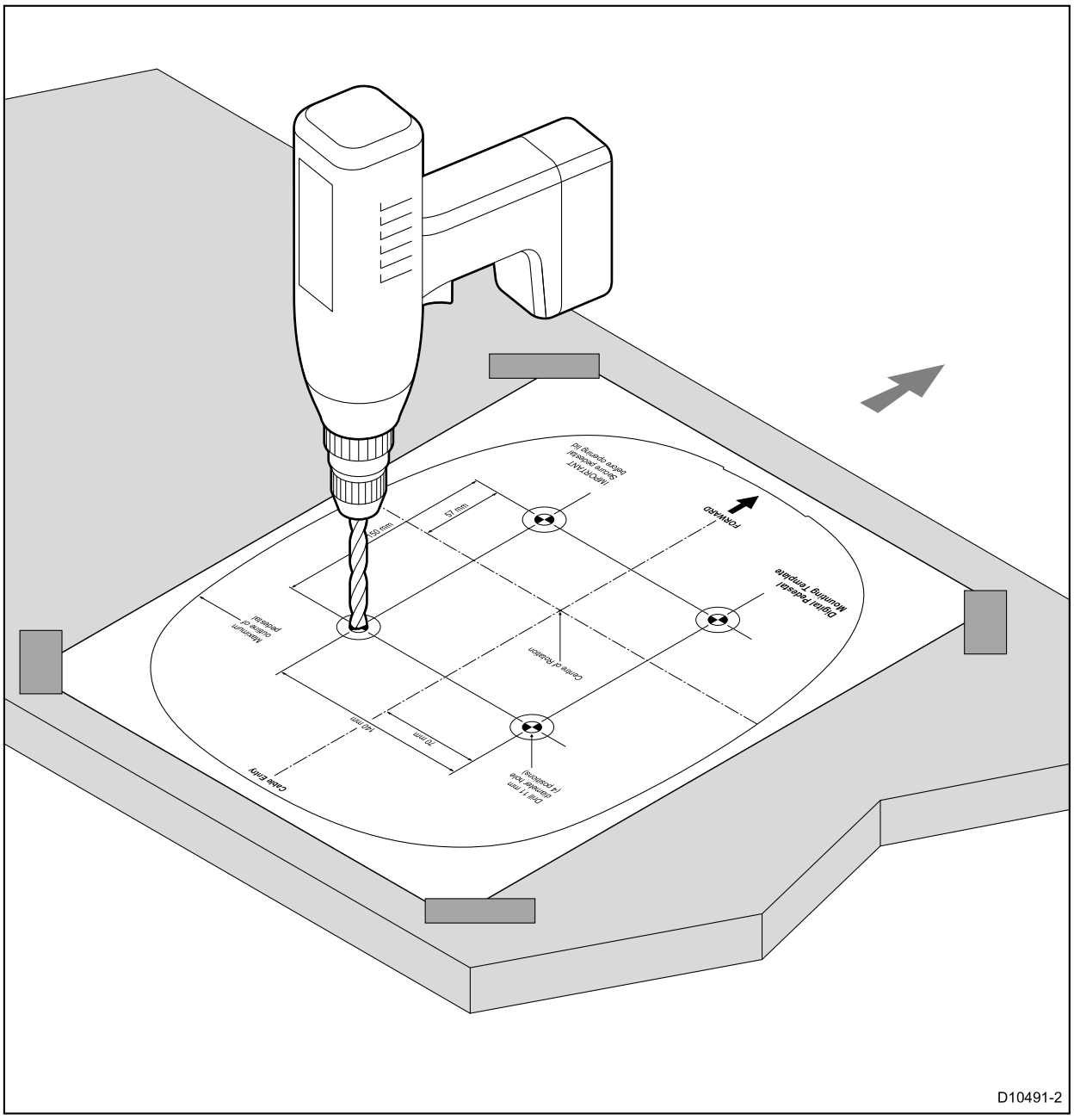
Before mounting the unit, ensure that you have:

- Selected a suitable location.
- Identified the cable connections and route that the cables will take.
- Prepared suitable lifting equipment for fixing the pedestal to the mounting platform. The digital radar weighs in total (with antenna fitted):
  - 48" Radar - 25 kg (55.1 lb)
  - 72" Radar - 29 kg (63.9 lb)

  For safety reasons it is recommended that the unit is not lifted by one person. The unit is supplied with lifting eyes (maximum Safe Working Load (SWL) = 40 kg (80 lb)) to facilitate the use of standard lifting accessories, such as a rope, chain or strop. The SWL of the lifting accessories should be a minimum of 150 kg (330 lb). Suitable lifting equipment could include a crane, hoist, or an appropriate rigid overhead structure. **Do NOT attach the antenna to the pedestal prior to lifting.**

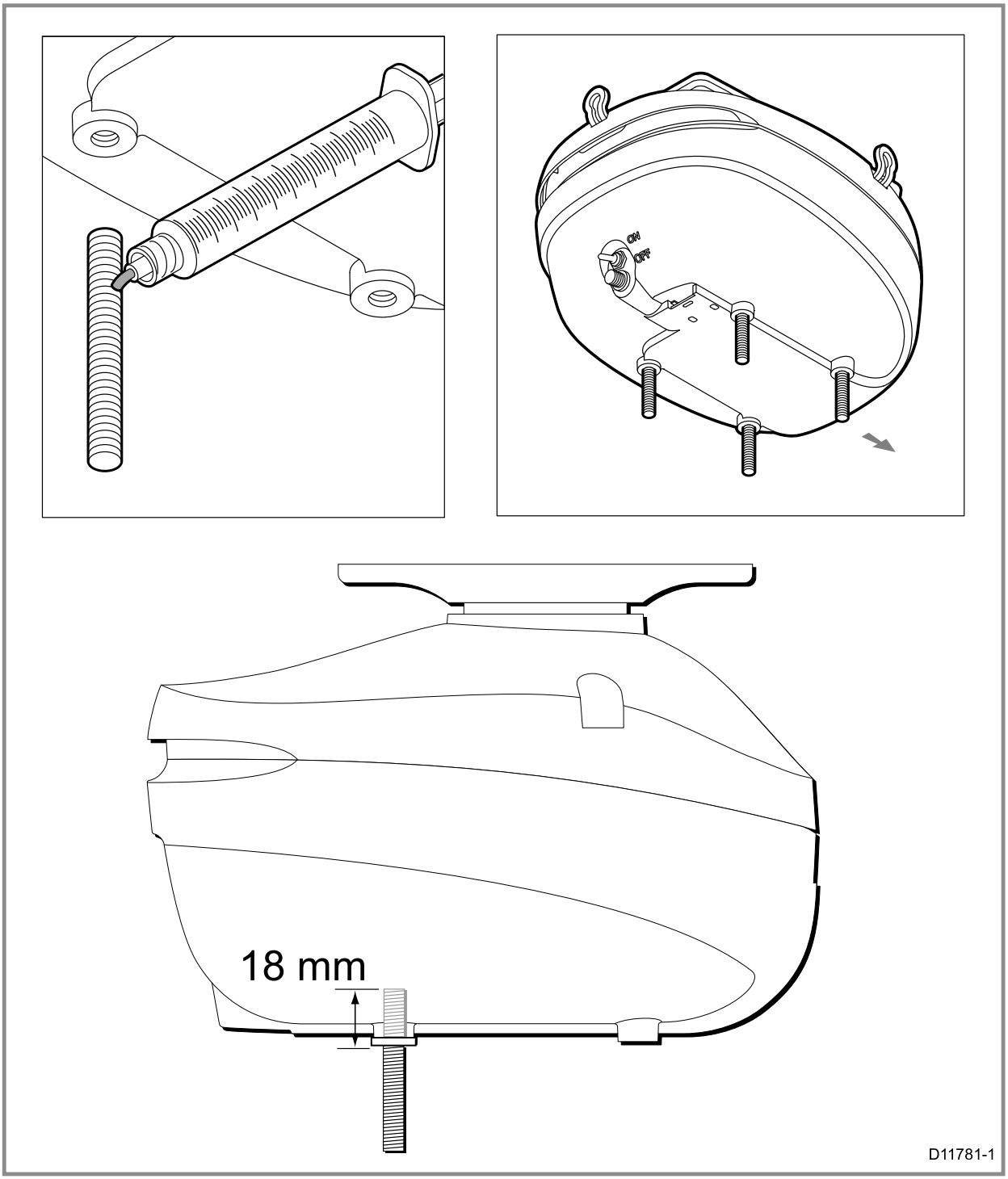
Note: Do NOT connect any cables until the following steps have been completed.

1. Check the selected location. A clear, flat platform is required for mounting the pedestal unit.
2. Fix the supplied mounting template to the platform, using masking or self-adhesive tape.



3. Using a 3 mm drill bit, drill the 4 holes, as indicated on the supplied mounting template.
   Check that the holes have been drilled in the correct position.
4. Using an 11 mm drill bit, drill through the 4 holes.
5. Remove the mounting template.
6. Ensure the lifting eyes are fitted to the pedestal. To fit a lifting eye, remove the securing bolt, place the lifting eye in position, and then secure the lifting eye with the bolt, to 7 N·m (5.2 lbf·ft) torque.
7. The pedestal unit has a cap fitted over the open array mounting shaft to protect the protruding coaxial pin. **This cap must be left in place until the open array antenna is fitted to the pedestal.**

