KODEN

INSTALLATION MANUAL

SOLID-STATE RADAR

# KRS Series

KRS-SER.IM.E 0093114244-00

**KRS Series Installation Manual**
**Doc No. 0093114244**

**Document Revision History**

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**Document No. Revised Version Norm**

When part of the document needs to be revised, the document has advanced revision number.
The document No. is indicated at the lower right side on the cover and at the left or right side of the footer region of each page.

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# CHAPTER 1: HEALTH & SAFETY

## Warnings and cautions

**Note:**

The warnings and cautions detailed in this document apply to the installation and commissioning of the equipment. For warnings and cautions related to equipment operation please refer to the Operation manual. For a list of applicable documents refer to: **p.21 — Product documentation**

## Risk assessment

In accordance with employer's, vessel owner's and/or shipyard's requirements, risk assessments of the work areas must be carried out prior to commencing installation of equipment. Risk assessments should be reviewed regularly.

## Aid to navigation

The equipment detailed in this document comply with relevant SOLAS regulations and are provided as an aid to navigation. The equipment should be used in accordance with the SOLAS regulations.

## Safety warnings

### Warning: Product installation and commissioning

- This product must be installed and operated in accordance with the Installation manual. Failure to do so could result in personal injury, damage to the vessel and/or poor product performance.
- The installation and commissioning of the equipment must be performed by an authorized engineer.
- Incorrect or unauthorized installations can be dangerous and may void product warranty.

### Warning: Poor installation

Incorrect or poor mounting of equipment can be dangerous and also invalidate product warranty.

### Warning: Weather conditions

When working in adverse weather conditions ensure that a full risk assessment is carried out prior to working aloft. Adverse weather conditions can include but are not restricted to high winds, heavy rain, snow, ice or a sea state which may cause vessel pitch and roll.

## Warning: Working aloft

When working at height ensure that:

- all applicable regulatory, employer, shipyard and vessel health & safety requirements must be adhered to, including but not limited to the inspection and use of Personal Protective Equipment (PPE), such as approved safety harnesses and protective gloves etc.
- any nearby equipment with moving parts or which radiate RF are fully electrically and mechanically isolated.
- someone in authority and at ground level is aware of the required works and that suitable clear warnings are in place.
- a safety cordon is put in place below the working area.
- all access routes are secure and beware of wet or slippery surfaces such as work areas or ladder rungs etc.
- all equipment and loose items such as replacement equipment and tools are safely stowed or secured so that they cannot present a drop hazard.

## Warning: Equipment lifting

- When lifting spares and equipment to a platform or via a ladder, heavy items must be lifted using suitably-rated lifting bag or strops.
- You MUST NOT manually carry heavy items up ladders, as they can present a drop hazard.

## Warning: Radar rotation

Some settings will power up the Radar scanner causing the antenna to rotate. Ensure that all personnel are clear of the Radar scanner before the Radar scanner is powered up.

## Warning: Radio Frequency (RF) 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.

Radio Frequency (RF) transmissions can affect cardiac pacemakers and cause damage or cause irregularities in their operation. Any users of such devices should be aware and understand the risks prior to exposure.

**Important:**

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

## Transmitted power density levels (from center of rotation)

Installers must ensure that the Radar is installed in a location that adequately protects crew members and the general public from Radar antenna transmissions. Transmitted power density is based on the antenna gain, and the distance to the antenna.

The following table lists the calculated minimum compliance boundary (in meters) for *transmitted power density levels*(rounded up to the nearest 0.1 m):

| Worker / Occupational / Crew | General Public |
|---|---|
| 0.3 m which is < Swept Volume (0.975 m) | 0.5 m which is < Swept Volume (0.975 m) |

**Range within which the power density exceeds the following:**

| | | | |
|---|---|---|---|
| **Antenna Rotating** | 10W/$m^2$<br>0.5 m < Swept Volume (0.975 m) | 50W/$m^2$<br>0.3 m < Swept Volume (0.975 m) | 100W/$m^2$<br>A power density level of 100W/$m^2$ does not occur at any point. |

### Warning: Fire Risk

Equipment may contain materials which produce toxic fumes if burnt.

### Warning: Potential ignition source

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

### Warning: High voltage

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

### Warning: Switch off power supply

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

### Warning: Bearing alignment

Incorrect alignment of the heading line will result in a misalignment of radar returns in bearing. For example a 0.1 error will result in a target at 11 NM being displaced in azimuth by approximately 35 m (114.83 ft).

### Warning: Day mode brightness warning

Switching from Night mode to Day mode instantly increases the display brightness to maximum. This will impact the operator's night vision, due to the relative brightness of Day mode in night time conditions.

# Product warnings

## FCC Notice

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

### 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.

### Warning: Marine-grade sealant

Only use marine-grade neutral cure polyurethane sealants. Do NOT use sealants containing acetate or silicone, which can cause damage to plastic parts.

### Warning: Product grounding

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

### Warning: Anti virus protection

The system does not include protection against computer viruses. Before inserting any memory device ensure it is free from computer viruses by scanning the device with a suitable anti virus application with up to date virus definitions.

### Caution: Product weight

- Refer to the technical specification for your product to ensure the intended mounting surface is suitable to bear its weight.
- 2 people may be required for installation of larger / heavier products.

### 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: Servicing, maintenance and repair

Servicing, maintenance and repair of this equipment can only be carried out by Koden Electronics Co., Ltd. authorized engineers. Unauthorized servicing, maintenance and repair of the equipment will invalidate product warranty and require re-commissioning of the equipment.

# Regulatory notices

## Disclaimer

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

Koden 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. Koden Electronics Co., Ltd. or its affiliates have not tested or screened the third-party hardware. Koden has no control over, and is not responsible for:

- (a) the content and operation of such third-party hardware; or:
- (b) the privacy or other practices of such third-party hardware.

The fact that Koden's documentation may make reference to such third-party hardware does not indicate any approval or endorsement of any such third-party hardware. Koden may reference such third-party hardware only as a convenience.

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**Koden** does not exclude **Koden**'s liability (if any) to you for personal injury or death resulting from **Koden Electronics Co., Ltd.** negligence, for fraud or for any matter which it would be illegal to exclude or to attempt to exclude.

## 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. Koden will not warrant products subjected to high-pressure washing.

## Approval certificates

For more information, contact Koden dealer or Koden.

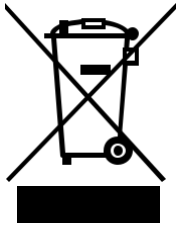
## Warranty registration

This registration must be completed in full to receive the warranty from Koden Distributor/Dealer or Koden Electronics Co., Ltd.
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 should retain the bar code label indicating the serial number of the 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.
This equipment shall be disposed according to the municipal regulations or rules.

## Technical accuracy

To the best of our knowledge, the information in this document was correct at the time it was produced. However, Koden 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, Koden cannot accept liability for any differences between the product and this document. Please check the Koden website 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



*Card reader: option

## 2.1 Handbooks

It is recommended that you read this document thoroughly before attempting installation, commissioning, or operation of this equipment. Ensure that you have read and understood all the specified warnings, cautions, location requirements, and limitations for the equipment. Ensure that you have read and understood cable routing requirements, connection requirements, connection methods, and configuration steps for the equipment and any connected devices.

## 2.2 Applicable products

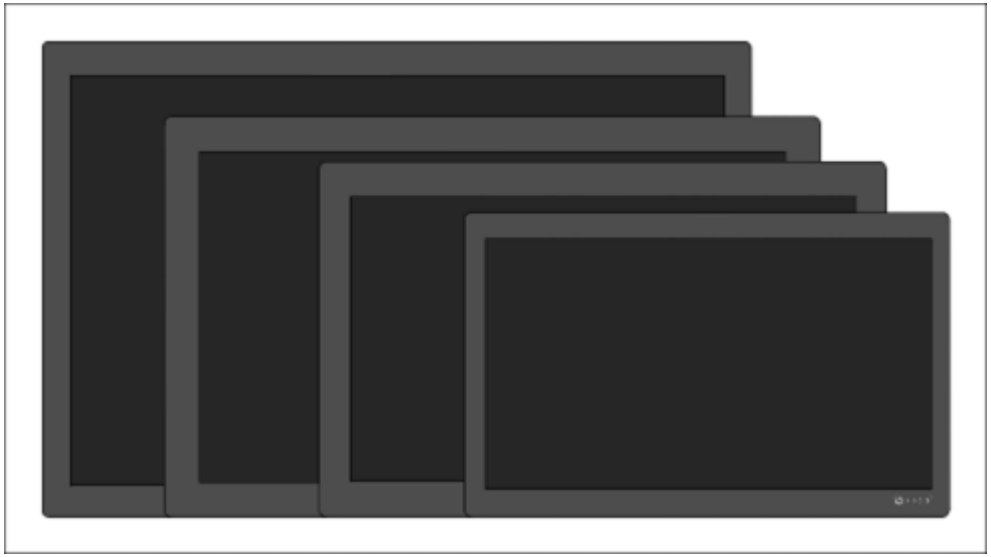
This document is applicable to the KRS Radar system.

### KRS Radar system

- KRS 16” Radar System, part number: KRS-1611P
- KRS 19” Radar System, part number: KRS-1911P
- KRS 22” Radar System, part number: KRS-1211P
- KRS 24” Radar System, part number: KRS-1411P

The KRS Radar System include the following products:

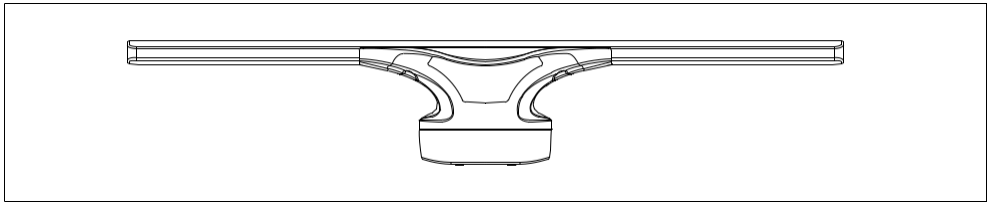
### Radar display unit



- KRS 16” Radar display, part number: RSD-16P
- KRS 19” Radar display, part number: RSD-19P
- KRS 22” Radar display, part number: RSD-12P
- KRS 24” Radar display, part number: RSD-14P

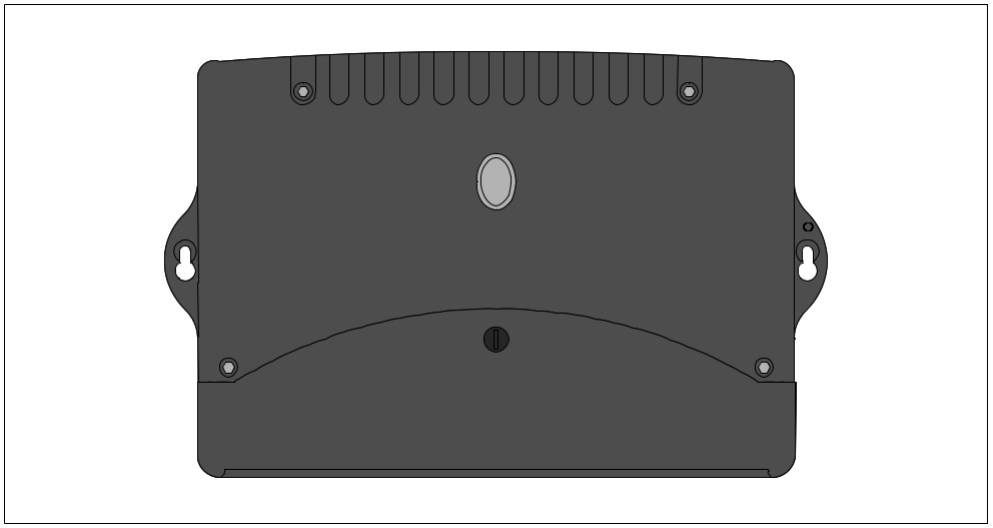
Including External alarm buzzer and External card reader* peripherals.

### Radar scanner unit



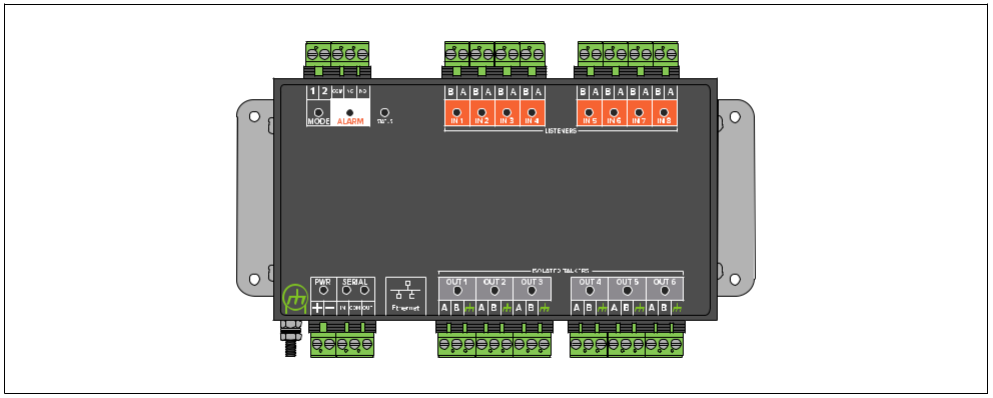
- Open array 110 W pedestal, part number: RSB-111P
- 6 ft Antenna, part number: RSA-1SP

## Radar scanner voltage converter module



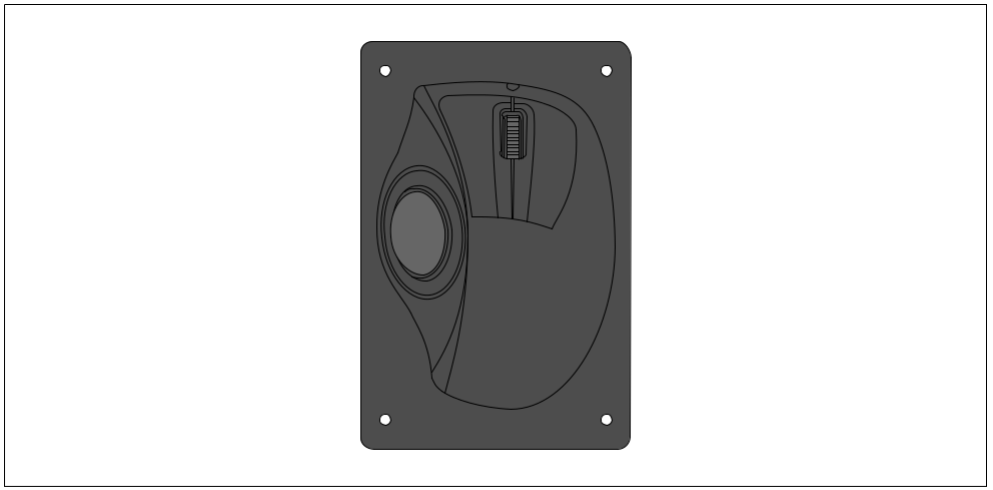
- VCM100 Voltage Converter Module, part number: E70648

## KRS Data Collection Unit (DCU)



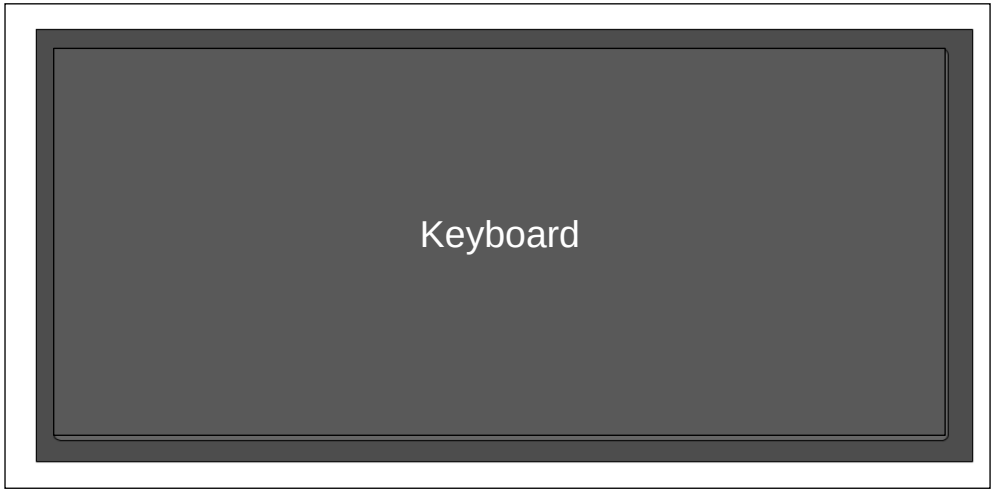
- KRS DCU, part number A80792

## KRS Trackball



- KRS Trackball, part number A80788

## KRS Keyboard — Optional accessory




- KRS Keyboard, part number A80790

**Note:**

The KRS keyboard is not included when ordering a KRS Radar System and must be ordered separately.

## 2.3 Product documentation

The following documentation is applicable to the KRS Radar System:

### Applicable documents

- KRS Radar System Installation manual (This document).
- KRS Radar Operation manual.
- 16” Display Mounting Template
- 19” Display Mounting Template
- 22” Display Mounting Template
- 24” Display Mounting Template
- Radar Scanner Mounting Template
- KRS Radar 3rd Party Integrator’s Guide

## 2.4 Operation manual

For detailed the Operation manual for your product, refer to the documentation that accompanies your display.
• KRS Radar Operation manual.

## 2.5 Document conventions

The following conventions are used throughout this document.

**Formatting of user interface menus and settings references**

References to menus, settings options and physical buttons are formatted using square brackets [].

**Examples:**

- “Select *[Guard Zone]*from the *[Additional features]*menu.
- “Enable the *[AIS]*toggle switch to display AIS targets onscreen.”
- Swipe your finger from left to right across the *[Power swipe]*touch control.

**Procedures for performing specific tasks using the product’s user interface**

The term “**Select**” is used to refer to the action of:

- *Trackball*— moving the cursor over an item and clicking the left or right button.
- *Touchscreen* — using your finger to select a menu option or item on the screen.

**Examples:**

- “Select *[Ok]* to confirm your selection.”
- “Select the target onscreen.”

The term “**Drag**” is used to refer to the action of:

- Trackball — click and hold left or right button and use the ball to move the cursor.
- Touchscreen — using your finger to select an item and then moving your finger in the required direction.

**Procedures for navigating menu hierarchies**

Menu hierarchies are used in this document to provide a quick summary on how to access a particular function or menu option.
References to menu hierarchies are formatted using square brackets [] with an arrow > separating each menu setting.

**Examples:**

- “The CCRP location can be configured from the *[Ownship]* settings menu: *[Standby screen > Settings > Ownship]*.”

## 2.6 Document illustrations and screenshots

**Note:**

- Whilst care is taken to ensure that the illustrations and screenshots provided in this document portray the latest hardware and software versions available, where differences are purely aesthetic, some illustrations and screenshots may depict an older version of hardware or software.
- The navigation and/or sensor data shown in screenshots may be simulated data and therefore may not reflect real world conditions.

# CHAPTER 3: PRODUCT AND SYSTEM OVERVIEW

## CHAPTER CONTENTS



*Card reader: option

# 3.1 KRS radar system overview

The Koden KRS radar system comprises of a Radar display with an integrated processor, Radar scanner, a Data Collection Unit (DCU) and display peripherals.

The Koden KRS radar system is currently compliant for CAT3 and CAT2 ships / craft.

The following table provides a summary of the categories and basic differential capabilities for each category of SOLAS shipborne radar equipment.

| Size of ship/craft | CAT 3 <500gt | CAT 2 500gt to <10000gt HSC <10000 gt | CAT 1 10000gt | KRS capability |
|---|---|---|---|---|
| Minimum operational display area diameter | 180 mm (7.09 in) | 250 mm (9.84 in) | 320 mm (12.60 in) | - |
| Auto acquisition of targets | - | - | Yes | Yes |
| Minimum acquired radar target capacity | 20 | 30 | 40 | 100 |
| Minimum activated AIS target capacity (simultaneously displayed) | 20 | 30 | 40 | 4,000 |
| Minimum sleeping AIS target capacity (simultaneously displayed) | 100 | 150 | 200 | 4,000 |
| Trial manoeuvre | - | - | Yes | Yes |

**Range and bearing discrimination**

- MSC.192/5.5.1: In line with regulations, the radar system is capable of displaying two point targets on the same bearing, separated by 40 m (131.23 ft) in range, as two distinct objects.
- MSC.192/5.5.2: In line with regulations, the radar system is capable of displaying two point targets on the same range, separated by 2.5° in bearing, as two distinct targets.

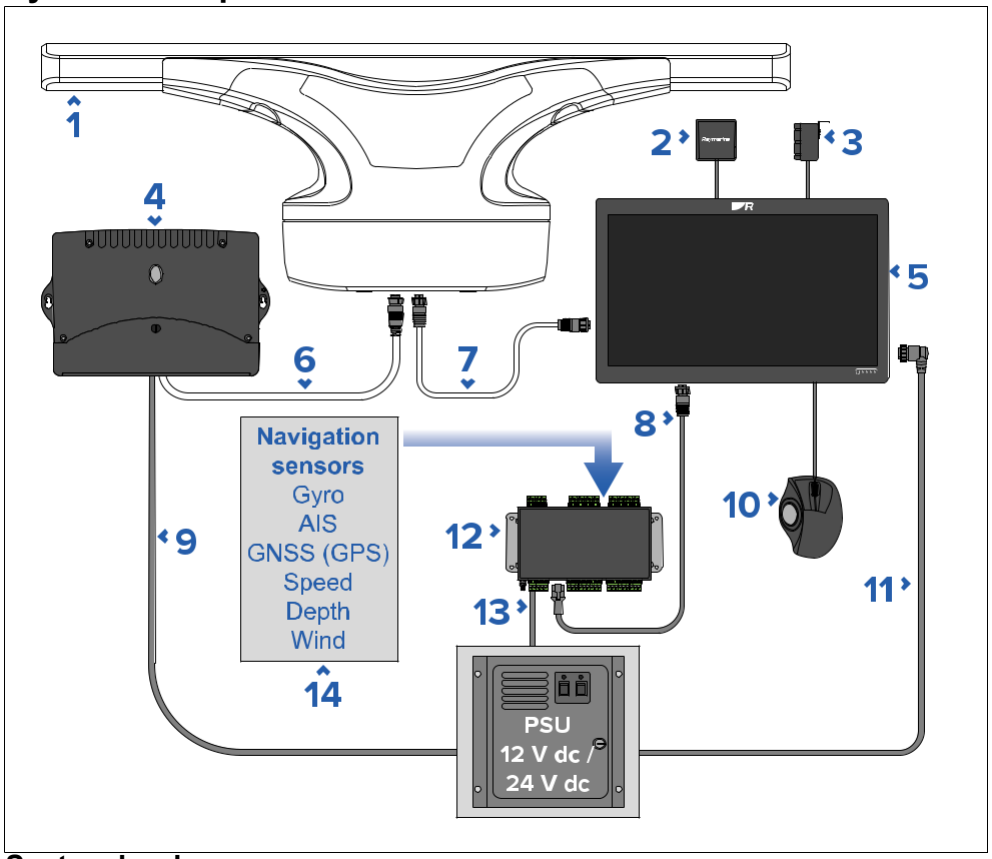
**Minimum range**

The minimum range of Koden approved sensors installed in accordance with MSC.922/5.3.1.2 shall be less than 40 m (131.23 ft).

# System

The KRS Radar system should be set up as follows:

## System example




### System hardware

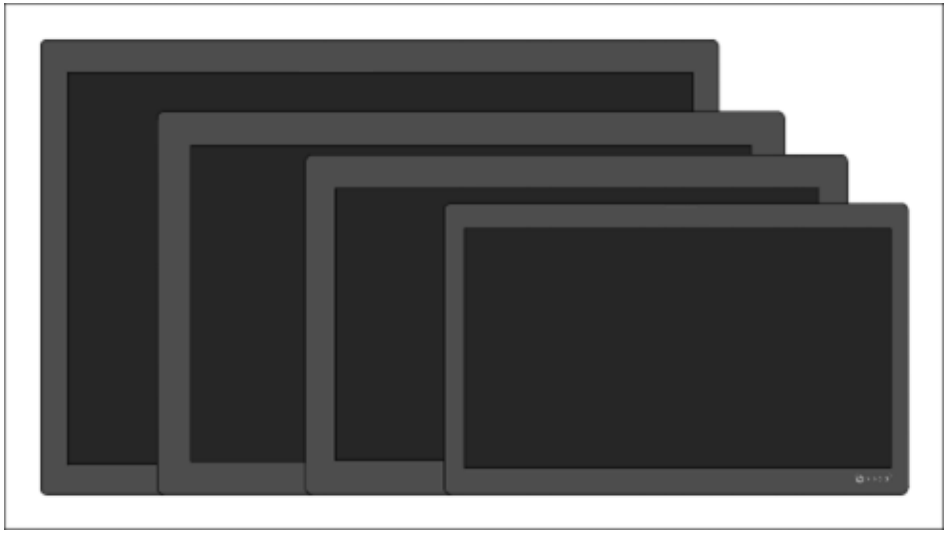
1. **Radar Scanner with 6 ft antenna** — Detects targets by transmitting microwaves and generating a picture on the Radar display using the microwaves reflected from the objects.
2. **External card reader*** — The external card reader* is used to backup and restore user data and settings.
3. **Alarm buzzer** — The alarm buzzer is used to provide an audible alert of a situation requiring the user's attention. The alarm buzzer is mandatory for the KRS radar system, as the Radar display does not include a built-in buzzer.
4. **VCM100** — The Radar scanner's Voltage Control Module (VCM) provides power to the Radar scanner.
5. **KRS Radar Display** — A display that shows the Radar image and data from externally connected devices, to provide situational and navigational awareness.
6. **Radar power cable** — Connects the Radar scanner to the VCM100.
7. **Radar data cable** — Transfers data from the Radar scanner to the Radar display.
8. **RJ45 cable** — Transfers data from the DCU to the Radar display.
9. **VCM power cable** — Connects the VCM to the power supply (cable NOT supplied).
10. **KRS Trackball** — Used to control the Radar display and interact with its user interface.
11. **Display power cable** — The cable is used to power the Radar display.
12. **KRS DCU (Data Collection Unit)** — Collects data transmitted by externally connected devices and transmits the data over Ethernet, so that it can be shown on the Radar display.
13. **DCU power cable** — A cable is required to power the DCU and is NOT supplied.
14. **NMEA 0183 External sensors** — External sensors are connected to the DCU's NMEA 0183 inputs.

**Note:**

The power cables for the VCM100 and DCU are not supplied with the system. All other components and cables are supplied when ordering a KRS Radar System.

## 3.2 Radar display overview

The KRS range of Radar displays are type approved, touchscreen, glass bridge-style displays with integrated navigation processor.



KRS Radar display features include:

- Available in 16, 19, 22 and 24 inch screen sizes.
- Hexacore (6-core) processor.
- 64 GByte internal solid state storage, for user data.
- Edge-to-edge glass construction.
- Multi-point touchscreen.
- Full HD IPS display.
- Hydrotough™ nano-coated, impact-resistant glass screen, which repels water, oil, and smudges for better viewing and accurate touch controls.
- Ambient light sensor for automatic brightness adjustment.
- Wide viewing angles.
- USB input for control via KRS Trackball (Part number: A80788).
- External alarm connection for Alarm buzzer (E26033), via alarm / video cable (Part number: A80235).
- External memory card reader* connection, via RCR-SDUSB card reader* (Part number: A80440).
- Waterproof to IPx6 and IPx7 (suitable for above or below decks installation).

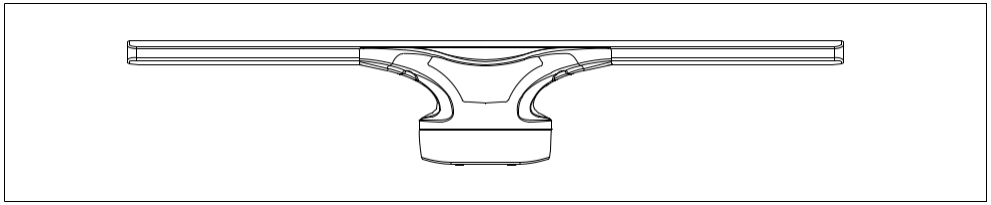
### Screen resolutions

KRS Radar display screen resolutions:

| Display | Screen resolution |
|---|---|
| 16” | 1920 x 1080 |
| 19” | 1920 x 1080 |
| 22” | 1920 x 1080 |
| 24” | 1920 x 1200 |

## 3.3 Radar scanner overview

The Solid State Open Array Radar Scanner is a type approved Radar scanner which provides a map-like representation of an extended area around your vessel, enabling you to identify birds, weather, other vessels, and land features such as coastlines and hills.



The Radar scanner includes the following features:

- Solid-state technology (no magnetron) for improved efficiency, and rapid start-up.
- 6 ft antenna array.
- Peak power output 110 W.
- Low-profile design (335 mm / 13.1 in height), for greater installation flexibility.
- Instrumented range up to 96 NM (dependent on model and installation location).
- Scanner rotation up to 24 RPM.
- 100 knot wind rating, meeting the IEC 62388 standard for shipborne Radar.
- Narrow horizontal beam widths for enhanced target separation.

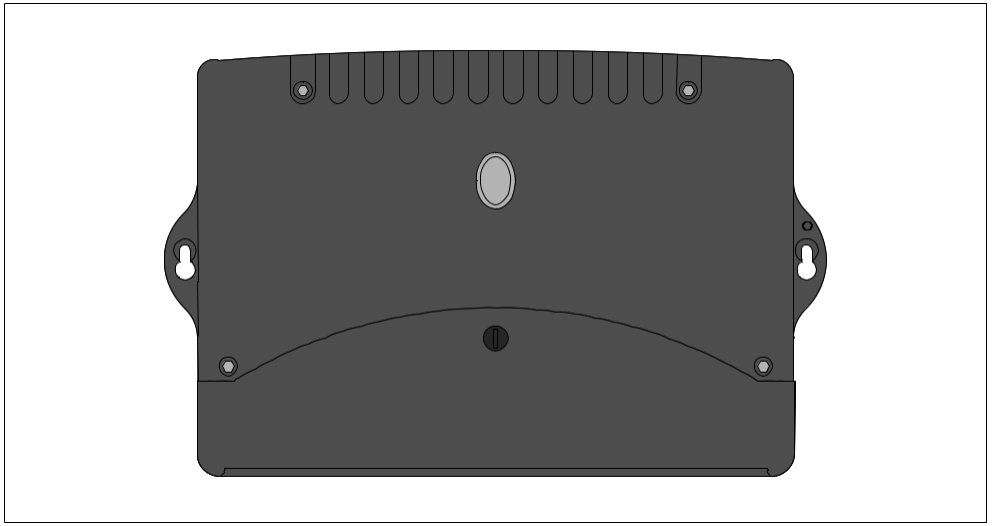
- CHIRP pulse compression for improved target range resolution, and reduced background noise.
- ARPA automatic target acquisition and tracking (up to 100 simultaneous ARPA targets.
- Real-time heading display.
- Data connection via Radar data cable.
- 12 V or 24 V operation (with VCM100 power converter).
- Waterproof to IPx6.

## VCM100 Voltage Converter Module

The VCM100 Voltage Converter Module converts the source of direct current from your vessel's power source to a safe level for the connected Radar.

**Important:**

- The VCM100 is an **essential** component in your Radar's system and MUST be used to supply power to the Radar scanner. The model number of the VCM100 that is suitable for use with the Radar scanner is: VCM100 (E70648).



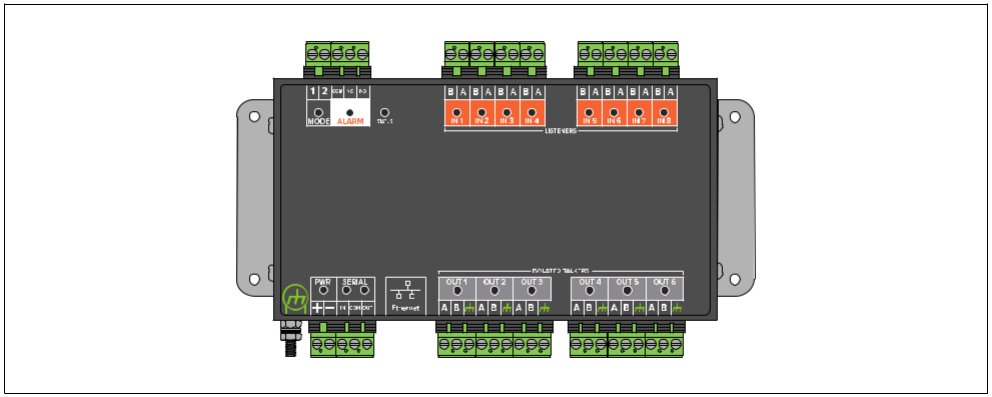
## Radar target acquisition data source requirements

Radar target acquisition requires external devices that transmit relevant data to be available on your system
The following data sources are required:

| Data type | Example data source |
|---|---|
| COG (Course Over Ground) | GPS or GNSS receiver. |
| SOG (Speed Over Ground) | GPS or GNSS receiver. |
| THS / HDT (True Heading) | Compass or Autopilot sensor providing fast heading data.<br>(The gyro compass or equivalent heading sensor must have an update rate that is adequate for the ship's rate of turn. In general for non-high speed craft, the update rate should be a minimum of 10 Hz.). |

## 3.4 DCU overview

The DCU is a Data Collection Unit which is required to convert data received from external devices and transfer over Ethernet to the Radar display.

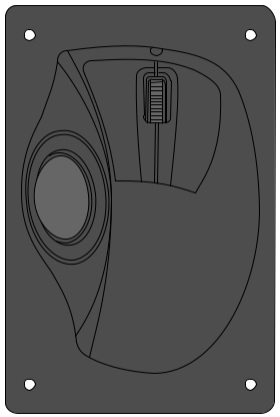


The DCU offers:

- 8 Configurable opto isolated inputs.
- 6 Configurable isolated outputs.
- 1 Bidirectional, configurable, isolated serial port.
- Automatic baud rate matching on inputs.
- Advanced data filtering/routing.
- 1 Alarm output relay (N/O and N/C contacts).
- Mode input pins to set operating mode without PC.
- Diagnostics LEDs on all inputs and outputs.
- Alarm status LED / Mode LED / Bi-color status LED.
- Durable stainless steel housing.
- Panel mountable.

## 3.5 KRS Trackball

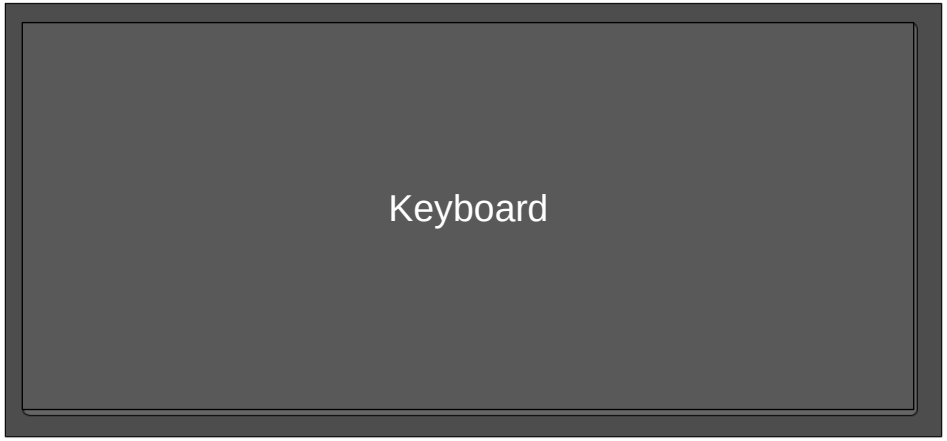
The following Trackball is recommended for controlling the Radar display.



- KRS USB trackball (part number: A80788).

## 3.6 KRS keyboard (optional accessory)

The KRS keyboard is available as an optional accessory.




- KRS Keyboard, part number A80790

**Note:**

The KRS keyboard is not included when ordering a KRS Radar System and must be ordered separately.

## 3.7 Additional components

The following additional devices are required to provide data to the system:

- A gyro-compass or transmitting heading device (THD)
- A speed and distance measuring equipment (SDME)
- An electronic position fixing system (EPFS)
- An automatic identification system (AIS); or
- Other sensors or networks providing equivalent information acceptable to the IMO (e.g.: an INS).

# CHAPTER 4: SOFTWARE DETAILS

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## 4.1 Display software

This document is applicable to the following software:


| Software name | Software version |
|---|---|
| KRS-Series Radar Display | v2.0 |

**Important:**

Running any software other than that supplied with the display will invalidate the product warranty.

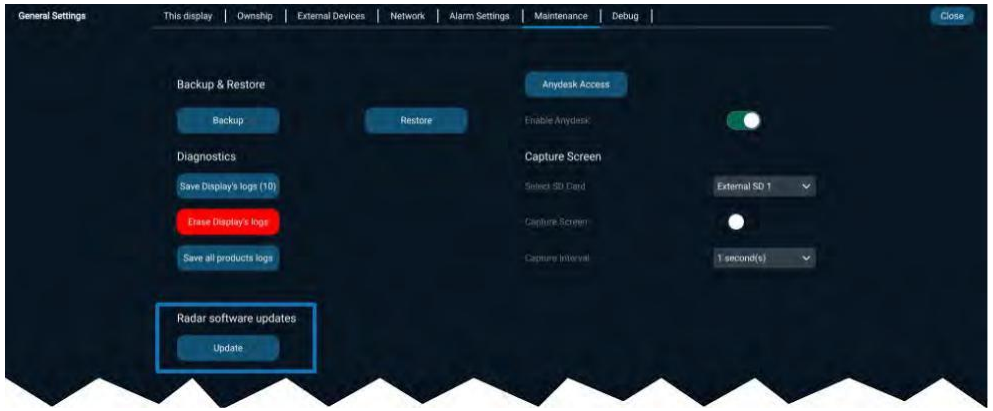
## 4.2 Performing a software update

From time to time software updates will be available which will improve available features and functionality. Software update will be provided by Koden or an authorized dealer.
The current display software version is shown on the standby screen.


For software information, contact Koden dealer or Koden.

## 4.3 Updating Radar scanner software

The Radar scanner's software can be updated from the Display's *[Maintenance]* settings menu.
The Radar scanner's software version is shown in the *[Network]* settings menu.




For software information, contact Koden dealer or Koden.

# CHAPTER 5: SUPERIOR FEATURES

## CHAPTER CONTENTS

## 5.1 Superior features introduction

Details of the superior features and improvements that have been included in the latest release of the KRS-Series Radar Display operating system are detailed here.

These details also appear inline in the relevant chapters of the ***KRS-Series Radar*** *Installation manual*. You may need to refer to these chapters to understand the full context of a feature.

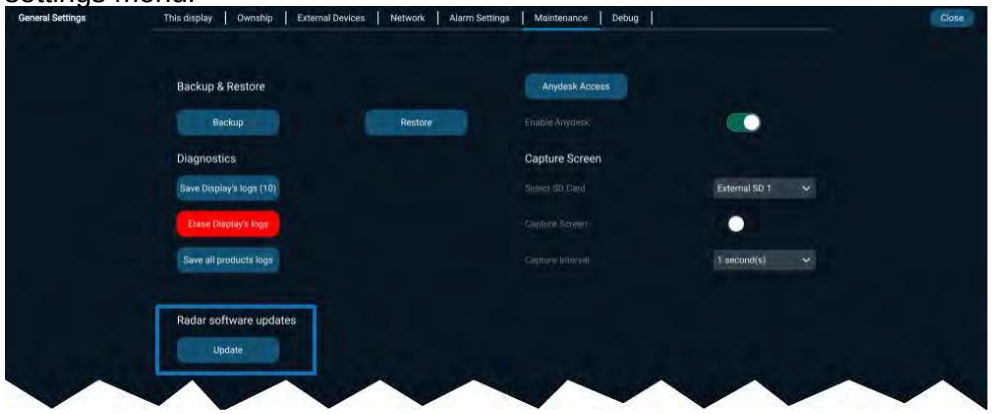
## 5.2 Superior Installation and Commissioning features

The following superior installation and commissioning features have been added to version v2.0 of the KRS-Series Radar Display operating system. **This list includes *superior features* only. It does NOT include software maintenance items, such as bug fixes or performance improvements.**

| Superior feature | More information |
|---|---|
| Added the ability to update Radar scanner software from the *[Maintenance]*settings menu. | **p.32 — Updating Radar scanner software** |
| Added the following default external devices: TGTD, SATD, NAVD, VDRD, VDR Screen output, DS1, DS2, DS3 and DS4. | **p.32 — Default external devices** |
| Added support for connection to ChartWorld services. | **p.33 — Connecting to the** ChartWorld **web service** |
| Added support for ASTERIX output for Radar overlay on connected ECDIS displays. | **p.34 — Radar overlay connection** |
| Added support for external control of the Radar system using REST API. | **p.35 — External Radar control** |

## 5.3 Updating Radar scanner software

The Radar scanner's software can be updated from the Display's *[Maintenance]* settings menu.
The Radar scanner's software version is shown in the *[Network]* settings menu.




For software information, contact Koden dealer or Koden.

## 5.4 Default external devices

The typical required external devices are configured by default.

### IEC 61162–450 compliant devices

- *[TGTD]*
- *[SATD]*
- *[NAVD]*
- *[VDRD]*
- *[VDR Screen Output]*

These devices are *[Disabled]* by default and will require enabling.

For the default settings for these devices refer to:

**Default IEC 61162–450 devices**

### Data servers

- *[DS1]*
- *[DS2]*
- *[DS3]*
- *[DS4]*

These devices are *[Enabled]* by default.

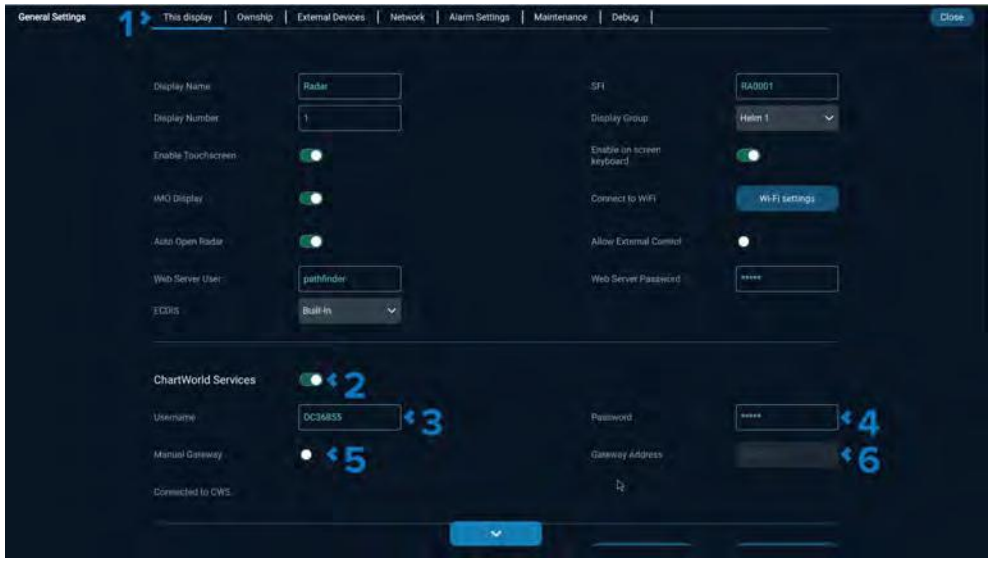
For the default settings for these devices refer to:

**Default DCU external devices**

## 5.5 Connecting to the ChartWorld web service

Connecting to the ChartWorld web service will ensure that whenever the display has an Internet connection that crash logs and other data is automatically sent to ChartWorld.

- Ensure you have the relevant username and password, obtained from https://www.chartworld.com/user
- The display requires an active Internet connection to send logs and data.
- When the display connects to the Internet it will transfer logs and data. If new data is available the transfer will repeat every 24 hours.

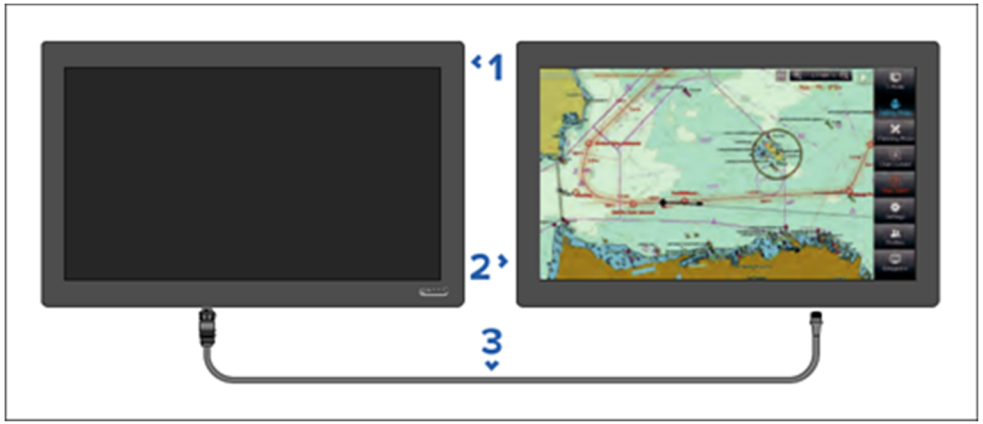



1. Open the *[This display]* settings menu.
2. Enable the *[ChartWorld Services]* toggle switch.
3. Enter the ChartWorld account username in the *[Username]* field.
4. Enter the ChartWorld account password in the *[Password]* field.
5. If required, you can use a *[Manual gateway ]* by enabling the toggle switch.
6. If required, enter a manual IP address in the *[Gateway Address]* field..

# 5.6 Radar overlay connection

## Radar overlay connection (ECDIS)

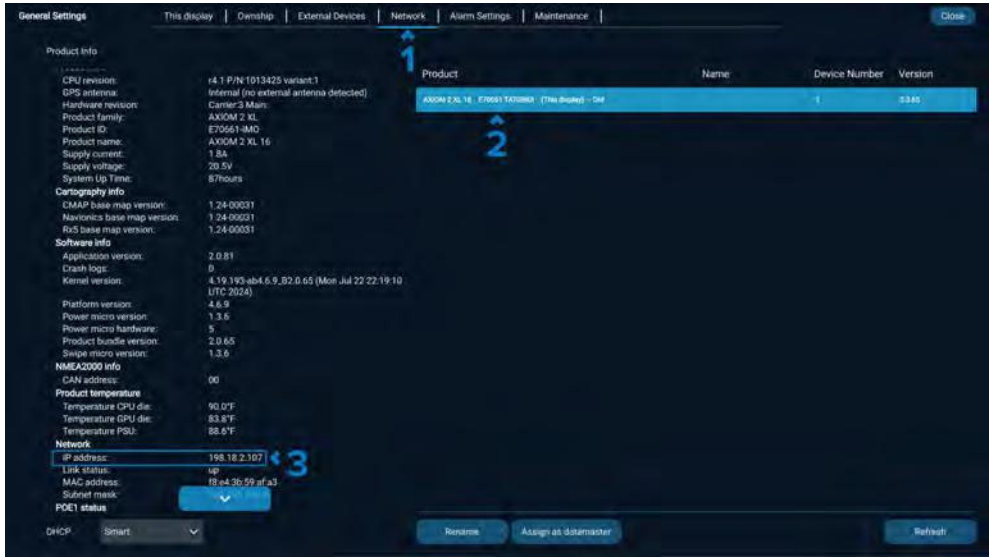
KRS Radar displays can generate an ASTERIX Cat 240 video output stream which provides a Radar overlay to a connected ECDIS display.




1. KRS Radar display.
2. ECDIS display.
3. Data adaptor cable (providing the ASTERIX output to the ECDIS display).

## Configuring Radar overlay for ECDIS displays

Follow the steps below to configure the Radar overlay output.




From the KRS Radar display:

1. Open the *[Network]*settings menu: *[Settings > Network]*.
2. Select the Radar display from the list.
3. Locate the *[IP address]* for the display.
   The ASTERIX output uses the Radar Display's IP address with the **198** replaced with **239**.
   E.G.: Display IP: **198.18.2.107** so the ASTERIX output is: **239.18.2.107** .

From the ECDIS display configure the ASTERIX output as follows:

- Address: ASTERIX output (e.g.: 239.18.2.107)
- Port: 6701

# 5.7 External Radar control

## 3rd party integration

The KRS Radar system can be integrated with 3rd party hardware using REST APIs. Integration allows the KRS Radar system to be controlled using external hardware.
The following controls are available externally to the Radar system:

- Receiving settings configuration.
- Sending a settings configuration.
- Commanding the Radar scanner to wake.
- Performing a factory reset of the Radar scanner.
- Acquiring a target by range and bearing.
- Setting the Radar scanner's Zero range.
- Deleting a Radar target by ID.
- Deleting a target by range and bearing.
- Commanding the Radar scanner to Standby.
- Commanding the Radar scanner to Transmit.

## Configuring the Radar display for external control

External control can be configured from the Radar display.

From the *[This Display]* settings menu:


1. Enable the *[Auto Open Radar]* toggle switch.
2. Enable the *[Allow External Control]* toggle switch.
3. Enter the relevant username in the *[Web Server User]* field.
4. Enter the relevant password in the *[Web Server Password]* field.

# CHAPTER 6: RADAR SCANNER INSTALLATION

## CHAPTER CONTENTS



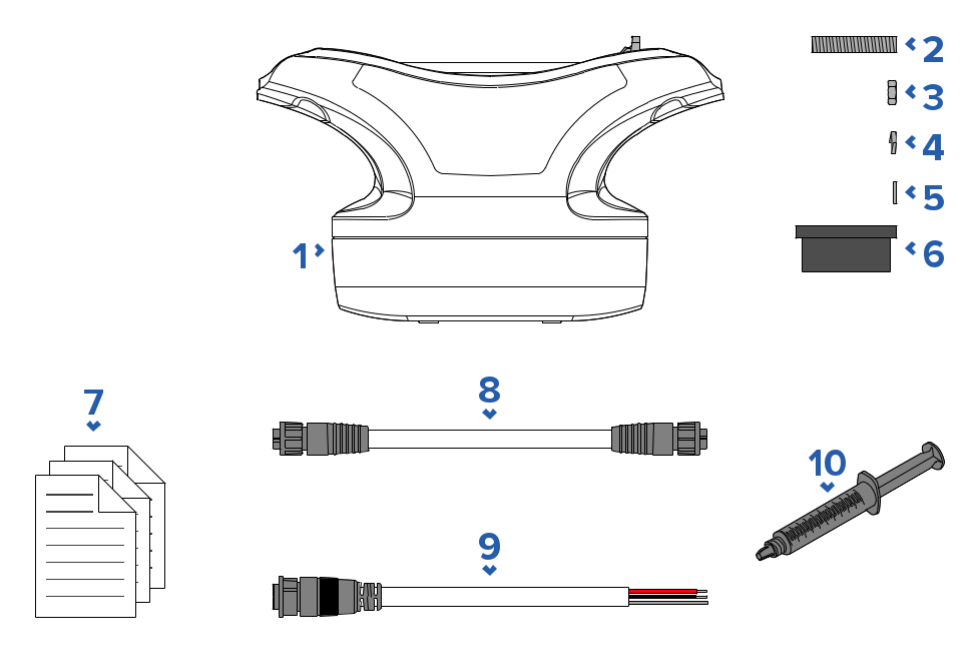
*Card reader: option

# 6.1 Parts supplied

## Parts supplied (Radar scanner pedestal)

The following parts are supplied in the Radar scanner pedestal box:

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

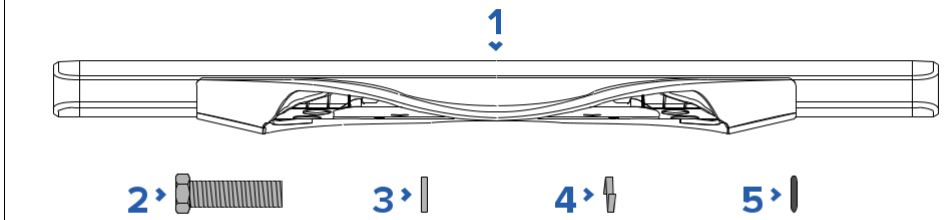



| Item | Description |
|---|---|
| 1 | Radar pedestal |
| 2 | M10 stud x4 |
| 3 | M10 nut x8 |
| 4 | M10 spring washer x4 |
| 5 | M10 plain washer x4 |
| 6 | Cable gasket |
| 7 | Documentation pack |
| 8 | Radar data cable |
| 9 | Power cable |
| 10 | Denso paste |

## Parts supplied (Radar scanner antenna)

The following parts are supplied in the Radar scanner antenna box:

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

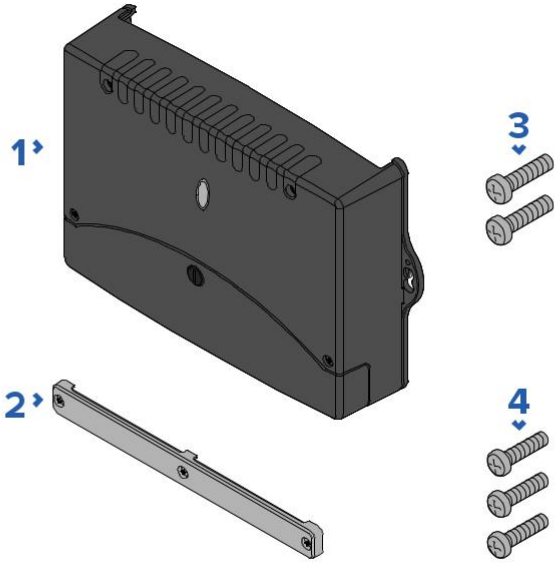



| Item | Description |
|---|---|
| 1 | Radar Antenna |
| 2 | M8 Hex Bolt x4 |
| 3 | M8 Plain Washer x4 |
| 4 | M8 Spring Washer x4 |
| 5 | O Ring x4 |

## Parts supplied (VCM100)

The following parts are supplied in the VCM100 box:

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



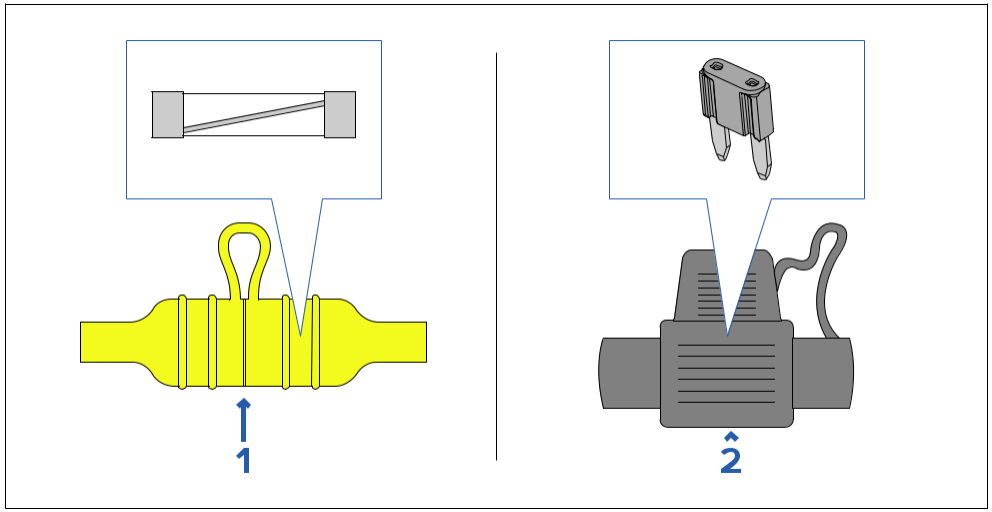

| Item | Description |
|---|---|
| 1 | VCM100 |
| 2 | Cable clamp |
| 3 | VCM100 mounting screw x2 |
| 4 | Cable clamp mounting screw x3 |

### Inline fuse requirement

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

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

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




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

**Fuse ratings:**

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

### 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 in-line fuse, fitted close to the power connection. The connection from the output of the VCM100 to the radar pedestal does not require a fuse or circuit breaker.

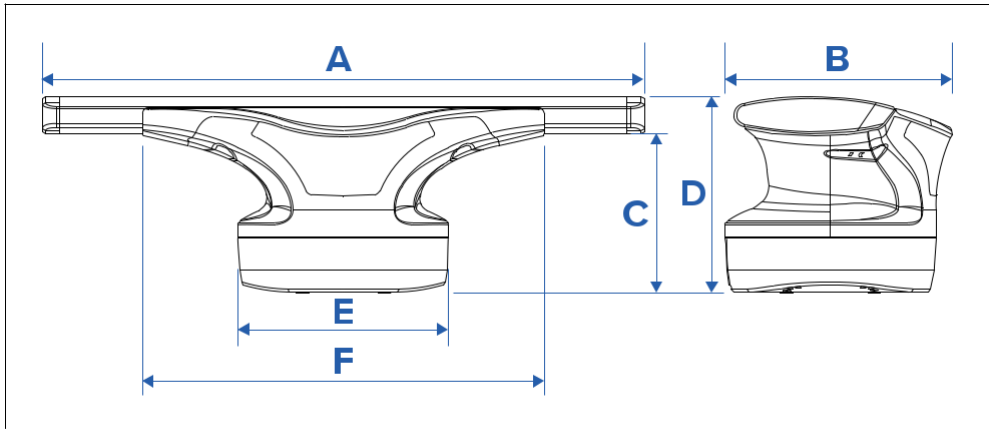
If you do not have a thermal circuit breaker or fuse in your power circuit (fitted to the DC distribution panel, for example), you MUST fit an in-line breaker or fuse to the positive wire of the power cable.

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

| Power supply | Protection | Rating |
|---|---|---|
| 12 V | Isolator switch | 30 A (minimum rating) |
| | Thermal breaker | 15 A |
| | Fuse | 20 A |
| 24 V | Isolator switch | 15 A (minimum rating) |
| | Thermal breaker | 10 A |
| | Fuse | 15 A |

## 6.2 Radar dimensions

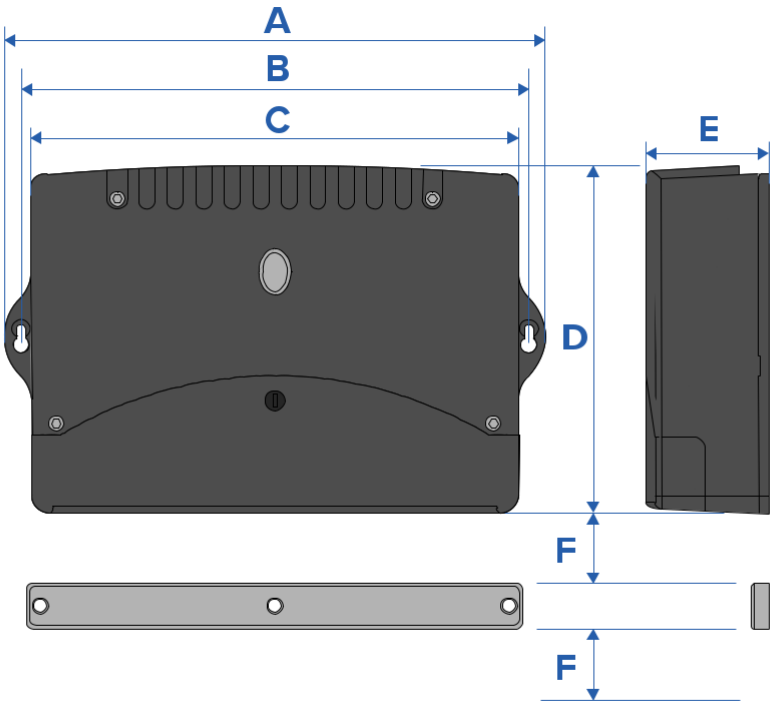
The dimensions for the Radar scanner are provided below.




| Item | Description |
|---|---|
| **A** | 1945.00 mm (76.57 in) |
| **B** | 388.00 mm (15.28 in) |
| **C** | 271.00 mm (10.67 in) |
| **D** | 335.00 mm (13.19 in) |
| **E** | 360.00 mm (14.17 in) |
| **F** | 686.00 mm (27.00 in) |

## 6.3 VCM100 dimensions

The dimensions for the Radar scanner's VCM are provided below.




| Item | Description |
|---|---|
| **A** | 306.80 mm (12.08 in) |
| **B** | 288.00 mm (11.34 in) |
| **C** | 276.40 mm (10.88 in) |
| **D** | 196.80 mm (7.75 in) |
| **E** | 69.90 mm (2.75 in) |
| **F** | 50.00 mm (1.97 in) |

**F** = Minimum cable clearance.

# 6.4 Location requirements

## Warnings and cautions

**Important:**

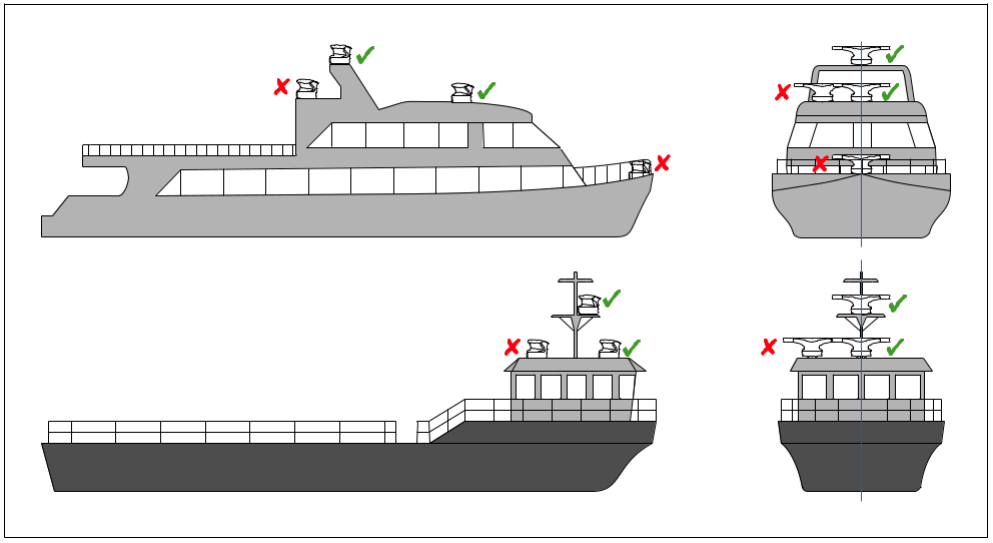
Before proceeding, ensure that you have read and understood the warnings and cautions provided in the following section of this document: **p.12 — Health & Safety**

### 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).

## Radar position overview

The optimum height for a Radar scanner is high enough above the waterline to give a long range line-of-sight to the horizon, but not so high as to be adversely affected by the vessel's pitching and rolling.



The scanner must also be mounted where it is:

- Above head height.
- Easily accessible.
- As near as possible to the vessel's center line.
- On a rigid and stable platform, capable of securely supporting the scanner under seagoing conditions.
- Clear of large objects such as the flybridge, large engine stacks, searchlights, horns, masts etc.
- Clear of heat and fumes.
- At least 1 m (3.28 ft) from a magnetic compass or other scanners.

## Radar scanner general 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 center line.

### 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.
- Standing rigging.
- Running rigging.
- Heat.
- Fumes.
- People.

### Magnetic compass

Mount the radar scanner at least 1 m (3.28 ft) away from a magnetic compass.

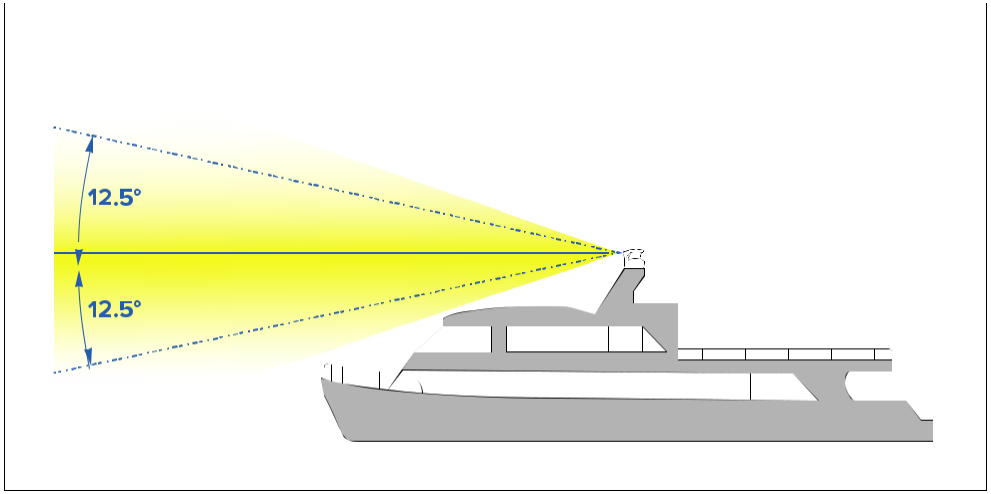
### Cables

- 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.

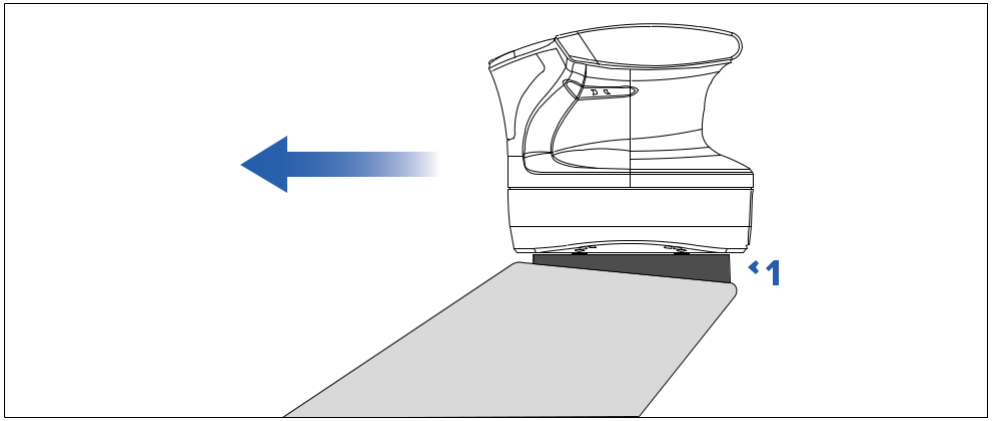
## Radar scanner mounting angle

Ensure the Radar scanner's antenna 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.




Planning 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.




1. Wedge or washers

## Multiple Radar scanners — location requirements

There are important considerations when installing multiple radar scanners on the same vessel.

**Note:**

For SOLAS approved installations only one Radar scanner should be connected to a single display.

- Radar Scanners should be mounted so that they are aligned vertically, one directly above the other, separated by at least 2 m (6.6 ft).
- Multiple scanners should be mounted in a way that minimizes interference between the vertical beamwidths of the 2 scanners.
- In all cases, you should aim to achieve as much physical separation as possible, to minimize any potential interference.
- If the Radar scanners can't be aligned one directly above the other, locate each scanner the same distance from the bow of the vessel. Interference is more likely if the scanners are installed one in front of the other, even when separated vertically.
- 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 Radar scanners when switching between the two on your display. This is especially noticeable at short ranges on larger vessels.

## VCM100 location requirements

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

### Mounting orientation

- Ensure product is mounted vertically to allow for efficient heat dissipation.

### 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 6 m (19.69 ft). 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 1 m (3.28 ft) 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.

## EMC installation guidelines

Koden 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:

- Koden equipment and cables connected to it are:
  - At least 1 m (3.28 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (6.56 ft).
  - More than 2 m (6.56 ft) from the path of a radar beam. A radar beam can normally be assumed to spread 25 degrees above and below the radiating element.
- The product is supplied power from a separate battery to that used for engine start. This is important to prevent erratic behaviour and data loss which can occur if the engine start does not have a separate battery.
- Koden specified cables are used.
- Cables are not cut or extended, unless doing so is detailed in the installation manual.
- USB cables, where used must not be longer than 1 m (3.28 ft) in length.

**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, when choosing a suitable location for the equipment maintain the maximum possible distance from any magnetic compasses.

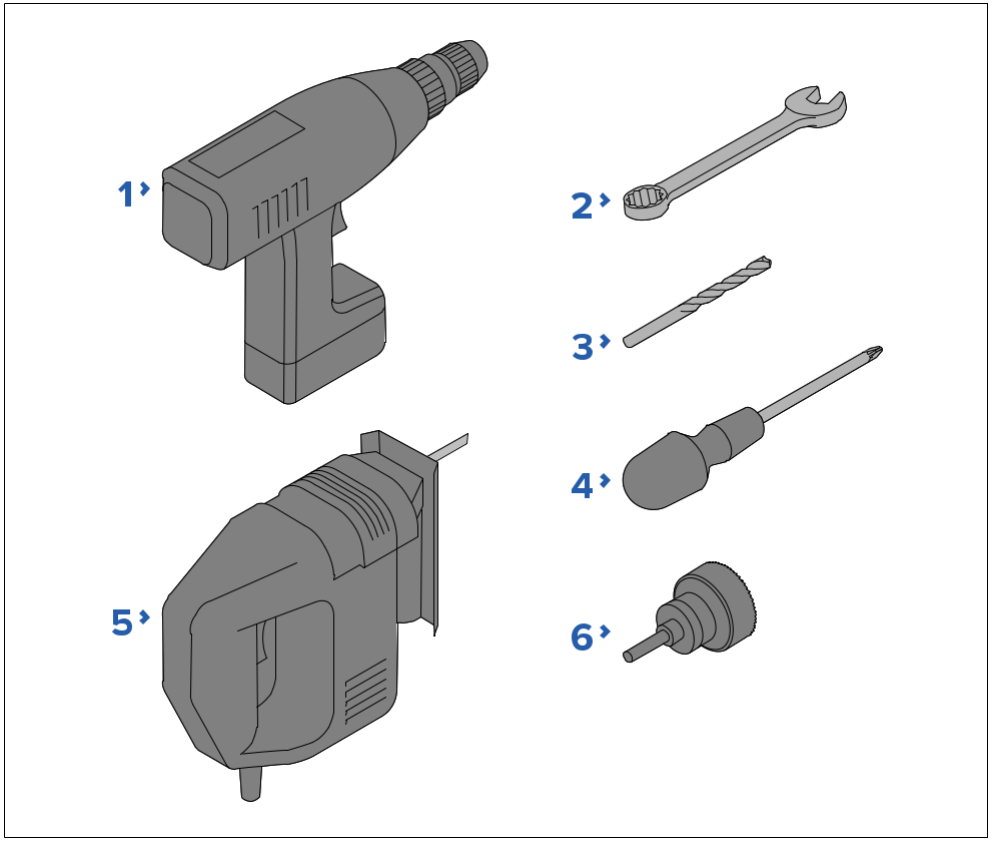
The minimum safe distance for each piece of equipment is shown below:

| Equipment | Minimum safe distance |
|---|---|
| Alarm buzzer | 1 m (3.28 ft) |
| KRS Radar scanner | 1 m (3.28 ft) |
| KRS DCU | 175.00 mm (6.89 in) |
| KRS Radar Display | 1 m (3.28 ft) |
| KRS Trackball | 1 m (3.28 ft) |
| RCR-SDUSB card reader* | 1 m (3.28 ft) |
| VCM100 | 1 m (3.28 ft) |

If the minimum safe distance cannot be adhered to then when choosing the installation location for the equipment, ensure that any compasses are not affected by the equipment when it is in a powered on state.

## 6.5 Tools required

The following tools are required for installation.




1. Drill
2. Spanner, 13 mm (1/2”) and 17 mm (11/16”).
3. Drill bit (appropriate size dependent on thickness and material of mounting surface)
4. Pozi-drive screwdriver
5. Jigsaw
6. 50 mm (2”) Hole saw

## 6.6 Mounting

### 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.12 — Health & Safety**

### Mounting the pedestal

Before mounting the unit, ensure that you have:

- Selected a suitable location.
- Identified the cable connections and route that the cables will take.

**Important:**

Prepare suitable lifting equipment (e.g. steel cable or chain) to lift the pedestal into place in its final mounting position, prior to securing the mounting bolts. The lifting equipment must be of a suitable gauge and strength capable of bearing the pedestal's weight of 16 Kg (35.27 lbs) as a minimum, and also capable of passing through the 20 mm (0.79 in) eyebolt hole on the pedestal. Additionally, you must also carefully consider the impact force on the lifting equipment, in the event that the pedestal falls before it is secured to the mounting surface. **Do NOT attach the antenna to the pedestal prior to lifting.**

1. Check the selected location. A clear, flat platform is required for mounting the pedestal unit.

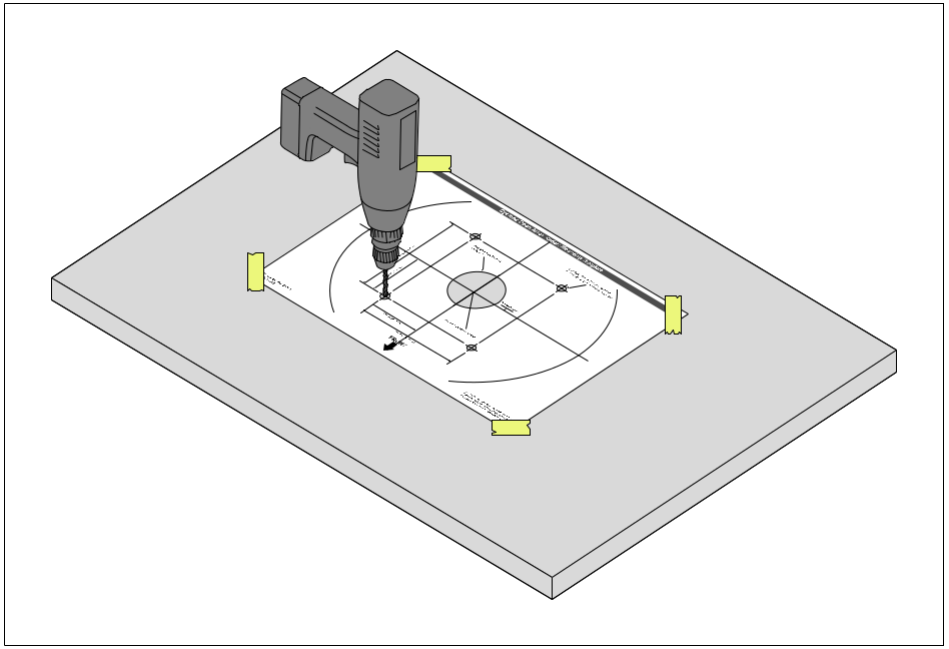
**Important:**

For more information refer to **p.52 — Location requirements**

2. Fix the supplied mounting template to the platform, using masking or self-adhesive tape.

**Important:**

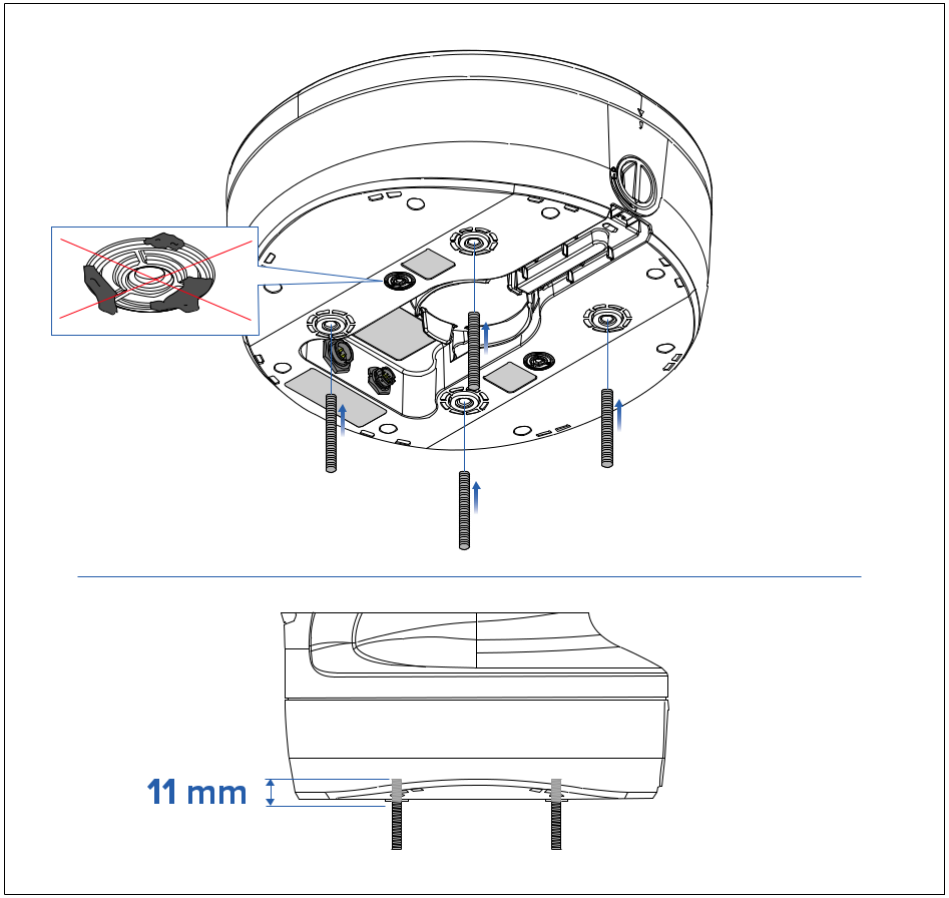
Ensure the mounting template is orientated correctly.



3. Using a 3 mm (0.1 in) drill bit, drill the 4 holes as indicated on the mounting template. Check that the holes have been drilled in the correct position.
4. Using an 11 mm (0.4 in) drill bit, drill through the 4 holes.
5. If you plan to route your cables through the mounting surface, cut the cable hole out using a jigsaw.
6. Remove the mounting template.
7. The pedestal has a transit cover fitted over the open array. This cover must be left in place until the open array antenna is fitted to the pedestal.
8. Insert the studs no more than 11 mm (0.4) into the holes in the pedestal base, and hand-tighten. 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.

**Important:**

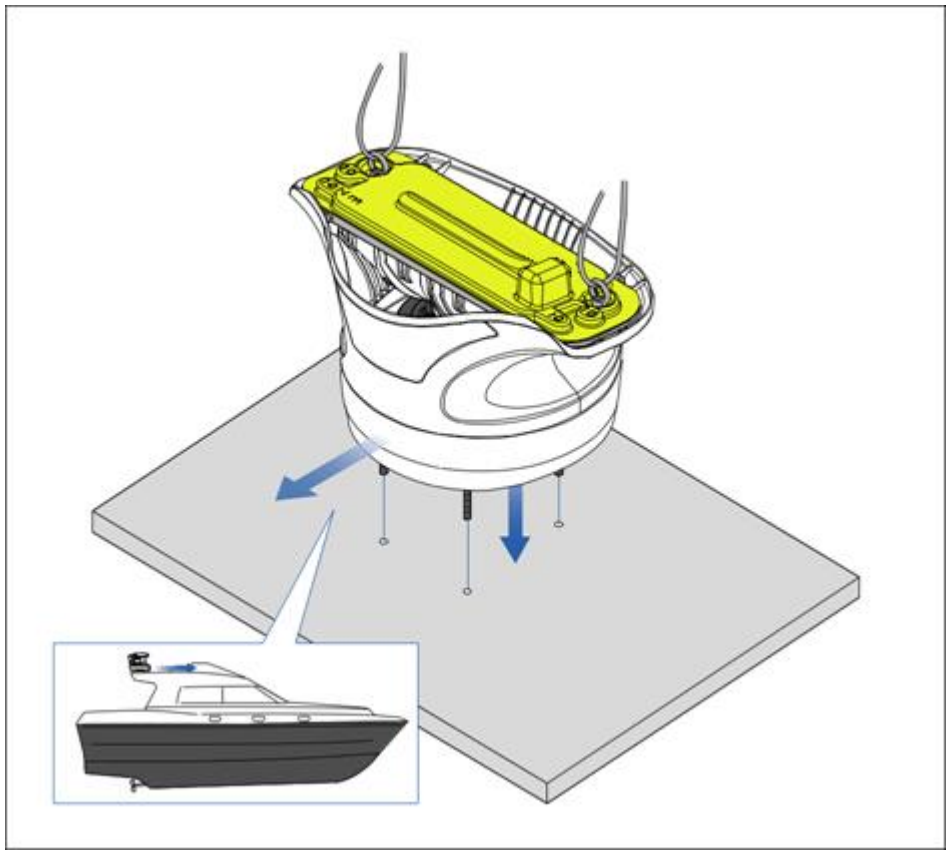
Ensure the vents on the underside are not blocked.




9. Pass a suitable steel cable or chain through the 20 mm (0.8 in) eyebolt holes. Once secure, lift the pedestal and test it fits correctly in its final mounting position.

**Important:**

Ensure the pedestal is orientated correctly.

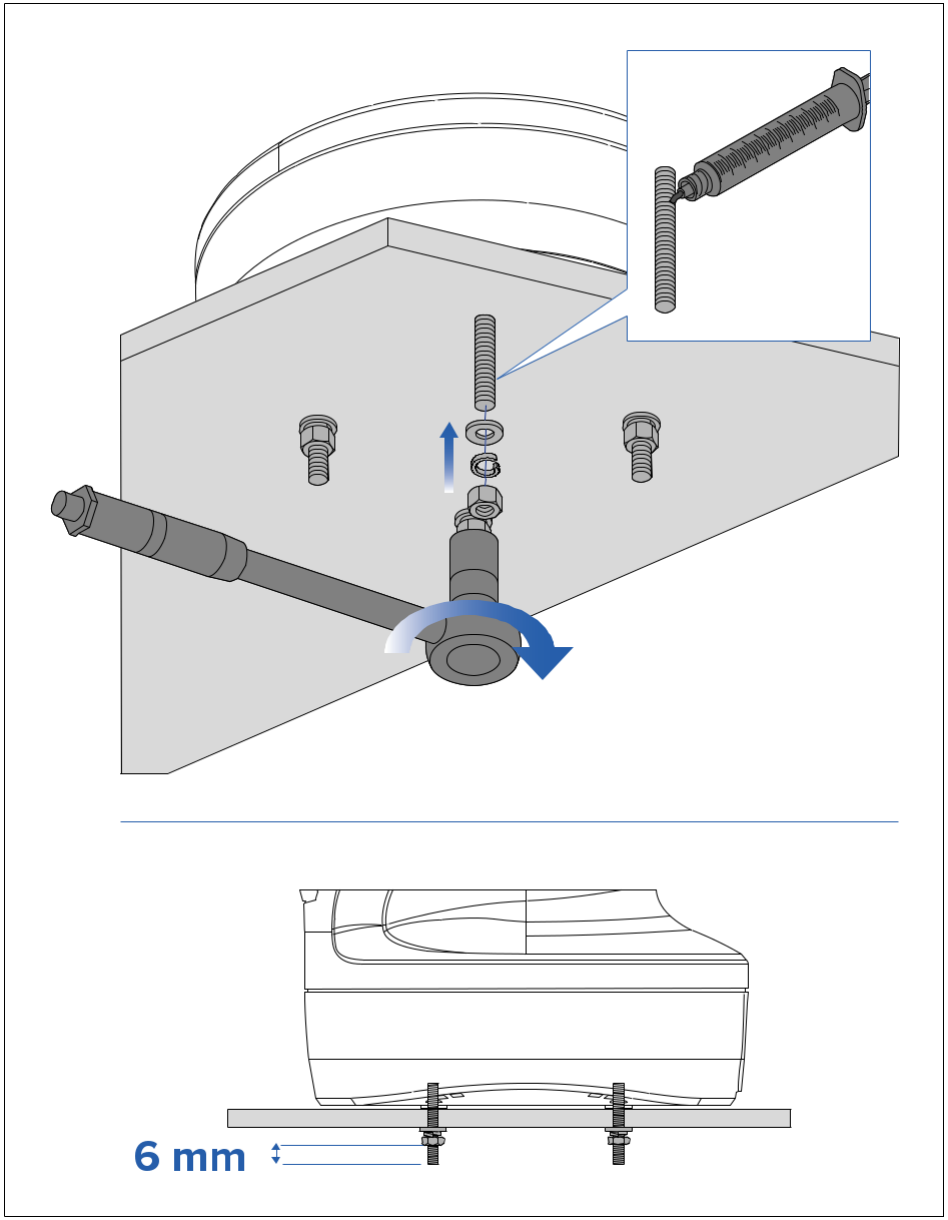


10. Lift the pedestal up and connect the power and data cables to the connectors on the underside of the pedestal. Organize the cables in accordance with your planned cable routing and place the pedestal back into position. **Ensure that you refer to the relevant cable routing instructions before proceeding to the next step:**
    i. For **rear exit cabling**, refer to: **p.94 — Rear exit**
    ii. For **through-surface cabling**, refer to: **p.95 — Through-surface cabling**

**Important:**

Ensure that power is NOT supplied to the cables during the installation procedure.

11. Grease the 4 metal studs using 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 lb ft).




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 (0.2 in) of excess stud below the nut. Cut-off any excess stud.

## Attaching the antenna

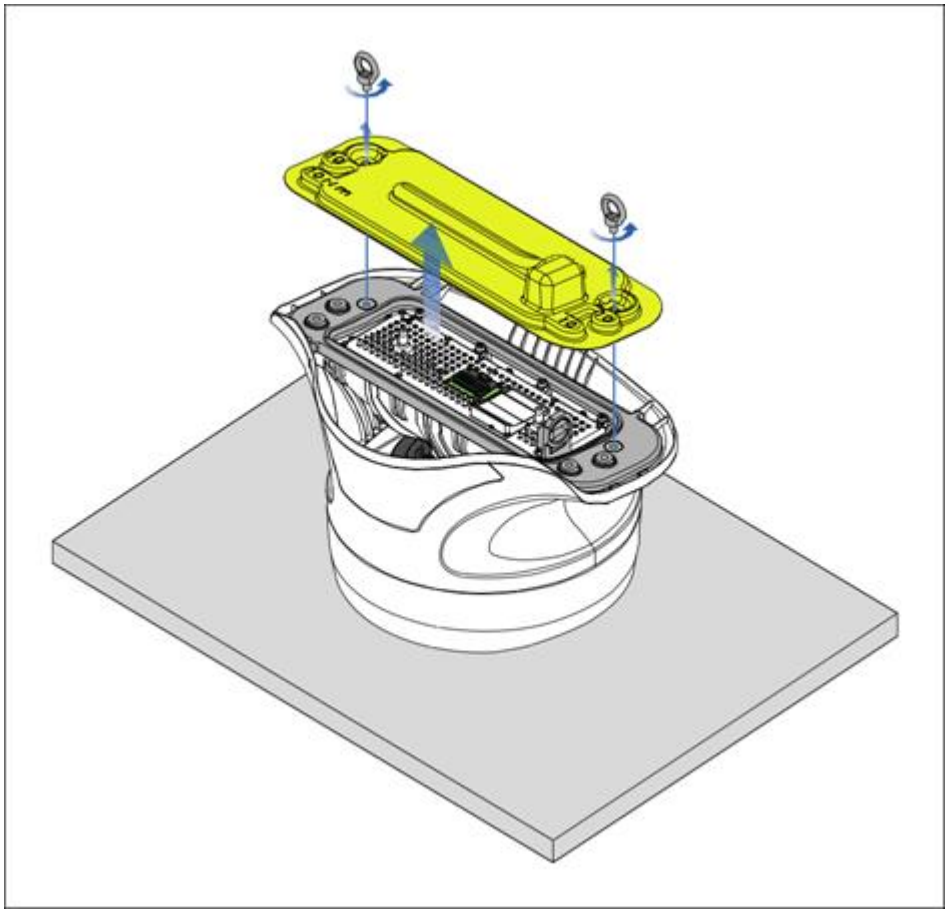
Before attaching the antenna to the pedestal unit, ensure that:

- The pedestal base is securely fixed to the platform.
- Power and data cables are connected securely and routed correctly, but are NOT powered.
- The pedestal power switch is in the OFF position.

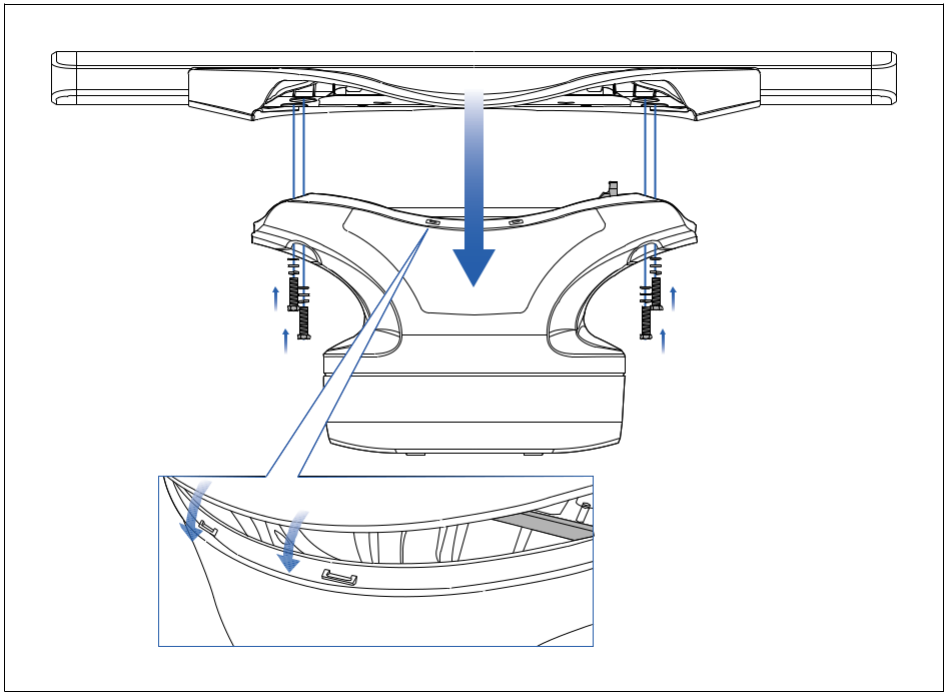
1. Unscrew the eyebolts and remove the transit cover.