8. Grease the 4 metal studs with the supplied Denso paste.

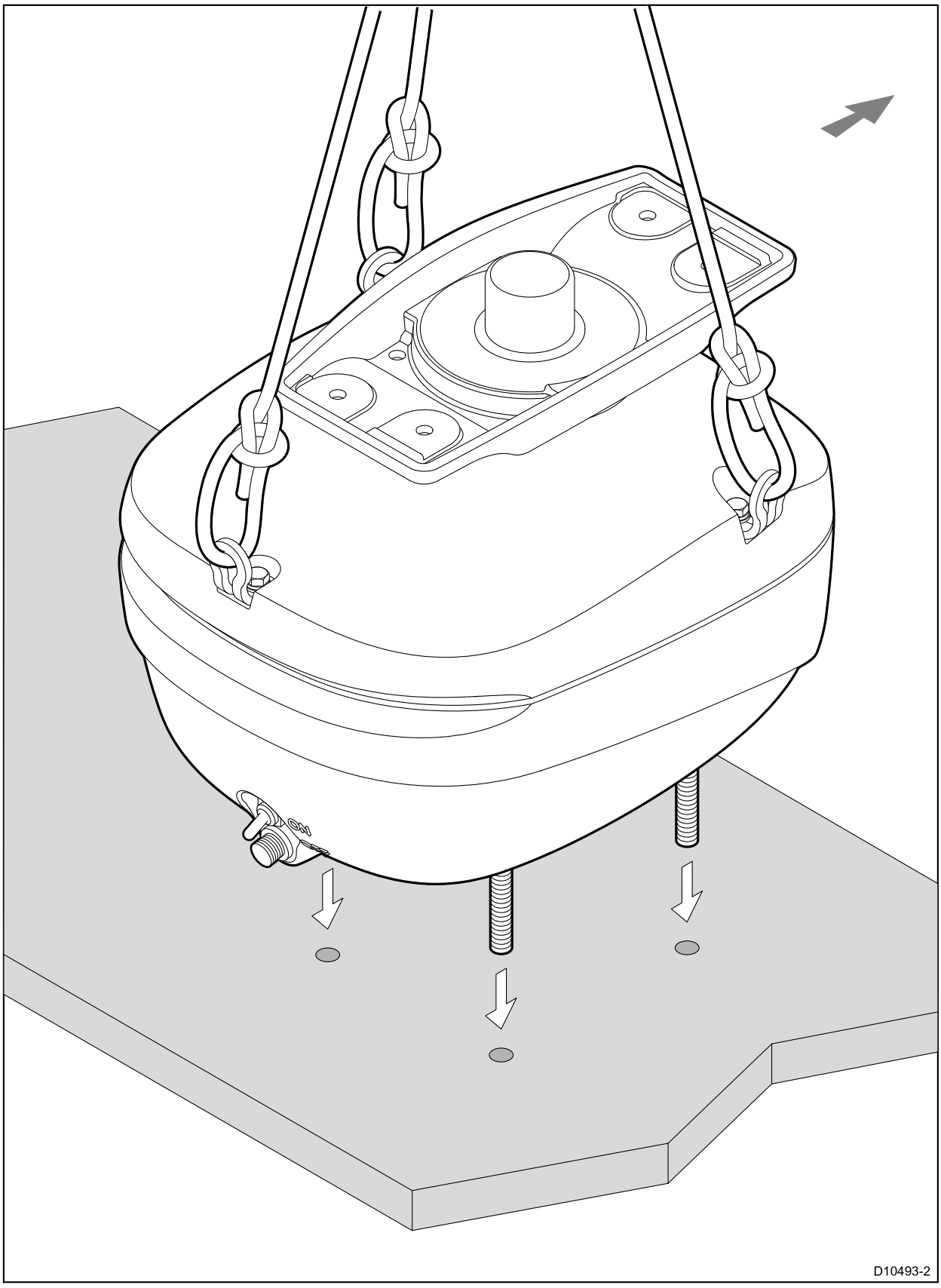


9. Insert the studs no more than 18 mm (0.7 in) into the holes in the pedestal base, and hand-tighten. 4 spare nuts are provided which may be used as temporary locking nuts to aid insertion of the studs into the pedestal.

   If the supplied studs are not long enough for the mounting surface thickness, use M10 stainless steel, grade A4-70 studding of a suitable length.

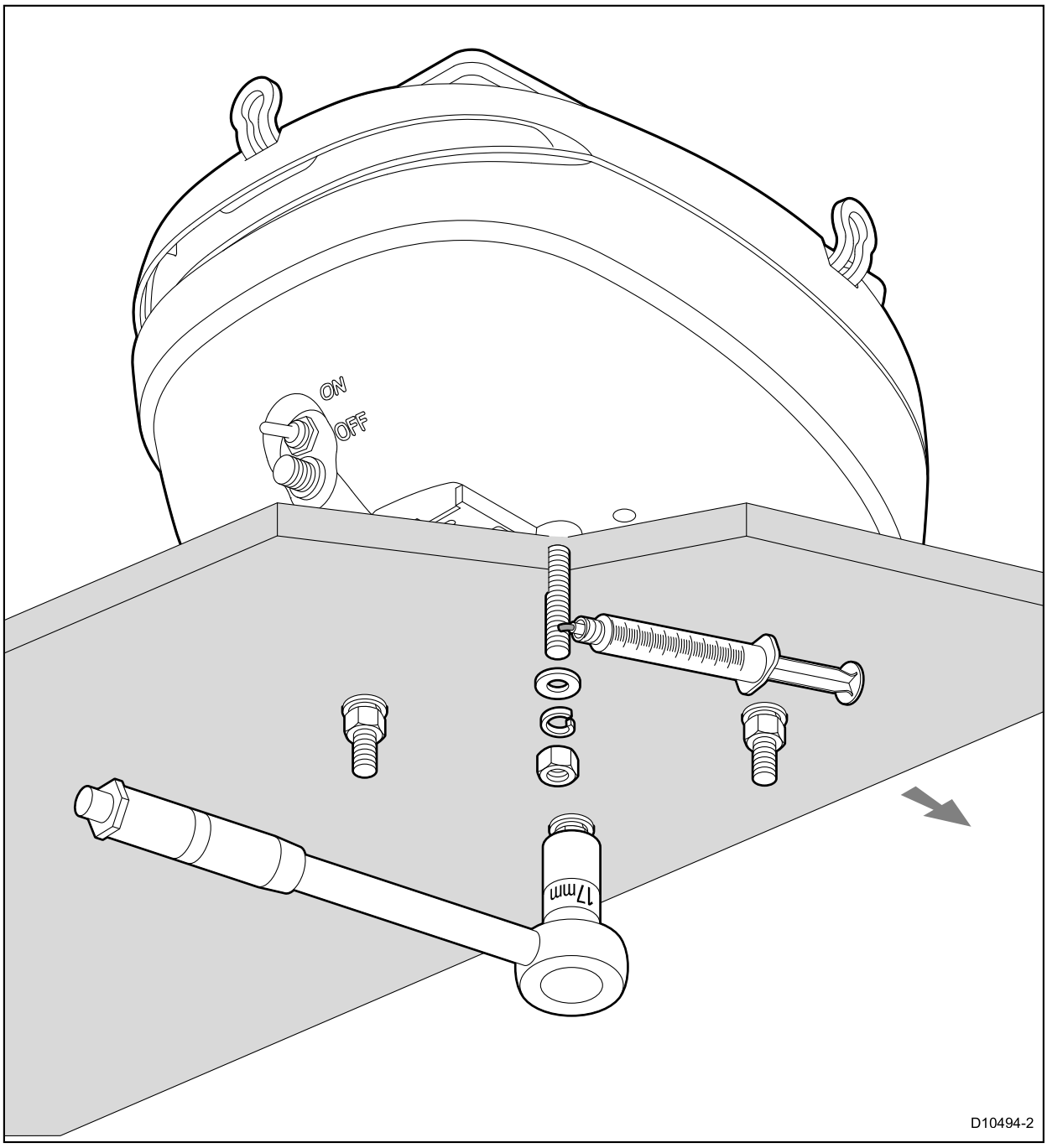
10. Using suitable lifting equipment (such as a rope or chain) attached to the lifting eyes, raise the pedestal over the mounting surface. Carefully lower into position, taking care that the studs

pass through the holes without damaging the threads. **Ensure that the front of the pedestal is pointing towards the bow of the vessel.**

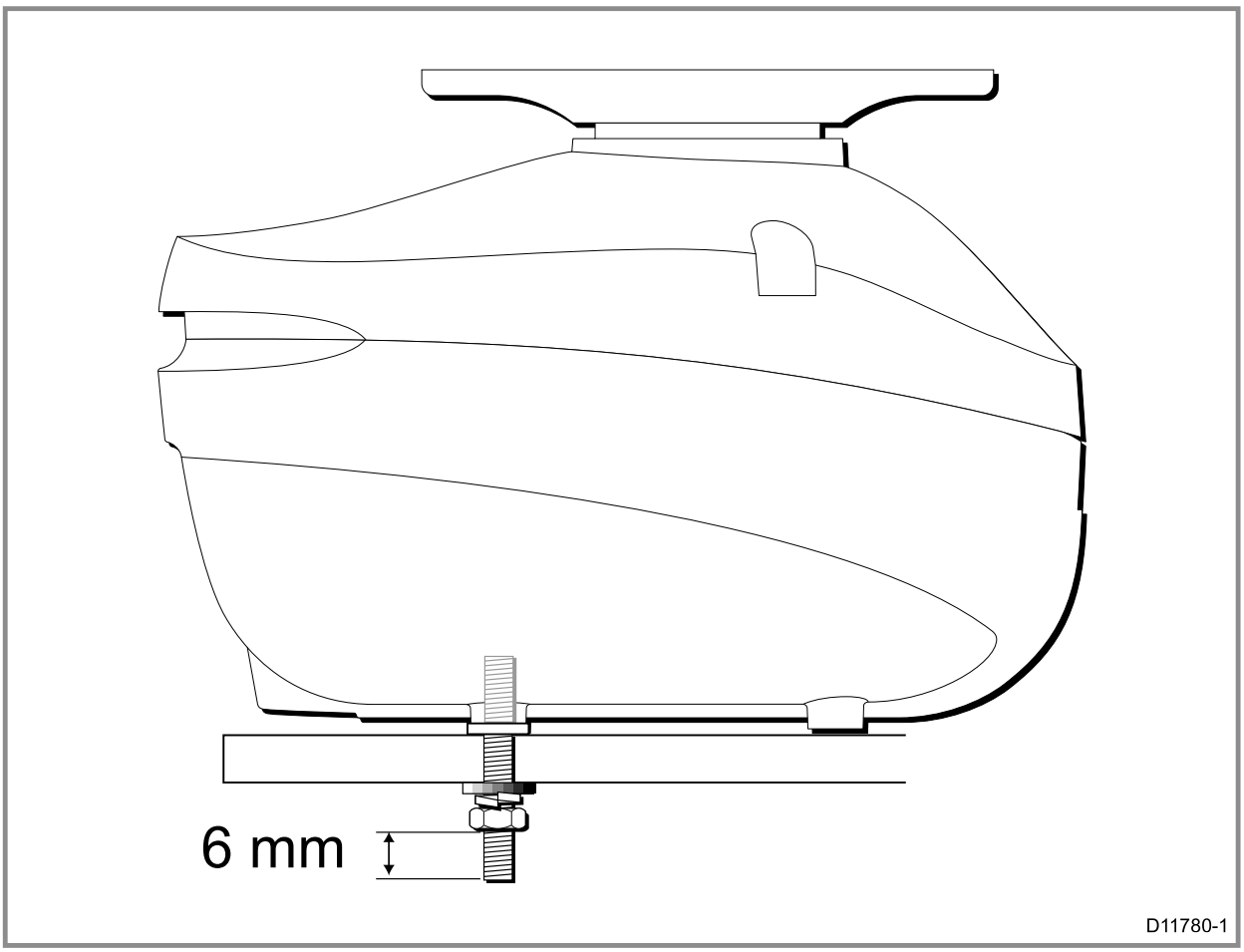


11. Grease the studs with the supplied Denso paste.

12. Referring to the following illustration, use the 4 nuts and associated washers to secure the pedestal to the platform. Tighten each nut to 30 N·m (22.1 lbf·ft) torque.