**Important:**

Take care not to damage the open array's delicate contacts when removing the cover.



2. Referring to the following illustration, lower the antenna onto the pedestal, placing the front on first and clipping it in place.
3. Using the 4 hex bolts and associated washers and O rings, secure the antenna to the pedestal. Tighten each nut to 10 N m (7.4 lb ft).



## Radar scanner protection — sailing vessels

Additional considerations apply when installing the Radar scanner on a sailing vessel.

- When mounting the Radar scanner unit onto the mast, check that the unit is not fouled by the sails, especially when tacking.
- Depending on the type of sailing vessel and the design of the sailplan, a Radar scanner guard should be attached to the mast if the sails or rigging contact either the Radar scanner unit or the mounting bracket. Without a proper Radar guard, serious damage can result to the Radar mounting bracket and the Radar itself. In extreme cases, such damage could result in the Radar scanner unit being pulled off the mast. Therefore, it is recommended that a Radar scanner guard should be mounted additionally and separately to the Radar scanner mounting bracket.
- To prevent the risk of the Radar scanner unit falling in the event that it has been damaged, the security lanyard supplied with the mast bracket MUST be secured properly to the mast and to the Radar scanner unit, according to the instructions provided with the bracket. If a safety lanyard

is not supplied with the mounting bracket, contact your local dealer for appropriate parts. Do NOT attach other equipment to either the Radar scanner unit or the bracket.

- Koden strongly recommends that you check the condition and security of the bracket mounting feet, the security lanyard(s), the Radar scanner guard, and the Radar scanner unit itself, on a yearly basis (or more frequently depending on environmental applications). Any fittings should be replaced as appropriate.

## Mounting the VCM100

**Before mounting the unit, ensure that you have:**

- Selected a suitable location, based on the location requirements found in this document. For further information, refer to:
  **p.52 — Location requirements**

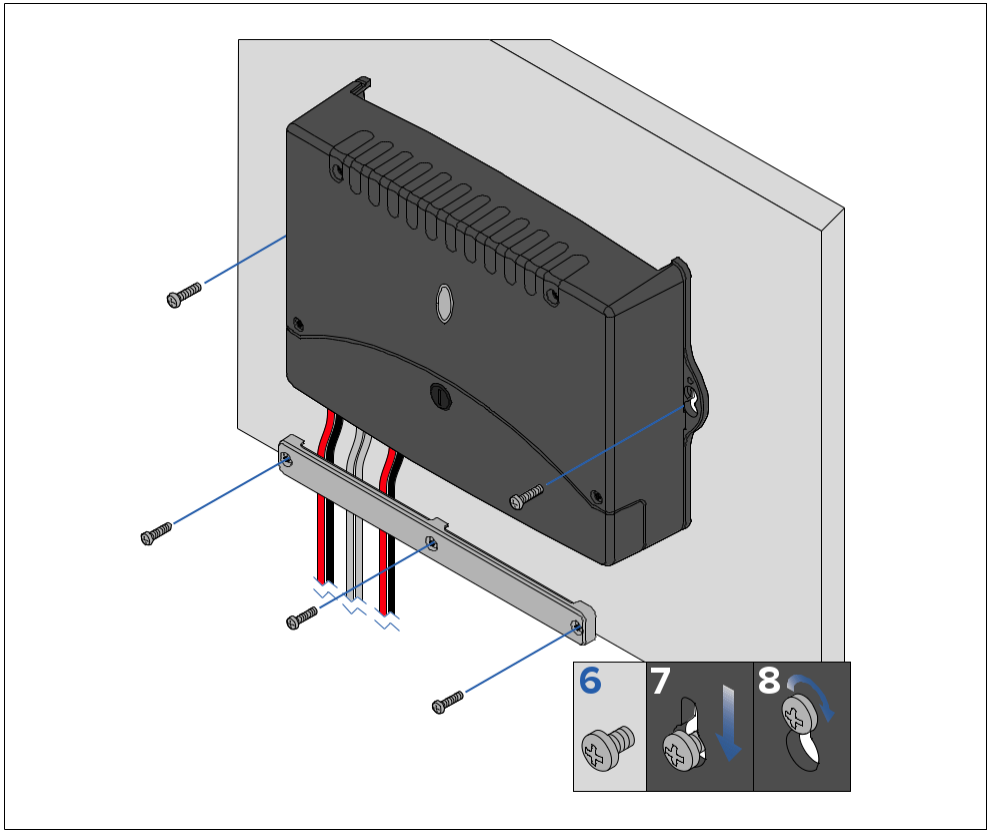
**Important:**

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

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

**Important:**

**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 vertical surface 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 (0.1 in) drill bit, drill holes at the marked locations.
5. Using a suitable screwdriver, screw the self-tapping mounting screws approximately halfway into the drilled holes.
6. Align the VCM100 mounting lugs with the drill holes.
7. Place the VCM100 into position and ensure that the VCM100 slides down into position.
8. Secure the VCM100 by fully tightening the screws.
9. Connect the cables, according to the instructions provided in this handbook.

10. Hold the cable clamp in place over the cables, approximately 50 mm (2 in) below the mounted VCM100 unit.
11. Using a pencil, mark the drilling area inside each mounting bracket hole.
    **Ensure that the cables do NOT cover the holes.**
12. Using a 3 mm (0.1 in) drill bit, drill a hole through the pencil marks.
13. Hold the cable clamp in place, each hole aligned with the drill holes.
14. Using a suitable screwdriver, screw the self-tapping mounting screws through the bracket holes, into the drilled holes.

# CHAPTER 7: DCU INSTALLATION

## CHAPTER CONTENTS

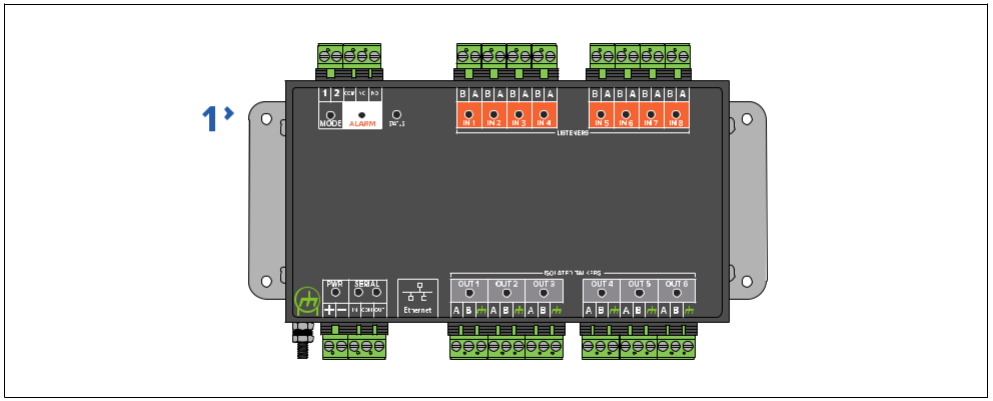


*Card reader: option

# 7.1 Parts supplied (DCU)

The following parts are supplied in the DCU box:

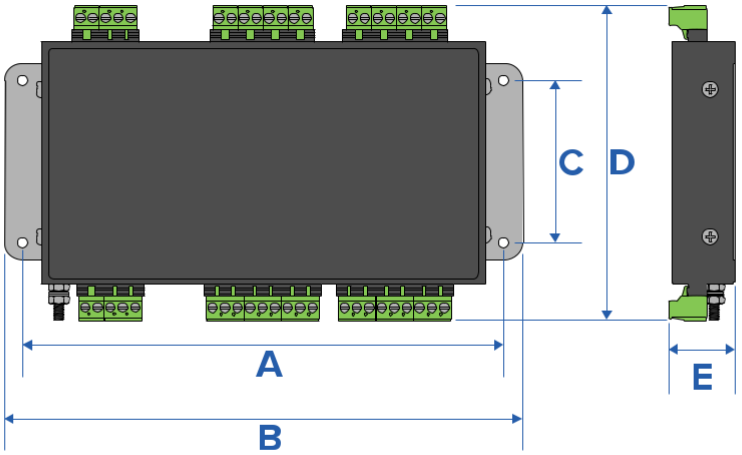
Unpack your product carefully to prevent damage or loss of parts. Check the box contents against the list below. Retain the packaging and documentation for future reference.




1. DCU (Data Collection Unit).

# 7.2 KRS DCU dimensions

The dimensions for the KRS DCU are provided below.




| Item | Description |
|---|---|
| | 195.60 mm (7.70 in) |
| | 210.60 mm (8.29 in) |
| | 66.00 mm (2.60 in) |
| | 128.35 mm (5.05 in) |
| | 27.00 mm (1.06 in) |

# 7.3 Location requirements

## 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.12 — Health & Safety**

**Warning: Potential ignition source**

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

## General location requirements

When selecting a location for 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 NOT protected against the ingress of moisture or liquids. The product should be located in a protected area away from moisture and 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.

## EMC installation guidelines

Koden 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:

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

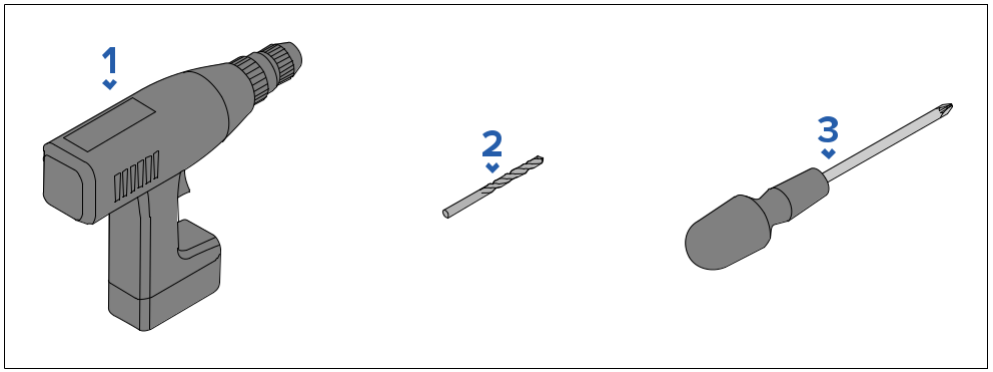
To prevent potential interference, when choosing a suitable location for the equipment maintain the maximum possible distance from any magnetic compasses.
The minimum safe distance for each piece of equipment is shown below:

| Equipment | Minimum safe distance |
|---|---|
| Alarm buzzer | 1 m (3.28 ft) |
| KRS Radar scanner | 1 m (3.28 ft) |
| KRS DCU | 175.00 mm (6.89 in) |
| KRS Radar Display | 1 m (3.28 ft) |
| KRS Trackball | 1 m (3.28 ft) |
| RCR-SDUSB card reader* | 1 m (3.28 ft) |
| VCM100 | 1 m (3.28 ft) |

If the minimum safe distance cannot be adhered to then when choosing the installation location for the equipment, ensure that any compasses are not affected by the equipment when it is in a powered on state.

# 7.4 Tools required

The following tools are recommended for installation:




1. Power drill.
2. Drill bit for pilot fixings holes.
3. Pozi-drive screw driver.

**Note:**

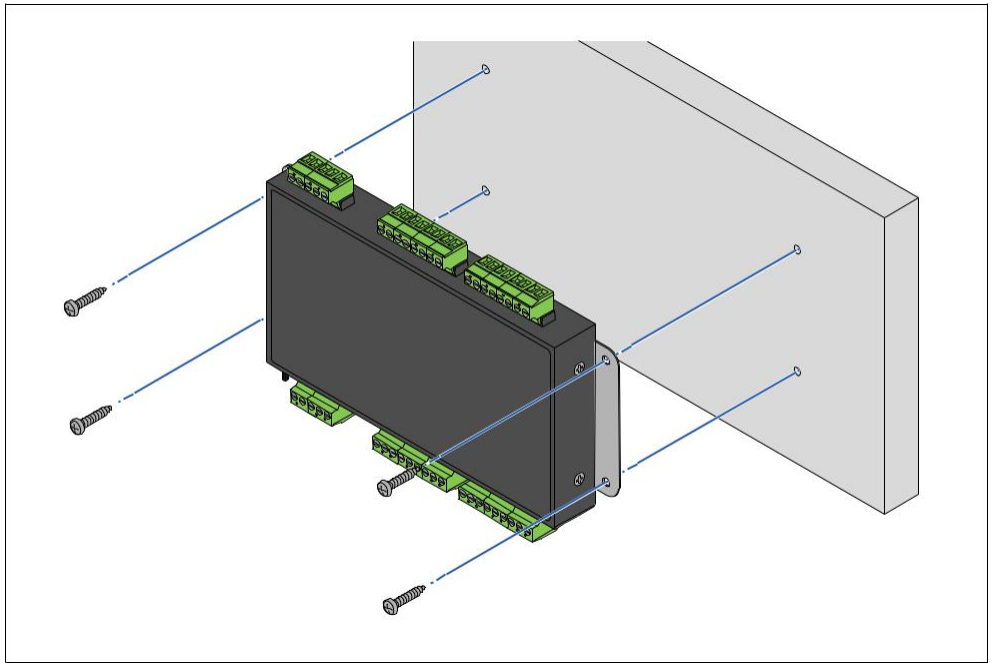
Drill bit and screw size are dependent upon the thickness and type of material that the unit is being mounted on.

# 7.5 Mounting the DCU

Follow the steps below to mount the DCU.

Pre-requisites:

- Ensure that the chosen location is a flat surface, Mounting on a contoured surface may damage the product.
- Mount the product before connecting power supply or device connection wires.



1. Using the product as a template mark the fixing hole locations on the mounting surface and drill pilot holes.
2. Mount the product using suitable screws (not supplied).

# CHAPTER 8: DISPLAY INSTALLATION

## CHAPTER CONTENTS

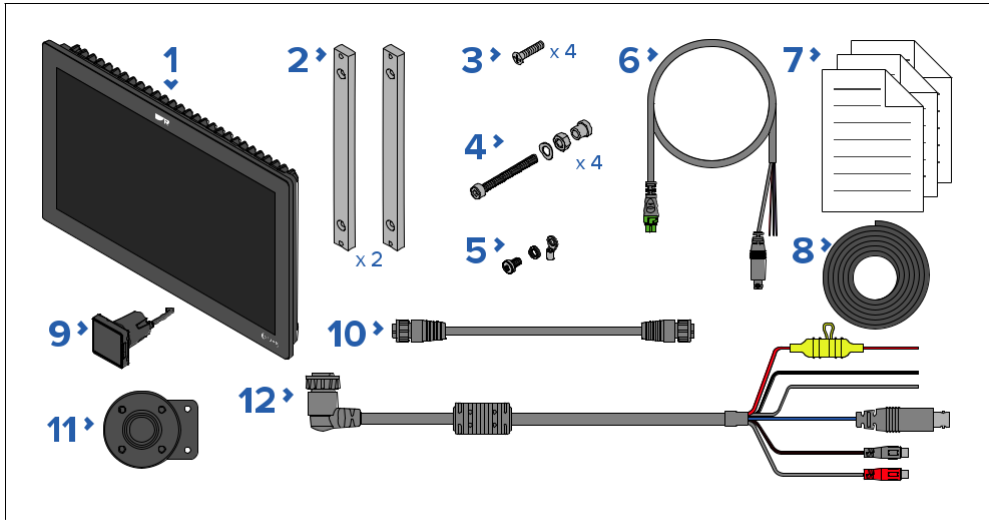


*Card reader: option

## 8.1 Parts supplied (Display)

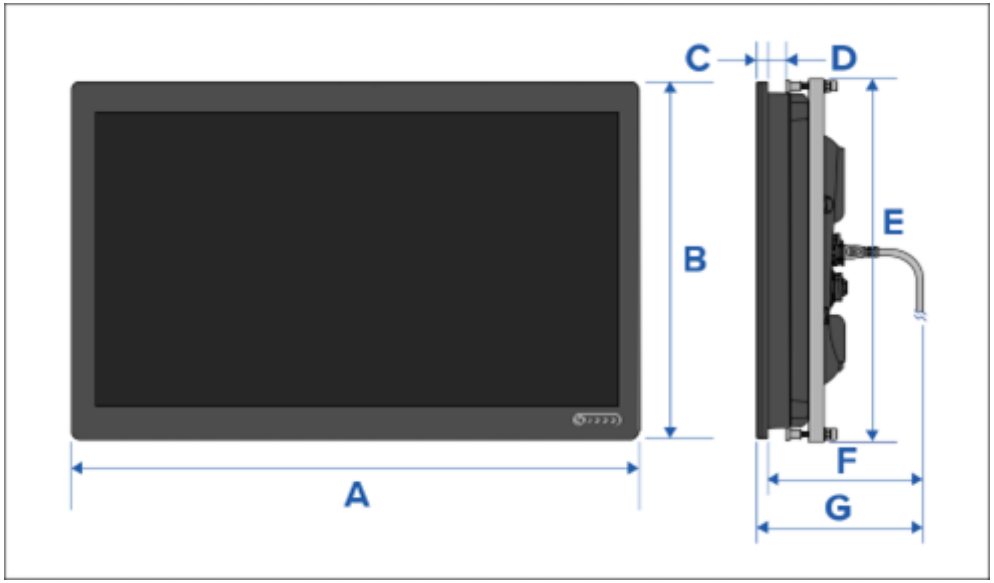
The following parts are supplied in the display box:

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




| Item | Description |
|---|---|
| 1 | Radar display. |
| 2 | Rear mount brackets. |
| 3 | Mounting bar fixings x4 (M5 x 20 pozi countersunk). |
| 4 | Mounting fixings x 4 (Including M5 x 35 Bolts, M5 wavy washers, M5 nuts and mounting feet). |
| 5 | M3 x 5 screw, M3 spring washer and M3 crimp terminal (for optional grounding connection). |
| 6 | Alarm / analog video in cable (part number A80235). |
| 7 | Documentation. |
| 8 | Mounting gasket tape. |
| 9 | RCR-SD/USB external card reader* (part number A80440). |
| 10 | Radar data cable, 2 m (6.6 ft). |
| 11 | Alarm buzzer (part number: E26033). |
| 12 | Right angled power / video / audio cable, 1.5 m (4.92 ft). |

## 8.2 Display dimensions




| | 16” Display | 19” Display | 22” Display | 24” Display |
|---|---|---|---|---|
| **A** | 394.9 mm (15.55 in) | 461.78 mm (18.18 in) | 533.56 mm (21.00 in) | 578.40 mm (22.77 in) |
| **B** | 248.22 mm (9.77 in) | 289.44 mm (11.40 in) | 326.33 mm (12.85 in) | 386.84 mm (15.23 in) |
| **C** | 9 mm (0.35 in) | 9 mm (0.35 in) | 9 mm (0.35 in) | 9 mm (0.35 in) |
| **D** | Min: 6 mm (0.24 in) Max 19 mm (0.75 in) | Min: 6 mm (0.24 in) Max 19 mm (0.75 in) | Min: 6 mm (0.24 in) Max 19 mm (0.75 in) | Min: 6 mm (0.24 in) Max 19 mm (0.75 in) |
| **E** | 253 mm (9.96 in) | 294 mm (11.57 in) | 331 mm (13.03 in) | 392 mm (15.43 in) |

| | 16” Display | 19” Display | 22” Display | 24” Display |
|---|---|---|---|---|
| **F** | 98.54 mm (3.88 in) to 179.26 mm (7.06 in) | 98.54 mm (3.88 in) to 179.26 mm (7.06 in) | 98.54 mm (3.88 in) to 179.26 mm (7.06 in) | 100.99 mm (3.98 in) to 182.01 mm (7.17 in) |
| **G** | 107.54 mm (4.23 in) to 188.26 mm (7.41 in) | 107.54 mm (4.23 in) to 188.26 mm (7.41 in) | 107.54 mm (4.23 in) to 188.26 mm (7.41 in) | 109.99 mm (4.33 in) to 191.01 mm (7.52 in) |

**Note:**

- Dimension D above shows the minimum and maximum thickness of the mounting surface when surface mounting the display.
- Dimensions C+D shows the minimum and maximum mounting surface thickness when flush mounting the display.

**Note:**

- Dimension F & G are the depths required for surface mounting and flush mounting, these depths are variable based on the cable connections required and types of cable used in the installation.
- The minimum possible depth reflects an installation with **only** a right angled power cable connected and with no card reader* connected.
- The maximum depth reflects an installation with HDMI cable connected.

### Dimension F — examples

For examples of dimension G add 9.00 mm (0.35 in) to the values below.

| | 16” Display | 19” Display | 22” Display | 24” Display |
|---|---|---|---|---|
| HDMI IN/OUT cables connected | 179.26 mm (7.06 in) | 179.26 mm (7.06 in) | 179.26 mm (7.06 in) | 191.01 mm (7.52 in) |
| GPS antenna cable connected | 159.58 mm (6.28 in) | 159.58 mm (6.28 in) | 163.16 mm (6.42 in) | 165.91 mm (6.53 in) |
| Card reader* accessory connected | 141.31 mm (5.56 in) | 141.31 mm (5.56 in) | 141.31 mm (5.56 in) | 144.06 mm (5.67 in) |
| Right angle power cable connected | 98.54 mm (3.88 in) | 98.54 mm (3.88 in) | 98.54 mm (3.88 in) | 100.99 mm (3.98 in) |

## 8.3 Location requirements

### 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.12 — Health & Safety**

**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).

### Radar display location requirements

In accordance with MSC.192/7.5.2, displays must be located in a position where the orientation is such that when in use and the user is looking ahead, the lookout view is not obscured and there is minimum ambient light on the display viewing surfaces.

**Display viewing distance**

The recommended viewing distances for the Radar displays are:

- 16” display = 0.6 m (1.97 ft).
- 19” display = 0.7 m (2.30 ft).
- 22” display = 0.8 m (2.62 ft).
- 24” display = 0.9 m (2.95 ft).

## Viewing angle considerations

As display contrast and color are affected by the viewing angle, It is recommended that you temporarily power up the display, prior to installation, to enable you to best judge which location provides the optimum viewing angle.
For viewing angles for your product refer to the *Technical specification*.

## 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.

### Caution: Product weight

Refer to the technical specification for your product to ensure the intended mounting surface is suitable to bear its weight.
2 people may be required for installation of larger / heavier products.

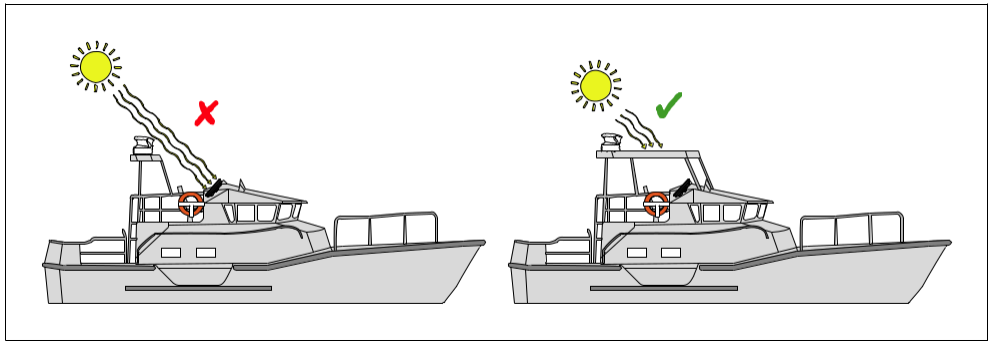
### Rear access requirements

Access to the rear of the display and mounting surface is required to surface and flush mount the display.
Ensure there is sufficient access and space behind the mounting surface to attach and tighten the fixings and also to connect the cables.

## 24” display above decks installation requirements

**Note:**

The installation requirements below only apply to the 24” display when being installed in an above decks environment.



The 24” display is designed to operate in ambient temperatures of up to 55°C 131°F and with display surface temperatures of up to 65°C / 149°F. However, when the display is exposed to prolonged, direct sunlight the surface of the 24” display may exceed these temperatures. This may cause the LCD to blackout temporarily, until the surface temperature falls to within normal limits. To help mitigate this occurrence it is recommended that when installing in an above decks environment the Axiom XL 24 is mounted in a location protected from direct sunlight e.g.: underneath a hardtop or Bimini (canvas).

Other factors that can help to reduce the surface temperature of your display include ensuring sufficient airflow around the display and reducing the LCD’s brightness level.

## Touchscreen location requirements

**Note:**

Touchscreen performance can be affected by the installation environment, specifically Touchscreen displays installed above decks, where it will be open to the elements may exhibit the following:

- Hot touchscreen temperature — If the display is mounted where it will be exposed to prolonged periods of direct sunlight, the touchscreen may become hot.
- Erroneous touchscreen performance — Exposure to prolonged rain and / or water wash over may cause the display to respond to ‘false touches’, caused by the rain/water hitting the screen.

If, due to the required installation location, exposure to these elements is anticipated then it is recommended that you consider:

- Locking the touchscreen and using a physical controller such as a USB Trackball instead.
- Attaching a third-party ‘display hood accessory’ to reduce direct sunlight exposure and the volume of water that the display is exposed to.

## EMC installation guidelines

Koden 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:

- Koden equipment and cables connected to it are:

– At least 1 m (3.28 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (6.6 ft).
– More than 2 m (6.56 ft) from the path of a Radar beam. A Radar beam can normally be assumed to spread 20 degrees above and below the radiating element.

- The product is supplied from a separate battery from that used for engine start. This is important to prevent erratic behaviour and data loss which can occur if the engine start does not have a separate battery.
- Koden 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, when choosing a suitable location for the equipment maintain the maximum possible distance from any magnetic compasses.

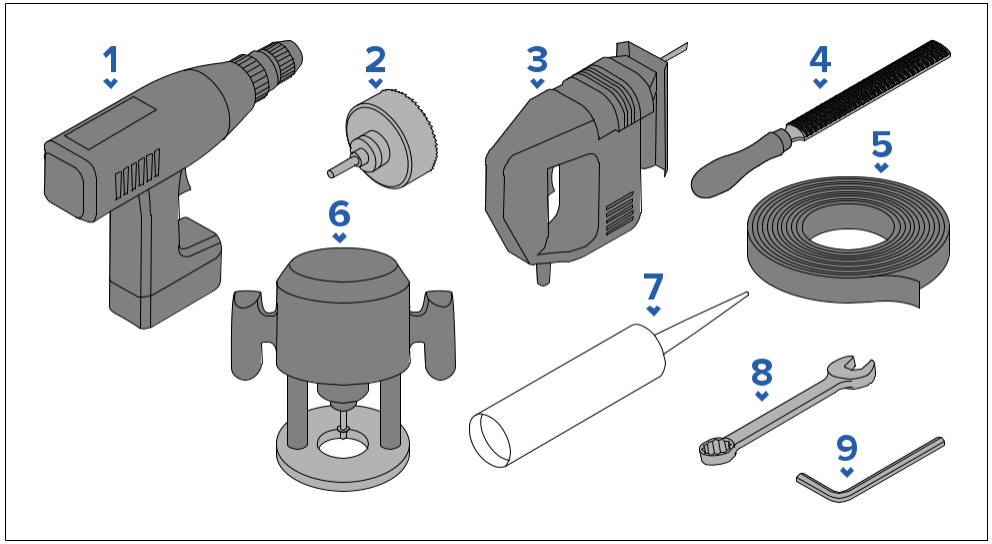
The minimum safe distance for each piece of equipment is shown below:

| Equipment | Minimum safe distance |
|---|---|
| Alarm buzzer | 1 m (3.28 ft) |
| KRS Radar scanner | 1 m (3.28 ft) |
| KRS DCU | 175.00 mm (6.89 in) |
| KRS Radar Display | 1 m (3.28 ft) |
| KRS Trackball | 1 m (3.28 ft) |
| RCR-SDUSB card reader* | 1 m (3.28 ft) |
| VCM100 | 1 m (3.28 ft) |

If the minimum safe distance cannot be adhered to then when choosing the installation location for the equipment, ensure that any compasses are not affected by the equipment when it is in a powered on state.

# 8.4 Tools required

The following tools are recommended for installation:




1. Power drill.
2. Hole cutter (appropriate size for corner diameters of the **Cut out** line identified on the supplied mounting template):
   - 15.40 mm (0.61 in) — 16”, 19” and 24” displays.
   - 13.5 mm (0.53 in) — 22” displays.
3. Jigsaw.
4. Half round file (or sandpaper).
5. Masking/self adhesive tape.
6. * Hand router with a router bit an appropriate size for the 14.00 mm (0.55 in) corner diameter required for the flush mount rebate.
7. Marine grade sealant.

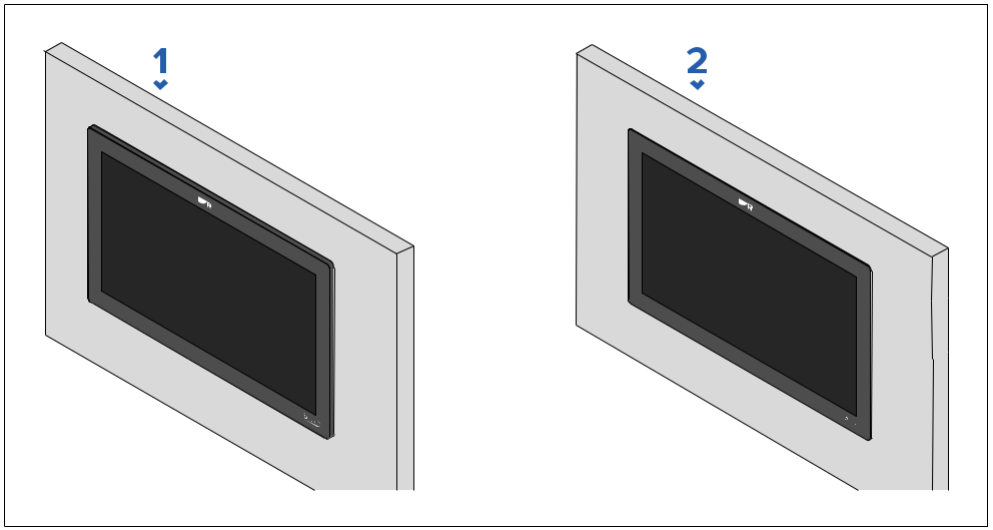
8. 8 mm ($^{5}/_{16}$”) wrench or small adjustable wrench.
9. 4 mm Hex wrench (Allen key).

**Note:**

* Items are only required when flush mounting the display.

## 8.5 Mounting options

The displays can be mounted flush with the mounting surface (flush mount) or with the glass protruding from the mounting surface (surface mount).




1. Surface mount
2. Flush mount

**Warning: 2 person installation required**

To prevent potential product damage, vessel damage and personal injury 2-person installation is recommended.

## 8.6 Rear access requirements

Access to the rear of the display and mounting surface is required to surface and flush mount the display.
Ensure there is sufficient access and space behind the mounting surface to attach and tighten the fixings and also to connect the cables.

## 8.7 Preparing the mounting surface — surface mounting

Surface mounting requires one cut out hole. When the display is surface mounted the glass/bezel will protrude from the mounting surface.

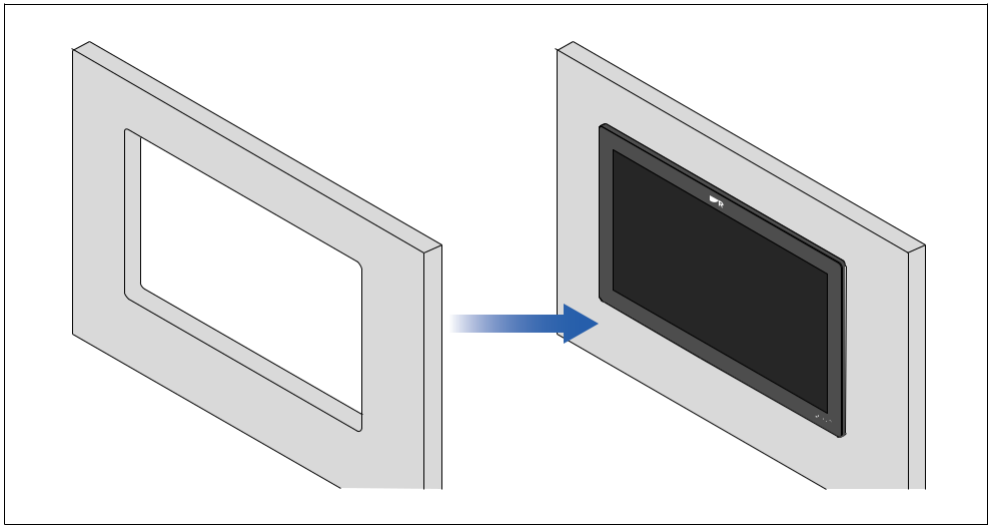
**Note:**

The following procedure is for preparing the mounting surface for surface mount installations. For flush mounting details refer to:
**p.62 — Preparing the mounting surface — flush mounting**

**Important:**

Before preparing the mounting surface ensure that:

- Your selected location meets the location requirements. For details refer to: **p.67 — Location requirements**
- You have identified cable connections and the route that the cables will take.



1. Mark the **cutout** line on the mounting surface, as identified on the supplied mounting template.
2. Use a drill and an appropriate size drill bit or hole cutter to cut out the corners of the **Cutout** line.

   *The corner diameters for the displays are:*

   - *15.40 mm (0.61 in) — 16”, 19” and 24” displays.*
   - *13.5 mm (0.53 in) — 22” displays.*
3. Use a jigsaw or similar cutting tool to cut out the remainder of the cutout area.
4. Use a half round file and/or sandpaper to smooth and rough edges or burs on the cutout hole.

## 8.8 Preparing the mounting surface — flush mounting

Flush mounting requires the same cut out hole as surface mounting and an additional rebate around the edge of the cut out. When the display is flush mounted, the glass will be flush with the mounting surface.

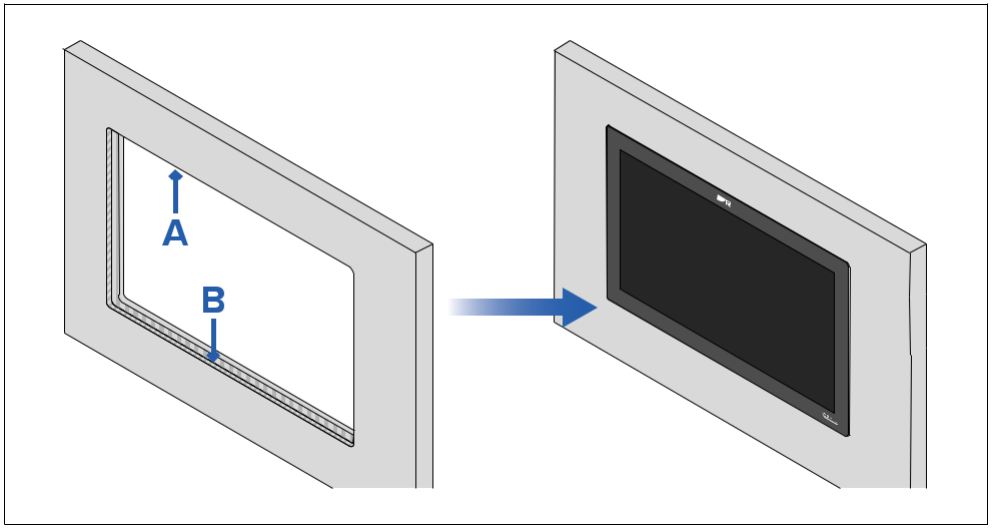
**Note:**

The following procedure is for preparing the mounting surface for flush mount installations. For surface mounting details refer to:
**p.62 — Preparing the mounting surface — surface mounting**

**Important:**

Before preparing the mounting surface ensure that:

- Your selected location meets the location requirements. For details refer to: **p.67 — Location requirements**
- You have identified cable connections and the route that the cables will take.




- **A** — Cutout (when flush mounting the cut out will be the same size as for surface mounting.
- **B** — Flush mounting requires an extra rebate to recess the display fully in the mounting surface.

1. Mark the **cutout** line on the mounting surface, as identified on the supplied mounting template.
2. Mark on the mounting surface the **Flush mount rebate** line, as identified on the supplied mounting template.
3. Use a drill and an appropriate size drill bit or hole cutter to cut out the corners of the **Cutout** line.

   *The corner diameter for each display is:*

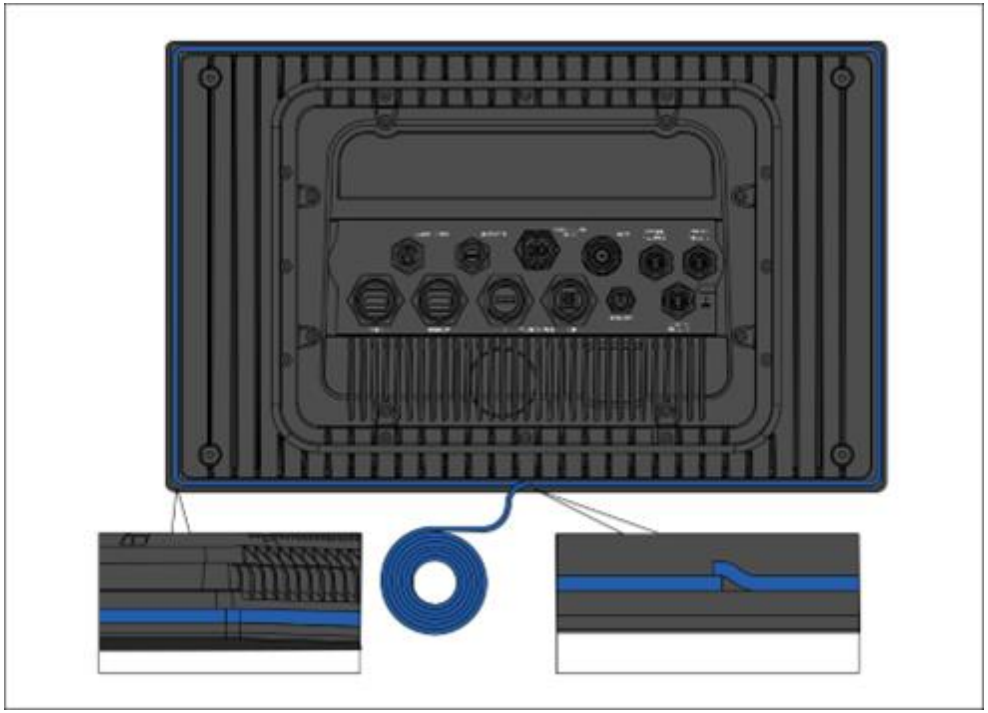
   - *15.40 mm (0.61 in) — 16", 19" and 24" displays.*
   - *13.5 mm (0.53 in) — 22" displays.*

4. Use a jigsaw or similar cutting tool to cut out the remainder of the **Cutout** area.
5. Use a router hand tool to recess the marked **Flush mount rebate** area, to a depth of 9.00 mm (0.35 in).
6. Carefully (and temporarily) fit the display to the cutout area, to check for a good fit. **Do not use any fixings at this time.** If the fit is very tight, it may be necessary to remove the display and file the edges of the cutout to achieve a better fit, using a half round file and/or sandpaper.

   Alternatively, if the fit is loose and there is a visible gap between the edge of the display and the cutout, this will need to be filled with marine-grade sealant or suitable packing material to fill the gap. *This should only be done once the display has been secured to the surface using the fixings, as described in the next mounting procedure*.

## 8.9 Fitting the gasket tape

Before fitting the display you must fit the mounting gasket tape to the rear of the display, as shown below.



1. Starting at the bottom center, affix the gasket tape to the display.
2. Remove the paper backing from the tape before going around the corners, ensuring that the tape remains tight all around the display, and no air gap exists between display and tape.
3. When you reach the end, leave a small overlap to ensure that no gap exists between the ends of the gasket when it is compressed.

**Note:**

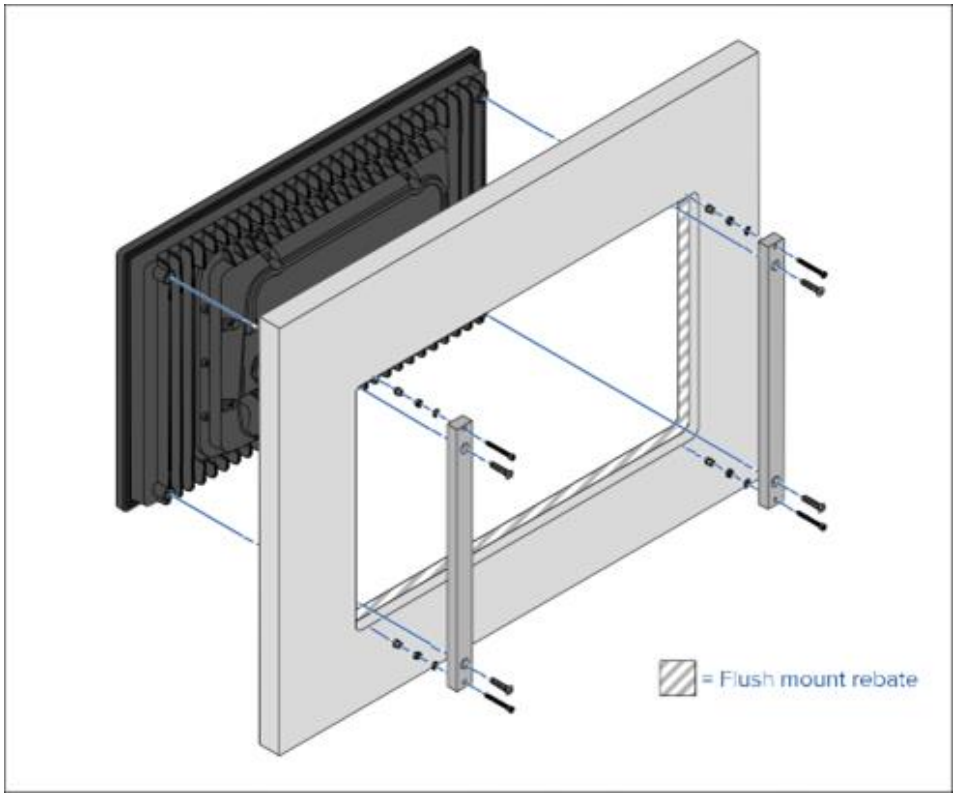
The supplied gasket tape provides a seal between the unit and a suitably flat and stiff mounting surface or binnacle. **The gasket should be used in all installations**. It may also be necessary to use a marine-grade sealant if the mounting surface or binnacle is not entirely flat and stiff or has a rough surface finish.

## 8.10 Mounting the display

The displays are mounted from the rear.

**Important:**

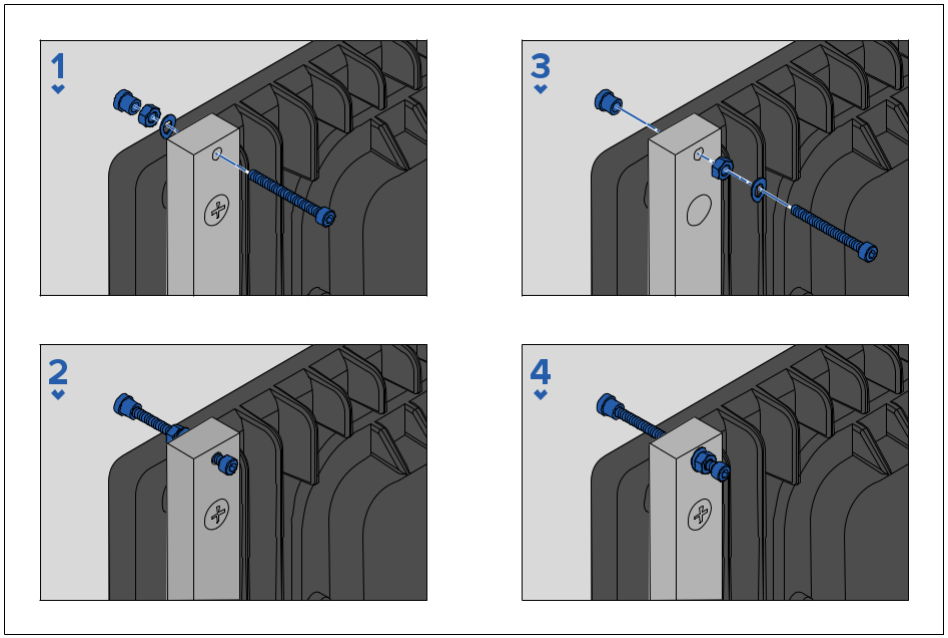
In above decks installations, marine-grade sealant should be used to seal the gap between the edge of the mounting surface and the edge of the display.




1. Ensure you have followed the Installation manual for preparing the mounting surface for either surface mounting or flush mounting.
2. Route the relevant cables to behind the mounting surface cut out.

*This may be difficult or not possible once the display has been mounted.*

3. With one person holding the display in place, the second person should attach the mounting bars to the back of the display using the supplied countersunk screws, in the 4 locations shown.
4. Secure the display using the provided mounting fixings (M5 bolt, wavy washer, nut and foot, in the 4 locations shown).
   Depending on the thickness of the mounting surface, the washer and nut may be located:
   - between the mounting bracket and mounting feet, as shown in (1) and (2) below, or:
   - after the mounting bracket, as shown in (3) and (4) below.




5. Using a 4 mm Hex (Allen) wrench, tighten the mounting bar bolts, ensuring that the feet are tight against the rear of the mounting surface.
6. Using an 8 mm wrench or adjustable wrench, tighten the nut against the washer and the mounting bar to lock in position.
   The nut should be tightened sufficiently to securely hold the display in position.

**Warning: Marine-grade sealant**

Only use marine-grade neutral cure polyurethane sealants. Do NOT use sealants containing acetate or silicone, which can cause damage to plastic parts.

# CHAPTER 9: CARD READER INSTALLATION

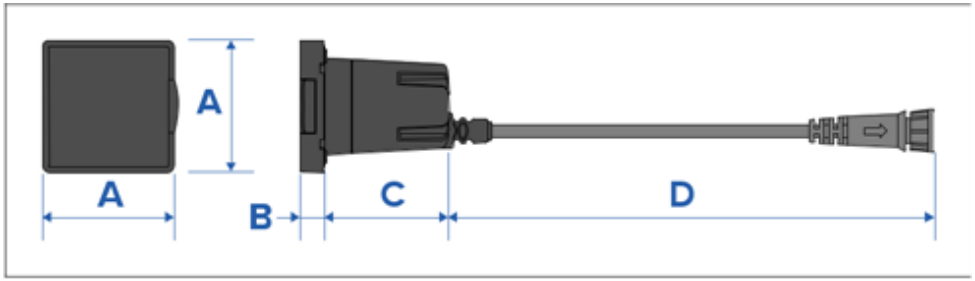
## CHAPTER CONTENTS



*Card reader: option

# 9.1 Card reader dimensions

The External card reader* dimensions are provided below.




| | Measurement |
|---|---|
| **A** | 55.00 mm (2.165 in) |
| **B** | 10.00 mm (0.39 in |
| **C** | 53.00 mm (2.09 in) |
| **D** | 2.00 m (6.56 ft) |

# 9.2 Location requirements

## 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.12 — Health & Safety**

### 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).

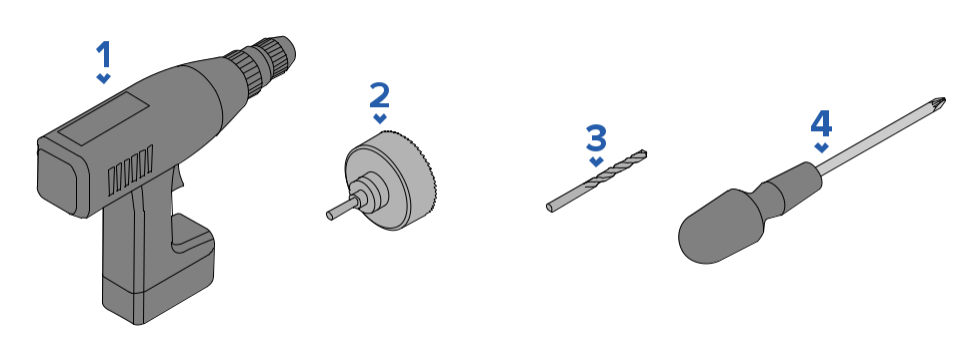
## Card reader location requirements

When selecting a location for the external card reader* it is important to consider a number of factors.
Factors for consideration:

- **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:
  - The product should be located close to the display to which it is connected, ensuring that the cable is not stretched or pulled tight.
  - 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 should be located 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.

# 9.3 Tools required

The following tools are recommended for installation:



1. Power drill.
2. 40.00 mm (1.59 in) Hole cutter.
3. Drill bit for pilot fixings holes.
4. Pozi-drive screw driver.

**Note:**

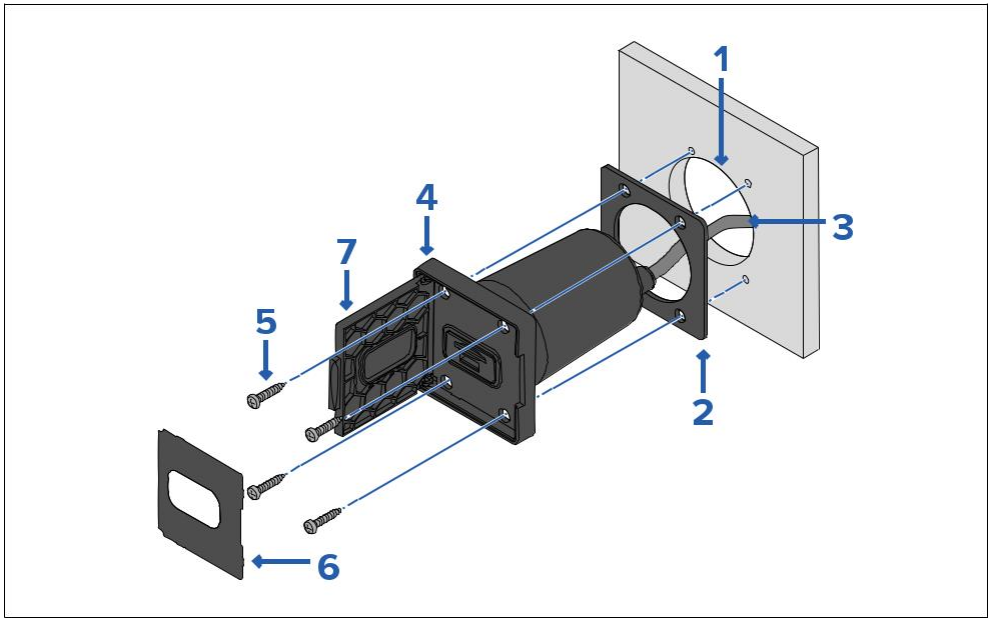
Drill bit and screw size are dependent upon the thickness and type of material that the unit is being mounted on.

## 9.4 Mounting the card reader

The card reader* can be surface mounted following the steps below:

**Note:**

- 4 x appropriate size self-tapping screws (not supplied) are required to mount the card reader*.
- Drill bit and screw size are dependent upon the thickness and type of material that the card reader* is being mounted on.



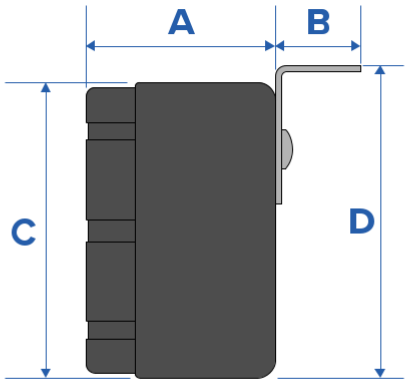

1. Using the supplied card reader* mounting template as a guide, cut and drill the cut out hole and fixing pilot holes at the relevant locations on the mounting surface.
2. Attach the gasket to the rear of the card reader*.
3. Feed the cable through the hole and connect to the Accessory connection on the rear of the display.
4. Insert the card reader* into the cut out hole.
5. Secure the card reader* using appropriate self-tapping screws (not supplied).
6. Insert the card reader* inlay.
7. To prevent water ingress and consequent damage to the product, ensure that the card reader door or cover is firmly closed.

# CHAPTER 10: ALARM BUZZER INSTALLATION

CHAPTER CONTENTS

# 10.1 Alarm buzzer dimensions

Dimensions for the Alarm buzzer are provided below.




| | Measurement |
|---|---|
| A | 38.00 mm (1.50 in) |
| B | 18.00 mm (0.71 in) |
| C | 60.00 mm (2.36 in) |
| D | 63.00 mm (2.48 in) |

# 10.2 Location requirements

## 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.12 — Health & Safety**

### 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).

## Alarm buzzer location requirements

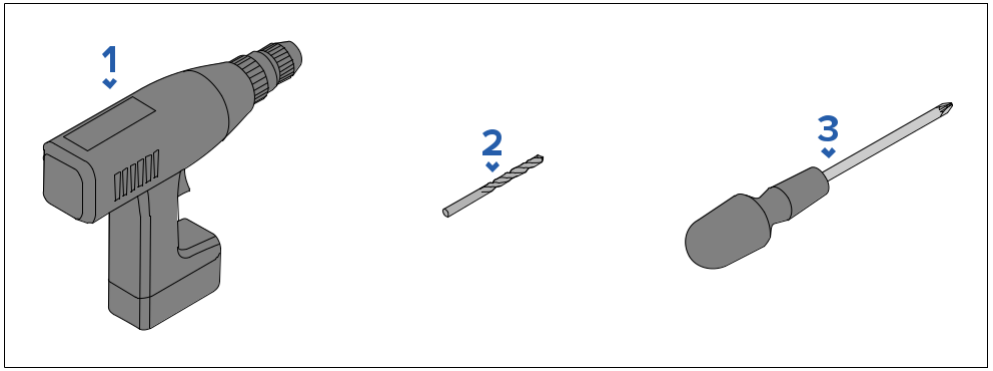
When selecting a location for the alarm buzzer it is important to consider a number of factors.

Factors for consideration:

- **Location** — Ensure the product is mounted in a location where the display operator will be able to easily hear the alarm buzzer when an alarm or warning is triggered.
- **Mounting surface** — Ensure product is adequately supported on a secure surface.
- **Cabling** — Ensure the product is mounted in a location which allows proper routing, support and connection of cables:
  - The product should be located close to the display to which it is connected, ensuring that the cable is not stretched or pulled tight.
  - 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 should be located 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.

## 10.3 Tools required

The following tools are recommended for installation:



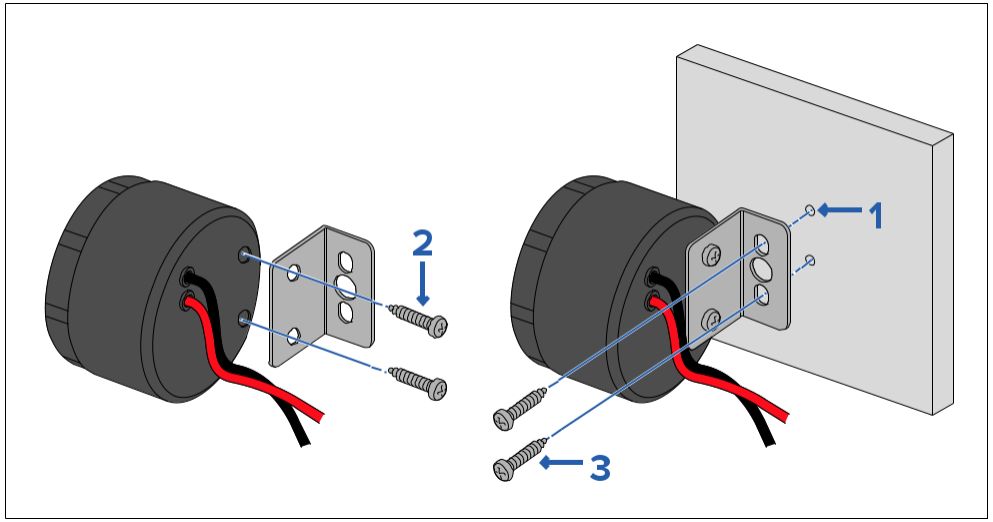

1. Power drill.
2. Drill bit for pilot fixings holes.
3. Pozi-drive screw driver.

**Note:**

Drill bit and screw size are dependent upon the thickness and type of material that the unit is being mounted on.

## 10.4 Mounting the alarm buzzer

Follow the steps below to mount the alarm buzzer.



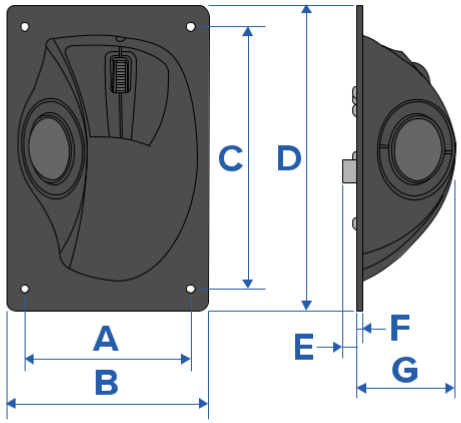

1. Using the bracket as a template mark the fixing hole locations on the mounting surface and drill pilot holes.
2. Attach the mounting bracket to the rear of the alarm buzzer using the screws provided.
3. Mount the alarm buzzer using the screws provided.

# CHAPTER 11: KRS TRACKBALL INSTALLATION

CHAPTER CONTENTS

# 11.1 Trackball dimensions

Dimensions for the KRS trackball are provided below.




| Item | Description |
|---|---|
| A | 90.00 mm (3.54 in) |
| B | 110.00 mm (4.33 in) |
| C | 142.00 mm (5.59 in) |
| D | 165.80 mm (6.53 in) |
| E | 7.71 mm (0.30 in) |
| F | 3.00 mm (0.12 in) |
| G | 53.37 mm (2.10 in) |

The Trackball includes a captive 1 m (3.28 ft) cable.

# 11.2 Location requirements

## 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.12 — Health & Safety**

### Warning: Potential ignition source

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

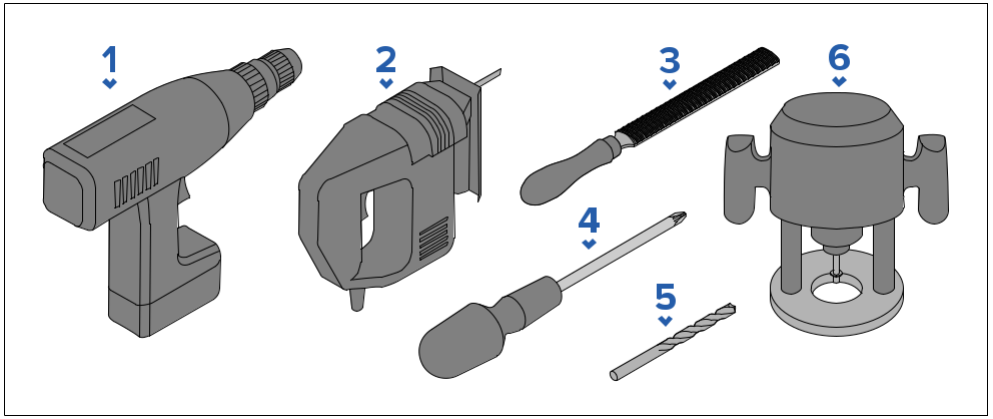
## General location requirements

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

- **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.

## 11.3 Tools required

The following tools are recommended for installation:




1. Power drill.
2. Jigsaw.
3. Half round file (or sandpaper).
4. Screw driver suitable for fixings.
5. Drill bit, suitable size for pilot fixing holes.

**Note:** Drill bit and screw size are dependent upon the thickness and type of material that the unit is being mounted on.

6. * Hand router with a router bit an appropriate size for the 10 mm (0.31 in) corner diameter required for the flush mount rebate.

**Note:**

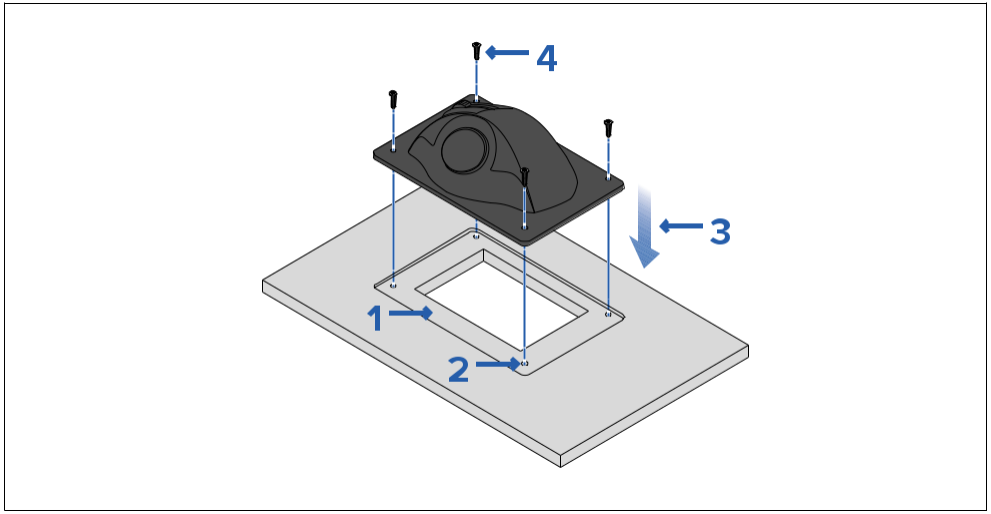
* Items are only required when flush mounting the display.

## 11.4 Mounting the KRS trackball

Follow the steps below to install the Panel mount trackball.

**Note:**

The Trackball requires 4 x appropriate size self-tapping screws (not supplied).




1. Use the supplied KRS trackball dimensions and the actual product as a guide to prepare the mounting surface for either flush mounting or surface mounting.

   *Flush mounting requires a 3 mm (0.12 in) rebate.*

**Important:**

Drill bit and screw size are dependent upon the thickness and type of material that the unit is being mounted on.

2. Drill the mounting holes for the fixings.
3. Place the Trackball in position.
4. Secure the trackball to the mounting surface using the fixings.

# CHAPTER 12: KRS KEYBOARD INSTALLATION

CHAPTER CONTENTS

# 12.1 Location requirements

## 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.12 — Health & Safety**

### Warning: Potential ignition source

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

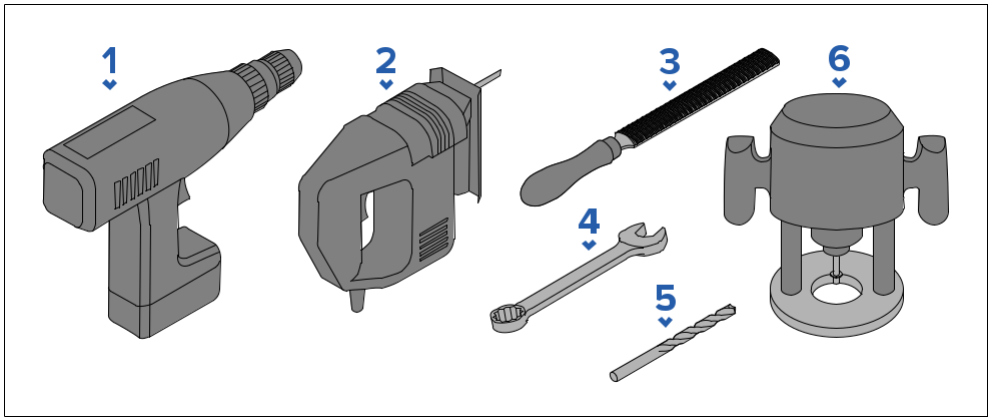
## General location requirements

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

- **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.

## 12.2 Tools required

The following tools are recommended for installation:




1. Power drill.
2. Jigsaw.
3. Half round file (or sandpaper).
4. 5.5 mm (7/32 in) wrench or adjustable wrench.
5. 2.5 mm (3/32 in) drill bit for fixing holes.

**Note:** Drill bit and screw size are dependent upon the thickness and type of material that the unit is being mounted on.

6. * Hand router with a router bit an appropriate size for the 10 mm (0.31 in) corner diameter required for the flush mount rebate.

**Note:**

* Items are only required when flush mounting the display.

# CHAPTER 13: CABLES AND CONNECTIONS — GENERAL INFORMATION

CHAPTER CONTENTS

# 13.1 General cabling guidance

## Cable types and length

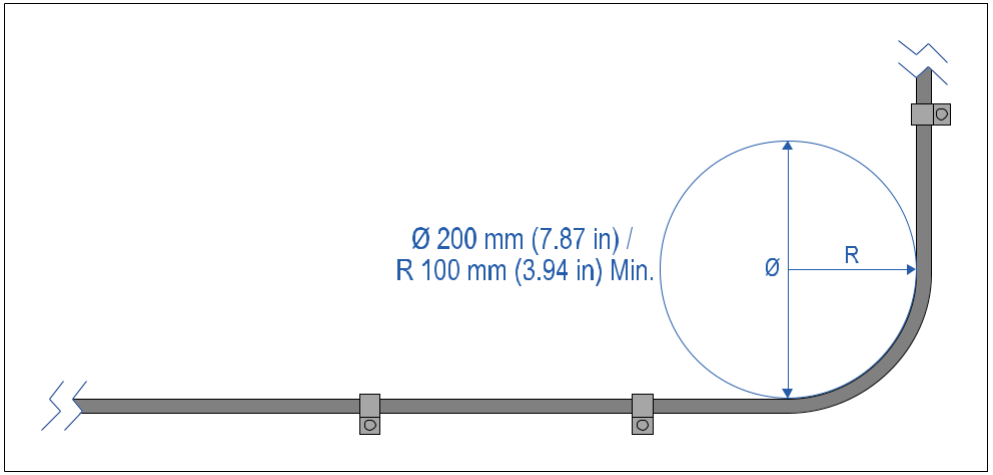
It is important to use cables of the appropriate type and length.

- Unless otherwise stated only use cables supplied by Koden.
- Where it is necessary to use non-Koden 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.

**Important:**

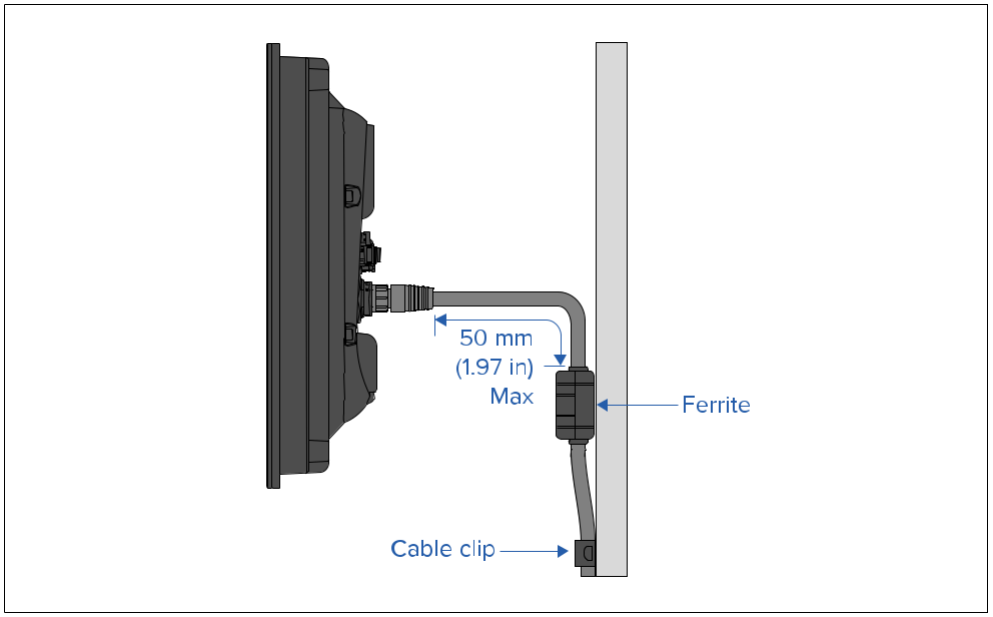
Be aware that some **third-party** cables and adaptors (for example, certain Ethernet cables using RJ45 connectors) are not always shielded. To prevent breaks in cable shielding continuity and potential grounding issues, special attention is required to ensure that any cables, extension cables, adaptors,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

## 13.2 Cable suppression ferrites

To ensure optimum EMC performance and to comply with applicable EMC regulations all data cables connected to this product must have a suppression ferrite fitted.

Three suppression ferrites are included with your display, one for each data connection.

Fit a ferrite to each data cable as shown below:




- Cable clips (not supplied) should be used to support the cable and ferrite.
- If you need to remove a ferrite for any reason, ensure it is replaced in its original location before using the product.
- If the ferrite moves freely once fitted, use cable ties (not supplied) above and below the ferrite to secure it in place.

## 13.3 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 manual 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.

## 13.4 Bare-ended wire connections

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

### Bare-ended wire connections

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

### Unused bare-ended wires

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

# CHAPTER 14: DISPLAY CONNECTIONS

## CHAPTER CONTENTS

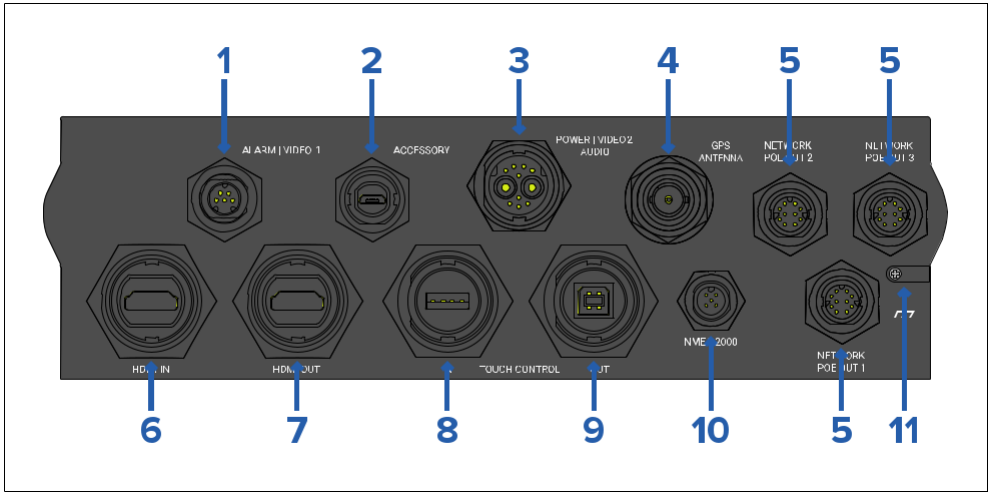


*Card reader: option

# 14.1 Display connections

**Important:**

The display connections where DO NOT USE is specified are not currently supported by the KRS Radar System. Connecting devices to these connections may mean that navigation is not being performed in a type approved manner and may invalidate product warranty.



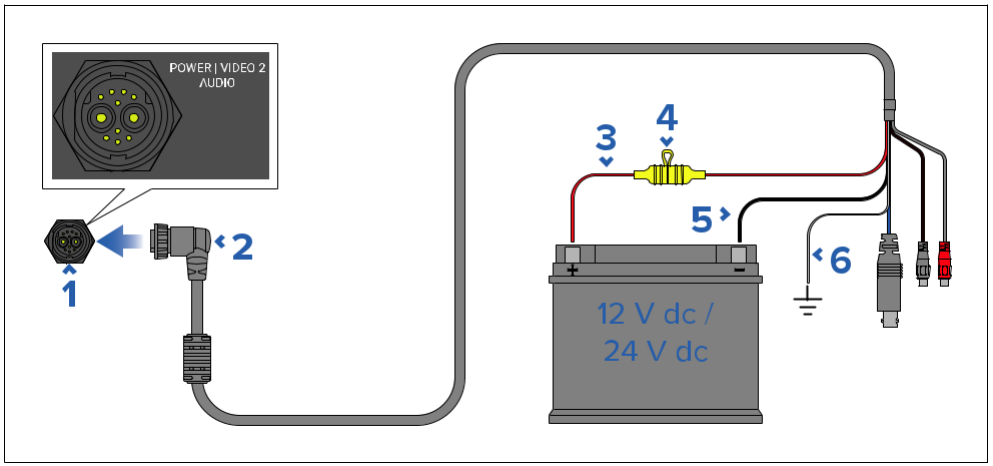

1. **ALARM | VIDEO 1** — The alarm / video 1 connector enables connections of the external alarm buzzer using the Alarm / video cable (part number A80235). **DO NOT USE** the video input connection as it is not currently available on this display.
2. **ACCESSORY** — The accessory connector enables connection of the external card reader* RCR-SD/USB (part number A80440).
3. **POWER | VIDEO 2 | AUDIO** — The power / video / audio connector enable connection to a 12 / 24 V dc power supply. **DO NOT USE** the video input or RCA audio connections as they are not currently available on this display.
4. **GPS ANTENNA** — **DO NOT USE** the GPS antenna connection as it is not currently available on this display.
5. **NETWORK POE OUT** — The 3 x network connectors enable connection of Ethernet devices using data cables. **DO NOT USE** the display to power Ethernet devices as this feature is not currently available on this display.
6. **HDMI IN** — **DO NOT USE** the HDMI input as it is not currently available on this display
7. **HDMI OUT** — **DO NOT USE** the HDMI output as it is not currently available on this display.
8. **TOUCH CONTROL IN** — The touch in connector enables connection of a suitable USB Trackball.
9. **TOUCH CONTROL OUT** — **DO NOT USE** the Touch out connection as it is not currently available on this display.
10. **NMEA 2000** — **DO NOT USE** the NMEA 2000 connection as it is not currently available on this display.
11. **GROUND** — The optional grounding point should only be used when the display experiences touchscreen interference from nearby equipment. The grounding point should be connected to the same RF ground point as the interfering equipment, or the vessel's negative battery terminal.

# CHAPTER 15: DISPLAY POWER CONNECTION AND GROUNDING

CHAPTER CONTENTS

# 15.1 Power connection

The supplied power cable is connected to the **POWER | VIDEO 2 | AUDIO** connector located on the rear of the display. The power cable must then be connected to a 12 V dc or 24 V dc power supply; this can be achieved by connecting to a distribution panel, or directly to a battery. The product is protected against reverse polarity.




1. Display's **POWER | VIDEO 2 | AUDIO** connector.
2. Power/video/audio cable, 1.5 m (4.9 ft).
3 Positive (Red) wire: connect to the power supply's positive (+) terminal.
4. Fuse.
5. Negative wire: connect to the power supply's negative (-) terminal.
6. Drain wire: connect to RF ground point. If no ground point is available, connect to the battery's negative (-) terminal.

## Inline fuse and thermal breaker ratings

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

| Inline fuse rating | Thermal breaker rating |
|---|---|
| 15 A | 15 A (if only connecting one device) |

**Note:**

- The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. If in doubt consult an Koden technical support.
- Your product's power cable may have a fitted inline fuse. If not, you must fit an inline fuse to the positive wire of your product's power connection.

### 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.

## Power distribution

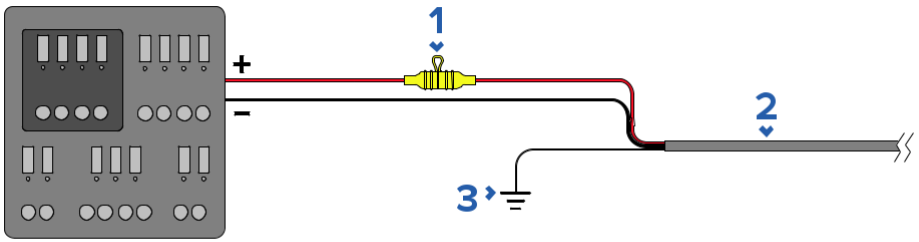
Recommendations and best practice for the power connection of products supplied with a drain wire as part of the supplied power cable.

- 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:**

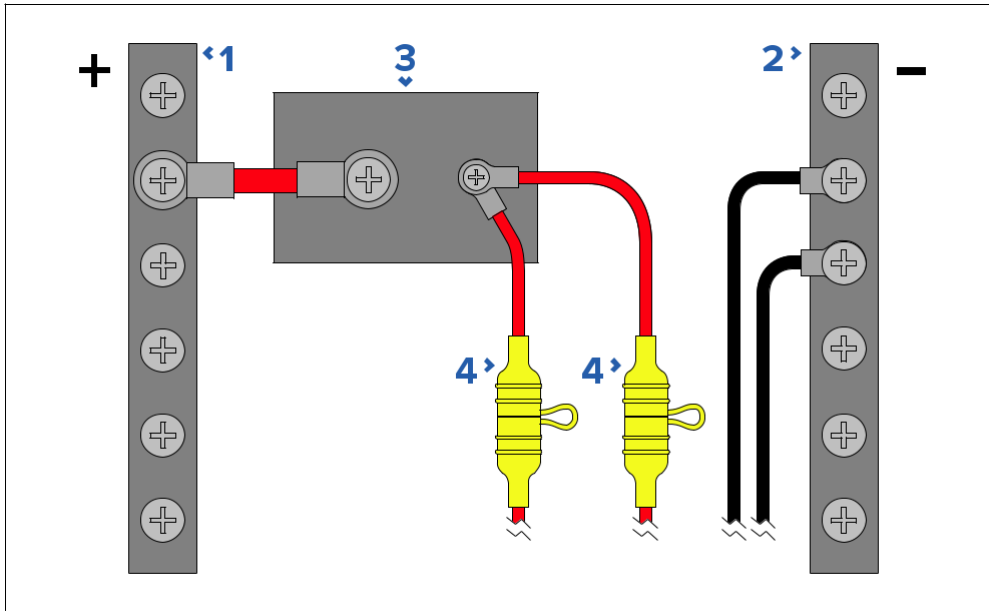
- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for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




| 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 $mm^2$) cable.
- Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 1 item of equipment shares a breaker, use individual inline fuses for each power circuit to provide the necessary protection.
- The power cable supplied with your product includes a drain wire, which must be connected to the vessel's common RF ground.

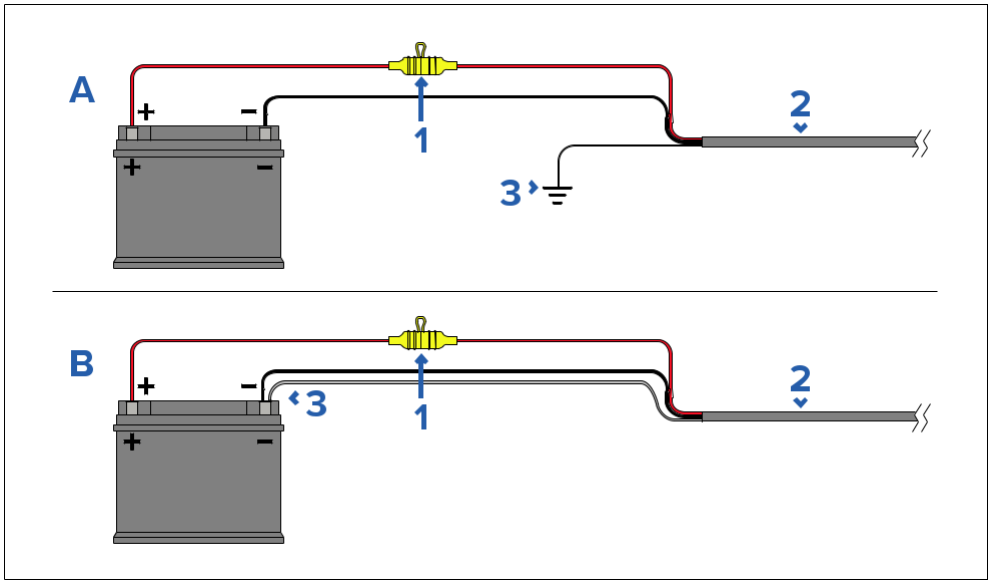



| Description |
|---|
| 1. Positive (+) bar |
| 2. Negative (-) bar |
| 3. Circuit breaker |
| 4. Waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*. |

**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 extension* advice provided in the product's documentation.

| 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
- ISO 13297: Small craft — Electrical systems — Alternating and direct current installations
- ISO 10133: Small craft — Electrical systems — Extra-low-voltage d.c. installations
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

### Warning: Product grounding

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

### Warning: Positive ground systems

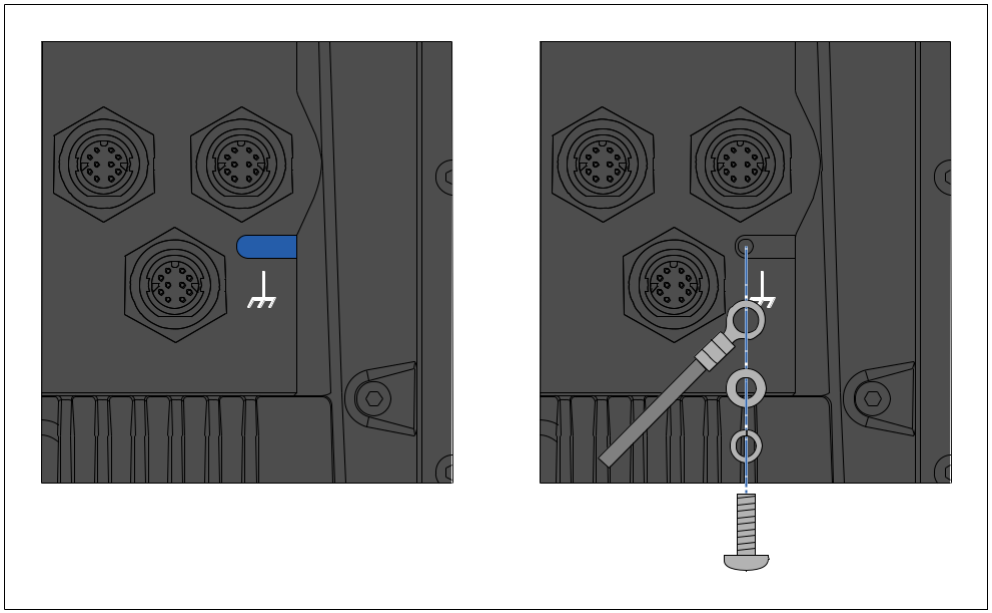
Do not connect this unit to a system which has positive grounding.

## Grounding — optional grounding point

Frequencies emitted from equipment such as switch mode power supplies or MF/HF transmitters can cause interference with your display's touchscreen. If you experience issues with touchscreen performance, fitting an additional dedicated ground connection can resolve the issue.

**Important:**

The ground point should ONLY be connected when touchscreen interference is observed.



If using this optional ground connection, a single common ground point should be used for all equipment in your system.

To fit the grounding wire to the display, use a small flat blade screwdriver to remove the cover over the grounding screw hole.

Connect one end of the ground wire (not supplied) to your display using the supplied crimp, washer and screw.

**Connect the other end of the ground wire to either the vessel's RF ground point, or on vessels without an RF ground system, the negative battery terminal.**

The dc power system should be either:

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

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 vessel's common RF ground point.

### Implementation

The preferred minimum requirement for the path to ground 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 may be 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.

### References

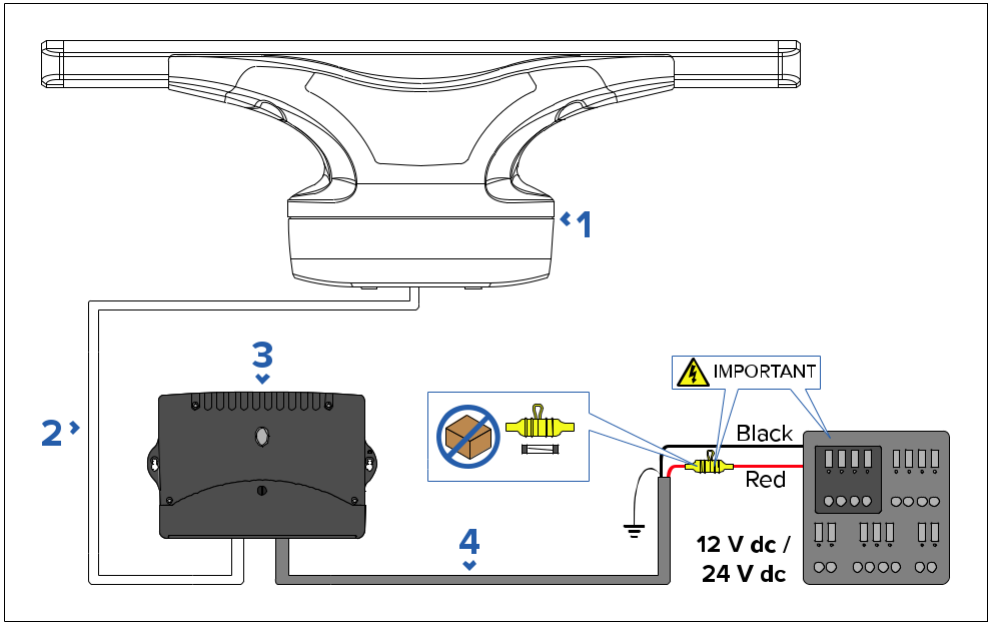
- ISO10133/13297
- BMEA code of practice
- NMEA 0400

# CHAPTER 16: RADAR POWER CONNECTIONS

CHAPTER CONTENTS

# 16.1 Pedestal power connections

The Radar scanner must be powered via the supplied VCM100 Converter Module.




1. Radar scanner.
2. Power cable.
3. VCM100 power converter.
4. Power cable from vessel power supply to VCM100 (power cable not supplied).
5. Vessel power supply.

The Radar scanner is intended for use on vessel DC power systems operating at 12 or 24 Volts DC.

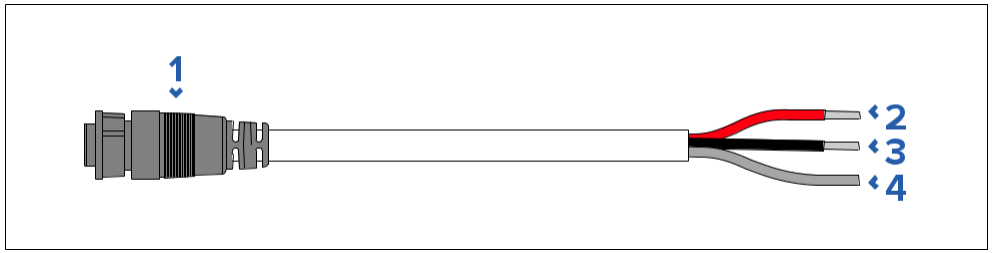
- All power connections must be made via the VCM100 Voltage Converter Module.
- The radar scanner must NOT be connected directly to a battery.
- The radar scanner's power cable must be connected directly to the VCM100 only.
- Only one radar scanner must be connected per VCM100 unit. Each radar scanner in your system requires a dedicated VCM100 unit.
- The power connection between the radar scanner and the VCM100 must be via an official Koden power cable (a power cable is supplied with the radar).
- Do NOT cut and re-join any part of the power cable. A range of cable lengths are available for longer cable runs (refer to p.182 — Spares and accessories).

**Note:**

The maximum length for the radar power cable (including all extensions) is 25 m (82 ft).

- The radar scanner must be connected to the POWER OUT terminals of the VCM100.
- The screen (drain) strands of the radar scanner's power cable must be connected to one of the VCM100 SCREEN terminals.

The following diagram illustrates the power connections of the supplied power cable.




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

**Important:**

Fuses (not supplied) are required for circuit protection for the Radar scanner. For information, refer to the fuse ratings listed below.

## 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 in-line fuse, fitted close to the power connection. The connection from the output of the VCM100 to the radar pedestal 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 | Protection | Rating |
|---|---|---|
| 12 V | Isolator switch | 30 A (minimum rating) |
| | Thermal breaker | 15 A |
| | Fuse | 20 A |
| 24 V | Isolator switch | 15 A (minimum rating) |
| | Thermal breaker | 10 A |
| | Fuse | 15 A |

### Warning: Positive ground systems

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

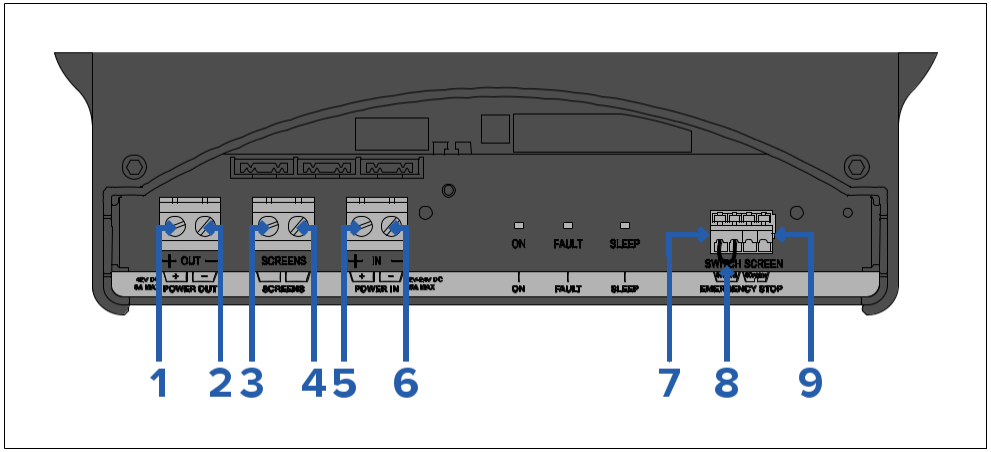
## VCM100 power connections

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.
  The distribution point should be fed from the vessel's primary power source by 8 AWG (8.36 $mm^2$) cable.
  Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 1 item of equipment shares a breaker, use individual inline fuses for each power circuit to provide the necessary protection.
- 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:




1. **POWER OUT (Positive)** — connect to the RED wire of the Radar's power cable.
2. **POWER OUT (Negative)** — connect to the BLACK wire of the Radar's power cable.
3. **SCREEN** — connect to the bare screen (drain) strands of the Radar's power 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.