13. Ensure all 4 sets of nuts and washers are used to secure the pedestal to the mounting platform. There should be no more than 6 mm (0.23 in) of excess stud below the nut. Cut-off any excess stud.



14. Retain the 4 spare nuts (which may have been used as a temporary measure during Step 9).

8.7 Removing the radar pedestal lifting eyes

On the pedestal unit:

1. Loosen the first lifting eye securing bolt, enough to remove the lifting eye.
2. Once the lifting eye is removed, re-tighten the bolt to 7 Nm (5.2 lb ft) torque.
3. Repeat Steps 1 to 2 to remove all lifting eyes.

8.8 Securing the radar antenna to the pedestal

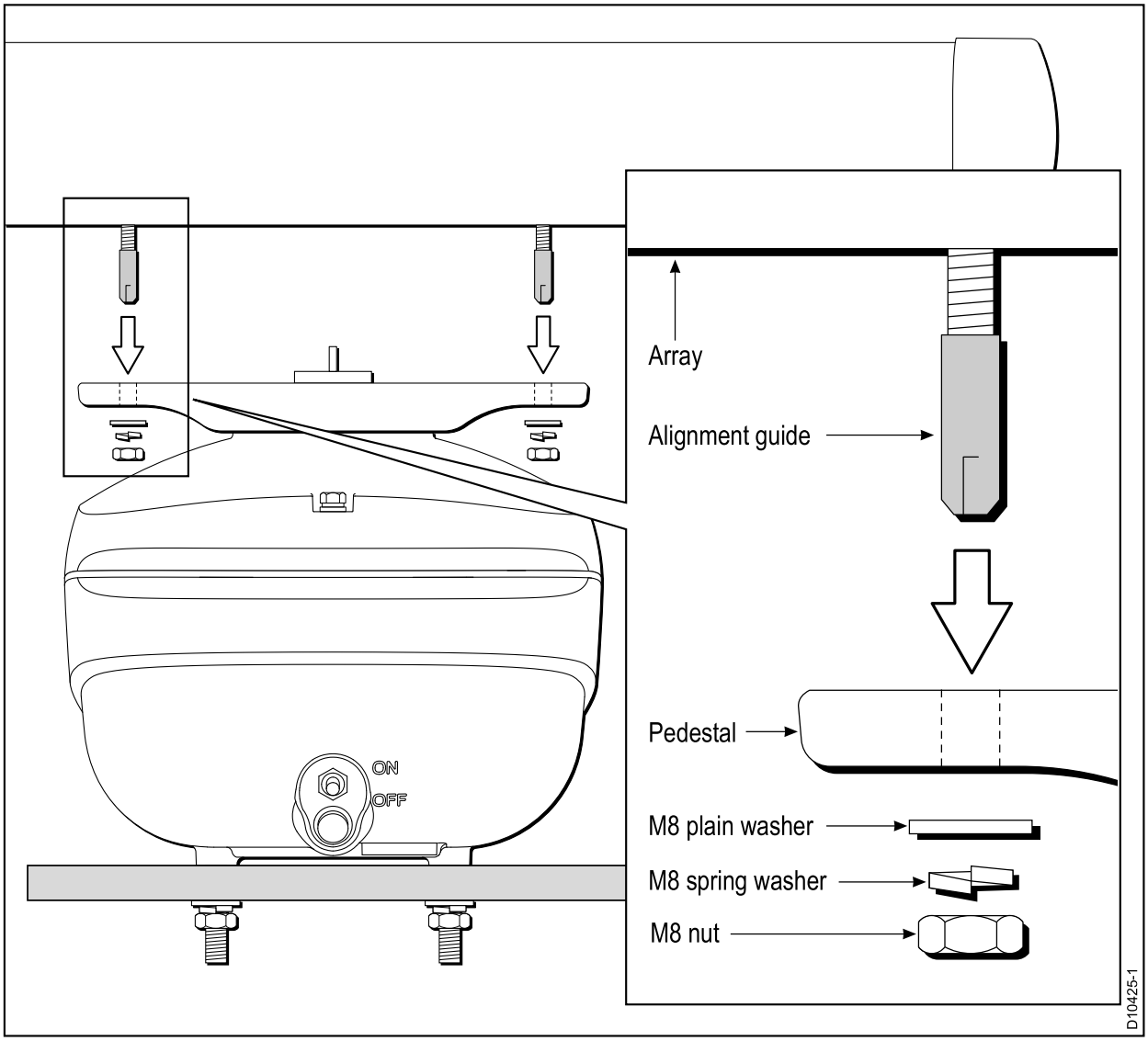
Before attaching the antenna to the pedestal unit, ensure that:

- The pedestal base is securely fixed to the platform.
- The cable is NOT attached.
- The pedestal power switch is in the OFF position.
- The pedestal unit has a cap fitted over the open array mounting shaft to protect the protruding co-axial pin. **This cap must remain in place until you're ready to fit the antenna to the pedestal unit.**

Note: You MUST ensure that the antenna does not come into contact with the delicate protruding coaxial pin. This is a critical component and should be treated with caution. Follow all the instructions provided below, and ensure that the alignment guides are used.

1. Fit the 4 threaded alignment guides to the studs on the underside of the antenna. Ensure a close fit. The alignment guides are essential to help prevent damage to the coaxial pin.
2. Remove the protective cap from the antenna shaft. Retain the cap for future use.

3. Position the antenna mounting bracket on the Port to Starboard axis of the pedestal.
4. Lift the antenna into position, ensuring it is in the correct orientation and that the threaded alignment guides are fitted. Carefully align and slowly lower the antenna.
5. Once the antenna is in position, remove the alignment guides.
6. Grease the 4 securing studs with the supplied Denso paste.
7. Use the 4 nuts and associated washers to secure the antenna to the pedestal, as shown in the following diagram. Tighten each nut to 10 N·m (7.4 lbf·ft) torque.



Chapter 9: Connections

Chapter contents

- 9.1 General cabling guidance on page 48
- 9.2 Radar scanner power connections on page 49
- 9.3 Product grounding on page 50
- 9.4 Circuit breaker and fuse ratings on page 51
- 9.5 Sharing a breaker on page 51
- 9.6 VCM100 power connections on page 52
- 9.7 VCM100 power cable extension on page 54
- 9.8 VCM100 screen (drain) wire extension on page 54
- 9.9 Radar scanner connection on page 54
- 9.10 Display connection on page 54
- 9.11 Radar cable extension on page 55
- 9.12 Radar cables on page 56

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).

Strain relief

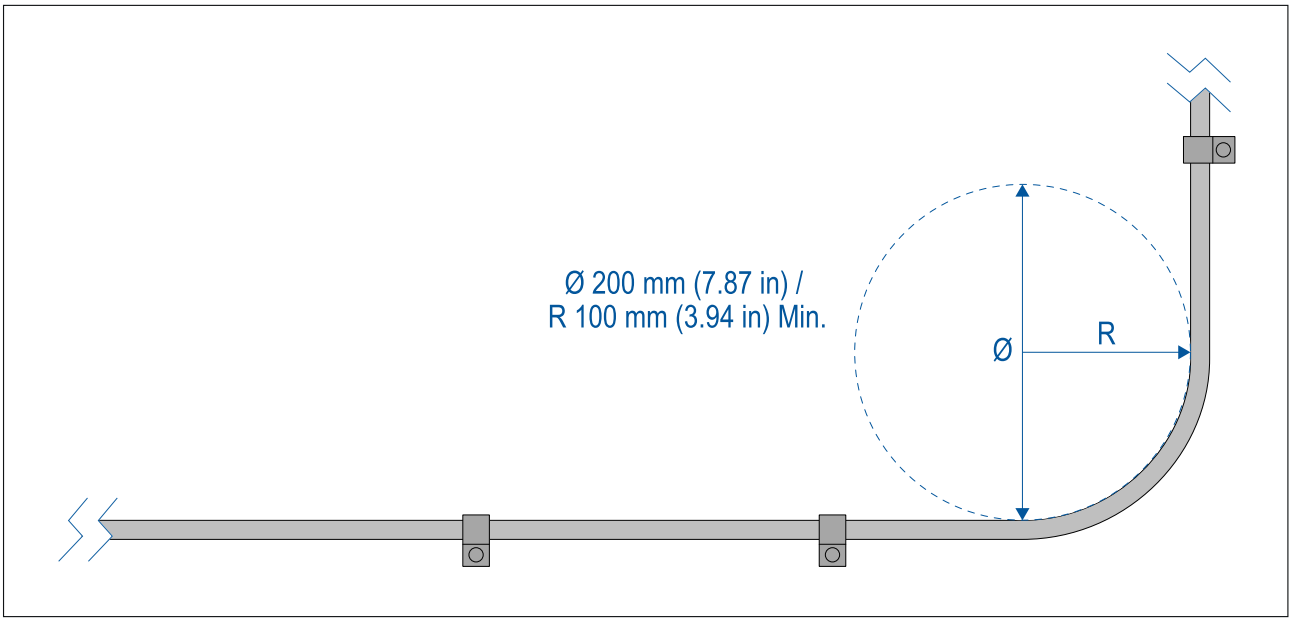
Use adequate strain relief for cabling to ensure that connectors are protected from strain and will not pull out under extreme sea conditions.

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

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.

Cable shielding

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

Making connections

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 to the unit has been installed in accordance with the installation instructions supplied with that device.
3. Ensuring correct orientation, push the cable connector fully onto the corresponding connector on the unit.
4. Turn the locking collar clockwise to secure the cable.

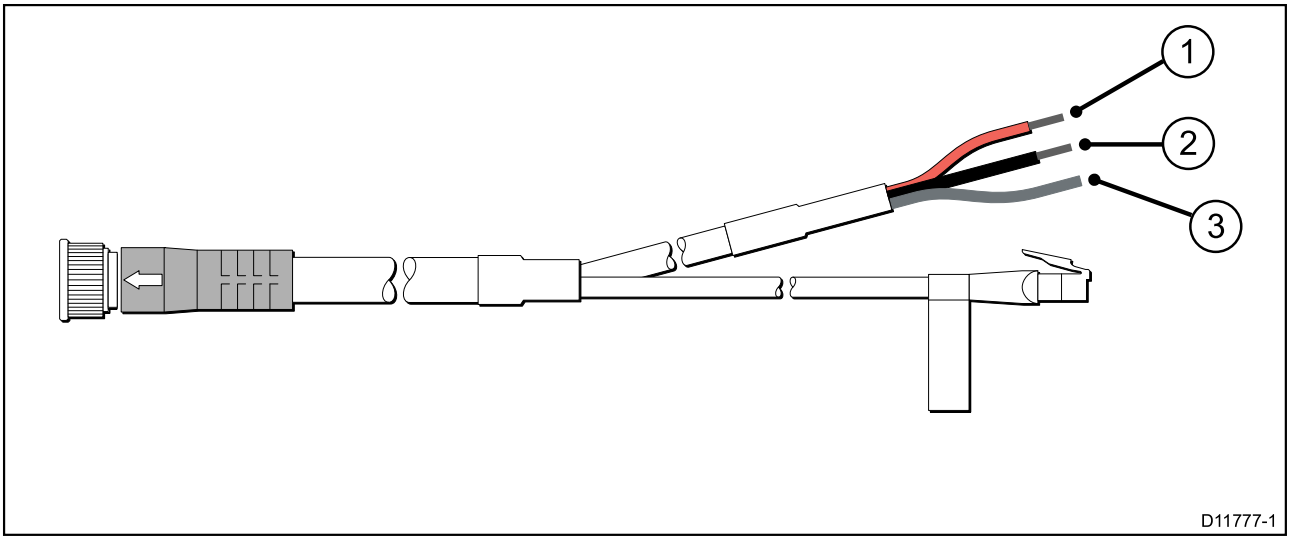
9.2 Radar scanner power connections

Radar scanner power requirements.