**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 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.

## More information

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

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

## VCM100 power wire gauge

You must provide suitable power wires to connect the VCM100 to the vessel's DC distribution panel or battery isolator switch.

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 V supply) | Maximum distance (24 V 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 lengths result in unacceptably large diameter cables, use 2 or more smaller gauge wires to achieve the required copper wire cross-section. For example, using 2 pairs of 2 $mm^2$ cables is equivalent to using 2 single 4 $mm^2$ cables.

## VCM100 screen (drain) wire gauge

You must provide and connect a suitable screen (drain) wire between the VCM100's SCREEN terminal and your vessel's RF ground system. The screen (drain) wire should use an 8 mm braid or AWG 10 (5.26 $mm^2$) multi-stranded cable.

### Warning: Product grounding

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

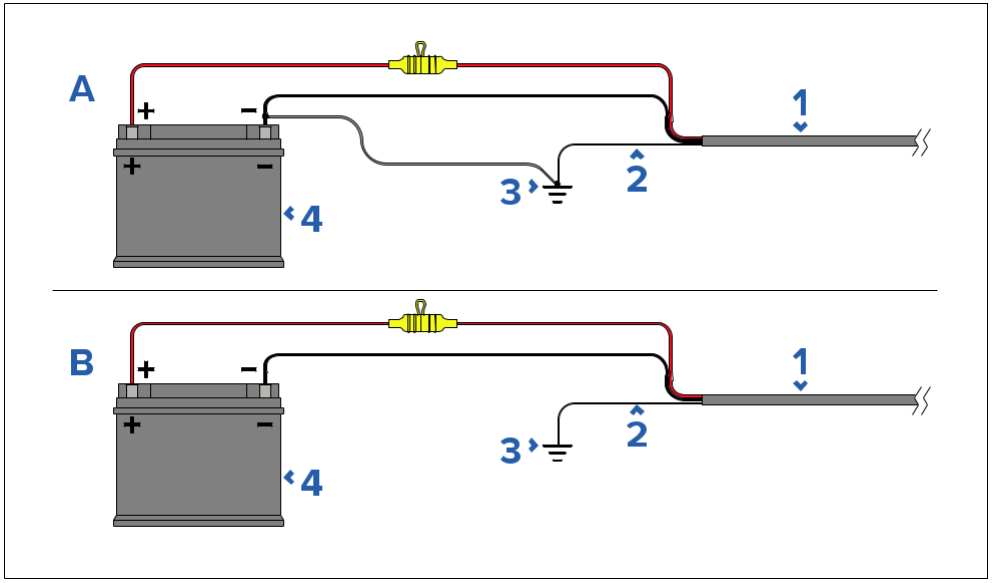
## VCM100 grounding requirements

These grounding requirements are applicable for the VCM100.

**Note:**

The Radar scanner is not grounded directly, but is connected to ground via the VCM100. The following grounding requirements apply to the VCM100:

- The VCM100 power cable 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.




- **A** — Bonded ground system (preferred)
- **B** — RF ground system (alternative)

1. Power cable to VCM100.
2. VCM100 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

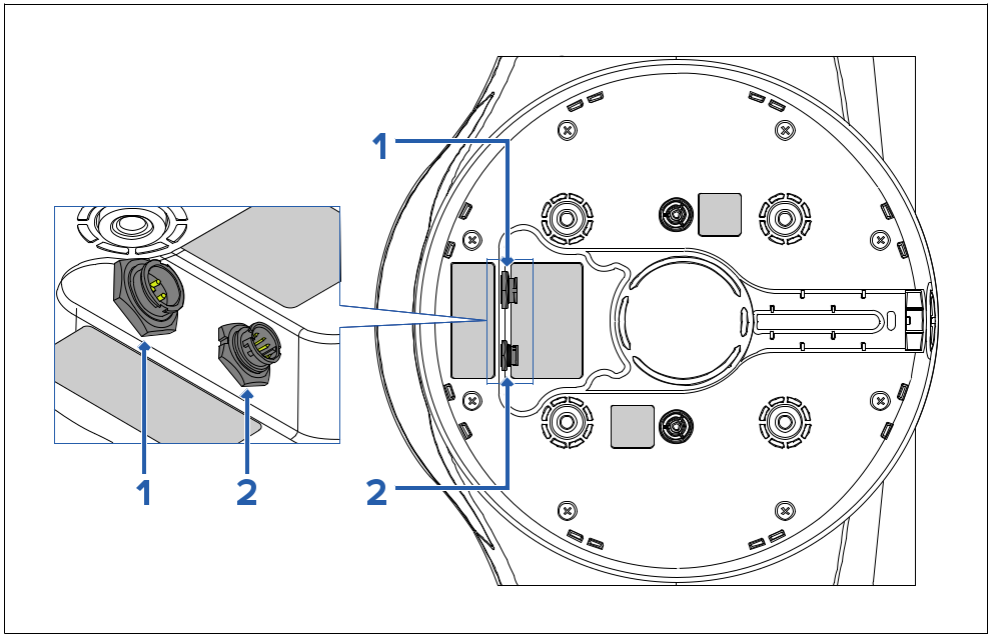
- ISO10133/13297
- BMEA code of practice
- NMEA 0400

# CHAPTER 17: RADAR CONNECTIONS

## CHAPTER CONTENTS

## 17.1 Connections overview

The Radar scanner includes the following connectors:




1. Power connector — Connects to the power cable.
2. Data connector — Connects to a Radar data cable.

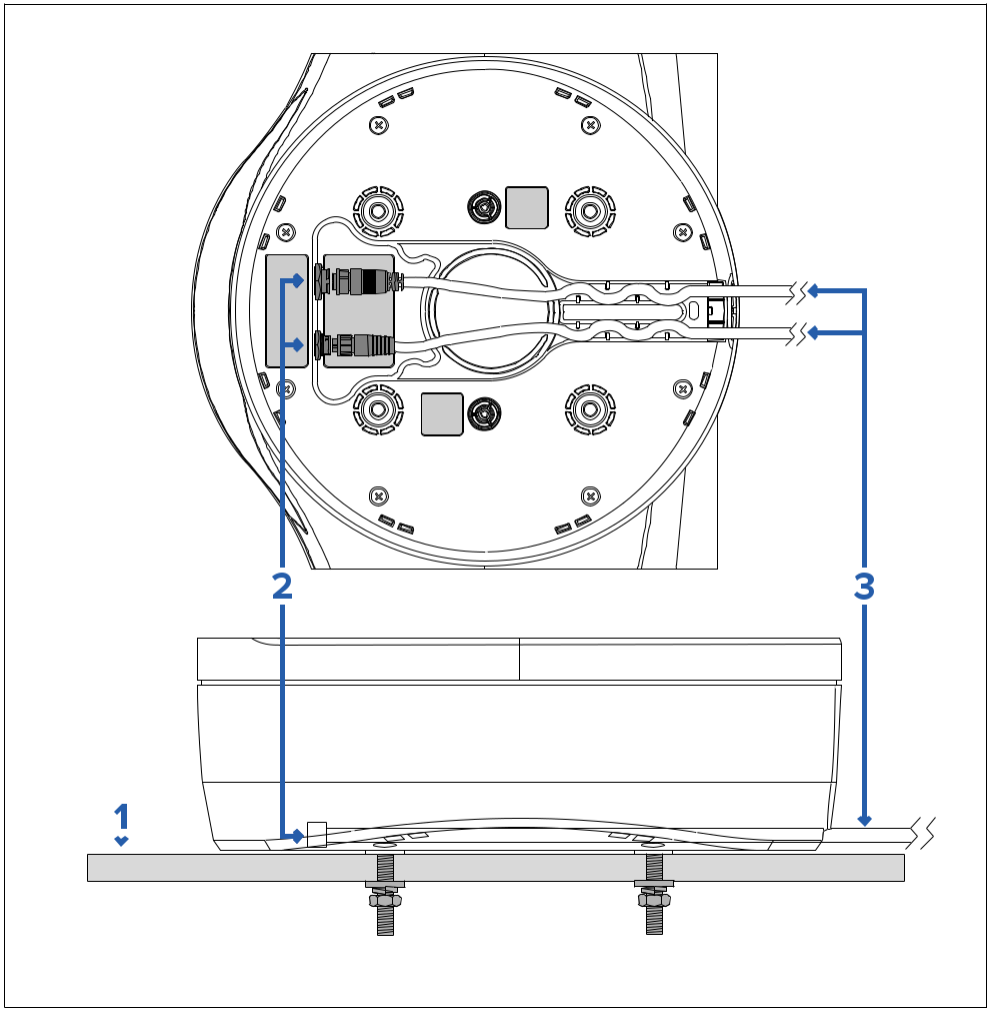
## 17.2 Cable routing options

You can route the power cable and data cable away from the radar in different ways.

The routing options allow for the cable to exit the radar in two different positions — the option you choose will depend on the radar mounting location.

1. **Rear cable exit** — if the radar is mounted on an extended flat surface, and the cable cannot be routed through the surface.
2. **Surface cable exit** — if the radar is mounted on a flat surface, and the cable can be routed through the surface.

### Rear exit



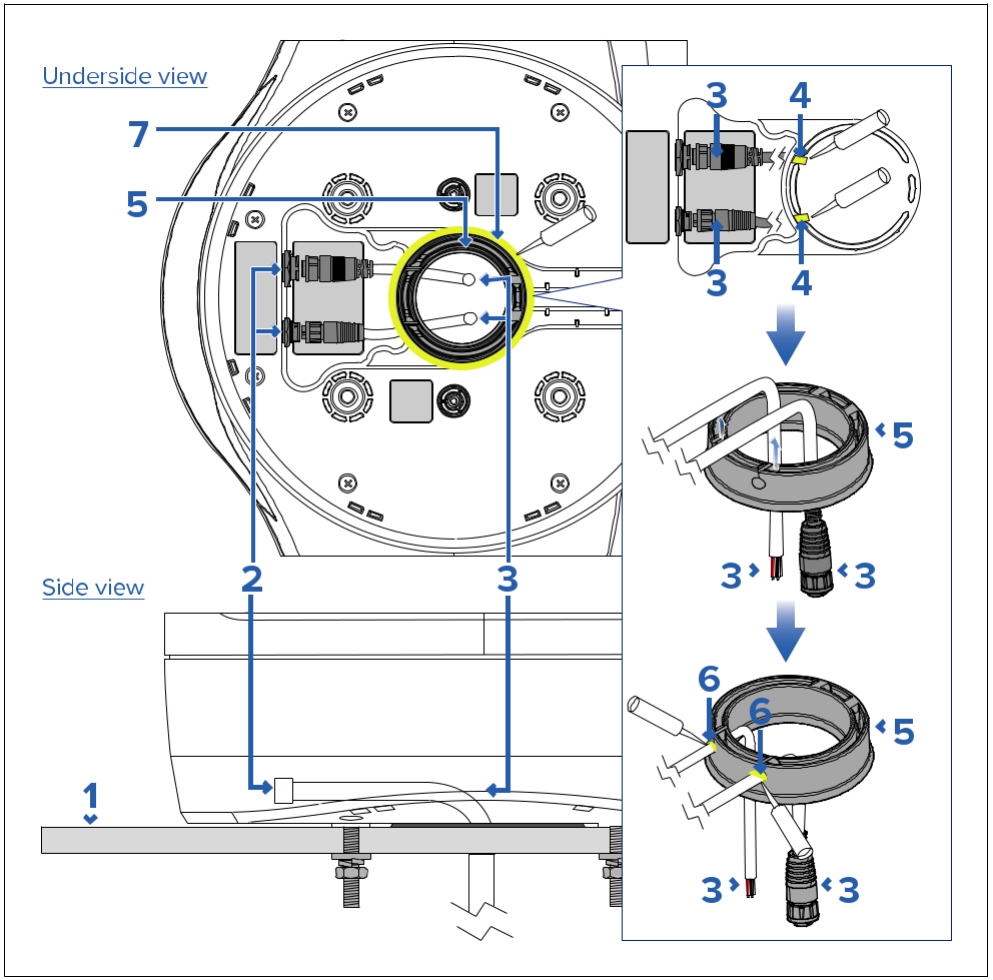

1. Mounting surface.
2. Power and data connectors.
3. Power and data cables.

## Through-surface cabling

In this mounting configuration, the Radar scanner power and data cables are passed through the mounting surface, via the cable exit aperture on the underside of the pedestal.

**Important:**

To prevent water ingress, the cable exit aperture on the underside of the pedestal must be completely **sealed with a suitable marine-grade sealant or adhesive**, as described in the following instructions:

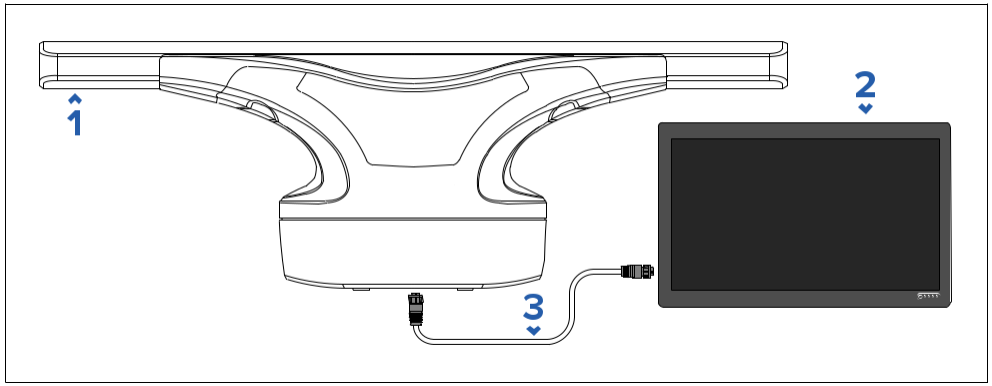



1. Connect the power and data cables to the pedestal. **Do NOT supply power to the cables at this time.**
2. **Before** laying the cables in the exit channels on the underside of the pedestal, apply sealant to each of the cable exit channels at the point where the cables pass through them, as shown in (4) in the illustration below.
3. Lay the cables in the channels.
4. Pass the cables through the aperture on the underside of the pedestal, and then through the supplied cable gasket.
5. Push the cables fully into the slits in the cable gasket, as shown in the illustration below.
6. Apply sealant all around the cables at the point where they enter the gasket, as shown in (6) in the illustration below. **Ensure 360° coverage all around the cable entries.**
7. Carefully insert the cable gasket into position in the underside of the pedestal.
8. Seal all around both the top and bottom perimeters of the cable gasket, as shown in (7), to ensure a watertight seal with the pedestal. **Take care to avoid disturbing the sealant around the cable entries.**

# 17.3 Radar data connection

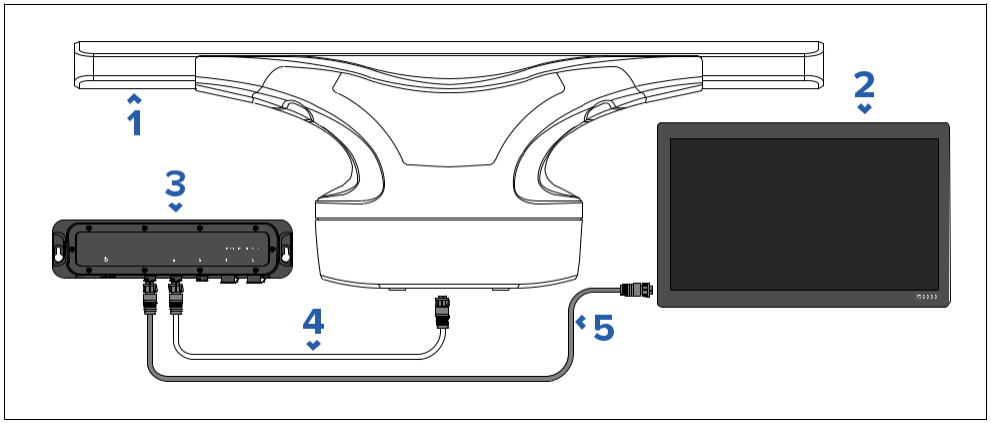
The Radar scanner is connected to the Radar display using the data network connection.

### Direct connection



1. Radar scanner.
2. Radar display.
3. Radar data cable (Supplied with the Radar scanner).

### Network switch connection




1. Radar scanner.
2. Radar display.
3. Data network switch (e.g.: RNS-5).
4. Radar data cable (Supplied with the Radar scanner).
5. Data network cable.

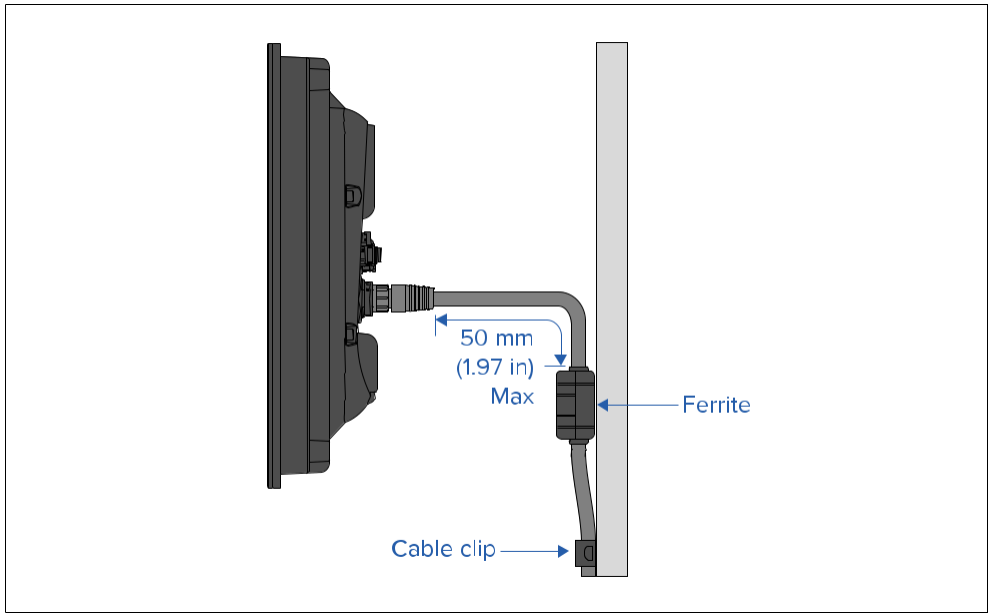
**Note:**

When using multiple network cables the White Radar data cable that is supplied with the Radar scanner must be connected directly to the Radar scanner.

## Cable suppression ferrites

To ensure optimum EMC performance and to comply with applicable EMC regulations all data cables connected to this product must have a suppression ferrite fitted.
Three suppression ferrites are included with your display, one for each data connection.

Fit a ferrite to each data cable as shown below:




- Cable clips (not supplied) should be used to support the cable and ferrite.
- If you need to remove a ferrite for any reason, ensure it is replaced in its original location before using the product.
- If the ferrite moves freely once fitted, use cable ties (not supplied) above and below the ferrite to secure it in place.

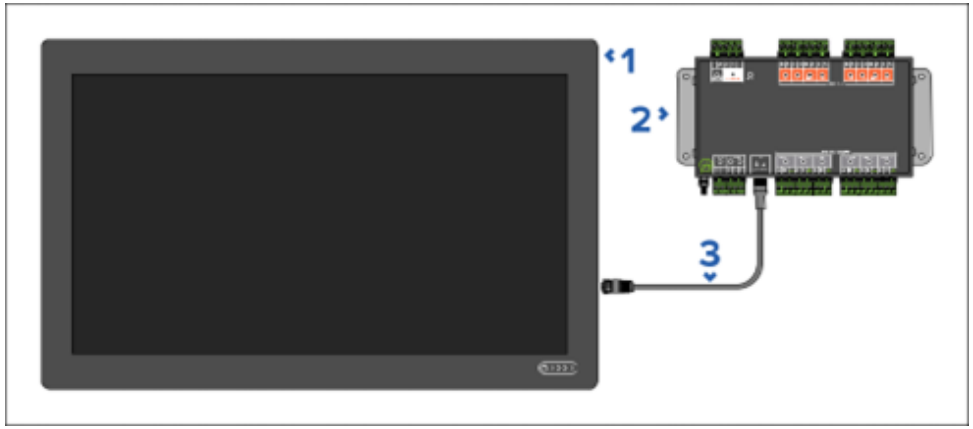
# CHAPTER 18: DCU CONNECTIONS

CHAPTER CONTENTS

# 18.1 DCU to display connection

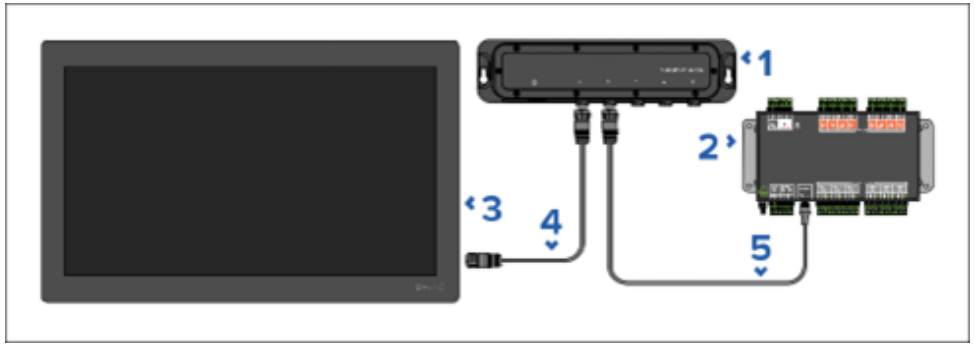
The DCU is connected to the display using RJ45 adaptor cable either directly or via a network switch.

## Direct display connection




1. Radar display.
2. KRS DCU.
3. RJ45 (Male) adaptor cable.

## Network switch connection



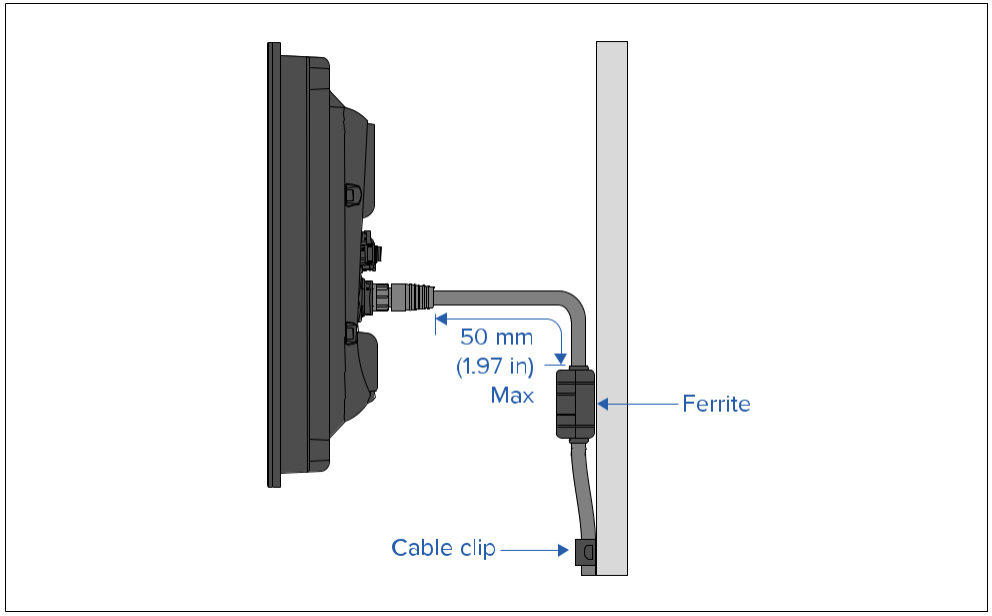

1. Data network switch (e.g.: RNS-5).
2. KRS DCU.
3. Radar display.
4. Data network cable.
5. Data adaptor cable.

## Cable suppression ferrites

To ensure optimum EMC performance and to comply with applicable EMC regulations all data cables connected to this product must have a suppression ferrite fitted.

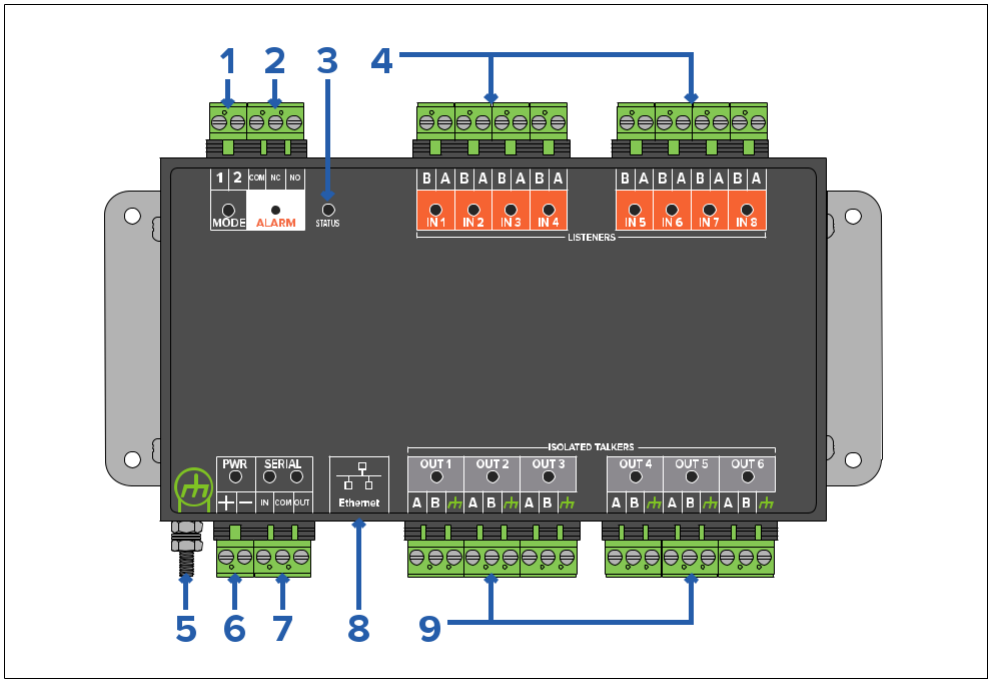
Three suppression ferrites are included with your display, one for each data connection.

Fit a ferrite to each data cable as shown below:




- Cable clips (not supplied) should be used to support the cable and ferrite.
- If you need to remove a ferrite for any reason, ensure it is replaced in its original location before using the product.
- If the ferrite moves freely once fitted, use cable ties (not supplied) above and below the ferrite to secure it in place.

## 18.2 DCU connections overview




1. Mode Pins.
2. Alarm Input.
3. Status LED.
4. IEC-61162-1 inputs from talkers (x8).
5. Grounding stud.
6. Power connection.
7. Serial Port.
8. Ethernet port.
9. IEC-61162-1 output to listeners (x6).

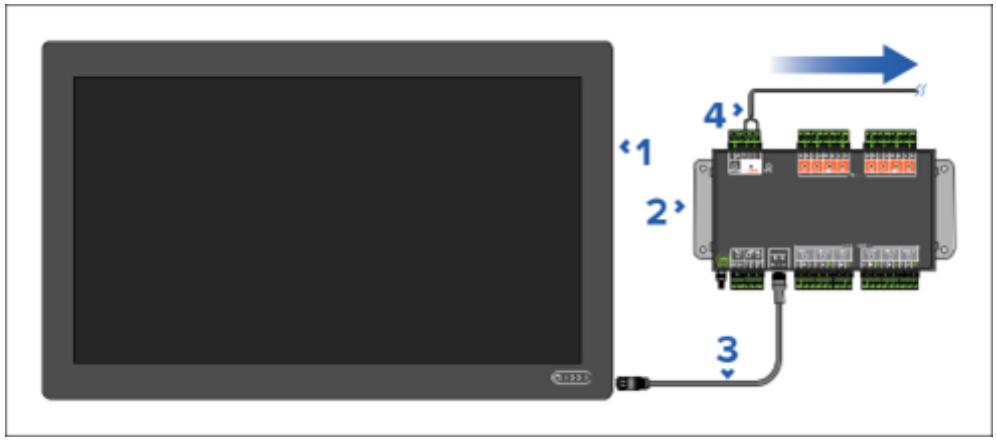
## 18.3 DCU recommended device connections

The table below shows the recommended device connection for each Input / Output channel.

| Input / Output channel | Device |
|---|---|
| IN1 | AIS |
| IN2 | GPS 1 |
| IN3 | Gyro |
| IN4 | Speed Log |
| IN5 | Echo Sound |
| IN6 | GPS 2 |
| IN7 | Gyro 2 |
| IN8 | Wind |
| OUT1 | Track Out |
| OUT2 | VDR |

## 18.4 DCU alarm connection

The DCU can trigger a relay when certain telegrams are received from an alarm system. The alarm system must be connected to the Alarm connection on the DCU.




1. Radar display.

2. KRS DCU.
3. RJ45 (Male) adaptor cable.
4. Alarm system connection (2 core cable, not supplied, connects to COM and NO connection on the DCU).

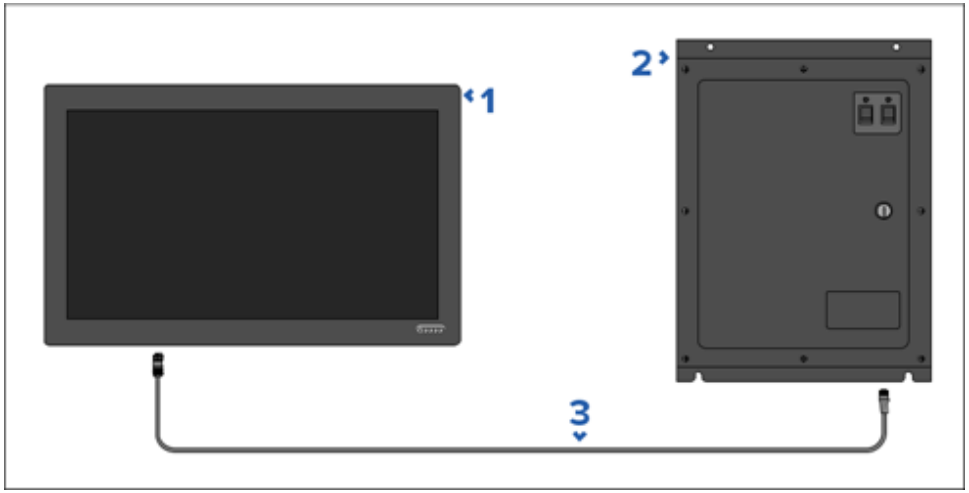
# CHAPTER 19: VDR CONNECTION

CHAPTER CONTENTS

# 19.1 VDR to display connection

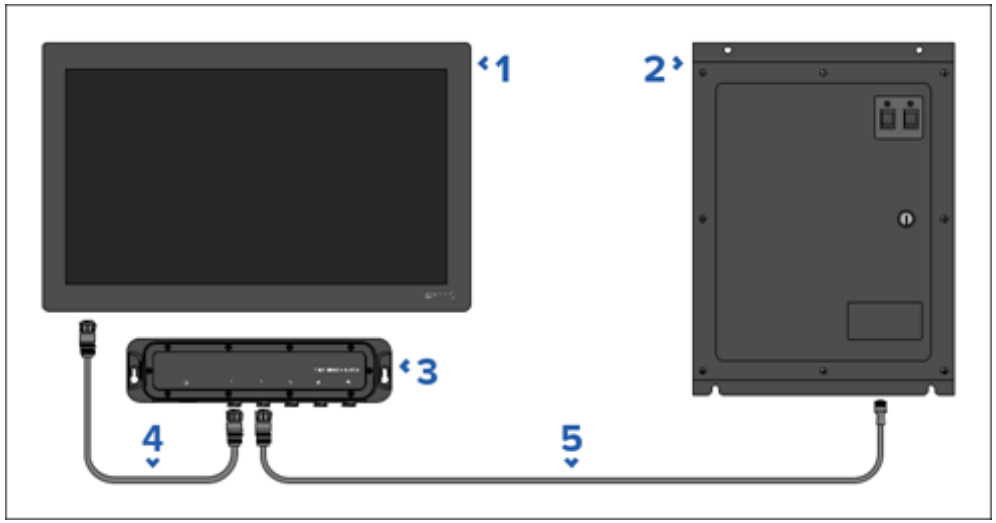
A VDR (Voyage Data Recorder) can be connected to the display (using RJ45 adaptor cable) either directly or via a network switch.

## Direct display connection




1. Radar display.
2. VDR data collection unit.
3. RJ45 (Male) adaptor cable.

## Network switch connection



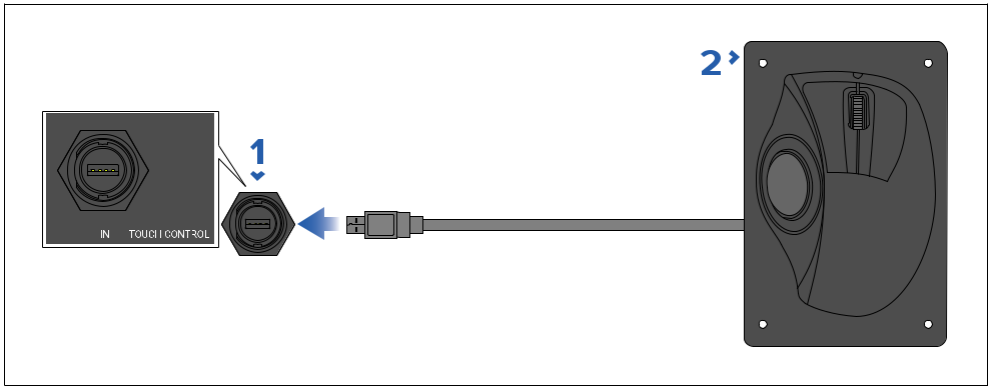

1. Radar display.
2. VDR data collection unit.
3. Data network switch (e.g.: RNS-5).
4. Data network cable.
5. Data adaptor cable.

# CHAPTER 20: TRACKBALL & KEYBOARD CONNECTIONS

## CHAPTER CONTENTS

## 20.1 KRS trackball connection

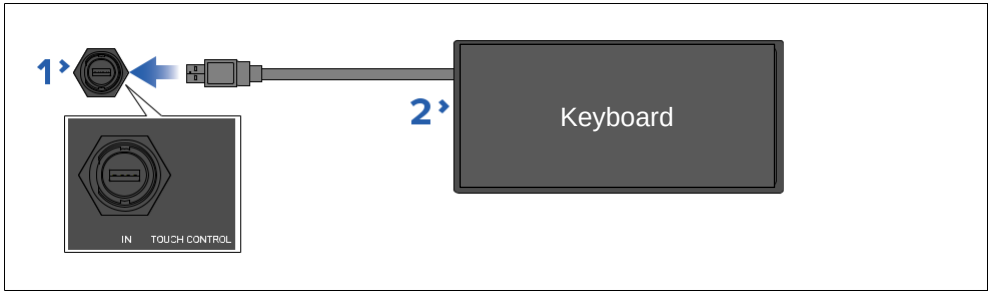
The KRS trackball is connected to the display using the **TOUCH CONTROL IN** connector.




1. Display's **TOUCH CONTROL IN** connector.
2. KRS trackball.

## 20.2 KRS keyboard connection

The optional KRS keyboard is connected to the display using the **TOUCH CONTROL IN** connector. The KRS trackball is then connected to the KRS keyboard.




1. Display's **TOUCH CONTROL IN** connector.
2. KRS keyboard with trackball (part number: A80790).

# CHAPTER 21: ACCESSORY (CARD READER) CONNECTION

## CHAPTER CONTENTS

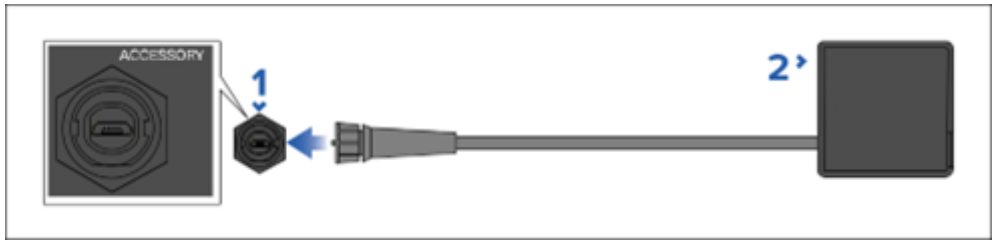


*Card reader: option

## 21.1 Accessory connection

The **ACCESSORY** connector can be used to connect an external memory card reader* or external storage device to the display.
The following functions require a card reader* attached to the display:

- Updating product software.
- Importing and exporting user data.
- Backing up and restoring settings.
- Capturing screenshots.




1. Display's **ACCESSORY** connector.
2. Card reader*:
   - **RCR-SDUSB** (part number: A80440) — Includes 1x SD card slot (or MicroSD card when using an SD card adaptor) and 1x USB (Type A connector) (e.g. for connection of an external USB hard drive or pen / flash drive).
   - **RCR-1**— Includes 1x MicroSD card slot.
   - **Bulkhead Mount Micro USB Socket**— Includes 1x Micro USB (Type Micro A connector) (e.g. for connection of an external USB hard drive or pen / flash drive; an additional adaptor may be required for the connection of some USB devices).

**Note:**

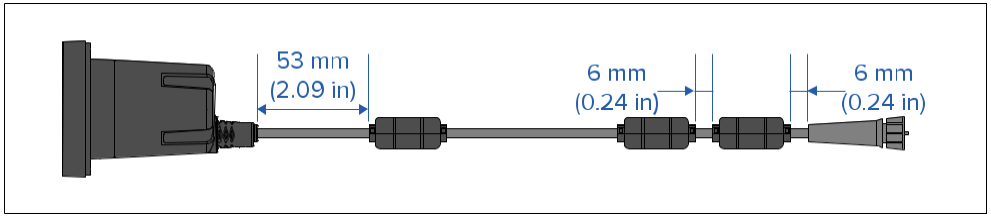
To store images (.png, .jpg files), *[External SD]*or *[External USB]*must be selected as the *[Screenshot File]* location on the *[This display]* settings menu (accessible from Standby screen).

**Warning: USB device power**

Do NOT connect any device to the product's USB connection that requires an external power source.

## 21.2 Fitting suppression ferrites

In certain installation scenarios interference may be experienced in the form of data corruption when reading and writing to external storage via the card reader*. Under these circumstances the supplied suppression ferrites should be fitted to the card reader*'s cable, as described below.




Two of the suppression ferrites should be fitted at 6 mm (0.24 in) intervals from the connector end of the cable and the third ferrite at a distance of 53 mm (2.09 in) from the rear of the card reader*. Cable ties are also supplied to help secure each ferrite in place.

# CHAPTER 22: ALARM BUZZER CONNECTION

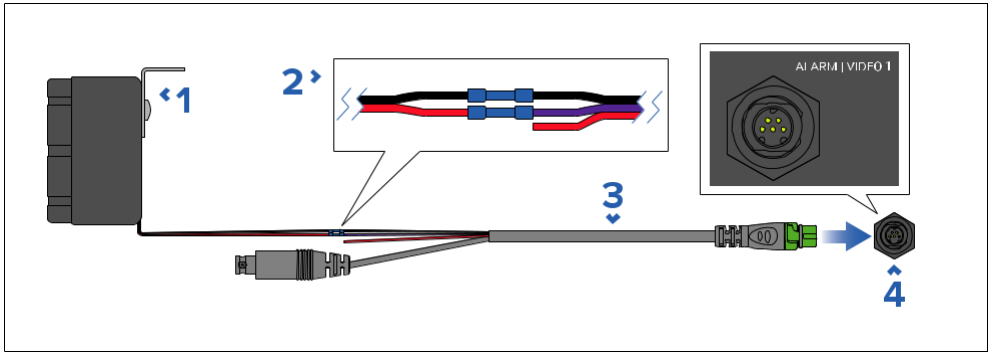
CHAPTER CONTENTS

# 22.1 External alarm connection

An external alarm can be connected to the **ALARM | VIDEO 1** connector located on the rear of the display, using the Video In/Alarm out cable accessory (part number: A80235). The alarm buzzer sounds an audible alert tone when an alarm is triggered on the display.

**Note:**

- To ensure a secure connection to the display, twist the locking collar on the **ALARM | VIDEO 1** connector so that it is in the locked position.
- The alarm to cable connection should be made using suitable connectors (e.g. crimps), and then covered in insulation tape or similar to ensure the connection is secure and watertight.



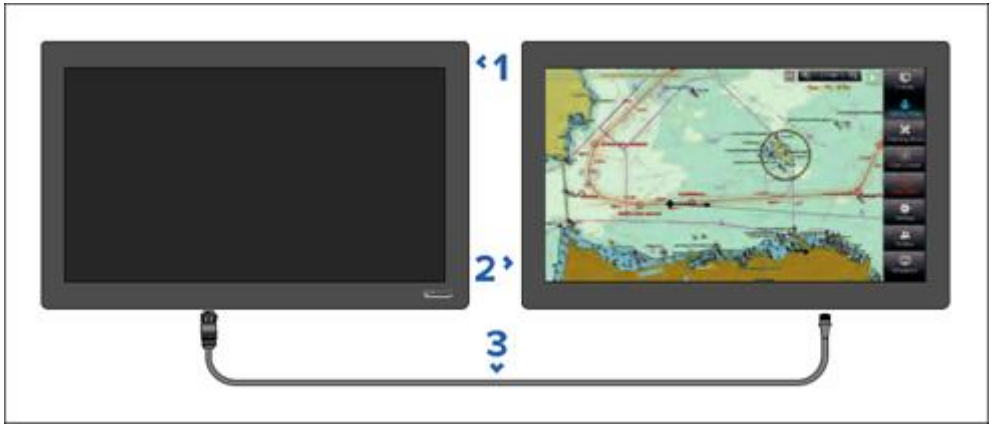

1. External alarm buzzer (part number: E26033) — Not supplied.
2. Connection — Wires must be connected **Black** to **Black** and **Red** to **Purple**.
3. Video in/Alarm out cable (part number: A80235) — Not supplied.
4. Display's **ALARM | VIDEO 1** connector.

# CHAPTER 23: RADAR OVERLAY CONNECTION

CHAPTER CONTENTS

## 23.1 Radar overlay connection (ECDIS)

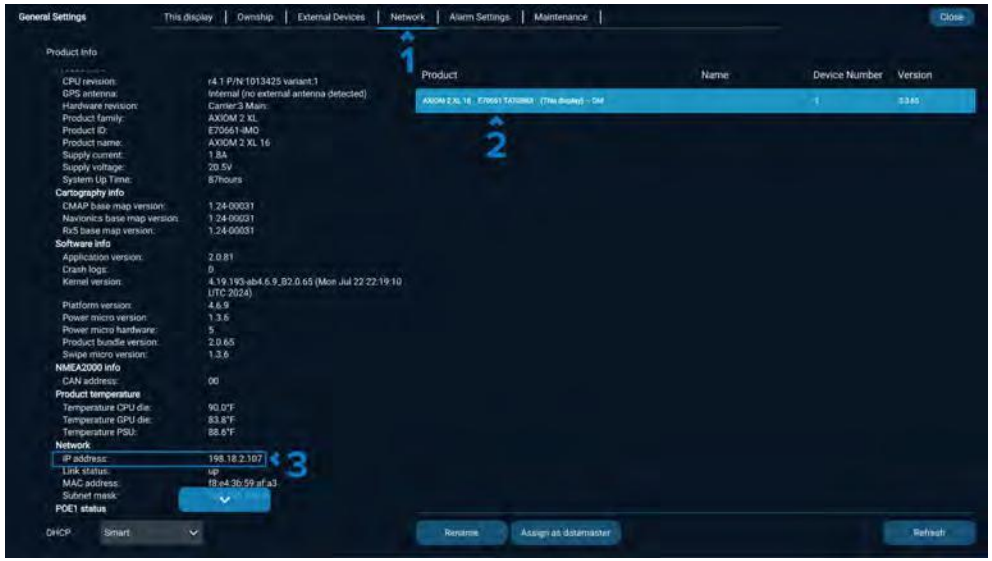
KRS Radar displays can generate an ASTERIX Cat 240 video output stream which provides a Radar overlay to a connected ECDIS display.