The digital radar system is intended for connection to vessel DC power systems operating from 12 to 24 Volts DC.

- **All power connections must be made via the VCM100 Voltage Converter Module.**
- The radar scanner must NOT be connected directly to a battery.
- The radar scanner must be connected directly to the VCM100 only.
- Only one radar scanner must be connected per VCM100 unit. Each radar scanner in your system requires a dedicated VCM100 unit.
- The power connection between the radar scanner and the VCM100 must be via an official Raymarine power and data digital cable (purchased separately); refer to: **p.56 — Radar cables**
- Do NOT cut and re-join any part of the power and data digital cable. A range of cable lengths and cable extensions is available for longer cable runs; refer to: **p.56 — Radar cables**
- The radar scanner must be connected to the POWER OUT terminals of the VCM100.
- The screen (drain) strands of the radar scanner's power and data digital cable must be connected to one of the VCM100 SCREEN terminals.

The following diagram illustrates the power connections of the power and data digital cable.



Item	Description
1	Red wire — connect to the positive POWER OUT terminal of the VCM100.
2	Black wire — connect to the negative POWER OUT terminal of the VCM100.
3	Screen (drain) strands — connect to one of the SCREEN terminals of the VCM100.

9.3 Product grounding

Important safety information for connections to ground.

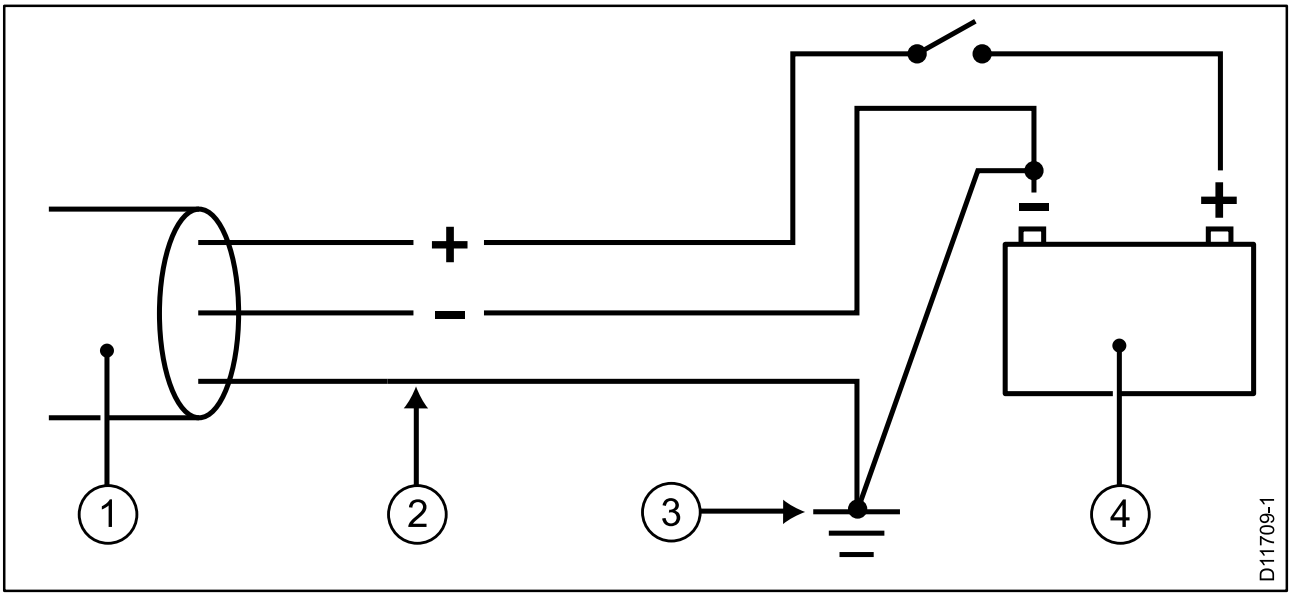
Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions provided.

Grounding requirements

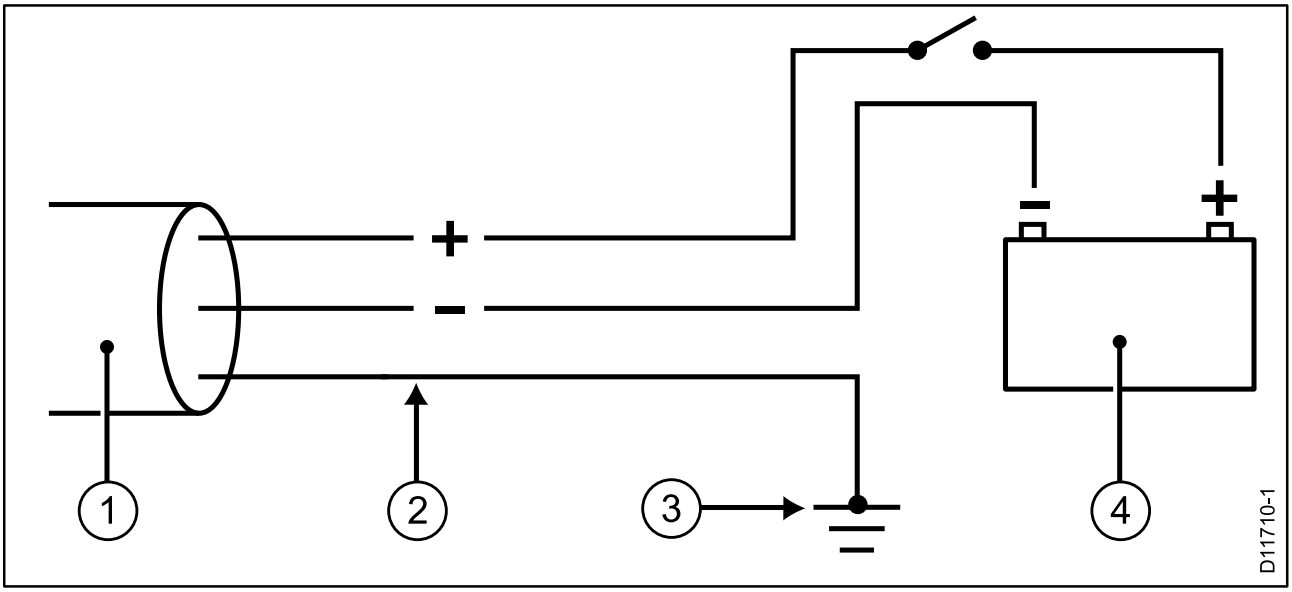
These grounding requirements are applicable for Raymarine equipment supplied with a separate drain wire or screen.

- The product power cable drain conductor (screen) must be connected to a common ground point.
- It is recommended that the common ground point is a bonded ground, i.e. with the ground point connected to battery negative, and situated as close as possible to the battery negative terminal. If a bonded ground system is not possible, a non-bonded RF ground may be used.

Bonded ground system (preferred)



RF ground system (alternative)



1. Power cable to product.
2. Drain (screen).
3. Bonded (preferred) or non-bonded RF ground.
4. Power supply or battery.

Implementation

If several items require grounding, they may first be connected to a single local point (e.g. within a switch panel), with this point connected via a single, appropriately-rated conductor, to the boat's common 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 (1/4 inch) or greater. If this is not possible, an equivalent stranded wire conductor maybe used, rated as follows:

- for runs of <1 m (3 ft), use 6 mm^2 (#10 AWG) or greater.
- for runs of >1 m (3 ft), use 8 mm^2 (#8 AWG) or greater.

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

Important: Do NOT connect this product to a positively-grounded power system.

References

- ISO10133/13297
- BMEA code of practice
- NMEA 0400

9.4 Circuit breaker and fuse ratings

Battery isolator switch, thermal breaker, and fuse ratings.

All power connections between the VCM100 and its power source must be protected by a thermal circuit breaker or fuse, fitted close to the power connection. The connection from the output of the VCM100 to the digital radar does not require a fuse or circuit breaker.

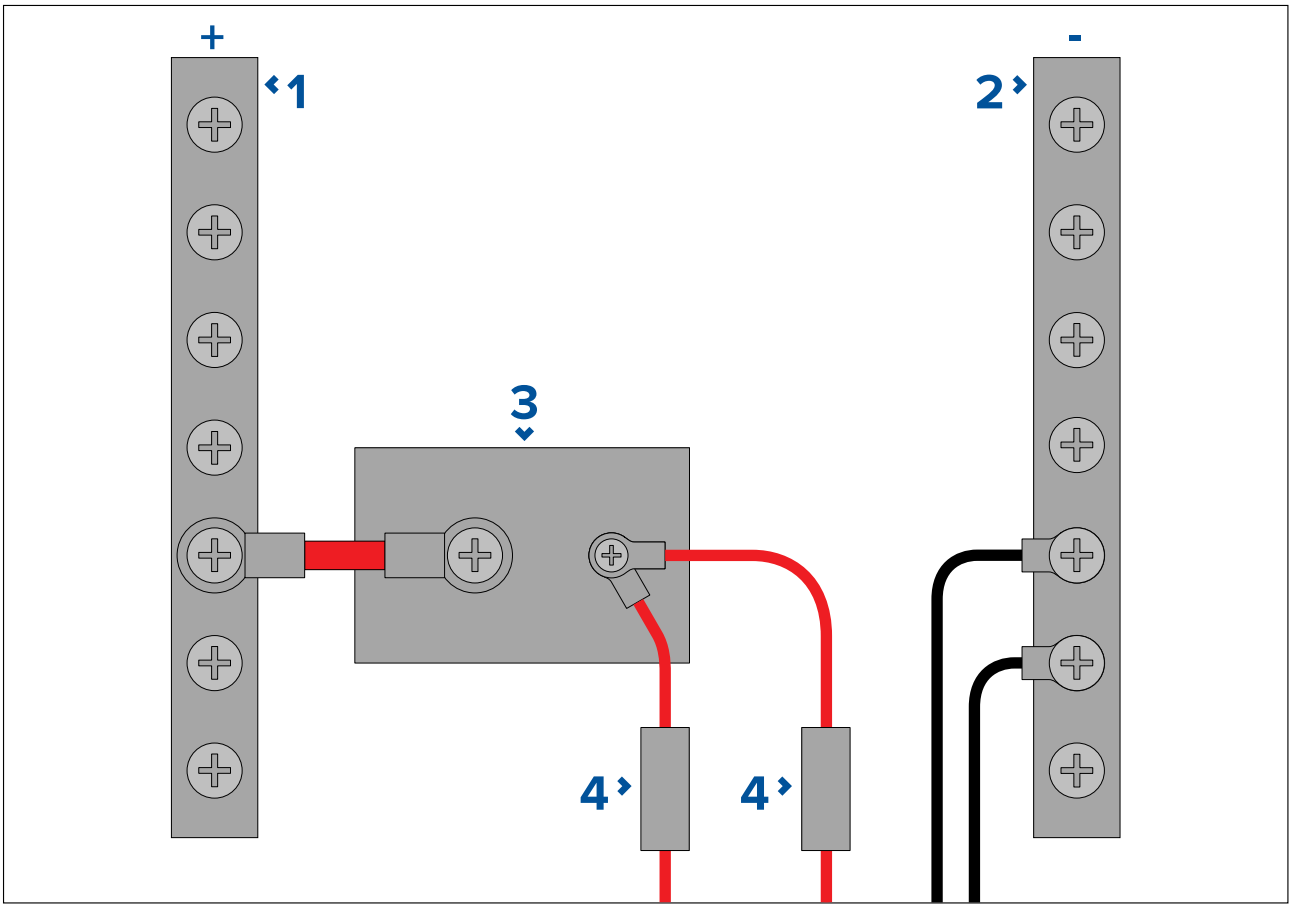
If you do not have a thermal circuit breaker or fuse in your power circuit (fitted to the DC distribution panel, for example), you MUST fit an in-line breaker or fuse to the positive wire of the power cable.

The following table provides suitable ratings for battery isolator switches, circuit breakers, and fuses.

Power supply	Device	4 kW scanner	12 kW scanner
12 volt	Isolator switch	30 amps (minimum rating)	30 amps (minimum rating)
	Thermal breaker	15 amps	15 amps
	Fuse	20 amps	20 amps
24 volt	Isolator switch	15 amps (minimum rating)	15 amps (minimum rating)
	Thermal breaker	8 amps	8 amps
	Fuse	10 amps	10 amps

9.5 Sharing a breaker

Where more than 1 piece of equipment shares a breaker you must provide protection for the individual circuits. E.g. by connecting an in-line fuse for each power circuit.



1	Positive (+) bar
2	Negative (-) bar
3	Circuit breaker
4	Fuse

Where possible, connect individual items of equipment to individual circuit breakers. Where this is not possible, use individual in-line fuses to provide the necessary protection.

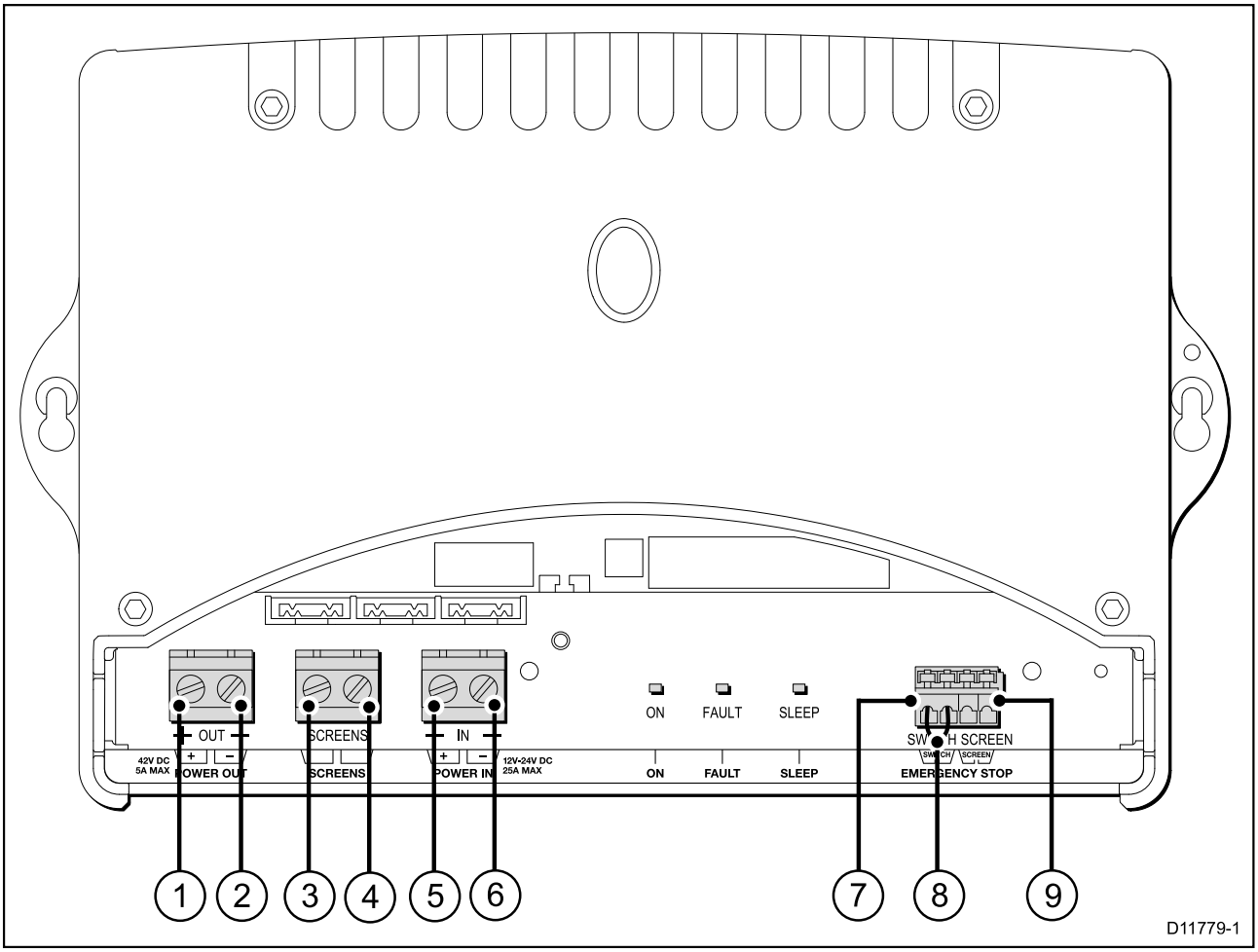
9.6 VCM100 power connections

VCM100 power and grounding requirements.

The VCM100 is intended for use on ships' DC power systems operating from 12 to 24 Volts DC.

- The VCM100 must be connected to a battery isolator switch, or a DC distribution panel.
- The battery isolator switch or DC distribution panel must be connected to the POWER IN terminals of the VCM100.
- Do NOT connect additional power switches to the cable providing the power feed to the VCM100.
- All power connections between the VCM100 and the power source must have appropriate fuse protection.
- All power connections must be of high quality to minimize resistance and to remove the risk of accidental shorts.
- The VCM100 SCREEN terminals must be connected to your vessel's RF ground system.
- Do NOT connect the radar scanner or the VCM100 to a positively-grounded power system.

The following diagram illustrates the power connections of the VCM100.



Item	Description
1	POWER OUT (Positive) — connect to the RED wire of the power and data digital cable.
2	POWER OUT (Negative) — connect to the BLACK wire of the power and data digital cable.
3	SCREEN — connect to the bare screen (drain) strands of the power and data digital cable.
4	SCREEN — connect to your vessel's RF ground system.
5	POWER IN (Positive) — connect to the positive terminal of the DC distribution panel or battery isolator switch.
6	POWER IN (Negative) — connect to the negative battery terminal.
7	EMERGENCY STOP (Switch) — if you have the optional VCM100 emergency stop button, remove the wire bridging link from the VCM100 EMERGENCY STOP terminals, and connect the emergency stop button SWITCH wire to the VCM100 EMERGENCY STOP SWITCH terminal.
8	EMERGENCY STOP wire bridging link— only remove if fitting the optional emergency stop button.
9	EMERGENCY STOP (Screen) — if you have the optional VCM100 emergency stop button, remove the wire bridging link from the VCM100 EMERGENCY STOP terminals, and connect the emergency stop button SCREEN (drain) wire to the VCM100 EMERGENCY STOP SCREEN terminal.

9.7 VCM100 power cable extension

The power cable can be extended for longer cable runs between the VCM100 and your vessel's DC distribution panel or battery isolator switch.

If you need to extend the power cable, use a splash proof junction box. The junction box should provide a terminal strip with sufficient space for power connections. The terminal strip should be a minimum of 30 Amp rating for power cores. It is essential that both power cores and the screen (drain) are connected and that the connection is of very low resistance as considerable power passes through this connection.

The following table provides recommended total power cable lengths and gauges. These figures relate to the maximum round-trip length of power cables from the battery or DC distribution panel to the VCM100. Exceeding these lengths may cause unreliable operation.

AWG (American Wire Gauge)	mm^2	Maximum distance (12 volt supply)	Maximum distance (24 volt supply)
7	10.55	15 m (49.2 ft.)	55 m (180.4 ft.)
8	8.36	10 m (32.8 ft.)	40 m (131.2 ft)
10	5.26	8 m (26.2 ft.)	32 m (104.9 ft.)
11	4.17	6 m (19.6 ft.)	24 m (78.7 ft.)

Note: If the required extensions result in unacceptably large diameter cables, use two or more smaller gauge wires to achieve the required copper wire cross-section. For example, using two pairs of 2 mm^2 cables is equivalent to using two single 4 mm^2 cables.

9.8 VCM100 screen (drain) wire extension

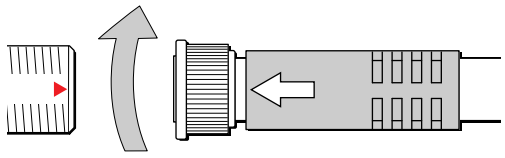
The screen (drain) wire can be extended for longer cable runs between the VCM100 and your vessel's RF ground system.

Extensions to the screen (drain) wire should use an 8 mm braid or AWG 10 (5.26 mm^2) multi-stranded cable.

9.9 Radar scanner connection

The power and data cable connector is at the rear of the radar scanner unit.

Ensuring that the arrow on the power and data cable connector is aligned with the red triangular mark on the radar scanner connector, connect the cable to the scanners' connector, and fully hand-tighten. Do NOT use a wrench or any other tool.



Note: If the antenna connector is disconnected after initial installation, Raymarine recommends that before reconnecting, you lightly coat the connector thread with Renolit Aqua 2 Calcium grease.