1. KRS Radar display.
2. ECDIS display.
3. RJ45 adaptor cable (providing the ASTERIX output to the ECDIS display).

## 23.2 Configuring Radar overlay for ECDIS displays

Follow the steps below to configure the Radar overlay output.




From the KRS Radar display:

1. Open the *[Network]* settings menu: *[Settings > Network]*.
2. Select the Radar display from the list.
3. Locate the *[IP address]* for the display.
   The ASTERIX output uses the Radar Display's IP address with the **198** replaced with **239**.
   E.G.: Display IP: **198.18.2.107** so the ASTERIX output is: **239.18.2.107** .

From the ECDIS display configure the ASTERIX output as follows:

- Address: ASTERIX output (e.g.: 239.18.2.107)
- Port: 6701

# CHAPTER 24: COMMISSIONING

## CHAPTER CONTENTS



*Card reader: option

# 24.1 Before you begin

## 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.12 — Health & Safety**

### Warning: Radar transmission safety

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

### Warning: Radar rotation

Some settings will power up the Radar scanner causing the antenna to rotate. Ensure that all personnel are clear of the Radar scanner before the Radar scanner is powered up.

## Handbooks

It is recommended that you read this document thoroughly before attempting installation, commissioning, or operation of this equipment. Ensure that you have read and understood all the specified warnings, cautions, location requirements, and limitations for the equipment.

Ensure that you have read and understood cable routing requirements, connection requirements, connection methods, and configuration steps for the equipment and any connected devices.

### Warning: Anti virus protection

The system does not include protection against computer viruses. Before inserting any memory device ensure it is free from computer viruses by scanning the device with a suitable anti virus application with up to date virus definitions.

## Laptop computer

The configuration of the NMEA 0183 to Ethernet converter requires connection to a laptop computer.
A suitable Ethernet LAN cable will be required to connected the laptop to the converter.

## Software checks

The commissioning engineer must ensure that all equipment has the latest available software installed.

**Note:**

- Failure to upgrade software to the latest versions may cause equipment to not communicate properly and may prevent successful commissioning of the system.
- Equipment must never be downgraded without the express permission of Koden Electronics Co., Ltd.

## System checks

The system must only contain the equipment listed as compatible in the **p.22 — Product and system overview** section. No other equipment should be connected to the system.

## Commissioning process

The commissioning steps are shown below:

| Sequence | Step |
|---|---|
| **1** | Read the *Commissioning* and *Connections* sections thoroughly. |
| **2** | Connect System as detailed, including any external devices required. |
| **3** | Perform any required software upgrades. |
| **4** | Configure the settings from the *[Get started]* and *[This display]* settings menus. |
| **5** | Configure the settings from the *[Ownship]* settings menu. |

| Sequence | Step |
|---|---|
| **6** | Add and configure external devices from the *[External Devices]* settings menu. |
| **7** | Configure alerts and alert audio. |
| **8** | Configure the Radar scanner from the *[Radar settings]* menu. |
| **9** | Perform functional tests. |
| **10** | Complete acceptance testing and complete the test records. |
| **11** | Backup the settings and user data to both internal and external memory. |
| **12** | Complete warranty registration for your equipment. |

## Password protection

The settings menus required for setup and commissioning of the equipment are password protected.
The password must be obtained prior to commencing commissioning.
The password is not provided in this document.
The password cannot be changed.

**Important:**

- Unauthorized access to the settings menus is prohibited.
- Commissioning by unauthorized or untrained persons will invalidate the equipment's warranty.
- NEVER COMMUNICATE THE PASSWORD TO ANYONE WITHOUT EXPRESS PERMISSION FROM Koden Electronics Co., Ltd.

# 24.2 Radar Display Set-Up

To set up the Radar display, first work through the *[General Settings]* menu completing the relevant fields.


The *[General Settings]* menu is accessed by selecting the *[Settings]*icon from the *[Standby]* screen.
The *[General Settings]* menu is password protected.

## Standby screen overview

After the display has started up, the standby screen is shown.


1. *[Radar screen]*— Select to display the Radar screen.
2. *[File management]*— Select to browse files on internal and external memory.
3. *[Backup]*— Select to initiate a settings and user data backup.
4. *[Display details]*— Identifies the display model and software version. Select and hold the model name to initiate a software update.
5. *[Export system logs]*— Select to save system logs to a memory card.
6. *[Settings]*— Select to open the password-restricted settings menu.

## General Settings menu

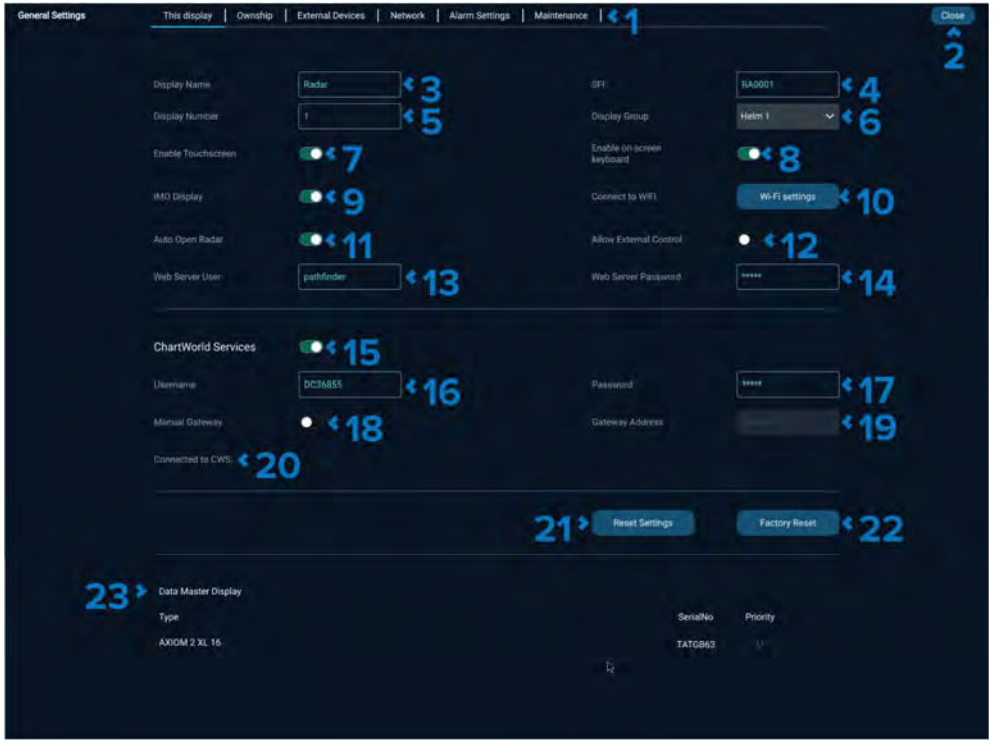
The *[General Settings]* menu is accessed using the *[Settings]* icon on the *[Standby]* screen and provides settings required during initial setup and commissioning of the system.

*[Settings]*are divided into different menus, which are accessed by selecting the tabs at the top of the screen. The following menus are available:

- *[This display]*
- *[Ownship]*
- *[External Devices]*
- *[Network]*
- *[Alarm Settings]*
- *[Maintenance]*

## This display settings menu

The *[This display]* settings menu includes information and options related to the Radar display. The *[This display]* settings menu is the default settings menu displayed when selecting the Settings icon from the Standby screen. The following information and options are available:




| Item | Description |
|---|---|
| **1** | Menu tabs — Select a tab to open the relevant settings menu. |
| **2** | *[Close]*— Select to return to the Standby screen. |
| **3** | *[Display Name]*— Enter a name for the display. |
| **4** | *[SFI]*— Enter a unique SFI (System Function Identifier). For details, refer to: **Configuring an SFI** |
| **5** | *[Display Number]*— Enter a number for the display. |
| **6** | *[Display Group]*— Assign the display to a group. |
| **7** | *[Enable Touchscreen] — Enable/ Disable (default)*the display's touchscreen. |
| **8** | *[Enable Onscreen Keyboard]— Enable (default)/ Disable* the display's onscreen keyboard. |

| Item | Description |
|---|---|
| 9 | *[IMO Display]*— Toggle switch must be enabled when running as a Type Approved navigation system. When disabled, the *[Hide UI]* button will be available on the radar screen. |
| 10 | *[Connect to Wi-Fi]*— Connect the display to a Wi-Fi Access Point (AP). |
| 11 | *[Auto Open Radar]*— Radar scanner will power-up automatically with the display. |
| 12 | *[Allow External Control]*— Enables external control of the Radar using the REST API |
| 13 | *[Web Server User]*— Username for external control. |
| 14 | *[Web Server Password]*— Password for external control. |
| 15 | *[ChartWorld Services]*— Enable / disable connection to ChartWorld services. |
| 16 | *[Username]*— ChartWorld service username. |
| 17 | *[Password]*— ChartWorld services password |
| 18 | *[Manual gateway]*— Enable / disable manual ChartWorld services IP address. |
| 19 | *[Gateway address]*— Manual ChartWorld services IP address. |
| 20 | *[Status]*— Connection status for ChartWorld services. |
| 21 | *[Reset Settings]*— Reset the display settings to factory default values. |
| 22 | *[Factory Reset]*— Reset the display settings to factory default values and delete all user data. |
| 23 | *[Data Master Display —]* This area lists the displays in the system, and provides *display type* and *serial number* for each display in the system. |

### Configuring an SFI

Each display's SFI must be unique and should consist of 2 letters followed by 4 numbers.

The SFI should be configured as follows:

1. Select the SFI field.
2. Enter 2 letters.

*To remain **-450 compliant**, it is recommended that you use **RA** for Radar, **EI** for ECDIS, and **IN** for Integrated Navigation.*

3. Enter a unique 4 digit number.

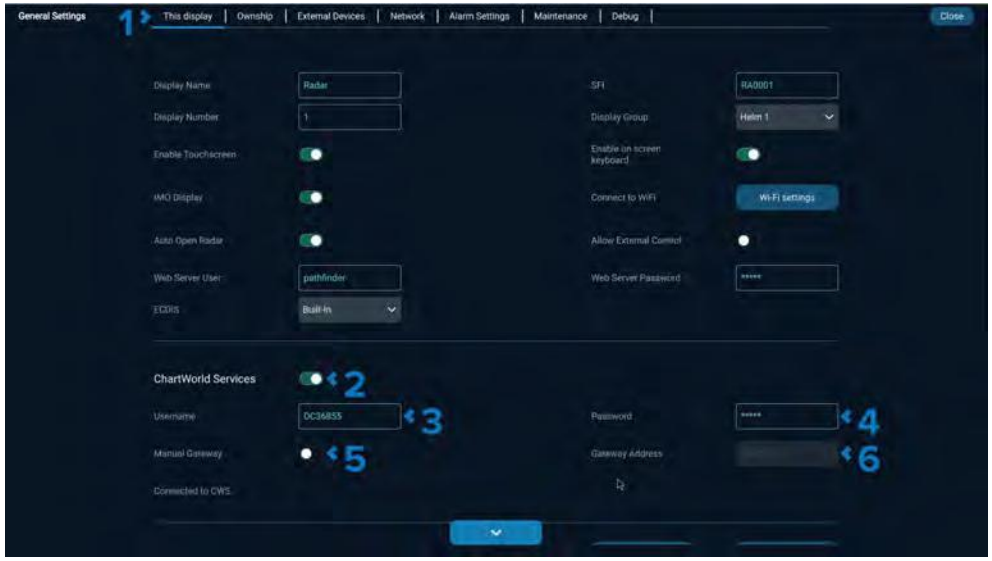
**Example:**

RA0001, EI0002, IN0003.

### Connecting to the ChartWorld web service

Connecting to the ChartWorld web service will ensure that whenever the display has an Internet connection that crash logs and other data is automatically sent to ChartWorld.

- Ensure you have the relevant username and password, obtained from www.chartworld.com/user
- The display requires an active Internet connection to send logs and data.
- When the display connects to the Internet it will transfer logs and data. If new data is available the transfer will repeat every 24 hours.




1. Open the *[This display]* settings menu.
2. Enable the *[ChartWorld Services]* toggle switch.
3. Enter the ChartWorld account username in the *[Username]* field.
4. Enter the ChartWorld account password in the *[Password ]*field.
5. If required, you can use a *[Manual gateway]* by enabling the toggle switch.

6. If required, enter a manual IP address in the *[Gateway Address]* field.

## External Radar control

### 3rd party integration

The KRS Radar system can be integrated with 3rd party hardware using REST APIs. Integration allows the KRS Radar system to be controlled using external hardware.
The following controls are available externally to the Radar system:

- Receiving settings configuration.
- Sending a settings configuration.
- Commanding the Radar scanner to wake.
- Performing a factory reset of the Radar scanner.
- Acquiring a target by range and bearing.
- Setting the Radar scanner's Zero range.
- Deleting a Radar target by ID.
- Deleting a target by range and bearing.
- Commanding the Radar scanner to Standby.
- Commanding the Radar scanner to Transmit.

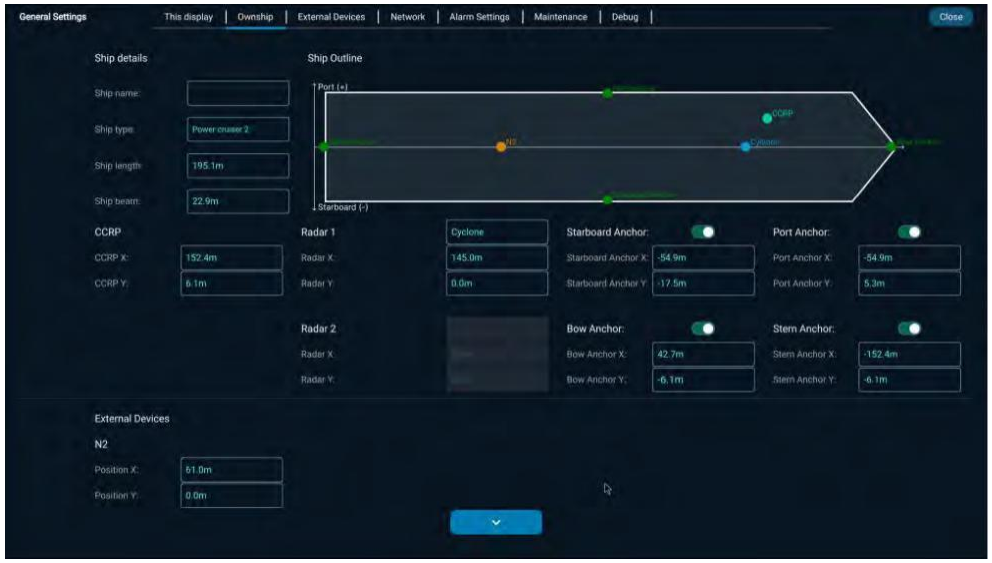
### Configuring the Radar display for external control

External control can be configured from the Radar display.
From the *[This Display]*settings menu:


1. Enable the *[Auto Open Radar]* toggle switch.
2. Enable the *[Allow External Control]* toggle switch.
3. Enter the relevant username in the *[Web Server User]*field.
4. Enter the relevant password in the *[Web Server Password]* field.

## Ownship settings menu

The *[Ownship]* settings menu provides settings for items which require their position to be configured, and also Device delta values.



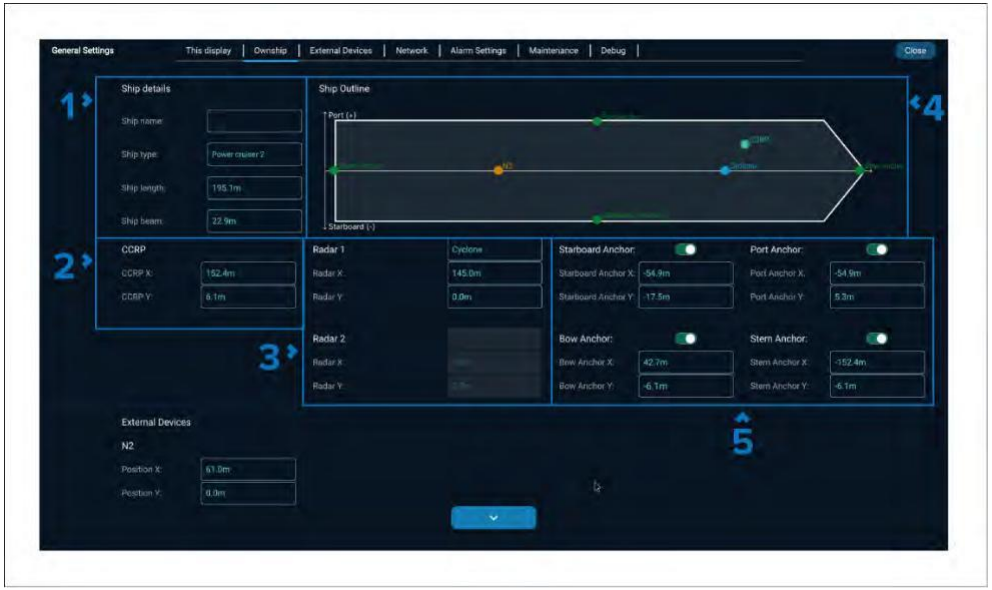

| Setting | Description |
|---|---|
| *[Ship name]* | Enter your ship name. |
| *[Ship type]* | Select a ship type. |
| *[Ship length]* | Enter the length of the ship. |
| *[Ship beam]* | Enter the width of the ship. |
| *[CCRP]* | Enter the *[CCRP X]*and *[CCRP Y]* position. |
| *[Radar 1]* | Enter the *[Radar X]*and *[Radar Y]* position. |
| *[Radar 2]* | Enter the *[Radar X]*and *[Radar Y]* position. |
| *[Anchors]* | Enable and enter X and Y positions for anchors (Anchor X and Y positions are referenced from the CCRP). |

| Setting | Description |
|---|---|
| *[External Devices]* | Enter X and Y positions for devices that provide position data. |
| *[Device Selection Delta Values]* | Determines the value at which device delta values are considered too significant to use. |

### CCRP and Radar positions

CCRP and Radar positions must be configured

### CCRP and Radar location settings




1. Ship details — *[Ship length]*and *[Ship width]*— CCRP and Radar scanner location are determined in relation to your vessel's specified length and beam.
2. *[CCRP]*:
   - *[CCRP X:]*— determines the position of the CCRP along the length of your vessel. Zero is located at the stern.
   - *[CCRP Y:]*— determines the position of the CCRP along the beam of your vessel. Zero is located at the vessel's center line. Positive values are to port of the vessel's center line. Negative values are to starboard of the vessel's center line.
3. *[Radar 1]/ [Radar 2]*
   - *[Radar X:]*— determines the position of the Radar scanner along the length of your vessel. Zero is located at the stern.
   - *[Radar Y:]*— determines the position of the Radar scanner along the beam of your vessel. Positive values are to port of the vessel's center line. Negative values are to starboard of the vessel's center line.
4. Graphic — The graphic shows the relative position of the CCRP and Radar scanner in relation to your vessel.
5. Anchor positions — determines the position of anchors in relation to the CCRP.

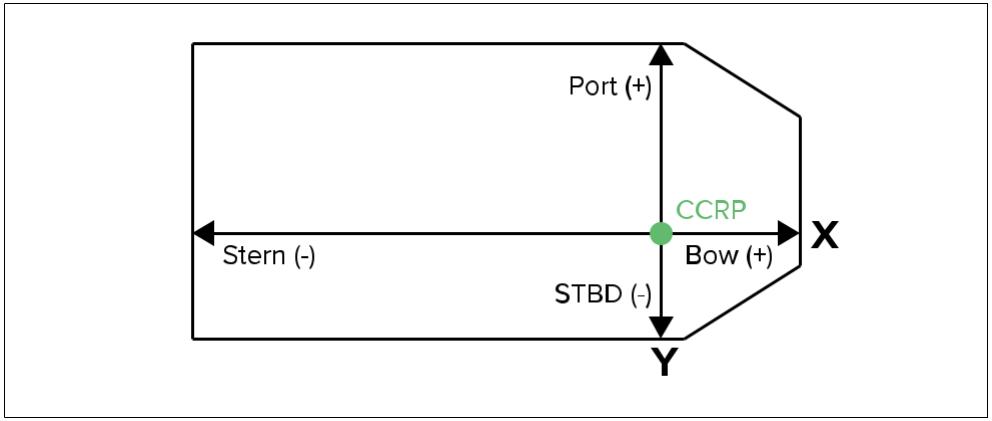
### Anchor positions

Anchor watch requires anchors and their positions to be configured. Anchor positions are configured from the *[Ownship]* settings menu. The *[Ownship]* settings menu is accessed from the Standby screen: *[Standby screen > Settings > Ownship]*.
Up to 4 anchors can be configured:

- Port
- Starboard
- Bow
- Stern

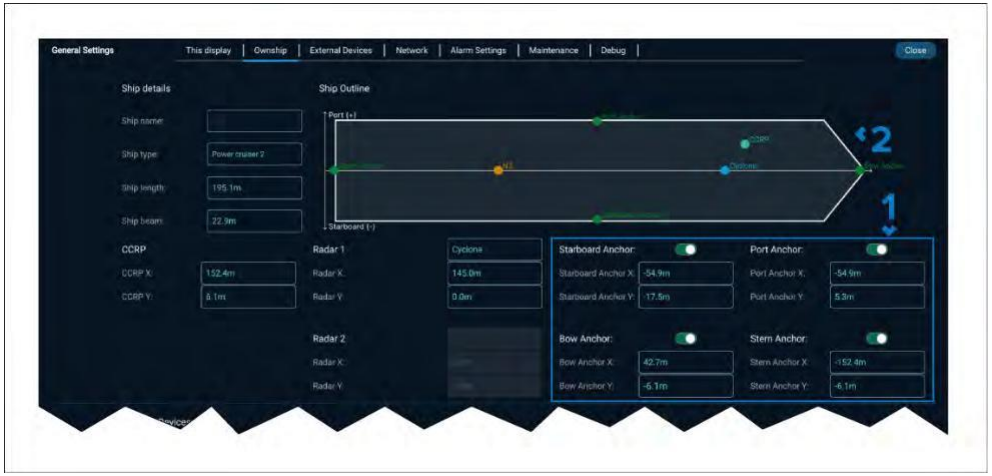
Anchor positions are configured by providing an 'X' and 'Y' distance for each anchor where:

- **X** = the distance along the length of the vessel with zero being at the CCRP (positive values are towards the bow and negative values towards the stern).
- **Y** = the distance along the vessel's beam with zero being at the CCRP (positive values are to port and negative values to starboard).




## Configuring anchors

Follow the steps below to configure your anchor positions. The steps should be followed for each anchor.




1. Anchor position settings.
2. Visualization of anchor positions.

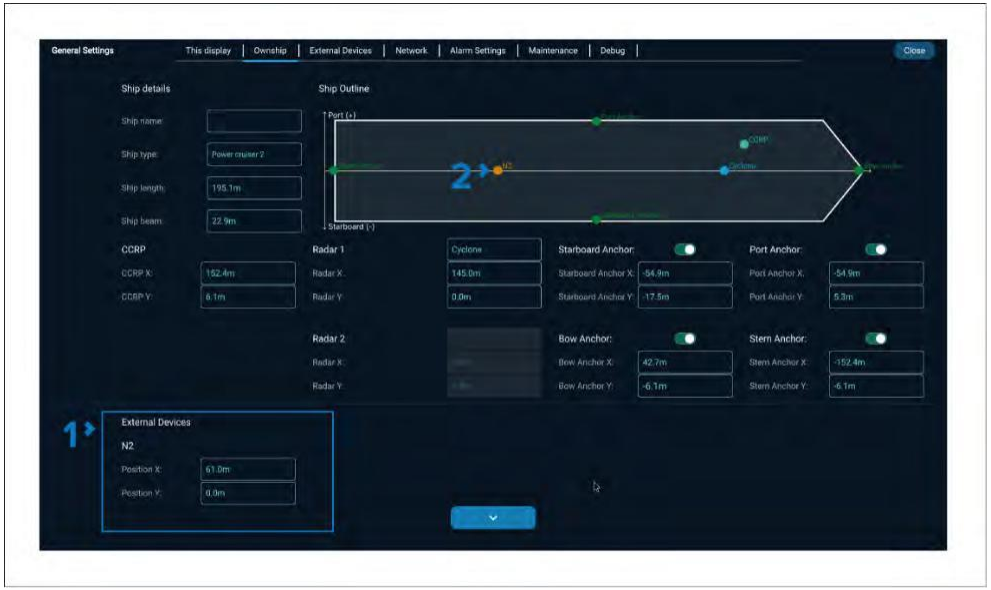
The *[Ship length]*and *[Ship beam]*settings located in the *[Ownship]* settings menu must be set before configuring anchor positions. Anchor positions are limited based on Ship length, Ship beam and CCRP position.

From the *[Ownship]* settings menu: *[Standby screen > Settings > Ownship]*:

1. Select the *[Mounted]*check box.
2. Select the *[X]* value and adjust to represent the distance from the CCRP (positive values are towards the bow and negative values towards the stern).
3. Select the *[Y]* value and adjust to represent the distance from the CCRP (positive values are to port and negative values to starboard).
4. Repeat steps 1 to 3 for relevant anchors.

## Configuring external device positions

External devices that provide position data to the system require their installation location to be configured. Devices configured to provide the system with position data will be listed in the *[External Devices]*section.




1. External device position settings.
2. Visualization of external device's position.

From the *[Ownship]* settings menu ( *[Standby screen* > *Settings* > *Ownship]*):

1. Ensure that the *[Ship length]*and *[Ship beam]*values have been configured.
2. Enter the *[Position X]* value.

*The [Position X] value determines the position of the external device along the length of your vessel. Zero is located at the stern.*

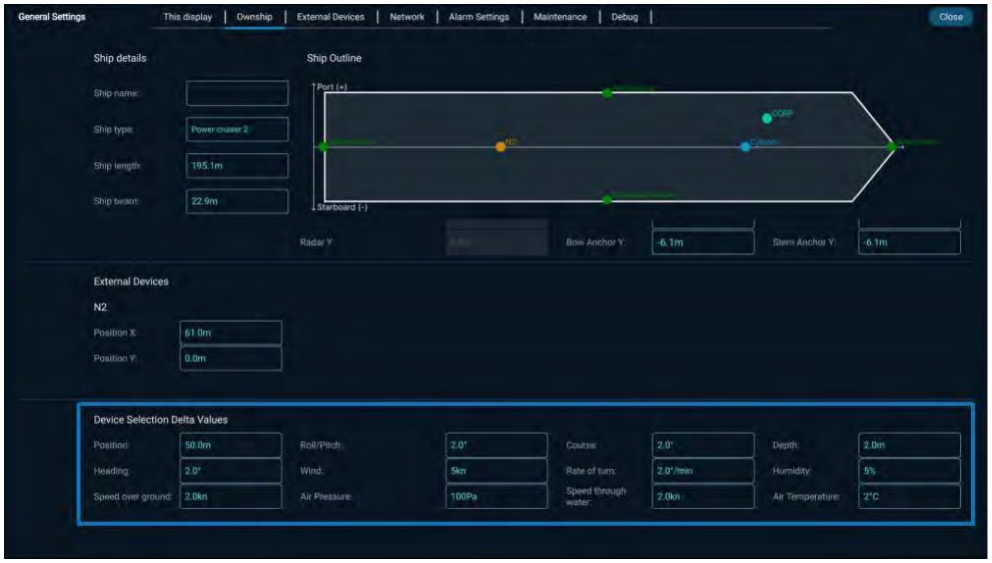
3. Enter the *[Position Y]* value.

   *The [Position Y] value determines the position of the external device along the beam of your vessel. Zero is located at the vessel's center line. Positive values are to port of the vessel's center line. Negative values are to starboard of the vessel's center line.*

4. Repeat steps 2 and 3 for each listed device.

### Device delta values

The values which determine if the delta between external devices' data is too significant can be configured from the *[Ownship]* settings menu: *[Standby screen > Settings > Ownship > Device Selection Delta Values]*
Scroll to the bottom of the menu.




Select each field to open the onscreen keypad and adjust the value.

When the difference between devices reporting the same data exceeds the set value, the device data listed in the *[Device selection]* menu will turn red.

## External Devices settings menu

The *[External Devices]*settings menu includes the following settings:

| Setting | Description |
|---|---|
| *[Data I/O]* | View details of transmitted and received telegrams. |
| *[Network Devices]* | Add and configure Ethernet network devices. |
| *[Manual Device]* | Enable and disable manual devices. |

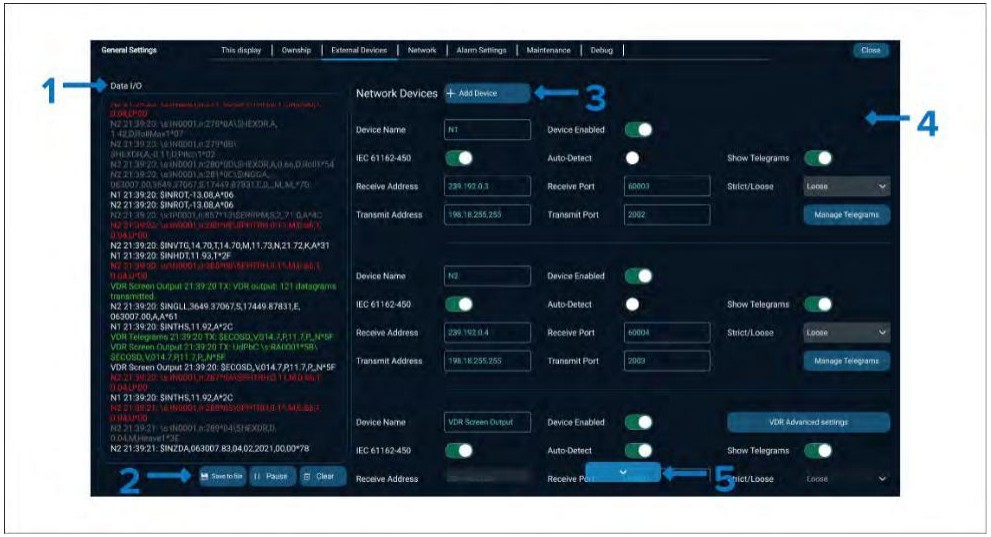
### External devices

The display can receive and transmit data from external devices.

In accordance with MSC.192/8.1, the Koden KRS Radar System is capable of receiving the required input information from the following equipment:

- a gyro-compass or transmitting heading device (THD)
- a speed and distance measuring equipment (SDME)
- an electronic position fixing system (EPFS)
- an automatic identification system (AIS); or
- other sensors or networks providing equivalent information acceptable to the IMO (e.g.: an INS).

Devices must be added manually using the *[External Devices]*settings menu: *[Standby screen > Settings > External Devices]*.



1. Data in/out history.
2. *[Save to file]*, *[Pause]*or *[Clear]* I/O history. Selecting *[Save to file]* will save the current I/O history to the display logs ready for export if required.
3. Add a network device.
4. List of networked devices.
5. Scroll button.

Manual devices can be enabled and disabled from the bottom of the network devices list.
External devices which transmit positional data messages will appear in the *[CCRP]*settings menu so that their ‘X’ and ‘Y’ position can be plotted.
The *[External devices]* menu includes a data in/out area which lists all incoming and outgoing data messages.

- Incoming messages received from a device which is currently enabled in the *[External devices]* menu will be colored white.
- Incoming messages received from a device which is currently disabled in the *[External devices]* menu will be colored black.
- Outgoing messages are colored green.
- Messages which are invalid will be colored red.

### Default external devices

The typical required external devices are configured by default.

## IEC 61162–450 compliant devices

- *[TGTD]*
- *[SATD]*
- *[NAVD]*
- *[VDRD]*
- *[VDR Screen Output]*

These devices are *[Disabled]*by default and will require enabling.
For the default settings for these devices refer to:
**Default IEC 61162–450 devices**

## Data servers

- *[DS1]*
- *[DS2]*
- *[DS3]*
- *[DS4]*

These devices are *[Enabled]* by default.
For the default settings for these devices refer to:
**Default DCU external devices**

### Adding an Ethernet network device

Ethernet network devices must be added and configured correctly.
From the *[External Devices]*settings menu:

1. Select *[Add Device]* under the *[Network Devices]* section.
2. Enter a name for the device and select *[OK]*.
3. Enable the *[IEC 61162-450]*and *[Show Telegrams]* toggle switches.
4. Enter the device’s receive IP address in the *[Receive Address]* field.
5. Enter the device’s receive port number in the *[Receive Port]* field.
6. If you want to transmit to the device, you can use the values in the *[Transmit Address]*and *[Transmit port]* field to configure the device you want to transmit to.
7. Select the *[Strict/Loose]* field to switch between *Strict*er *Loose* adherence to the telegram messages format.
8. Enable the *[Auto-Detect]* toggle switch to automatically detect Telegrams; or:
9. Select the *[Telegrams]* button and enable and disable your required Telegrams.

   *The maximum Telegram input rate for all external devices is 50 Hz.*

   *To ensure compliance with IEC 61162-450, all Telegram will be configured in accordance with the IEC 61162-450 standards. Koden proprietary data will not conflict with the -450 ports.*

If you have successfully connected to the device and it is transmitting data, the *[Data I/O]* section will show received data messages.

### Setting up an alarm system external device

A connected alarm system must be set up as an external device.
From the *[External devices]* setting menu:

1. Scroll to the *[DS4]* device.
2. Select the *[Manage Telegrams]* button.
3. Select the *[Output telegrams]* tab.

4. Enable the following Telegrams:
   - *[ALR Alarm State]* (If Alarm Message event is enabled).
   - *[EVE General Event Message]* (If Event Message event is enabled).
   - *[HBT Heartbeat]* (If Heartbeat Message event is enabled).
5. Select the Back *[<]*button.

The remaining *[DS4]* device settings can be left as is with their default values.

### Input and Output tests

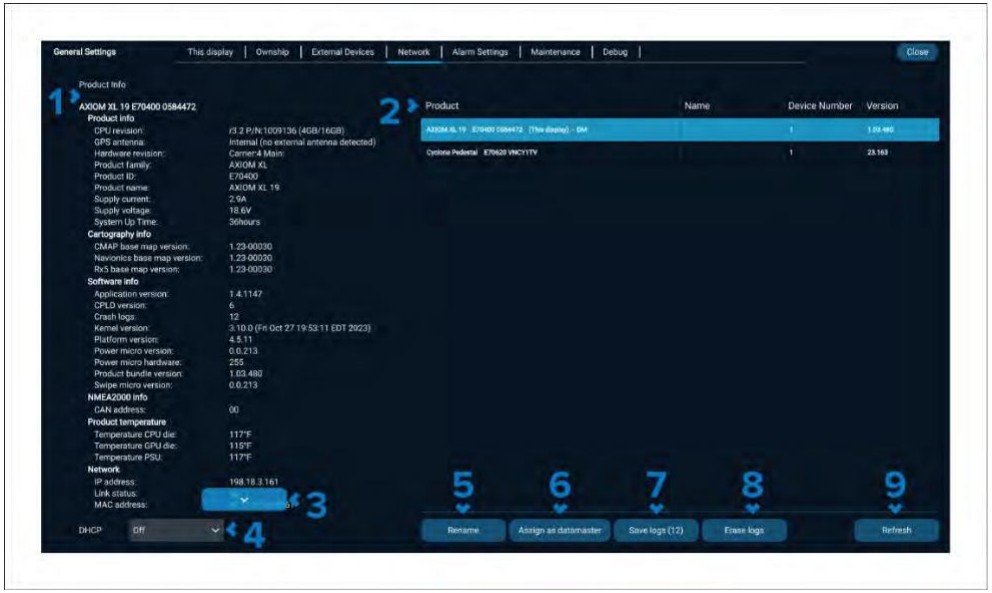
All data inputs and outputs for external devices should be tested to ensure that the relevant, accurate data is being received, and where possible, matches the source devices' data.

### Manual Heading, Position and Speed

Manual Heading, Position and Speed devices can be enabled and disabled from the *[External devices]* settings menu.

## Network settings menu

The *[Network]* settings menu shows display details and a list of devices connected to the display over Ethernet.




| Item | Description |
|---|---|
| 1. | Product information for the selected product. |
| 2. | List of Ethernet devices. |
| 3. | Scroll button — Indicates that additional product information is available off-screen. Scrolling can be achieved by dragging the cursor or pressing the button. |
| 4. | *[DHCP]*— Switch the display's DHCP server *On*, *Off*, or set to *Smart (default)* mode.<br>Smart mode allows the display to enable or disable the DHCP server automatically if another DHCP server is detected on the network. |
| 5. | *[Rename]*— Rename the selected product. |
| 6. | *[Assign as Datamaster]*— Assigns the currently selected display as the system Datamaster. |
| 7. | *[Save logs]*— Save logs from the selected device to a memory card. |
| 8. | *[Erase logs]*— Erase logs from the selected device to a memory card. |
| *9.* | *[Refresh]*— Refreshes the network list. |

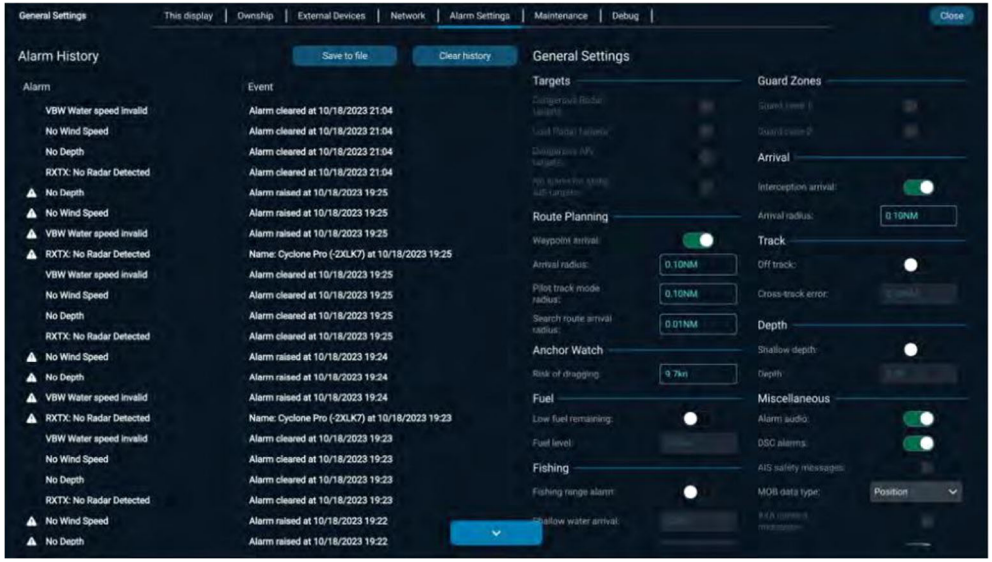
## Alarm Settings menu

The *[Alarm Settings]* menu enables configuration of alerts and provides a list of historical alerts raised by the system.

**Note:**

Hardware-dependent alerts are only triggered when relevant hardware (e.g.: sensors) is connected and reporting the data required for the alert.

The *[Alarm History]* can be cleared by selecting *[Clear history]* or saved to the display logs, ready for export by selecting *[Save to file]*.



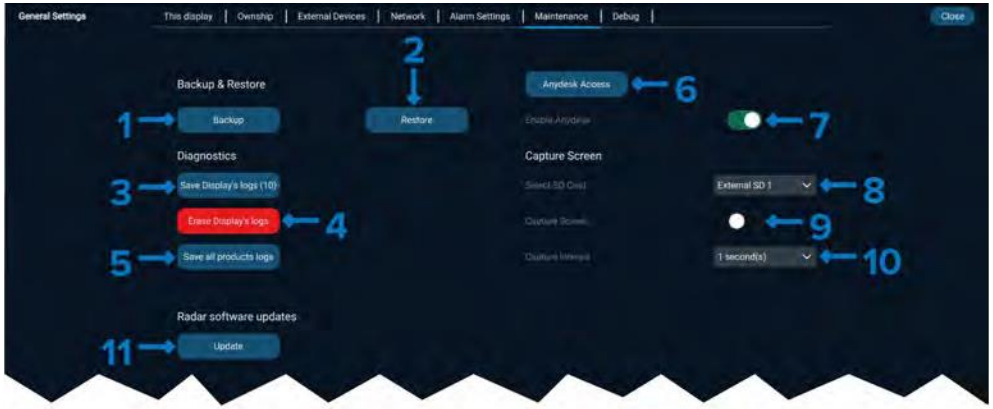

The following Alerts can be configured:

| Alert | Description and options |
|---|---|
| *[Targets] — [Dangerous Radar targets]* | *Enable/ Disable* alerts when a tracked radar target becomes dangerous. |
| *[Targets] — [Lost Radar targets]* | *Enable/ Disable* alerts when a tracked radar target becomes lost. |
| *[Targets] — [Dangerous AIS targets]* | *Enable/ Disable* alerts when an AIS target becomes dangerous. |
| *[Targets] — [No alarm for static AIS targets]* | *Enable/ Disable* alerts for static AIS targets. |
| *[Route planning] — [Waypoint arrival]* | *Enable/ Disable* Waypoint arrival alerts when following a route.<br>Configure the following arrival distances:<br>• *[Arrival radius]*<br>• *[Pilot track mode radius]*<br>• *[Search route arrival radius]*<br>The alert will trigger when your vessel reaches the specified distance from the waypoint |
| *[Anchor Watch]* | Enter the distance in the *[Risk of dragging]* field. |
| *[Fuel]— [Low fuel remaining]* | *Enable/ Disable* alerts when the fuel level is low.<br>Enter the volume of fuel that will trigger the *Low fuel remaining alert* in the *[Fuel level]* field. |
| *[Fishing]— [Fishing range alarm]* | *Enable/ Disable* alerts when depth reaches the values specified in the *[Shallow water arrival]* and *[Deep water arrival]* fields. |
| *[Water]— [Water temp alarm]* | *Enable/ Disable* alerts when water temperature drops to the value specified in the *[Lower temp limit]* field. |
| *[Guard Zones]* | *Enable/ Disable* Guard zone alerts for *[Guard Zone 1]* and *[Guard Zone 2]*. |
| *[Arrival]— [Interception arrival]* | *Enable/ Disable* Interception alerts when your vessel reaches the distance specified in the *[Arrival radius]* field, from a vessel that is being intercepted. |
| *[Track]— [Off Track]* | *Enable/ Disable* Off-track alerts when your vessel reaches the distance from the original track that is specified in the *[Cross track error]* field. |

| Alert | Description and options |
|---|---|
| *[Depth]— [Shallow depth]* | *Enable/ Disable*s hallow depth alerts when water depth is shallower than the value specified in the *[Depth]* field. |
| *[Miscellaneous]* | |
| *[Alarm audio]* | *Enable/ Disable* audio for alarms. |
| *[DSC alarms]* | *Enable/ Disable* DSC alerts received from DSC VHF radios. |
| *[AIS safety messages]* | *Enable/ Disable* display of AIS safety messages. |
| *[MOB data type]* | Switch Man Overboard data between *Position* and *Dead reckoning*.<br>Position — The MOB waypoint remains in the same position as when the alarm was triggered.<br>Dead reckoning — The MOB waypoint will move, taking into consideration the effects of wind and tide. |
| *[AX8 camera messages]* | *Enable/ Disable* alerts from an AX8 thermal camera. |
| *[Engine alarms]* | *Enable/ Disable* alerts from compatible engine management systems. |
| *[Apps and connected devices]* | *[Configure]* alerts from integrated 3rd party hardware. |
| *[Battery alarms]* | *[Configure]*alerts from vessel batteries. |
| *[Minimum sonar depth]* | *Enable/ Disable* alerts when the water depth is too shallow for accurate sonar readings. |
| *[Home button active alarm indication]* | *Enable/ Disable* active alert indication on the Homescreen icon. |

## Maintenance settings menu

The *[Maintenance]* settings menu includes options related to the maintenance and troubleshooting of the Radar display.
The following options are available:




| Item | Description |
|---|---|
| 1 | *[Backup]*— Backup user data and settings. |
| 2 | *[Restore]*— Restore user data and settings from a backup. |
| 3 | *[Save Display's logs]*— Save logs from this display to a memory card. |
| 4 | *[Erase Display's logs]*— Erase the logs saved on this display. |
| 5 | *[Save all products logs]*— Save logs from all products on the network. |
| 6 | *[Anydesk Access ]*— Open the Anydesk app to set up remote desktop access to the display. |
| 7 | *[Enable Anydesk]*— *Enable/ Disable* the use of Anydesk. |
| 8 | *[Select SD Card]*— Select the card reader slot that data, logs, screen capture etc are saved to. |
| 9 | *[Capture Screen]*— *Enable/ Disable* automatic screenshots at the specified time interval |
| 10 | *[Capture Interval]*— Time interval for the *[Capture Screen]* feature. |
| 11 | *[Radar software updates] [Update]*— Perform a software update on the connected Radar scanner. |

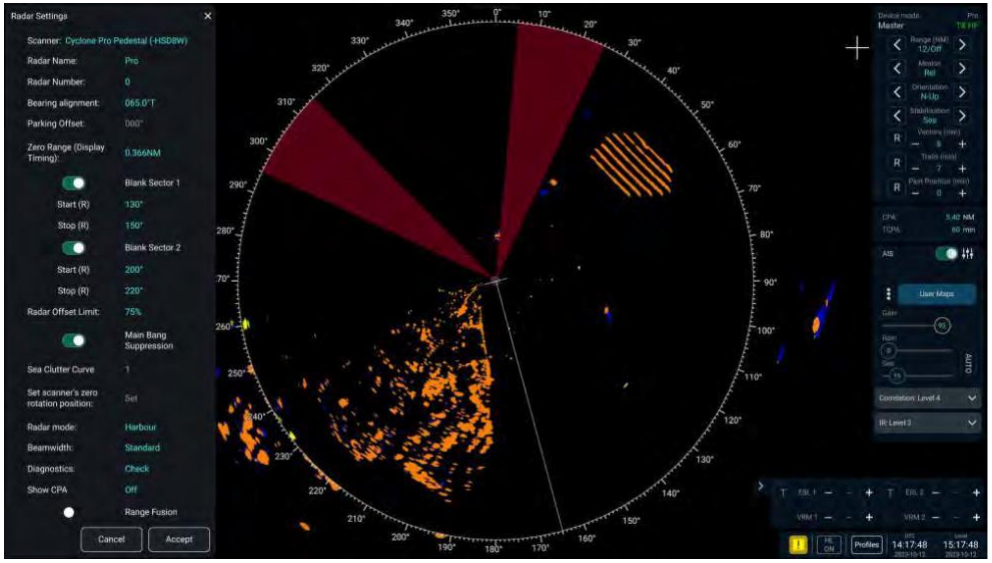
# 24.3 Radar Setup

To set up the Radar scanner, work through the *[Radar settings]* menu, performing relevant tests and adjusting the relevant settings.