9.10 Display connection

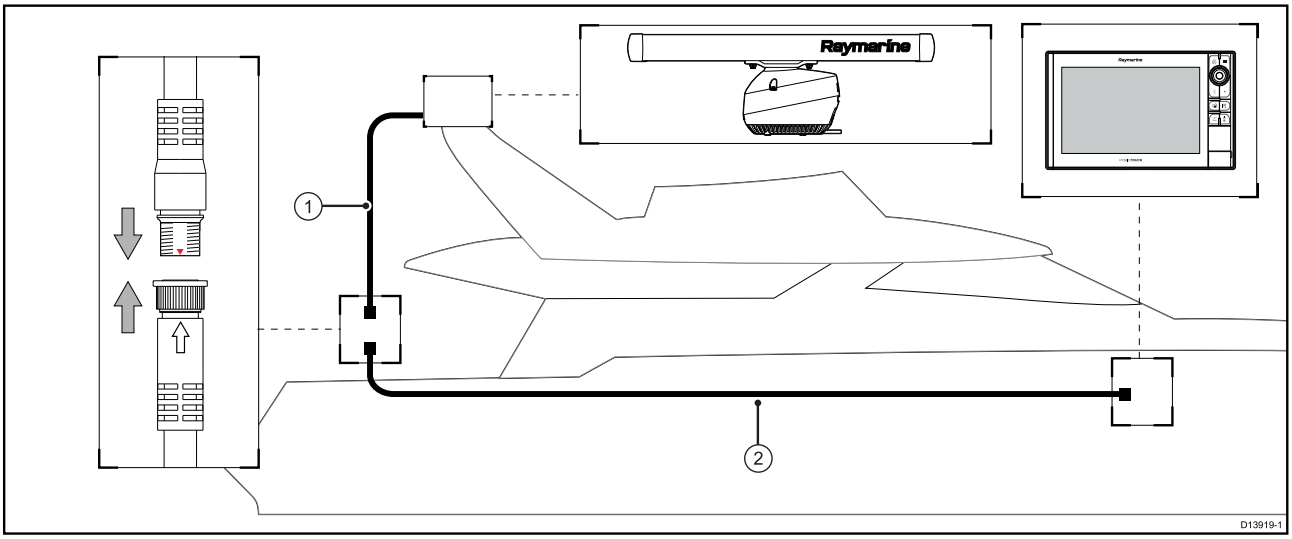
The correct connection to your multi-function display depends on whether you have a **SeaTalkhs** or **RayNet** network connector on your multi-function display.

Refer to the relevant system diagram in the following typical system example chapters:

- For **RayNet** multi-function displays, refer to: **p.29 — Typical system examples - RayNet displays**
- For **SeaTalkhs** multi-function displays, refer to: **p.33 — Typical system examples - legacy SeaTalkhs displays**

9.11 Radar cable extension

If required you can use a Raymarine radar extension cable.



1. Power-and-data radar extension cable.
2. Combined power-and-data radar cable.

Note: The extension cable connects directly to the radar scanner; the extension is at the radar end of the cable run, and is therefore compatible with both SeaTalkhs and RayNet digital radar cables.

Note: The maximum length for the combined power-and-data radar cable (including all extensions) is 25 m (82 ft).

Note: The power connections on the combined power-and-data radar cable MUST be connected to the VCM100 Voltage Converter Module (NOT shown in the diagram above).

For **RayNet** networked systems, a RayNet HS5 network switch is required between the combined power-and-data cable, and the MFD. **These connections are NOT shown in the illustration.**

For **SeaTalk hs** networked systems, a SeaTalk hs switch is required between the combined power-and-data cable, and the MFD. For non-networked SeaTalk hs connections, a crossover coupler is required for directly connecting to the MFD. **These connections are NOT shown in the illustration.**

9.12 Radar cables

For longer cable runs, a range of extensions is available for data cables, and combined power-and-data radar cables.

Note: The maximum length for the combined power-and-data radar cable (including all extensions) is 25 m (82 ft).

Radar scanner to RayNet switch

Combined power-and-data radar cables for RayNet systems

Cable	Part number	Notes
5 m (16.4 ft) Radar to “RayNet & Power” cable	A80227	
10 m (32.8 ft) Radar to “RayNet & Power” cable	A80228	
15 m (49.2 ft) Radar to “RayNet & Power” cable	A80229	
25 m (82.0 ft) Radar to “RayNet & Power” cable	A80230	

RayNet switch to display unit

RayNet network cables

Cable	Part number	Notes
0.4 m (1.3 ft) RayNet network cable	A80161	
2 m (6.5 ft) RayNet network cable	A62361	
5 m (16.4 ft) RayNet network cable	A80005	
10 m (32.8 ft) RayNet network cable	A62362	
20 m (65.6 ft) RayNet network cable	A80006	

RayNet hardware

To connect the radar to a RayNet network you will need to include:

Cable	Part number	Notes
RayNet HS5 network switch	A80007	5-port switch for network connection of multiple RayNet devices.

Radar scanner to SeaTalk hs switch (or crossover coupler)

Combined power-and-data radar cables for SeaTalk hs systems

Cable	Part number	Notes
5 m (16.4 ft) Radar to “RJ45 & Power” cable	A55076D	
10 m (32.8 ft) Radar to “RJ45 & Power” cable	A55077D	
15 m (49.2 ft) Radar to “RJ45 & Power” cable	A55078D	
25 m (82.0 ft) Radar to “RJ45 & Power” cable	A55079D	

SeaTalk hs switch (or crossover coupler) to display unit

SeaTalk hs network cables

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

SeaTalk hs hardware

To connect the radar to a SeaTalk hs multifunction display you will need to include one of the following:

Cable	Part number	Notes
SeaTalk hs switch	E55058	8–way hub for network connection of multiple SeaTalk hs devices.
SeaTalk hs coupler	E55060	Coupler for connection of a single SeaTalk hs device.

Extension cables

Use of one of these cables to extend the radar connection to the data network (RayNet OR SeaTalk hs) and power supply. These cables contain both power and data wires, and extend the **radar end** of the digital cable, and are therefore compatible with both **SeaTalkhs** and **RayNet** variant digital cables.

Cable	Part number	Notes
2.5 m (8.2 ft) Radar extension cable	A92141D	One male radar connector; one female radar connector.
5 m (16.4 ft) Radar extension cable	A55080D	One male radar connector; one female radar connector.
10 m (32.8 ft) Radar extension cable	A55081D	One male radar connector; one female radar connector.

Chapter 10: Post-installation procedures

Chapter contents

- 10.1 Mechanical checks on page 60
- 10.2 Checking for interference on page 60
- 10.3 Radar scanner initial power on test on page 60
- 10.4 Radar check on page 60

10.1 Mechanical checks

Before switching on the radar scanner:

- Ensure that:
  - All securing bolts are fully tightened and the appropriate mechanical locking washers are in place.
  - All connections are securely made.
  - All connecting cables and wires are secured and protected as necessary.
- Ask your local Raymarine authorized installer to check the installation.

10.2 Checking for interference

Post installation check

If you have installed any system aboard a boat or made other changes to the boat's electronic systems (radar, VHF radio etc.), you need to check before casting off, that all electrical systems operate satisfactorily without any undue electrical interference, in order to conform with Electro Magnetic Compatibility (EMC) regulations. To do this:

1. Ensuring it is safe to do so, turn on all electronic systems aboard your vessel.
2. Check that the electronic systems all operate satisfactorily.

10.3 Radar scanner initial power on test

With all cables correctly and securely connected to the radar scanner, and access to a multifunction display (power OFF):

1. Ensure the radar scanner power switch is set to ON.
2. Power on the multifunction display.
   The magnetron warm-up sequence should start, after which the radar scanner should enter Standby mode.
3. If necessary, adjust the lighting and contrast on the multifunction display.

10.4 Radar check



Warning: Radar scanner safety

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



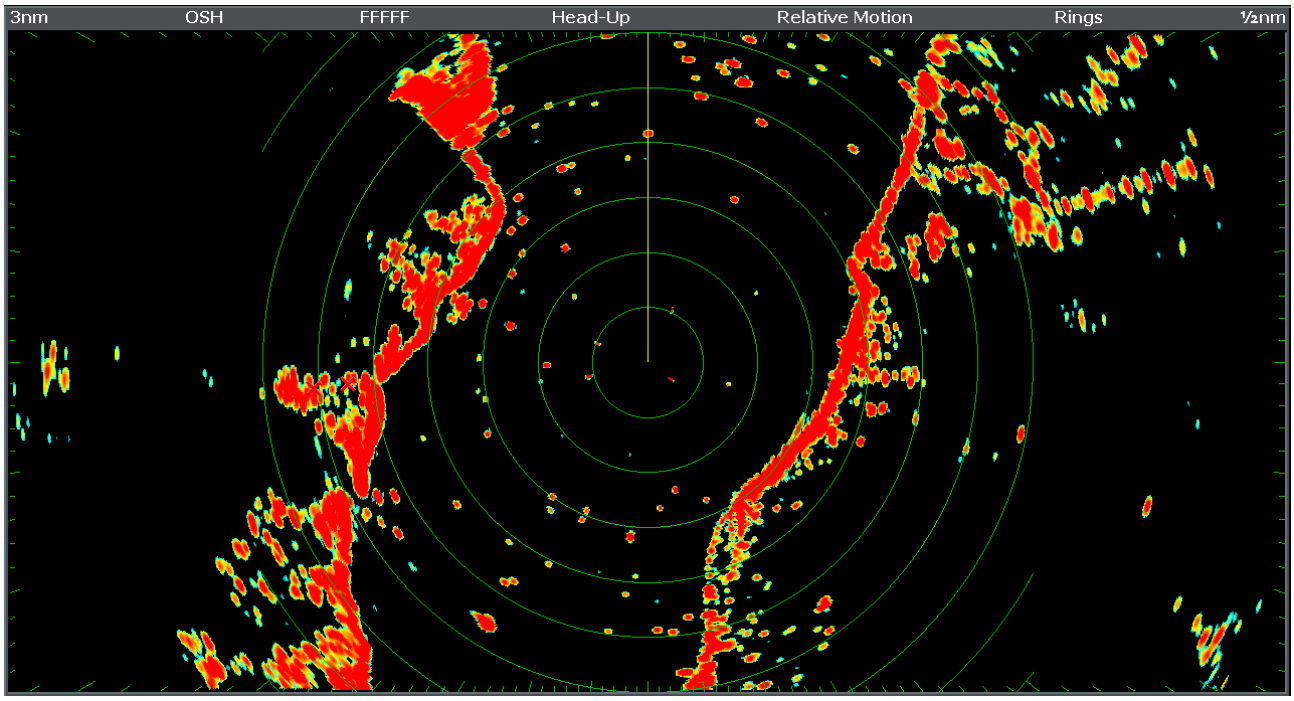
Warning: Radar transmission safety

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

Checking the radar — SeaTalkhs displays

1. Select a Radar page.
   The Radar scanners will now initialize in standby mode, this process will take approximately 70 seconds.
2. Press the **POWER** button.
3. Press the **Radar Tx/Stdby** softkey and set to Tx.
   The scanners should now be transmitting and receiving.
4. Check that the radar screen is operating correctly.