## Radar settings menu

The *[Radar settings]* menu provides advanced settings for installation and commissioning.

To access the *[Radar settings]* menu, select the Radar image from the *[Standby]* screen and then select *[Radar settings]* from the *[Pull down]* menu.




Access to the *[Radar settings]* menu is password-restricted.

- *[Scanner]*— Select a radar scanner.
- *[Radar Name]*— Name the selected radar scanner. The Radar name will appear on the top right of the Radar screen.
- *[Radar Number]*— Provide a unique number to identify the selected radar scanner.
- *[Bearing Alignment]* — For details, refer to: **p.124 — Check and adjust bearing alignment**
- *[Parking Offset]*— For details, refer to: **p.125 — Parking Offset**
- *[Zero Range (Display Timing)]*— For details, refer to: **p.125 — Display timing**
- *[Blank Sector 1]*— For details, refer to: **p.126 — Blank sector configuration**
- *[Blank Sector 2]*— For details, refer to: **p.126 — Blank sector configuration**
- *[Radar Offset Limit]*— Determines the percentage of the display screen range that can be used for Radar display offset. The range can be set between 50% to 75% of the display screen range.
- *[Main Bang Suppression]* — For details, refer to: **p.127 — Main Bang Suppression (MBS)**
- *[Sea Clutter Curve]*— For details, refer to: **p.127 — Sea clutter curve**
- *[Set scanner's zero rotation position]*— For details, refer to: **p.127 — Setting the Radar scanner's Zero rotation position**
- *[Diagnostics]*— Show Radar diagnostics and self test details for the Radar scanner.
- *[Show CPA]*— Displays CPA graphics on valid targets.
- *[Range Fusion]*— Enable and disable Range Fusion.
- *[Force gain to 100]*— For testing purposes only.
- *[Reset]*— Resets the *[Radar settings]*to default values.

To adjust a setting, select its current value.

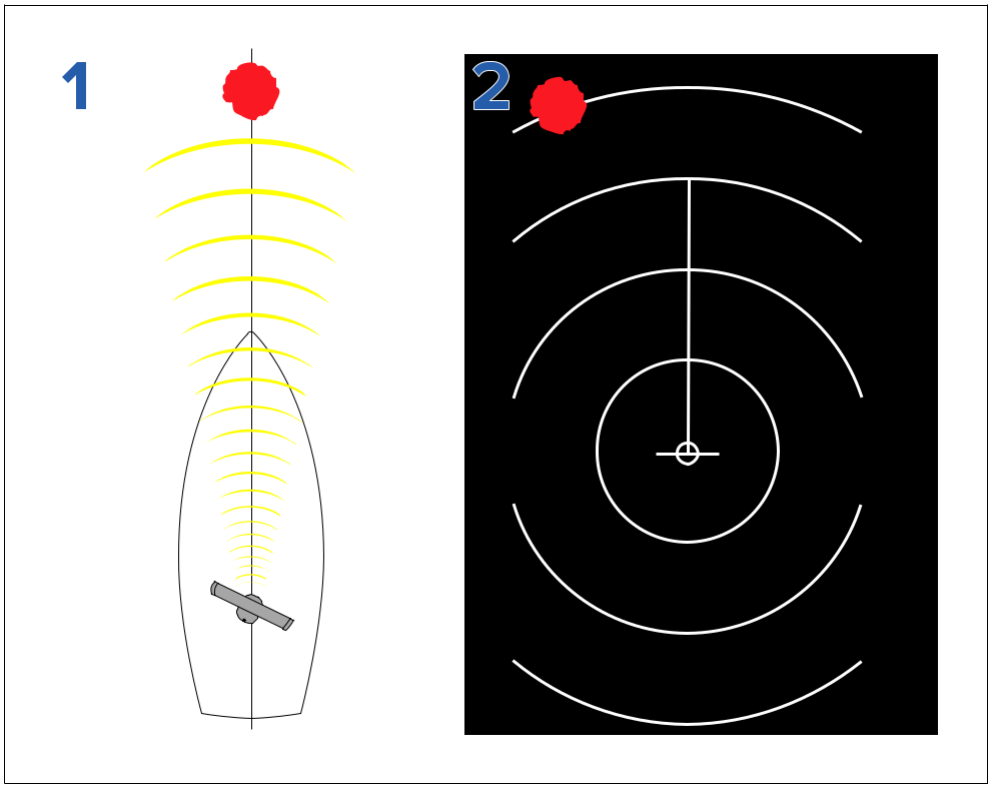
Items that are grayed-out cannot be edited.

## Check and adjust 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.

The bearing alignment adjustment is configured and stored locally within the Radar scanner. The following section details how to check and set the bearing alignment offset for the Radar scanner.

**Example misaligned Radar**




1. Target object (such as a buoy) dead ahead.
2. Target displayed on the Radar display is not aligned with ownship Heading Line (HL). Bearing alignment is required.

**Checking alignment**

Align the bow with a stationary object between 0.25 and 2 NM away.

Reduce the gain to make the target as small as possible on the screen.

Note the position of the object on the Radar screen. If the target is not under the ship's heading marker (SHM), then bearing alignment adjustment is required.

**Adjusting alignment**

The *[Bearing alignment]* setting can be accessed from the *[Radar Settings]* menu.

1. Use the bearing scale to help calculate the required offset.
2. Select the current *[Bearing alignment]* value and use the keypad to enter the required offset.
3. If, required repeat the steps until the target object appears under the Heading line.

**Note:**

Please be aware that bearing alignment refers to the **relative** bearing of **targets** to the vessel's bow using visual checks / traditional means.

### Warning: Bearing alignment

Incorrect alignment of the heading line will result in a misalignment of radar returns in bearing. For example a 0.1 error will result in a target at 11 NM being displaced in azimuth by approximately 35 m (114.83 ft).

## Parking offset

The parked position on an open array radar's antenna is determined by the *[Parking offset]* value.

The parked position will be the physical position, relative to the pedestal, that the antenna will be in when the radar is in standby.

**Note:**

The *[Parking offset]* setting is only available when the Radar scanner is in standby.

## Display timing (Zero range)

The display timing can be affected by the length of the cable connecting the Radar scanner to the display; this impacts the display's short-range accuracy. Display timing should be checked before using the system for navigation.

Incorrect display timing is most noticeable on the 0.25 NM range scale; targets such as bridges and piers appear bent or bowed.

**Note:**

Under normal circumstances you should not need to adjust display timing. If display timing is adjusted incorrectly, it will adversely affect the performance of the radar.

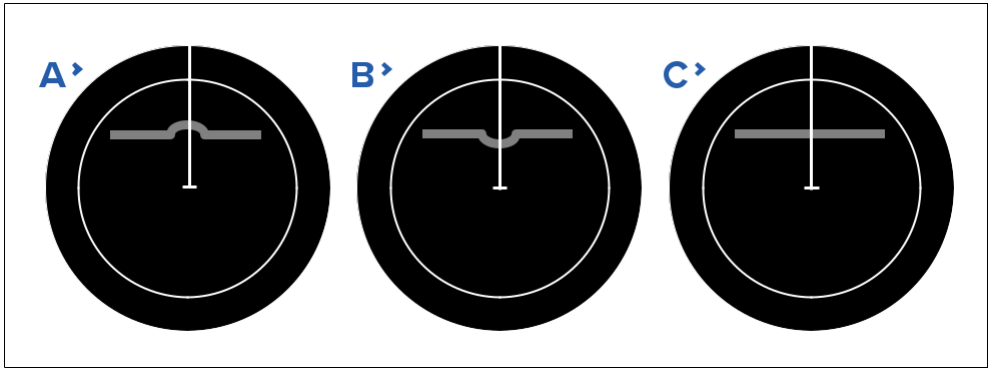
### Adjusting display timing

To check and adjust display timing follow the steps below.

**Note:**

Adjusting display timing may be easier with *[Main Bang Suppression (MBS)]* set to *[Off]*.

On the radar screen, locate a straight object such as a bridge, pier, dock, or seawall facing your vessel. If the image is bent or bowed as shown in '**A**', or '**B**' below, display timing requires adjustment.




- **A** — Display timing is early.
- **B** — Display timing is late.
- **C** — Display timing is normal.

1. Select *[Radar Settings]* from the pull-down menu.
2. Select the current *[Zero range (Display Timing)]* value.
3. Enter a new value and select *[OK]*.
4. If the bend gets worse, adjust the value in the opposite direction.
5. When the image appears straight, the display timing is correct.

Alternatively, you can use a VRM in conjunction with a target at a known distance and adjust the picture so that the target coincides with the VRM.

## Blank sector configuration

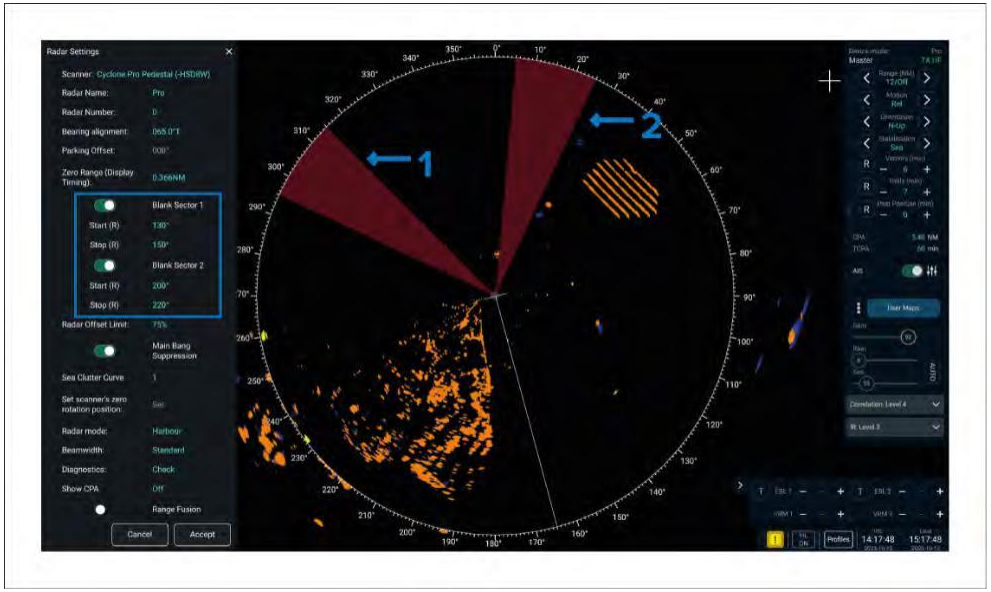
Blank sectors are used to disable the Radar scanner from transmitting in specified zones.

Blank sectors can be used to protect crew members from radar Radio Frequency (RF) emissions, when they are in close proximity to the Radar scanner. One example of this scenario is when the helm is within the beamwidth of the Radar scanner. Blank sectors can also be used when false radar readings are experienced from onboard structures or equipment.

Blank sectors are configured from the *[Radar Settings]* menu.

Two blank sectors are available. When a blank sector is enabled, you can specify how much of the radar display is blanked by entering the *[Start]*and *[Stop]*degrees for each blank sector.

### Example blank sectors




1. Blank sector 1.
2. Blank sector 2.

The user can enable or disable the display of the blank sectors using the *[Mute sector]* option in the Radar sensor menu.

The Blank sectors will not be displayed onscreen if *[Mute sector]* is disabled.

## Main Bang Suppression (MBS)

MBS is used to suppress a reflection signal from the Radar scanner which usually appears as a circular object at the center of the display.

**Note:**

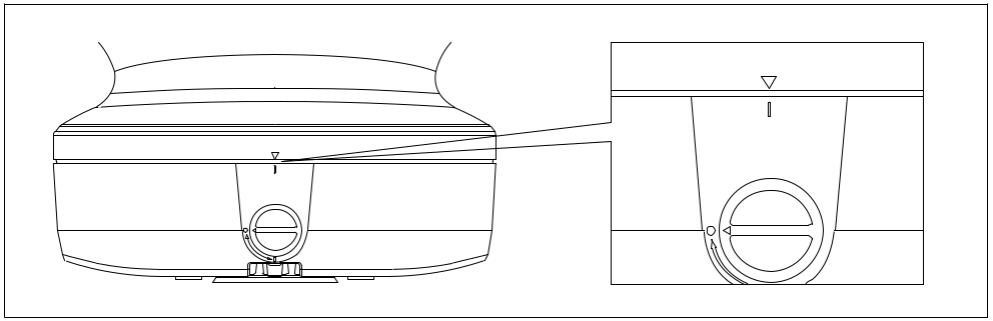
With MBS enabled, targets very close to the vessel may not be visible.

## Sea clutter curve

Radar echoes from waves can clutter the Radar screen. The *[Sea clutter curve]* control adjusts the radar scanner's sensitivity to sea clutter, improving the quality of the radar image.
Several factors can affect the level of clutter you see, including the weather, sea conditions, and the mounting height of the Radar scanner.
The Sea clutter curve can be set between level 1 and level 8, with level 1 providing the highest level of clutter suppression.
The Sea clutter curve should be set to an appropriate value for the radar scanner. The Sea anti clutter control can then be used to fine tune sea clutter for specific conditions.

## Setting the Radar scanner's Zero rotation position

The Zero position is set in the factory. It should only need changing if the slip ring has been replaced, if the unit has been taken apart or if it has been set incorrectly.



1. Ensure that the Radar scanner is in *[Standby]*.
2. Switch the Safety switch on the pedestal to the off position.
3. Rotate the top half of the pedestal by hand until the location marks are lined up.
4. Switch the Safety switch back on.
5. Open the *[Radar settings]* menu.
6. Select *[Set]*next to the *[Radar scanner's zero rotation position]* option.

# 24.4 Backup and restore

## Backup

Settings and data can be backed up to internal and external memory.

The backup procedure includes the following data and settings:

- Radar configuration settings (Radar Name, number Blank sectors etc).
- Ship data (External devices and Ownship settings).
- User maps.
- User profiles.
- Past position.
- 12 Hour log.
- Alert configuration settings.
- Crash logs (crash and system logs).

The backup file can be used at a later date to restore your data and settings.

### Performing a backup

A backup should be performed as part of commissioning, but can also be performed by the operator.

**Note:**

During commissioning a backup should be made and saved to both internal and external memory.


From the Standby screen:

1. Select the *[Backup]* icon.
2. Select the memory device from the drop down list.
3. Select *[Backup]*.
4. Select *[OK]*on the backup confirmation notification.

The backup file will be created in the ':\KRSBackup' folder of the internal or external memory.
The name for the backup file will be in the following format:
PFNDBackup_YYYMMDDHHMMSS_ShipName_DisplaySN

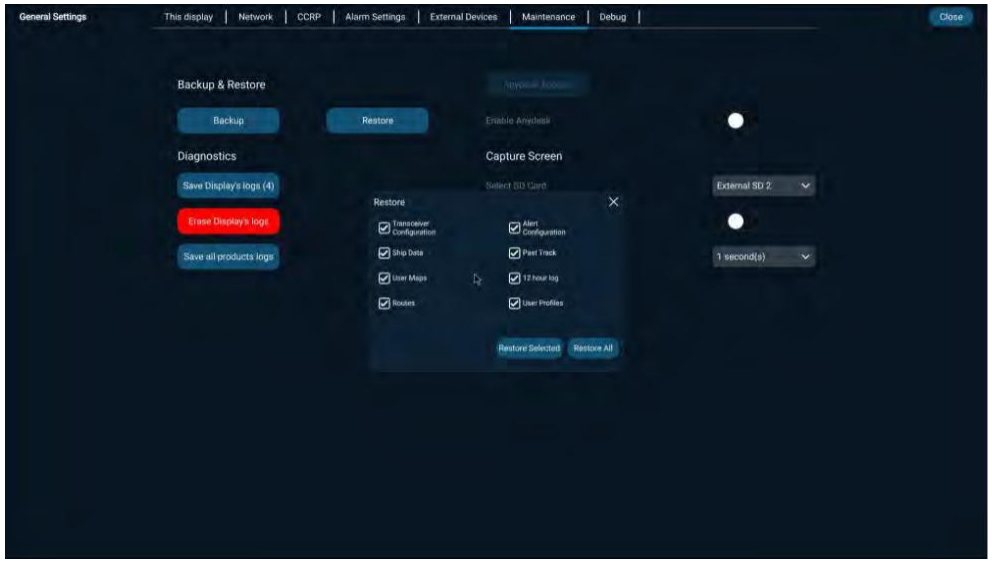
## Restore

User data and settings can be restored from a backup file stored on internal or external memory.
The restore function is provided in the password protected settings menu.

A restore should only be performed by an authorized engineer.

### Performing a restore

Follow the steps below to perform a restore from a backup file.




1. Select *[Restore]* from the *[This display]*settings menu.
2. Select the memory device from the drop down list.
3. Select the backup file.
4. Select *[Restore]*.
5. Either select the items that you want restored and select *[Restore]* selected, or select *[Restore All]*.

   *The following items can be restored from a backup file:*

   - *Transceiver Configuration*
   - *Ship Data*
   - *User Maps*
   - *Routes*
   - *Alert Configuration*
   - *Past Track*
   - *12 Hour Log*
   - *User Profiles*

6. Select *[OK]* on the restore complete notification.

# CHAPTER 25: ACCEPTANCE TESTING

## CHAPTER CONTENTS

# 25.1 Acceptance testing

Once all installation and commissioning activities are complete, the Radar display requires acceptance testing to confirm correct operation.

**Pre-requisites:**

Before performing acceptance testing ensure that:

- All equipment is running the latest available software.
- All relevant devices are powered on.
- All relevant health & Safety precautions as noted in this document and in the Operation manual are adhered to throughout the testing.

**Testing procedure:**

Carry out the relevant checks as described in the following test record pages to verify that the system operates as expected and that the relevant data is displayed onscreen.

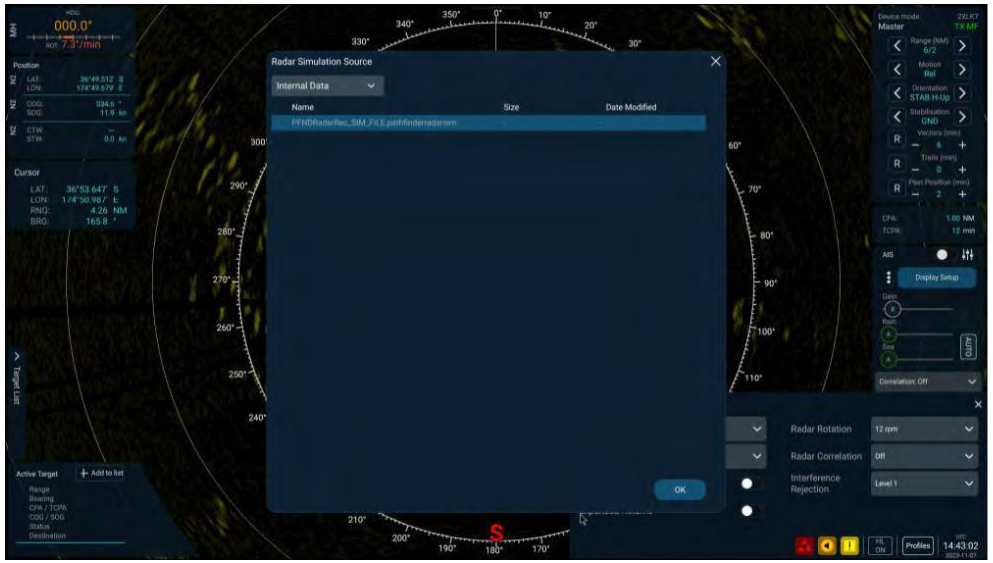
Follow the Operation manual to establish correct functional operation.

Providing that the KRS Radar Display has been set up as detailed in this document, the Demo simulator may be used to aid with some testing. The Demo simulator uses a replay of pre-recorded data. The Demo simulator requires live data from Gyro, Speed and Position sensors to use Radar features.

## Enabling the simulator

The simulator plays pre-recorded data in place of live data from a Radar scanner.

Follow the steps below to enable the simulator.




1. Select the Radar scanner name heading located at the top right of the screen.
2. Select the *[Radar]* name from the menu.
3. Select *[Radar simulator]*.
4. Select either *[Internal]*, or *[External]*.
   When *[External]* is selected the file browser will be displayed to enable you to select a file to play.

The Pre-recorded data will commence playback.

# 25.2 Radar operation test record

| | | |
|---|---|---|
| **Radar operation** | 1. Select the Radar application from the Standby screen and confirm the system is operational. | ☐ Passed |
| **Ownship data** | 1. Check that ownship data is available and appears accurate. | ☐ Passed |
| **Radar standby** | 1. Check that the Radar scanner is powered up and in *[STBY]*mode. | ☐ Passed |

| | | |
|---|---|---|
| **Radar transmit** | 1. Ensuring it is safe to do so, select the *[STBY]* option to start the Radar transmitting.<br>2. Check radar returns are available at all ranges. | ☐ Passed |
| **Mute sectors** | If Blank sectors have been configured, perform the following test.<br>1. Enable *[Mute sectors]* and ensure that the radar does not transmit during the mute sectors.<br>2. Ensure no loss of video or alerts during mute sector. | ☐ Passed |

## 25.3 Radar display test record

| Test | Steps | Result |
|---|---|---|
| **Gain** | 1. Check that the control operates smoothly throughout its available range.<br>2. Set the control to Auto and check operation.<br>3. Adjust the Gain control to a level where noise is just visible. | ☐ Passed |
| **Rain anti-clutter** | 1. Check that the control operates smoothly throughout its available range.<br>2. Set the control to Auto and check operation.<br>3. Set the control to zero. | ☐ Passed |
| **Sea anti-clutter** | 1. Check that the control operates smoothly throughout its available range.<br>2. Set the control to Auto and check operation.<br>3. Set the control to zero. | ☐ Passed |
| **Correlation controls** | 1. Check that the control operates smoothly throughout its available range. | ☐ Passed |
| **Cursor position** | 1. Place the cursor within the operational area and check that range, bearing, latitude and longitude are displayed in the cursor box located on the left side of the screen. | ☐ Passed |
| **Heading Line (HL) suppression** | 1. Select and hold the Heading Line suppression icon *[HL ON]*, located in the lower right side of the screen. All onscreen graphics other than the Bearing scale should be removed whilst the icon is selected. | ☐ Passed |
| **Orientation** | 1. Check that the following Orientation modes are available: *[STAB H-Up, ][H-Up]*, *[C-Up]*and *[N-Up]*. | ☐ Passed |
| **Screen brightness** | 1. Check that the screen brightness can be adjusted. | ☐ Passed |
| **User Maps** | 1. Create a User map.<br>2. Edit a User map.<br>3. Delete a User map. | ☐ Passed |

## 25.4 Tracked radar target test record

| Test | Steps | Result |
|---|---|---|
| **Acquire target** | 1. Select and hold on a radar target.<br>2. Select *[Acquire target]* from the context menu.<br>3. Check that the acquiring target symbol appears within one rotation. | ☐ Passed |
| **Target origins** | 1. Check that a tracked target's vector origin is in the middle of the target symbol. | ☐ Passed |
| **Target data** | 1. Select a tracked target.<br>2. Check that the target's data appears in the Active target area, located in the bottom left of the screen. | ☐ Passed |

| | | |
|---|---|---|
| **Reference target** | 1. Select and hold on a tracked target.<br>2. Enable the *[Reference target]* toggle switch.<br>3. Check that the target name is changed to ‘R1’. | ? Passed |
| **Delete a target** | 1. Select and hold on a radar target.<br>2. Select *[Delete Target]* from the context menu.<br>3. Check that the target symbol is removed and the target is no longer tracked. | ? Passed |

## 25.5 AIS target test record

**Note:**
If no AIS targets are currently available use the display’s built-in simulator to perform AIS tests.

| Test | Steps | Result |
|---|---|---|
| **Enable AIS** | 1. Ensure STAB H-up orientation is selected.<br>2. Enable the *[AIS]* toggle switch.<br>3. Check that AIS symbol appear onscreen. | ? Passed |
| **Activate AIS target** | 1. Select an AIS target.<br>2. Ensure that the target vectors are displayed and that the target’s data is displayed in the Active target area. | ? Passed |
| **Deactivate AIS target** | 1. Select and hold on an activated AIS target.<br>2. Disable the *[Activate AIS]* toggle switch.<br>3. Check that vector lines are removed. | ? Passed |
| **AIS target data** | 1. Hover cursor over an AIS target.<br>2. Check that Active target area data is updated to reflect new target. | ? Passed |

## 25.6 Guard zone test record

**Note:**
If no targets are currently available or the Radar is not currently permitted to transmit, use the display’s built-in simulator to perform guard zone tests.

| Test | Steps | Result |
|---|---|---|
| **Set up a guard zone** | 1. Ensure that *[Alarm Audio]*is enabled in the *[Alerts settings]* menu.<br>2. Take note of original *[CPA]*and *[TCPA]* settings.<br>3. Set the *[CPA]*limit to **6.0 NM**.<br>4. Set the *[TCPA]* limit to **30 min**.<br>5. Select the *[GZ]* icon from the *[Additional features]* menu.<br>6. Enable the *[Zone active]* toggle switch for Zone 1.<br>7. Select *[Edit]*.<br>8. Apply the following parameters:<br>• Outer perimeter: **5.0 NM**.<br>• Inner perimeter: **1.0 NM**.<br>• Sector start: **10 degrees to port of ownship**.<br>• Sector stop: **10 degrees to starboard of ownship**.<br>9. Check that the guard zone appears correctly onscreen. | Passed |
| **Automatic target acquisition** | 1. Ensure that radar targets are automatically acquired when they enter or appear within the guard zone area.<br>2. Ensure that AIS targets are automatically activated (vectors switch on) when they enter or appear within the guard zone area. | Passed |
| **Collision warning** | Due to the CPA and TCPA settings, targets within the guard zone should trigger the collision warning:<br>1. Ensure that audible alarm beeps are heard.<br>2. Ensure that the target symbol and vectors flash red.<br>3. Ensure that the target's details appear in the Active target area.<br>4. Ensure that a collision warning is present in the Alerts notification area. | Passed |
| **Collision warning vectors** | 1. Select a red flashing target.<br>2. Ensure that the symbol and vectors stop flashing. | Passed |
| **Turn off guard zone** | 1. Select the *[Guard Zone]* button from the *[Additional features]* menu.<br>2. Disable the *[Zone active]* toggle switch for Zone 1.<br>3. Check that the guard zone has been removed.<br>4. Check that all targets remain onscreen. | Passed |
| **Radar target deletion** | 1. Select *[Delete all targets]* from the *[Additional features]* menu.<br>2. Check that all radar targets are removed. | Passed |

On completion of testing, reset *[CPA]* and *[TCPA]* to their original values.

## 25.7 Equipment Registration

This registration must be completed in full to receive the warranty from Koden Distributor/Dealer or Koden Electronics Co., Ltd.

### All sections must be completed:

| | |
|---|---|
| Installation date: | Installation company name: |
| Installation Engineer Name: | |
| Vessel Name: | Vessel Owner Name & Address: |
| IMO Number: | |
| Vessel type: | |
| Port: | |
| Display serial number: | Display software version: |
| Radar scanner serial number: | Radar scanner software version: |
| DCU serial number: | DCU software version: |

### Complete the following questions:

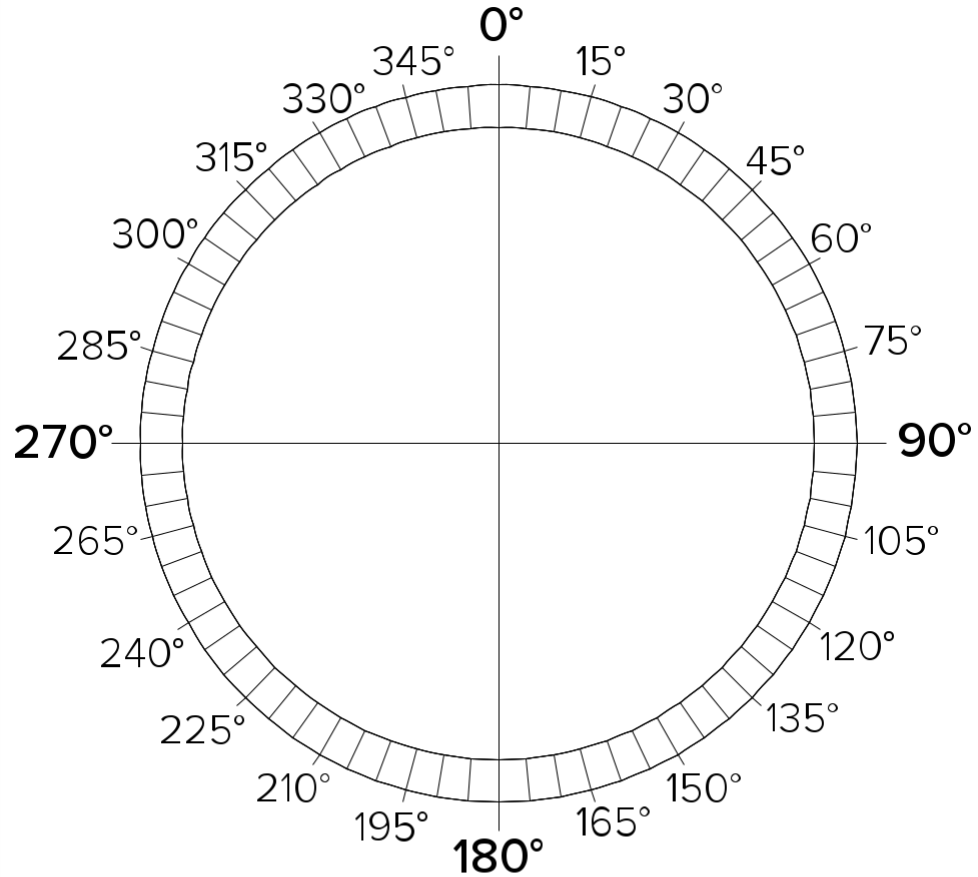
| | Yes | No | |
|---|---|---|---|
| **1.** Did you unpack the equipment? | ☐ | ☐ | If **yes** please answer question 2, otherwise proceed to question 3. |
| **2.** Was the packaging damaged? | ☐ | ☐ | If **yes** please provide photographs and comment in the available white space or on a separate sheet. |
| **3.** Were any items missing? | ☐ | ☐ | If **yes** please provide details in the available white space or on a separate sheet. |
| **4.** Were all supplied cables and fittings correct? | ☐ | ☐ | If **no** please provide details in the available white space or on a separate sheet. |
| **5.** Did the equipment work first time? | ☐ | ☐ | If **no** please provide details in the available white space or on a separate sheet and then answer question 6. |
| **6.** Did you get the equipment to work? | ☐ | ☐ | If **yes** please provide corrective actions taken in the available white space or on a separate sheet, and then answer question 7. |
| **7.** Were any spare parts required to get the equipment to work? | ☐ | ☐ | If **yes** please provide details in the available white space or on a separate sheet. |

| | | | | | |
|---|---|---|---|---|---|
| All equipment properly installed and earthed? | ☐ | Wiring electrically tested and labelled? | ☐ | Cable runs secured and tidy? | ☐ |
| Voltage rating correctly set? | ☐ | Waveguide clamped & watertight? | ☐ | Latest software loaded? | ☐ |
| System tested and adjusted? | ☐ | Through-deck and cable glands sealed? | ☐ | Crew / Customer handover complete? | ☐ |

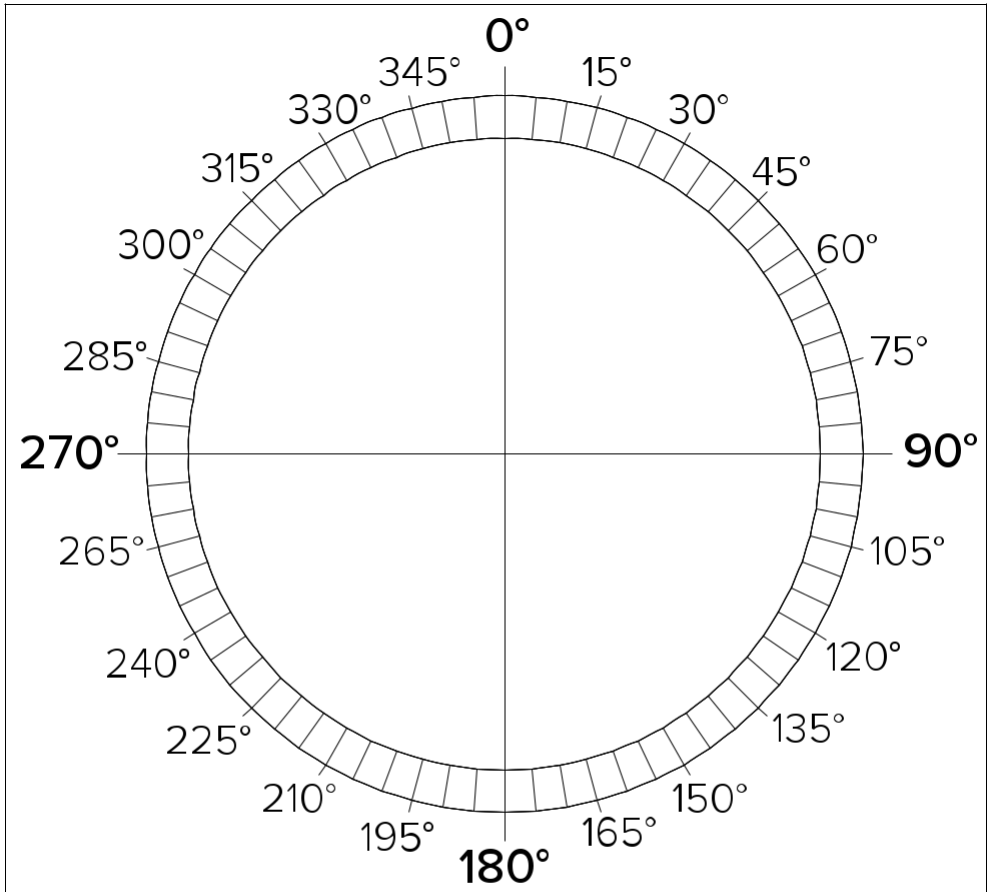
| **Signature of Installation Engineer** | **Signature of Master** |
|---|---|
| **Sign:** | **Sign:** |
| **Print name:** | **Print name:** |
| **Date: (DD/MM/YYYY):** | **Date: (DD/MM/YYYY):** |

## 25.8 Blank Sector and Heading Line Offset Record

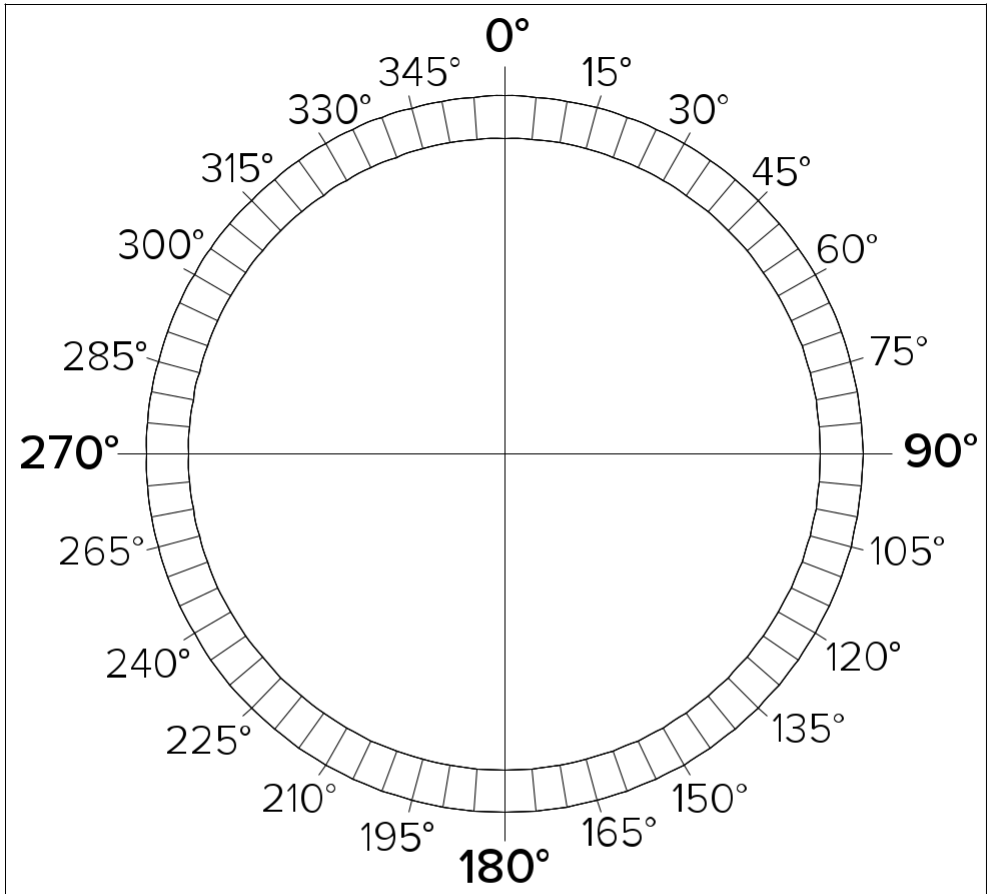
Record Blank (Mute) sectors and/or Heading Line Offsets on the diagrams below:



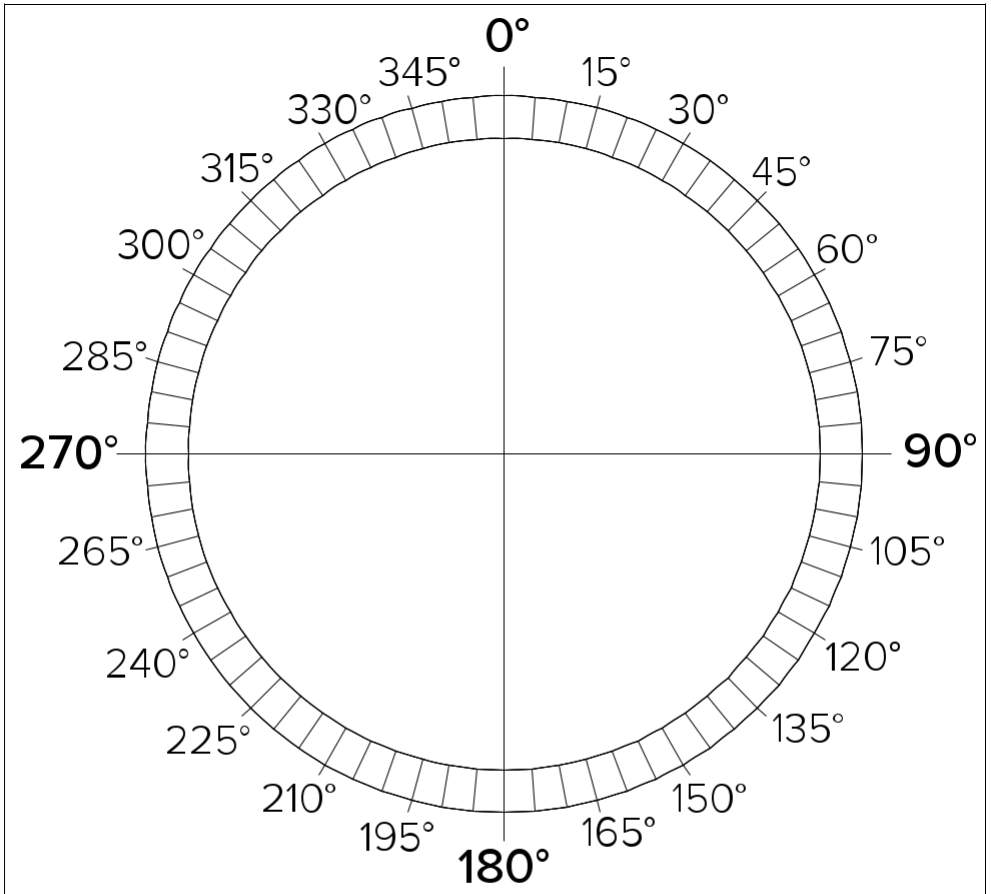

Description:




Description:




Description:




Description:

## 25.9 Customer handover & sign off

Once the installation and commissioning has been successfully completed, the following must be handed to the most senior member of the crew, ship owner or agent.

### Customer handover

| | |
|---|---|
| System manuals/instructions. | |
| System drawings (If applicable). | |
| Fully completed copy of test records. | |
| Fully completed Equipment registration certificate. | |
| Fully completed Blank sector / Heading Line offset diagrams (if applicable). | |
| Completed warranty registration for each system component. | |
| System backup. | |

### Return to Koden Distributor/Dealer or Koden Electronics Co., Ltd.

| | |
|---|---|
| Fully completed service/installation report | |
| Where possible, photographs of installed system components and wiring. | |
| System manuals/instructions. | |
| System drawings (If applicable). | |
| Fully completed copy of test records. | |
| Fully completed Equipment registration | |
| Fully completed Blank sector / Heading Line offset diagrams (if applicable). | |
| Completed warranty registration for each system component. | |
| System backup. | |

| | | |
|---|---|---|
| **Shipyard:** | | |
| **Customer:** | | |
| **Vessel, hull or project reference:** | | |
| **Signed (Koden Dealer or Koden)** | Sign: | Print Name: |
| **Date:** | | |
| **Signed (Customer):** | Sign: | Print Name: |
| **Date:** | | |

# CHAPTER 26: OPERATION

CHAPTER CONTENTS

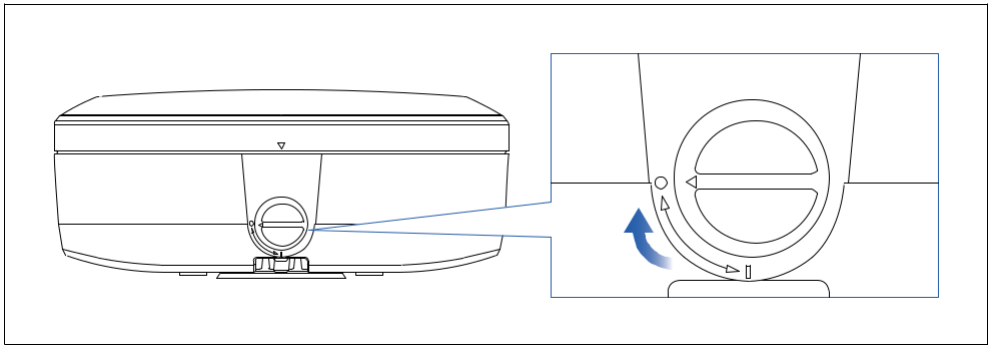
## 26.1 Operation manual

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

- KRS Radar Operation manual.