Typical HD digital radar screen



Note: *The example above is representative of the enhanced output provided by a HD digital radar scanner.*

Points to check:

- *Radar sweep with echo responses are shown on screen.*
- *Radar status icon rotating in top right hand corner.*

Checking the radar — RayNet displays

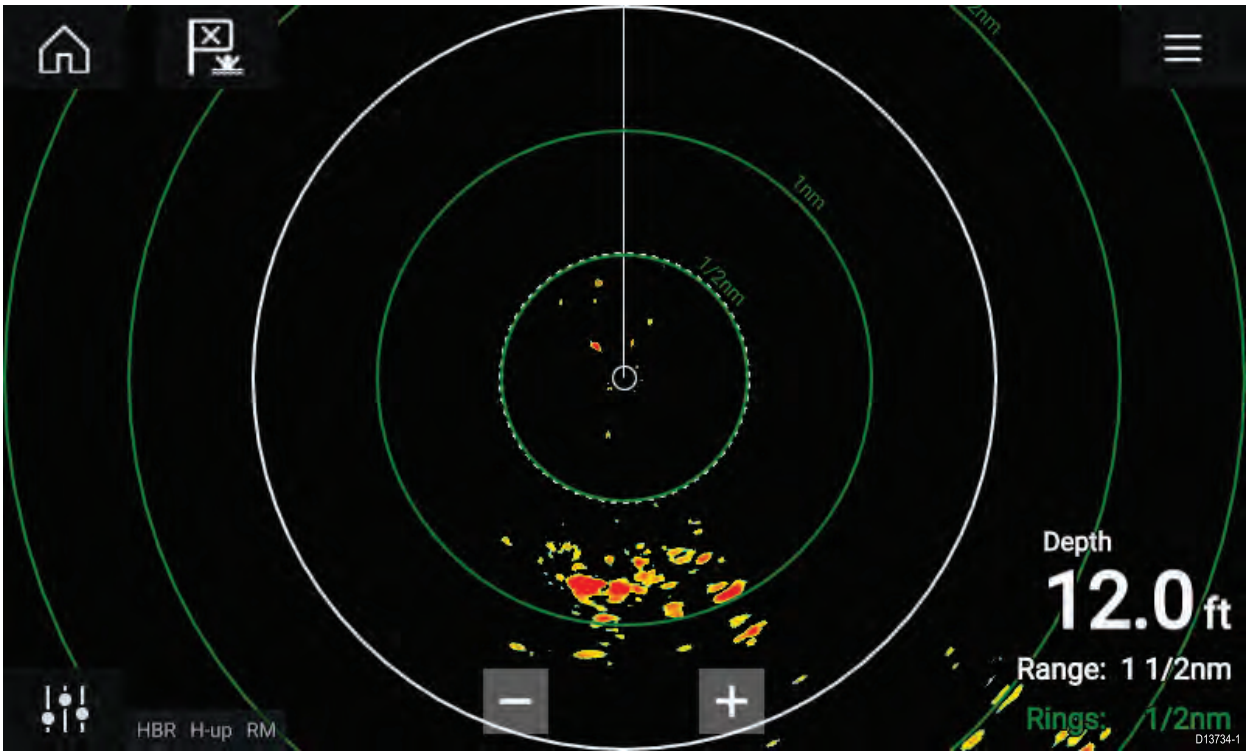
These instructions apply to multifunction displays running LightHouse™ 3 software.

1. Select a Radar page.
   The '**Off/Not Connected**' message is displayed.
2. Select **On** to power up your radar.

   This process will take approximately 70 seconds.

   The scanner should now be transmitting and receiving.
3. Check that the radar screen is operating correctly.

Typical radar screen



Points to check:

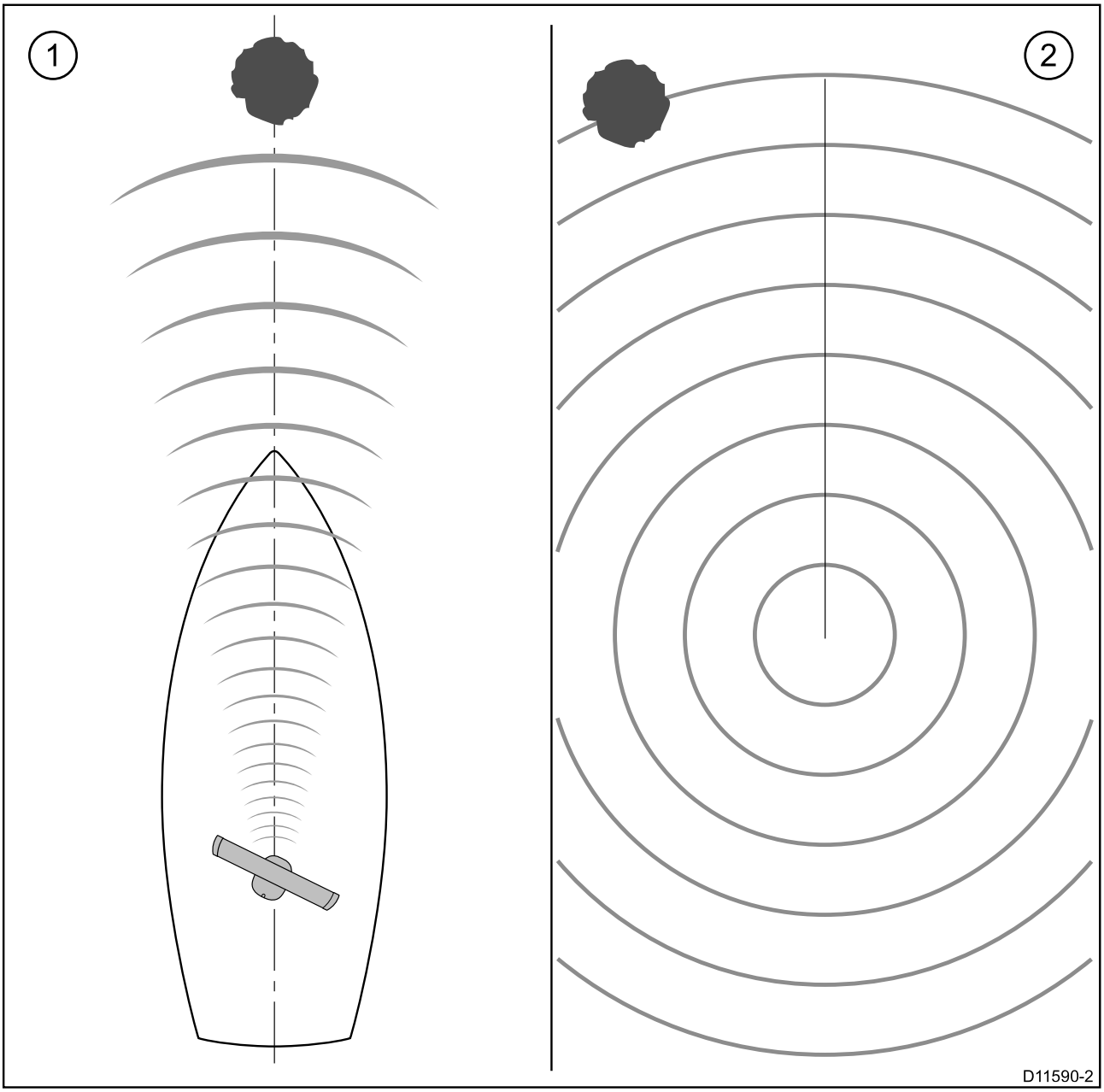
- *Radar sweep with echo responses are shown on screen.*
- *Radar status icon rotating in top right hand corner.*

Check and adjust bearing alignment

Bearing alignment

The Radar bearing alignment ensures that Radar objects appear at the correct bearing relative to your boat's bow. You should check the bearing alignment for any new installation.

Example misaligned Radar



Item	Description
1	Target object (such as a buoy) dead ahead.
2	Target displayed on the Radar display is not aligned with the Ship's Heading Marker (SHM). Bearing alignment is required.

Checking the bearing alignment

1. With your vessel under way: Align the bow with a stationary object identified on the Radar display An object between 1 & 2 NM distant is ideal.
2. Note the position of the object on the Radar display. If the target is not under the ships heading marker (SHM), there is an alignment error and you will need to carry out bearing alignment adjustment.

Adjusting the bearing alignment

Once you have checked the bearing alignment you can proceed and make any required adjustments.

With the radar page displayed:

1. Select the **RADAR SETUP** > **BEARING ALIGNMENT** menu.
2. Press the **BEARING ALIGNMENT** softkey.
3. Use the rotary control to place the selected target under the Ship's Heading Marker.
4. Press **OK** when complete.

Adjusting radar offset (parking)

This setting is applicable to open array scanners. It is used to ensure the scanner parks in the correct position when rotation stops.

Before you proceed, ensure that:

- The radar page is selected
- The radar scanner is initialized standby mode

1. Press the **RADAR SETUP** > **SCANNER SETUP**.
2. Select the **PARKING OFFSET** option, then adjust the offset angle required to park the radar so that the antenna comes to rest facing forward (you should see the Raymarine logo wording from the front of the vessel) when you place it in either standby or switch it off.
3. Press **OK** when complete.

Chapter 11: Operation

Chapter contents

- 11.1 Operation instructions on page 66

11.1 Operation instructions

For detailed operation instructions for your product, refer to the documentation that accompanies your display.

All product documentation is available to download from the Raymarine website: www.raymarine.com/manuals.

Chapter 12: Maintenance

Chapter contents

- 12.1 Switch off power on page 68
- 12.2 Service and maintenance on page 68
- 12.3 Routine equipment checks on page 68
- 12.4 Maintenance on page 68
- 12.5 Product cleaning on page 68

12.1 Switch off power

Short desc is not printed, but is used in searches

Before commencing any maintenance task, switch off all power to the product.

12.2 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.

12.3 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.

12.4 Maintenance

Once a year:

1. Remove one of the antenna-securing bolts and associated washers.
2. Clean the bolt and washers.
3. Use Denso paste to lightly re-grease the bolt thread.
4. Replace the bolt and associated washers.
5. Repeat steps 1 to 5 for all antenna-securing bolts.
6. Tighten all antenna-securing bolts to a torque of 30 N·m (22.1 lbf·ft).

Periodically, carry out these other maintenance tasks:

- Ensure the antenna is firmly attached to the mounting surface
- Check that the cable connections are in good condition and securely attached.
- Examine all cables for signs of chafing, cuts or other damage. If the antenna connector shows any sign of corrosion:
  1. Disconnect it.
  2. Clean the connector.
  3. Lightly re-coat the connector threads with Renolit Aqua 2 Calcium grease.
  4. Reconnect and hand-tighten the connection until it is secure.

12.5 Product cleaning

Best cleaning practices.

When cleaning products:

- Switch off power supply.
- Lightly rinse or flush with clean, cool fresh water.
- Do NOT use: abrasive, acidic, ammonia, solvent or other chemical based cleaning products.
- Do NOT use a jet wash.

Chapter 13: Troubleshooting

Chapter contents

- 13.1 Troubleshooting on page 70
- 13.2 Power up troubleshooting on page 71
- 13.3 Radar troubleshooting on page 72
- 13.4 System data troubleshooting on page 74
- 13.5 VCM100 LED indications on page 75
- 13.6 SeaTalk hs LED indications on page 76

13.1 Troubleshooting

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

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

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

13.2 Power up troubleshooting

Product does not turn on or keeps turning 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 *Technical Specification* 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 display 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 display turned on, try flexing the power cable near to the display 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 power supply may be wired incorrectly, ensure the installation instructions have been followed.

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 turn on or keeps turning off'.
Software corruption	1. In the unlikely event that the product's software has become corrupted, try downloading and installing the latest software from the Raymarine website. 2. On display products, as a last resort, attempt to perform a 'Power on Reset'. Be aware that this will delete all settings / presets and user data (such as waypoints and tracks), and revert the unit back to factory defaults.

13.3 Radar troubleshooting

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

No connection can be made to the scanner

Possible Causes	Possible Solution
Radar powered down	• If the scanner unit has shut down, awaken it by using the **Power Up Radar** option on the Shortcuts page, accessible on your MFD by momentarily pressing the power button. • Quantum Radar will shut down within 30 minutes if neither a wired (RayNet) connection, nor a wireless (Wi-Fi) connection can be made to a multifunction-display unit (MFD).
Radar not transmitting	Select Tx for the relevant Radar scanner from the Shortcuts page.
Missing or incorrect Wi-Fi credentials	If using a WiFi (wireless) connection to the Radar, check that you have entered the correct WiFi pass key for the SSID that matches your scanner. Both the SSID and WiFi pass key are provided on the scanner packaging, and are also shown on the serial number label on the underside of the unit.
Damaged or disconnected Power cable / RayNet 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 unit turned on, try flexing the cable near to the display connector to see if this causes the unit to re-boot/loose 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. 5. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc (this can cause the unit to reset/turn off), replace if necessary. 6. Check condition of relevant breakers and fuses, replace if necessary. . If breaker keeps tripping or fuses keep blowing, contact a Raymarine authorized dealer for assistance.
Open Array power switch in OFF position	Ensure Open Array power switch is in ON position.
Software mismatch between equipment may prevent communication.	Ensure all Raymarine products contain the latest available software, check the Raymarine website: www.raymarine.com/software for software compatibility.

Displayed bearing is different to the true bearing.

Possible Causes	Possible Solution
Bearing alignment adjustment required	Carry out the Bearing Alignment procedure described in the latest version of the **LightHouse™** Operations manual (81360).

Radar will not initialize (Voltage control module (VCM) stuck in “sleep mode”

Possible Causes	Possible Solution
Intermittent or poor power connection	Check power connection at VCM. (Voltage at input = 12 / 24 V, Voltage at output = 40 V)

13.4 System data troubleshooting

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

Problem	Possible causes	Possible solutions
Instrument, engine or other system data is unavailable at all displays.	Data is not being received at the display.	Check the data bus (e.g. **SeaTalk ng**) wiring and connections.
		Check the overall integrity of the data bus (e.g. **SeaTalk ng**) wiring.
		If available refer to the reference guide for the data bus (e.g. **SeaTalk ng** reference manual).
	Data source (e.g. instrument display or engine interface) is not operating.	Check the source of the missing data (e.g. instrument display or engine interface).
		Check the power to the **SeaTalk** bus.
		Refer to the manufacturer's handbook for the equipment in question.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Instrument or other system data is missing from some but not all displays.	Network problem.	Check that all required equipment is connected to the network.
		Check the status of the Raymarine network Switch.
		Check that **SeaTalk hs** / **RayNet** cables are free from damage.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Position data is not displayed on VHF radio	VHF radio **NMEA 0183** input not isolated / incorrect polarity	• Check that the radio has an Isolated **NMEA 0183** input. • Check polarity of **NMEA 0183** wires.

13.5 VCM100 LED indications

LED indications associated with the VCM100.

LED name	LED color / state	Possible causes
On	Green / solid	Radar operating normally.
Fault	Red / solid	Fault condition.
Sleep	Yellow / flashing	Radar scanner in standby.
	Yellow / solid	Fault condition, unit self-recovers after 20 seconds.

13.6 SeaTalk hs LED indications

LED indications associated with the SeaTalk hs switch are described here.

LED state	Possible causes
For all connected channels: 1 steady and 1 flashing green LED.	No problem detected (Steady LED indicates network connection Flashing LED indicates network traffic) .
No LEDs are illuminated.	No power to the SeaTalk hs switch.
Some LEDs are not illuminated.	• Cable / connection faults on the channels with non-illuminated LEDs. • Equipment connected to non-illuminated LEDs may be faulty.

Chapter 14: Technical support

Chapter contents

- 14.1 Raymarine product support and servicing on page 78
- 14.2 Learning resources on page 79

14.1 Raymarine product support and servicing

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

Product information

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

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

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

Servicing and warranty

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

Don't forget to visit the Raymarine website to register your product for extended warranty benefits: http://www.raymarine.co.uk/display/?id=788.

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

- E-Mail: emea.service@raymarine.com
- 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** — http://forum.raymarine.com
- **Software updates** — http://www.raymarine.com/software

Worldwide support

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

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

United States (US):

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

Australia and New Zealand (Raymarine subsidiary):

- E-Mail: aus.support@raymarine.com
- 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

14.2 Learning resources

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

Video tutorials

Raymarine official channel on YouTube:

- YouTube

LightHouse™ 3 tips and tricks:

- Raymarine website

Video Gallery:

- Raymarine website

Note:

- Viewing the videos requires a device with an Internet connection.
- Some videos are only available in English.

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:

- http://forum.raymarine.com

Chapter 15: Technical specification

Chapter contents

- 15.1 Technical specification on page 82

15.1 Technical specification

Approvals

Region	Certification
USA	47CFR FCC Part 2 & Part 80 Certificate of Approval
Canada	RSS138 Iss. 1 Technical Acceptance Certificate
European Union & EFTA	R & TTE directive 1999/5/EC Certificate of Opinion
Australia / New Zealand	ACMA Declaration of Conformity Compliance level 3

General

	48” 4kW HD or SuperHD	72” 4kW HD or SuperHD	48” 12kW HD or SuperHD	72” 12kW HD or SuperHD
Dimensions	• Pedestal: 412 mm x 402 mm (to top of antenna) • Antenna length: 1306 mm	• Pedestal: 412 mm x 402 mm (to top of antenna) • Antenna length: 1918 mm	• Pedestal: 412 mm x 402 mm (to top of antenna) • Antenna length: 1306 mm	• Pedestal: 412 mm x 402 mm (to top of antenna) • Antenna length: 1918 mm
Weight (with antenna)	26 kg (57 lb)	29 kg (64 lb)	26 kg (57 lb)	29 kg (with antenna)
Supply voltage	10.8 to 32 volts (using VCM100)	10.8 to 32 volts (using VCM100)	10.8 to 32 volts (using VCM100)	10.8 to 32 volts (using VCM100)
Power consumption (typical)	< 70 watts	< 70 watts	< 110 watts	< 110 watts
Power consumption (standby)	< 30 watts	< 30 watts	< 30 watts	< 30 watts
Power consumption (sleep)	< 1.2 watts	< 1.2 watts	< 1.2 watts	< 1.2 watts
Maximum range scale	72 nautical miles	72 nautical miles	72 nautical miles	72 nautical miles
Warm-up time	75 seconds	75 seconds	75 seconds	75 seconds
Standby to transmit	2.5 seconds	2.5 seconds	2.5 seconds	2.5 seconds
Environmental:				
Waterproof rating	IPX6	IPX6	IPX6	IPX6
Operating temperature range	-25 °C to +55 °C (-13 °F to +131 °F).	-25 °C to +55 °C (-13 °F to +131 °F).	-25 °C to +55 °C (-13 °F to +131 °F).	-25 °C to +55 °C (-13 °F to +131 °F).
Humidity	Up to 95% at 35°C (95 °F)	Up to 95% at 35°C (95 °F)	Up to 95% at 35°C (95 °F)	Up to 95% at 35°C (95 °F)
Maximum wind speed	85 knots	85 knots	85 knots	85 knots

Range

Range (Nm)	Expanded range (Nm)	Pulse width (nominal)	PRF
0.125, 0.25	N/A	75 ns	3 kHz
0.5	N/A	100 ns	3 kHz
0.75	0.125, 0.25	150 ns	3 kHz
N/A	0.5	250 ns	3 kHz
1.5	0.75	350 ns	2 kHz
3	N/A	450 ns	1.5 kHz
N/A	1.5	600 ns	1.3 kHz
6 +	3 +	1.0 us	820 Hz

Transmitter

	48” 4kW HD or SuperHD	72” 4kW HD or SuperHD	48” 12kW HD or SuperHD	72” 12kW HD or SuperHD
Transmitter frequency	9405 MHz ±20 MHz	9405 MHz ±20 MHz	9405 MHz ±20 MHz	9405 MHz ±20 MHz
Peak power output	4 kW	4 kW	12 kW	12 kW
Standby mode	Magnetron heater: ON Magnetron control: ON All other services: OFF	Magnetron heater: ON Magnetron control: ON All other services: OFF	Magnetron heater: ON Magnetron control: ON All other services: OFF	Magnetron heater: ON Magnetron control: ON All other services: OFF

Receiver (all models)

Intermediate frequency:	70 MHz
Receiver characteristic:	Linear
Receiver noise:	Less than 5 dB (including low noise converter and IF amplifier)
Bandwidth:	Matched digital filter for each pulse length

Antenna

	48” 4kW HD or SuperHD	72” 4kW HD or SuperHD	48” 12kW HD or SuperHD	72” 12kW HD or SuperHD
Beamwidth (vertical)	25° (nominal)	25° (nominal)	25° (nominal)	25° (nominal)
Beamwidth (horizontal)	1.85° (nominal)	1.15° (nominal)	1.85° (nominal)	1.15° (nominal)
Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Rotation speed	24 RPM 48 RPM (compatible displays and scanners only)	24 RPM 48 RPM (compatible displays and scanners only)	24 RPM 48 RPM (compatible displays and scanners only)	24 RPM 48 RPM (compatible displays and scanners only)

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