## 26.2 Safety switch

The pedestal's Power switch also acts as a Safety switch, which can be used to quickly stop the antenna rotating.
The pedestal's **Power/Safety** switch is located at the rear of the pedestal, directly above the channel where the cables exit the unit.
To use the **Power/Safety** switch to quickly stop the antenna rotating, turn the switch OFF (i.e. turn the switch to the 9 o'clock position), as shown below:



**Note:**

It's also possible to quickly stop the Radar antenna rotating by switching off the power to the VCM100, via the appropriate fuse / thermal breaker at the vessel's power distribution panel.

# CHAPTER 27: TROUBLESHOOTING

## CHAPTER CONTENTS

## 27.1 Troubleshooting

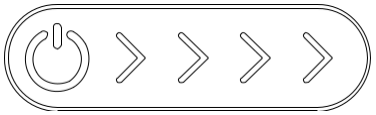
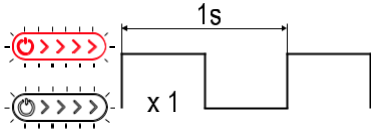
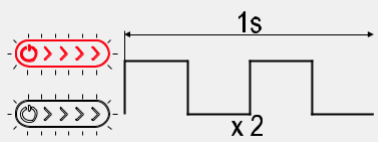
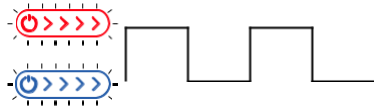
The troubleshooting section provides possible causes and the corrective action required for common problems that are associated with the installation and operation of your product.

Before packing and shipping, all Koden 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 Koden technical support contact details.

## 27.2 LED Diagnostics

The Display's "Power swipe" key is illuminated using LEDs. The LED color and flash sequence identifies the status of the display, along with any error codes.

| LED indication | Status and required action |
|---|---|
|  | **(White) Powered up / Ok**<br>Normal operation — no user action is required. |
|  | **(Red) Standby**<br>Swipe to power up display. |
|  | **(Red flash: 1 per second) Low voltage**<br>• Increase supply voltage to within operating temperature range.<br>• Check power cabling and connections for damage and corrosion; replace if required. |
|  | **(Red flash: 2 per second) High voltage**<br>• Reduce supply voltage to within operating temperature range. |
|  | **(Red / Blue alternating flash) High temperature**<br>• Check display installation for adequate ventilation and 'free' space around rear of display.<br>• Check ambient temperature; if high, consider powering down the display until ambient temperature reduces. |

## 27.3 Pedestal LED indications

LED indications associated with the Radar scanner.

| LED color / state | Possible causes |
|---|---|
| Power LED not lit | Unit is NOT receiving power, OR it is powered and is in *Sleep* mode. |
| Amber or Red / solid | Unit is receiving power, but the pedestal's **Power/Safety** switch is in the "Off" position. |
| Green / flashing once every 30 seconds | Radar is powered on and functioning correctly (is in *Standby* or *Transmit* mode). |
| Amber or Red / flashing once every 30 seconds | Internal fault. Refer to your dealer or Koden product support. |

## 27.4 VCM100 LED indications

LED indications associated with the VCM100.

| LED color / state | Possible causes |
|---|---|
| **Green / solid:** | Radar operating normally. |
| **Red / solid:** | Fault condition. |

| LED color / state | Possible causes |
|---|---|
| **Yellow / flashing:** | Radar scanner in standby. |
| **Yellow / solid:** | Fault condition, unit self-recovers after 20 seconds. |

## 27.5 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, and replace if necessary. (Refer to the Technical Specification section of the installation manual for fuse ratings.)<br>2. If fuse keeps blowing, check for cable damage, broken connector pins or incorrect wiring. |
| Poor / damaged / insecure power supply or cable / connections | 1. Check that the power cable connector is correctly orientated and fully inserted into the display connector and locked in position.<br>2. Check the power supply cable and connectors for signs of damage or corrosion, and replace if necessary.<br>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.<br>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.<br>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 manual 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 | In the unlikely event that the product’s software has become corrupted, contact Koden to obtain and install the latest software. |

## 27.6 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 not transmitting | Select *[STBY]* from the top right corner of the radar screen. |
| Damaged or disconnected Power cable / Data cable | 1.Check that the cable connectors are fully inserted and locked in position.<br>2.Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary.<br>3. With the unit turned on, try flexing the cable near to the display connector to see if this causes the unit to restart or lose power; replace if necessary.<br>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.<br>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 / switch off); replace if necessary.<br>6. Check condition of relevant breakers and fuses; replace if necessary. If breaker keeps tripping or fuses keep blowing, contact a Koden authorized dealer for assistance. |
| *[Power]* switch in OFF position | Ensure *[Power]* switch is in the ON position. |
| Software mismatch between equipment may prevent communication | Ensure KRS radar contain the latest available software. For more information, contact Koden dealer or Koden. |

### 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 relevant display *Operation manual*. |

### 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 = 42 V) |

### Picture not updated or appears to be locked-up. This may be indicated by the UTC / Local time not changing

| Possible causes | Possible solution |
|---|---|
| Possible system error | If the Display hasn't rebooted itself then shut down and restart the processor. |

## 27.7 Radar target acquisition data source requirements

Radar target acquisition requires external devices that transmit relevant data to be available on your system
The following data sources are required:

| Data type | Example data source |
|---|---|
| COG (Course Over Ground) | GPS or GNSS receiver. |
| SOG (Speed Over Ground) | GPS or GNSS receiver. |
| THS / HDT (True Heading) | Compass or Autopilot sensor providing fast heading data.<br>(The gyro compass or equivalent heading sensor must have an update rate that is adequate for the ship’s rate of turn. In general for non-high speed craft, the update rate should be a minimum of 10 Hz.). |

# CHAPTER 28: MAINTAINING YOUR DISPLAY

CHAPTER CONTENTS

## 28.1 Servicing, maintenance and repair

Servicing, maintenance and repair of this equipment can only be carried out by Koden Electronics Co., Ltd. authorized engineers. Unauthorized servicing, maintenance and repair of the equipment will invalidate product warranty and require re-commissioning of the equipment.

### 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.

### Caution: Sun covers

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

### 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.

## 28.2 Product cleaning

Best cleaning practices.

When cleaning products:

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

### Cleaning the display case

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

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

### Cleaning the display screen

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

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

### Cleaning the sun cover

If you use a sun cover for your display clean it regularly following the procedure below to avoid causing damage to your display's screen.

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

# CHAPTER 29: TECHNICAL SUPPORT

CHAPTER CONTENTS

## 29.1 KRS technical support

For technical support for you KRS Radar system, please contact Koden dealer or Koden.

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

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

# CHAPTER 30: 16” DISPLAY TECHNICAL SPECIFICATION

CHAPTER CONTENTS



*Card reader: option

## 30.1 Power specification

| Specification | |
|---|---|
| **Nominal supply voltage:** | 12 V / 24 V dc |
| **Operating voltage range:** | 8 V dc to 32 V dc |
| **Current (Maximum):** | 8.56 A |
| **Off-current (Maximum @ 12 V dc):** | 352 mA (4.32 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Off-current (Maximum @ 24 V dc):** | 352 mA (5.54 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Fuse requirements:** | • Inline fuse = 15 Amp, or<br>• Thermal breaker = 15 Amp |
| **Power consumption: (Maximum @ 12 V dc):** | 76.56 Watts |
| **Power consumption: (Maximum @ 24 V dc):** | 71.35 Watts |

## 30.2 Environmental specification

| Specification | |
|---|---|
| **Operating temperature range:** | -25° C (-13° F) to + 55° C (131° F) |
| **Storage temperature range:** | -30°C (-22° F) to + 70° C (158° F) |
| **Humidity:** | up to 93% @ 40° C (104° F) |
| **Water ingress protection:** | IPx6 and IPx7 |
| **Installation location:** | • Above decks<br>• Below decks |

## 30.3 LCD specification

| Specification | |
|---|---|
| **Size (diagonal):** | 15.6” |
| **Type:** | IPS (In-Plane Switching) |
| **Color depth:** | 24 bit |
| **Resolution:** | 1920 x 1080 FHD |
| **Aspect ratio:** | 16:9 |
| **Brightness / Luminance:** | 1300 nits / 1300 cd/m$^2$ |
| **Viewing angle:** | Top 88° / Bottom 88° / Left 88° / Right 88° |
| **Number of simultaneous touches:** | 2 |

## 30.4 Physical specification

| Specification | |
|---|---|
| **Gross (boxed) product weight:** | 8.32 kg (18.34 lbs) |
| **Net (unboxed) product weight:** | 5.84 kg (12.88 lbs) |
| **Dimensions:** | Height: 248.22 mm (9.77 in), Width, 394.9 mm (15.55 in), Depth (including cables): 174.95 mm (6.89 in). |
| **Internal storage:** | 64 GB solid state. |
| **External storage:** | Remote card reader* required. |

## 30.5 Connections specification

| Specification | |
|---|---|
| **Accessory connection:** | USB Micro B (for external card reader* connection). |
| **Analog video connections:** | DO NOT USE the video input connection as it is not currently available on this display. |

| Specification | |
|---|---|
| **Audio connections:** | DO NOT USE the audio output connection as it is not currently available on this display. |
| **Ethernet connections:** | 3 network connectors (10/100/1,000 Mbits/s)<br>DO NOT USE the display to power ethernet devices as this feature is not currently available on this display. |
| **External alarm connection:** | Bare-ended wires x 2 (via Alarm/Video cable). |
| **GPS antenna connection:** | DO NOT USE the GPS antenna connection as it is not currently available on this display. |
| **HDMI connections:** | DO NOT USE the HDMI input as it is not currently available on this display. |
| **NMEA 0183 connection:** | NMEA 0183 to ethernet converter (Part number: A80792) |
| **NMEA 2000 connection:** | DO NOT USE the NMEA 2000 connection as it is not currently available on this display. |
| **USB connections:** | USB-A: Touch input, USB-B.<br>DO NOT USE the Touch out connection as it is not currently available on this display. |

# CHAPTER 31: 19” DISPLAY TECHNICAL SPECIFICATION

## CHAPTER CONTENTS



*Card reader: option

## 31.1 Power specification

| Specification | |
|---|---|
| **Nominal supply voltage:** | 12 V / 24 V dc |
| **Operating voltage range:** | 8 V dc to 32 V dc |
| **Current (Maximum):** | 8.98 A |
| **Off-current (Maximum @ 12 V dc):** | • PoE — 2,135 mA (25.62 Watts) — *Display is powered off, but supplying network data and power to connected PoE network devices*.<br>• No PoE — 352 mA (4.32 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Off-current (Maximum @ 24 V dc):** | • PoE — 1,161 mA (27.86 Watts) — *Display is powered off, but supplying network data and power to connected PoE network devices*.<br>• No PoE — 352 mA (5.54 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **PoE operating voltage range:** | 9.5 V dc to 32 V dc |
| **Fuse requirements:** | • Inline fuse = 15 Amp, or<br>• Thermal breaker = 15 Amp |
| **Power consumption: (Maximum @ 12 V dc):** | 85.42 Watts |
| **Power consumption: (Maximum @ 24 V dc):** | 73.98 Watts |

## 31.2 Environmental specification

| Specification | |
|---|---|
| **Operating temperature range:** | -25° C (-13° F) to + 55° C (131° F) |
| **Storage temperature range:** | -30°C (-22° F) to + 70° C (158° F) |
| **Humidity:** | up to 93% @ 40° C (104° F) |
| **Water ingress protection:** | IPx6 and IPx7 |
| **Installation location:** | • Above decks<br>• Below decks |

## 31.3 LCD specification

| Specification | |
|---|---|
| **Size (diagonal):** | 18.5” |
| **Type:** | IPS (In-Plane Switching) |
| **Color depth:** | 24 bit |
| **Resolution:** | 1920 x 1080 FHD |
| **Aspect ratio:** | 16:9 |
| **Brightness / Luminance:** | 1200 nits / 1200 cd/$m^2$ |
| **Viewing angle:** | Top 88° / Bottom 88° / Left 88° / Right 88° |
| **Number of simultaneous touches:** | 2 |

## 31.4 Physical specification

| Specification | |
|---|---|
| **Gross (boxed) product weight:** | 10.10 kg (22.27 lbs) |
| **Net (unboxed) product weight:** | 7.62 kg (16.80 lbs) |
| **Dimensions:** | Height: 289.44 mm (11.40 in), Width, 461.78 mm (18.18 in), Depth (including cables): 174.95 mm (6.89 in). |

| Specification | |
|---|---|
| **Internal storage:** | 64 GB solid state. |
| **External storage:** | Remote card reader* required. |

## 31.5 Connections specification

| Specification | |
|---|---|
| **Accessory connection:** | USB Micro B (for external card reader* connection). |
| **Analog video connections:** | DO NOT USE the video input connection as it is not currently available on this display. |
| **Audio connections:** | DO NOT USE the audio output connection as it is not currently available on this display. |
| **Ethernet connections:** | 3 network connectors (10/100/1,000 Mbits/s)<br>DO NOT USE the display to power ethernet devices as this feature is not currently available on this display. |
| **External alarm connection:** | Bare-ended wires x 2 (via Alarm/Video cable). |
| **GPS antenna connection:** | DO NOT USE the GPS antenna connection as it is not currently available on this display. |
| **HDMI connections:** | DO NOT USE the HDMI input as it is not currently available on this display. |
| **NMEA 0183 connection:** | NMEA 0183 to ethernet converter (Part number: A80792) |
| **NMEA 2000 connection:** | DO NOT USE the NMEA 2000 connection as it is not currently available on this display. |
| **USB connections:** | USB-A: Touch input, USB-B.<br>DO NOT USE the Touch out connection as it is not currently available on this display. |

# CHAPTER 32: 22” DISPLAY TECHNICAL SPECIFICATION

CHAPTER CONTENTS



*Card reader: option

## 32.1 Power specification

| Specification | |
|---|---|
| **Nominal supply voltage:** | 12 V / 24 V dc |
| **Operating voltage range:** | 8 V dc to 32 V dc |
| **Current (Maximum):** | 10.12 A |
| **Off-current (Maximum @ 12 V dc):** | 352 mA (4.32 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Off-current (Maximum @ 24 V dc):** | 352 mA (5.54 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Fuse requirements:** | • Inline fuse = 15 Amp, or<br>• Thermal breaker = 15 Amp |
| **Power consumption: (Maximum @ 12 V dc):** | 94.25 Watts |
| **Power consumption: (Maximum @ 24 V dc):** | 79.46 Watts |

## 32.2 Environmental specification

| Specification | |
|---|---|
| **Operating temperature range:** | -25° C (-13° F) to + 55° C (131° F) |
| **Storage temperature range:** | -30°C (-22° F) to + 70° C (158° F) |
| **Humidity:** | up to 93% @ 40° C (104° F) |
| **Water ingress protection:** | IPx6 and IPx7 |
| **Installation location:** | • Above decks<br>• Below decks |

## 32.3 LCD specification

| Specification | |
|---|---|
| **Size (diagonal):** | 21.5” |
| **Type:** | IPS (In-Plane Switching) |
| **Color depth:** | 24 bit |
| **Resolution:** | 1920 x 1080 FHD |
| **Aspect Ratio:** | 16:9 |
| **Brightness / Luminance:** | 1275 nits / 1275 cd/m$^2$ |
| **Viewing angle:** | Top 89° / Bottom 89° / Left 89° / Right 89° |
| **Number of simultaneous touches:** | 2 |

## 32.4 Physical specification

| Specification | |
|---|---|
| **Gross (boxed) product weight:** | 12.98 kg (28.62 lbs) |
| **Net (unboxed) product weight:** | 9.72 kg (21.43 lbs) |
| **Dimensions:** | Height: 326.33 mm (12.85 in), Width, 533.56 mm (21.00 in), Depth (including cables): 180.75 mm (7.12 in). |
| **Internal storage:** | 64 GB solid state. |
| **External storage:** | Remote card reader* required. |

## 32.5 Connections specification

| Specification | |
|---|---|
| **Accessory connection:** | USB Micro B (for external card reader* connection). |
| **Analog video connections:** | DO NOT USE the video input connection as it is not currently available on this display. |

| Specification | |
|---|---|
| **Audio connections:** | DO NOT USE the audio output connection as it is not currently available on this display. |
| **Ethernet connections:** | 3 network connectors (10/100/1,000 Mbits/s)<br>DO NOT USE the display to power ethernet devices as this feature is not currently available on this display. |
| **External alarm connection:** | Bare-ended wires x 2 (via Alarm/Video cable). |
| **GPS antenna connection:** | DO NOT USE the GPS antenna connection as it is not currently available on this display. |
| **HDMI connections:** | DO NOT USE the HDMI input as it is not currently available on this display. |
| **NMEA 0183 connection:** | NMEA 0183 to ethernet converter (Part number: A80792) |
| **NMEA 2000 connection:** | DO NOT USE the NMEA 2000 connection as it is not currently available on this display. |
| **USB connections:** | USB-A: Touch input, USB-B.<br>DO NOT USE the Touch out connection as it is not currently available on this display. |

# CHAPTER 33: 24” DISPLAY TECHNICAL SPECIFICATION

## CHAPTER CONTENTS



*Card reader: option

## 33.1 Power specification

| Specification | |
|---|---|
| **Nominal supply voltage:** | 12 V / 24 V dc |
| **Operating voltage range:** | 8 V dc to 32 V dc |
| **Current (Maximum):** | 10.03 A |
| **Off-current (Maximum @ 12 V dc):** | 352 mA (4.32 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Off-current (Maximum @ 24 V dc):** | 352 mA (5.54 Watts) — *Display is powered off, but supplying network data to connected non-PoE network devices*. |
| **Fuse requirements:** | • Inline fuse = 15 Amp, or<br>• Thermal breaker = 15 Amp |
| **Power consumption: (Maximum @ 12 V dc):** | 92.50 Watts |
| **Power consumption: (Maximum @ 24 V dc):** | 77.96 Watts |

## 33.2 Environmental specification

| Specification | |
|---|---|
| **Operating temperature range:** | -25°C (-13°F) to + 55°C (131°F) |
| **Storage temperature range:** | -30°C (–22°F) to + 70°C (158°F) |
| **Humidity:** | up to 93% @ 40°C (104°F) |
| **Water ingress protection:** | IPx6 and IPx7 |
| **Installation location:** | • Above decks (protected from direct sunlight)<br>• Below decks |

## 33.3 LCD specification

| Specification | |
|---|---|
| **Size (diagonal):** | 24” |
| **Type:** | IPS (In-Plane Switching) |
| **Color depth:** | 24 bit |
| **Resolution:** | 1920 x 1200 (WUXGA) |
| **Aspect ratio:** | 16:10 |
| **Brightness / Luminance:** | 1300 nits / 1300 cd/m$^2$ |
| **Viewing angle:** | Top 89° / Bottom 89° / Left 89° / Right 89° |
| **Number of simultaneous touches:** | 2 |

## 33.4 Physical specification

| Specification | |
|---|---|
| **Gross (boxed) product weight:** | 15.06 kg (33.20 lbs) |
| **Net (unboxed) product weight:** | 11.78 kg (25.97 lbs) |
| **Dimensions:** | Height: 386.84 mm (15.23 in), Width, 578.40 mm (22.77 in), Depth (including cables): 177.39 mm (6.98 in) . |
| **Internal storage:** | 64 GB solid state. |
| **External storage:** | Remote card reader* required. |

## 33.5 Connections specification

| Specification | |
|---|---|
| **Accessory connection:** | USB Micro B (for external card reader* connection). |
| **Analog video connections:** | DO NOT USE the video input connection as it is not currently available on this display. |

| Specification | |
|---|---|
| **Audio connections:** | DO NOT USE the audio output connection as it is not currently available on this display. |
| **Ethernet connections:** | 3 network connectors (10/100/1,000 Mbits/s)<br>DO NOT USE the display to power ethernet devices as this feature is not currently available on this display. |
| **External alarm connection:** | Bare-ended wires x 2 (via Alarm/Video cable). |
| **GPS antenna connection:** | DO NOT USE the GPS antenna connection as it is not currently available on this display. |
| **HDMI connections:** | DO NOT USE the HDMI input as it is not currently available on this display. |
| **NMEA 0183 connection:** | NMEA 0183 to ethernet converter (Part number: A80792) |
| **NMEA 2000 connection:** | DO NOT USE the NMEA 2000 connection as it is not currently available on this display. |
| **USB connections:** | USB-A: Touch input, USB-B.<br>DO NOT USE the Touch out connection as it is not currently available on this display. |

# CHAPTER 34: RADAR SCANNER TECHNICAL SPECIFICATION

CHAPTER CONTENTS

## 34.1 Physical specification (pedestal)

| Specification | |
|---|---|
| **Dimensions:** | Width: 388 mm (15.3 in)<br>Depth: 360 mm (14.2 in)<br>Height: 335 mm (13.2 in) (to top of antenna) |
| **Weight:** | 16 Kg |

## 34.2 Physical specification (antenna)

| Specification | |
|---|---|
| **6 ft Antenna length:** | 1945 mm (76.6 in) |
| **6 ft Antenna weight:** | 12 Kg (26.5 lbs) |

## 34.3 Power specification

| Specification | |
|---|---|
| **Supply voltage (using VCM100):** | • Nominal: 12 V dc or 24 V dc<br>• Minimum: 10.2 V dc<br>• Maximum: 31.2 V dc |
| **Power consumption (typical):** | 95 W |
| **Power consumption (max):** | 195 W |
| **Power consumption (standby):** | 28 W |
| **Inline fuse rating:** | • 12V:20A<br>• 24V:15A |
| **Thermal breaker rating:** | • 12V:15A<br>• 24V:10A |
| **Maximum range scale:** | 96 NM |
| **Startup time:** | 40 seconds |
| **Standby to transmit time:** | Less than 5 seconds |

## 34.4 Environmental specification

| Specification | |
|---|---|
| **Waterproof rating:** | IPx6 |
| **Operating temperature range:** | -25°C to +55°C (-13°F to 131°F) |
| **Humidity:** | Up to 93% at 40°C (104°F) |
| **Maximum wind speed:** | 100 Knots |

## 34.5 Data connections

| Specification | |
|---|---|
| **Power connection:** | 1x Power connector |
| **Data connection:** | 1x connector (10 Mbit/s, 100 Mbit/s) |

## 34.6 Range

| Specification | |
|---|---|
| **1/16 Range (NM):** | • 46 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **1/8 Range (NM):** | • 46 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **1/4 Range (NM):** | • 46 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **3/8 Range (NM):** | • 46 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **1/2 Range (NM):** | • 46 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **3/4 Range (NM):** | • 192 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **1 Range (NM):** | • 192 Pulse width (ns)<br>• 4.8 PRF (kHz) |

| Specification | |
|---|---|
| **1 1/2 Range (NM):** | • 192 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **2 Range (NM):** | • 1675 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **3 Range (NM):** | • 2300 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **4 Range (NM):** | • 2710 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **6 Range (NM):** | • 3900 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **8 Range (NM):** | • 3900 Pulse width (ns)<br>• 4.8 PRF (kHz) |
| **12 Range (NM):** | • 17600 Pulse width (ns)<br>• 3.6 PRF (kHz) |
| **16 Range (NM):** | • 23600 Pulse width (ns)<br>• 2.4 PRF (kHz) |
| **24 Range (NM):** | • 35000 Pulse width (ns)<br>• 1.6 PRF (kHz) |
| **32 Range (NM):** | • 47000 Pulse width (ns)<br>• 1.2 PRF (kHz) |
| **48 Range (NM):** | • 79000 Pulse width (ns)<br>• 0.82 PRF (kHz) |
| **72 Range (NM):** | • 79000 Pulse width (ns)<br>• 0.7 PRF (kHz) |
| **96 Range (NM):** | • 79000 Pulse width (ns)<br>• 0.7 PRF (kHz) |

## 34.7 ARPA target tracking

| Specification | |
|---|---|
| Target tracking | Tracking of up to 100 simultaneous ARPA targets. |

## 34.8 Transmitter specification

| Specification | |
|---|---|
| **Transmitter frequency** | 9370, 9400, 9430 MHz (User Selectable) |
| **Peak power output** | 110 W |

## 34.9 Receiver specification

| Specification | |
|---|---|
| **Receiver characteristic:** | Linear |
| **Receiver noise:** | Less than 5 dB |

## 34.10 Antenna specification

| Specification | |
|---|---|
| **6 ft Antenna Beamwidth (vertical):** | 25° |
| **6 ft Antenna Beamwidth (horizontal):** | 1.32° |
| **6 ft Antenna Polarization:** | Horizontal |
| **6 ft Antenna Rotation speed:** | 12 RPM / 24 RPM |

# CHAPTER 35: DCU TECHNICAL SPECIFICATION

CHAPTER CONTENTS

## 35.1 Power specification

| Specification | |
|---|---|
| **Nominal supply voltage:** | 12 V / 24 V dc |
| **Operating voltage range:** | 10 V dc to 35 V dc |
| **Current (Maximum):** | 220 mA max @ 12 V dc (all outputs @ full drive into 100 ohm loads) |
| **Input protection:** | Continuous reverse polarity, transient overvoltage and ESD protection |

## 35.2 Environmental specification

| Specification | |
|---|---|
| **Operating temperature range:** | -25°C (-13°F) to + 70°C (158°F) |
| **Storage temperature range:** | -40°C (-40°F) to + 85°C (185°F) |
| **Humidity:** | up to 95% @ 55°C (131°F) |
| **Water ingress protection:** | IP40 |
| **Installation location:** | Below decks protected |

## 35.3 Physical specification

| Specification | |
|---|---|
| **Product weight:** | 0.54 kg (1.19 lbs) |
| **Dimensions:** | Height: 128.35 mm (5.05 in), Width: 210.60 mm (8.29 in), Depth 27.00 mm (1.06 in). |
| **Housing material:** | 316 Stainless steel |

## 35.4 Connections specification

| Specification | |
|---|---|
| **Ethernet port:** | 1 x RJ45 (10/100 Mbits/s) |
| **Listener/Input ports:** | 8 x Pluggable 2-way screw terminals, 5.08 mm pitch (12 to 30 AWG) |
| **Talker/Output ports:** | 6 x Pluggable 3-way screw terminals, 5.08 mm pitch (12 to 30 AWG) |
| **Power supply connection:** | 1 x Pluggable 2-way screw terminal, 5.08 mm pitch (12 to 30 AWG) |
| **Serial port:** | 1 x Pluggable 3-way screw terminals, 5.08 mm pitch (12 to 30 AWG) |
| **Mode input:** | 1 x Pluggable 2-way screw terminals, 5.08 mm pitch (12 to 30 AWG) |
| **Alarm output:** | 1 x Pluggable 3-way screw terminals, 5.08 mm pitch (12 to 30 AWG) |

## 35.5 Inputs and outputs specification

| Specification | |
|---|---|
| **Speed / baud rate:** | 4800 to 38400 bps |
| **Output voltage:** | >= 2.2 V (differential) into 100 ohm |
| **Output current:** | 20 mA maximum per output |
| **Output protection:** | Short circuit and ESD |
| **Input voltage:** | -15 V to +15 V continuous, -35 V to +35 V short term (< 1 second) |
| **Input protection:** | Current limited, overdrive protection to 40 V dc and ESD protection |

## 35.6 Serial port specification

| Specification | |
|---|---|
| **Speed / baud rate:** | 4800 to 115200 bps |
| **Output voltage:** | >= 2.1 V (differential) into 100 ohm |
| **Output current:** | 20 mA maximum |
| **Output protection:** | Short circuit and ESD |

| Specification | |
|---|---|
| **Input voltage:** | -15 V to +15 V continuous, -35 V to +35 V short term (< 1 second) |
| **Input protection:** | Current limited, overdrive protection to 40 V dc and ESD protection |

## 35.7 Mode inputs specification

| Specification | |
|---|---|
| **Input voltage range:** | 0 V dc to 35 V dc |
| **Protection:** | Transient overvoltage and ESD protection |

## 35.8 Alarm output specification

| Specification | |
|---|---|
| **Contacts:** | Common, Normally Open and Normally Closed |
| **Alarm indication:** | LED, Red indicates a valid alarm condition |
| **Contact ratings:** | 35 V ac/ 50 V dc |

## 35.9 Conformance/approvals

This product is compliant or approved to the following standards or by the listed entities.

Approval: The displays meet the applicable requirements of IEC 60945:2002–08, DNVGL-CG-0339:2019 & IACS UR E10 Rev 7

# CHAPTER 36: IEC-61162 MESSAGES

CHAPTER CONTENTS

# 36.1 IEC61162 Messages

The following table details the IEC61162 messages that can be accepted by the Koden KRS Radar Display.
This list is current for the KRS-Series operating system version v2.0, and is subject to change with later versions of software.

**Note:**
Items in **bold** are mandatory sentences.

## Input

| Telegram | Parameter |
|---|---|
| AAM | Waypoint Arrival Alarm |
| **ACK** | **Acknowledge Alarm** |
| **ACN** | **Alert Command** |
| **ALR** | **Alarm State** |
| APB | Autopilot B Sentence |
| BWC | Bearing & Distance to Waypoint (Great Circle) |
| BWR | Bearing & Distance to Waypoint (Rhumb Line) |
| DBT | Depth Below Transducer |
| DPT | Depth |
| DSC | Digital Selective Caller Information |
| DSE | Expanded Digital Selective Caller Information |
| **DTM** | **Datum Reference** |
| GBS | GNSS Satellite Fault Detection |
| **GGA** | **Geographic Position (GPS Fix Data)** |
| GLC | Geographic Position (Loran-C) |
| **GLL** | **Geographic Position (Latitude and Longitude)** |
| **GNS** | **Geographic Position (GNSS Fix Data)** |
| GSA | GNSS DOP and Active Satellites |
| GST | GNSS Pseudorange Noise Statistics |
| GSV | GNSS Satellites In View |
| **HBT** | **Heartbeat** |
| HDG | Heading, Deviation and Variation |
| HDM | Heading, Magnetic |
| **HDT** | **Heading True** |
| MDA | Meteorological Composite |
| MSK | MSK Receiver Interface |
| MSS | MSK Receiver Signal Status |
| MTW | Water Temperature |
| MWV | Wind Speed and Angle |
| RMA | Recommended Minimum Specific Loran-C Data |
| RMB | Recommended Minimum Navigation Information |
| RMC | Recommended Minimum Specific GNSS Data |
| **ROT** | **Rate of turn** |
| RTE | Routes |
| SSD | AIS Ship Static Data |
| **THS** | **True Heading and Status** |
| TTM | Tracked Target Message |
| TLB | Tracked Target Label |
| TTD | Tracked Target Data |
| **VBW** | **Dual Ground/Water Speed** |
| **VDM** | **AIS Target Data** |
| **VDO** | **AIS Ownship Information** |
| **VHW** | **Water Speed and Heading** |
| VLW | Dual Ground Water & Distance |
| VSD | AIS Voyage Static Data |
| **VTG** | **Course Over Ground and Ground Speed** |

| Telegram | Parameter |
|---|---|
| WPL | Waypoint Location |
| XTE | Measured Cross Track Error |
| **ZDA** | **Time and Date** |

## Output

| Telegram | Parameter | Transmission Time |
|---|---|---|
| **ACK** | **Acknowledge Alarm** | **Event based (on alert acknowledge)** |
| **ALC** | **Cyclic Alert Output** | **30 seconds** |
| **ALF** | **Alert Data Output** | **Event based (on alert state change or on request by ACN)** |
| **ALR** | **Set Alarm State** | **Event based (on alert state change)** |
| **ARC** | **Alert Command Refused** | **Event based (on command refused)** |
| DBT | Depth Below Transducer | 2 seconds |
| DPT | Depth | 2 seconds |
| **EVE** | **General Event Message** | **Event based (1 second after user input)** |
| GLL | Geographic Position (Latitude and Longitude) | 2 seconds |
| GSA | GNSS DOP and Active Satellites | 1 second |
| GST | GNSS Pseudorange Noise Statistics | 2 seconds |
| GSV | GNSS Satellites In View | 1 second |
| **HBT** | **Heartbeat** | **30 seconds** |
| **OSD** | **Ownship Data** | **2 seconds** |
| **RSD** | **Radar System Data** | **2 seconds** |
| SRP | System function ID resolution | 30 seconds |
| **TLB** | **Tracked Target Labels** | **1 second** |
| **TTD** | **Tracked Target Data** | **1 second** |
| TTM | Tracked Target Message | 1 second |
| VHW | Water Speed and Heading | 2 seconds |
| VTG | Course Over Ground and Ground Speed | 2 seconds |
| VR | Screen Output | Period defined in advanced settings, default is 5 seconds. |

# CHAPTER 37: IEC-61162-450 SUPPORT

CHAPTER CONTENTS

# 37.1 IEC-61162-450 Support

The KRS Radar Display supports communication compliant to IEC 61162-450.
When configuring for a -450 network the IP address must be 192.168.0.0/24 – 192.168.10.0/24 and 172.16.0.0/16.
The underlying network for communication compliant to IEC 61162-450 is ethernet based. All interface connections must meet the requirements of IEC 61162-450.
System Function ID (SFI) is configured during the commissioning process, as detailed here: **Configuring an SFI**

**Transmission Group**

All supported transmission groups are shown in the table below.

To remain IEC 61162-450 compliant, all multicast addresses must be configured within these transmission groups.
Some of the transmission groups are set up by default, but will need to be enabled. Others can be added as a new device, as detailed here:
**External devices**

| Transmission Group | Multicast Address | Destination port | Setting |
|---|---|---|---|
| MISC | 239.192.0.1 | 60001 | To be added |
| TGTD | 239.192.0.2 | 60002 | Disabled |
| SATD | 239.192.0.3 | 60003 | Disabled |
| NAVD | 239.192.0.4 | 60004 | Disabled |
| VDRD | 239.192.0.5 | 60005 | Disabled |
| RCOM | 239.192.0.6 | 60006 | To be added |
| TIME | 239.192.0.7 | 60007 | To be added |
| PROP | 239.192.0.8 | 60008 | To be added |
| USR1 to USR8 | 239.192.0.9 to 239.192.0.16 | 60009 to 60016 | To be added |
| BAM1 | 239.192.0.17 | 60017 | To be added |
| BAM2 | 239.192.0.18 | 60018 | To be added |
| CAM1 | 239.192.0.19 | 60019 | To be added |
| CAM2 | 239.192.0.20 | 60020 | To be added |
| NETA | 239.192.0.56 | 60056 | To be added |

# CHAPTER 38: ABBREVIATIONS

CHAPTER CONTENTS

# 38.1 Abbreviations

| Term | Abbreviation |
|---|---|
| Acknowledge | ACK |
| Acquire, Acquisition | ACQ |
| Aids to Navigation (applies to AIS) | AtoNs |
| Air Search & Rescue (applies to AIS) | ASARs |
| Acquisition Zone | AZ |
| Additional Military Layer | AML |
| Adjust, Adjustment | ADJ |
| All-purpose STructured Eurocontrol suRveillance Information eXchange | ASTERIX |
| Altitude | ALT |
| Anchor Watch | ANCH |
| Antenna | ANT |
| Automatic | AUTO |
| Automatic Frequency Control | AFC |
| Automatic Gain Control | AGC |
| Automatic Identification System | AIS |
| Automatic Identification System – Search and Rescue Transmitter | AIS-SART |
| Automatic Radar Plotting Aid | ARPA |
| Autopilot | AP |
| Auxiliary System / Function | AUX |
| Available | AVAIL |
| Azimuth Indicator | AZI |
| Background | BKGND |
| Beacon mode | BCM |
| Bearing | BRG |
| Bearing Waypoint To Waypoint | BWW |
| Bow Crossing Range | BCR |
| Bow Crossing Time | BCT |
| Built in Test Equipment | BITE |
| Calibrate | CAL |
| Cancel | CNCL |
| Cancel All | CNCL ALL |
| Category | CAT |
| Center | CENT |
| Change | CHG |
| Chart Display Settings | CHT DISP SET |
| Chart Management | CHT MGMT |
| Chart Safety Settings | CHT SF SET |
| Circularly Polarized | CP |
| Clear | CLR |
| Closest Point of Approach | CPA |
| Compact Disc Read Only Memory | CD-ROM |
| Conning | CONN |
| Consistent Common Reference Point | CCRP |
| Consistent Common Reference System | CCRS |
| Contrast | CONT |
| Coordinated Universal Time | UTC |
| Correction | CORR |
| Course | CRS |
| Course Over the Ground | COG |
| Course Through the Water | CTW |
| Course To Steer | CTS |
| Course Up | C UP |

| Term | Abbreviation |
|---|---|
| Cross Track Distance | XTD |
| Cross Track Limit | XTL |
| Cursor | CURS |
| Curved Heading Line | CHL |
| Dangerous Goods | DG |
| Data Collection Unit | DCU |
| Date | DATE |
| Dated Objects | DO |
| Day | DAY |
| Day/Night | DAY/NT |
| Dead Reckoning, Dead Reckoned Position | DR |
| Decrease | DECR |
| Default Settings | DFLT SET |
| Delay | DELAY |
| Delete | DEL |
| Departure | DEP |
| Depth | DPTH |
| Destination | DEST |
| Deviation | DEV |
| Differential GNSS | DGNSS |
| Differential GPS | DGP |
| Digital Selective Calling | DSC |
| Display | DISP |
| Display Settings | DISP SET |
| Display Brilliance | BRILL |
| Distance | DIST |
| Distance To Go | DTG |
| Down | DN |

| Term | Abbreviation |
|---|---|
| Drift | DRIFT |
| Electromagnetic Compatibility | EMC |
| Electronic Bearing Line | EBL |
| Electronic Chart Display and Information System | ECDIS |
| Electronic Chart System | ECS |
| Electronic Navigational Chart | ENC |
| Electronic Position Fixing System | EPFS |
| Electronic Range and Bearing Line | ERBL |
| Emergency Position Indicating Radio Beacon | EPIRB |
| Emergency Position Indicating Radio Beacon – AIS | EPIRB-AIS |
| ENC Management Report | ENC MGMT REP |
| ENC Update Status Report | ENC UPD STATUS |
| Enhance | ENH |
| Enter | ENT |
| Equipment | EQUIP |
| Error | ERR |
| Estimated Position | EP |
| Estimated Time of Arrival | ETA |
| Estimated Time of Departure | ETD |
| European Geo-Stationary Navigational Overlay System | EGNOS |
| Event | EVENT |
| Exclusion Zone | EZ |
| Export Route | ROUTE EXP |
| External | EXT |
| Federal Communications Commission | FCC |
| Frequently Asked Questions | FAQ |
| Forward | FWD |

| Term | Abbreviation |
|---|---|
| Frequency | FREQ |
| Global Maritime Distress and Safety System | GMDSS |
| Global Navigation Satellite System | GNSS |
| Global Orbiting Navigation Satellite System | GLONASS |
| Global Positioning System | GPS |
| Great Circle | GC |
| Grid | GRID |
| Ground | GND |
| Grounding Avoidance System | GAS |
| Guard Zone | GZ |
| Head Up | H UP |
| Heading | HDG |
| Heading Line | HL |
| Heading Line Off | HL OFF |
| High Definition Multimedia Interface | HDMI |
| High Frequency | HF |
| High Speed Craft | HSC |
| Horizontal Dilution Of Precision | HDOP |
| Identification | ID |
| Import Chart | IMPORT CHT |
| Import Route | ROUTE IMP |
| Increase | INCR |
| Indication | IND |
| Information | INFO |
| Information Report | INFO REPORT |
| Infrared | INF RED |
| Initialization | INIT |

| Term | Abbreviation |
|---|---|
| Input | INP |
| Input/Output | I/O |
| Integrated Navigation System | INS |
| Integrated Radio Communication System | IRCS |
| Interference Rejection | IR |
| International Maritime Organization | IMO |
| Innovation, Science and Economic Development Canada — previously Industry Canada (IC) | ISED |
| Interval | INT |
| JavaScript Object Notation | JSON |
| Label | LBL |
| Latitude | LAT |
| Latitude / Longitude | L/L |
| Leeway | LWY |
| Light Emitting Diode | LED |
| Limit | LIM |
| Line Of Position | LOP |
| Liquid Crystal Display | LCD |
| Local Area Network | LAN |
| Log | LOG |
| Long Pulse | LP |
| Long Range | LR |
| Longitude | LON |
| Loran | LORAN |
| Lost Target | LOST TGT |
| Low Frequency | LF |
| Magnetic | MAG |
| Main Bang Suppression | MBS |

| Term | Abbreviation |
|---|---|
| Man Overboard | MOB |
| Manoeuvre | MVR |
| Manual | MAN |
| Manual Update | MAN UPD |
| Map(s) | MAP |
| Maritime Mobile Services Identity number | MMSI |
| Maritime Pollutant (applies to AIS) | MP |
| Maritime Safety Information | MSI |
| Marker | MKR |
| Master | MSTR |
| Maximum | MAX |
| Medium Frequency | MF |
| Medium Pulse | MP |
| Menu | MENU |
| Minimum | MIN |
| Missing | MISSING |
| Mute | MUTE |
| Nautical Mile | NM |
| Navigation | NAV |
| Night | NT |
| Normal | NORM |
| North Up | N UP |
| Off | OFF |
| Off-centered | OFF CENT |
| Officer of the Watch | OOW |
| Offset | OFFSET |
| On | ON |
| Out / Output | OUT |

| Term | Abbreviation |
|---|---|
| Own Ship | OS |
| Own Ship Look-Ahead | LOOK AHEAD |
| Panel Illumination | PANEL |
| Parallel Index Line | PI |
| Past Positions | PAST POSN |
| Passenger Vessel (applies to AIS) | PASSV |
| Performance Monitor | MON |
| Permanent | PERM |
| Person Overboard | POB |
| Personal Computer | PC |
| Personal Identification Number | PIN |
| Pilot Vessel | PILOT |
| Position | POSN |
| Positional Dilution Of Precision | PDOP |
| Power | PWR |
| Predicted | PRED |
| Predicted Area of Danger | PAD |
| Predicted Point of Collision | PPC |
| Pulse Length | PL |
| Pulse Repetition Frequency | PRF |
| Pulse Repetition Rate | PRR |
| Pulses Per Revolution | PPR |
| Racon | RACON |
| Radar | RADAR |
| Radar Cross Section | RCS |
| Radar Overlay | RADAR OVR |
| Radar Settings | RADAR SET |
| Radar Plotting | RP |

| Term | Abbreviation |
|---|---|
| Radar Transponder | TPR |
| Radio Frequency | RF |
| Radius | RAD |
| Range | RNG |
| Range Rings | RR |
| Raster Chart Display System | RCDS |
| Raster Navigational Chart | RNC |
| Rate Of Turn | ROT |
| Receiver | RX |
| Receiver Autonomous Integrity Monitoring | RAIM |
| Reference | REF |
| Relative | R |
| Relative | REL |
| Relative Motion | RM |
| Revolutions Per Minute | RPM |
| Rhumb Line | RL |
| Roll On / Roll Off Vessel (applies to AIS) | RoRo |
| Root Mean Square | RMS |
| Save User Settings | SAVE USR |
| S-Band (applies to Radar) | S-BAND |
| Safety Of Life At Sea (Convention) | SOLAS |
| Scan to Scan | SC/SC |
| Search And Rescue | SAR |
| Search And Rescue Transponder | SART |
| Search And Rescue Vessel | SARV |
| Select | SEL |
| Select User Settings | USR SEL |

| Term | Abbreviation |
|---|---|
| Short Pulse | SP |
| Signal to Noise Ratio | SNR |
| Silence | SLNC |
| Simulation | SIM |
| Slave | SLAVE |
| Sleeping Target (applies to AIS) | ST |
| Speed | SPD |
| Speed and Distance Measuring Equipment | SDME |
| Speed Over the Ground | SOG |
| Speed Through the Water | STW |
| Stabilized | STAB |
| Standard Display | STND DISP |
| Standby | STBY |
| Starboard/Starboard Side | STBD |
| Station | STN |
| Symbol(s) | SYM |
| Synchronization | SYNC |
| System Electronic Navigational Chart | SENC |
| System Function Identifier | SFI |
| Target | TGT |
| Target Association | TA |
| Target Tracking | TT |
| Time Difference | TD |
| Time Dilution Of Precision | TDOP |
| Time Of Arrival | TOA |
| Time Of Departure | TOD |
| Time to CPA | TCPA |

| Term | Abbreviation |
|---|---|
| Time To Go | TTG |
| Time to Wheel Over Line | TWOL |
| Track | TRK |
| Track Control System | TCS |
| Tracking | TRKG |
| Track Made Good | TMG |
| Transceiver | TXRX |
| Transferred Line Of Position | TPL |
| Transmitter | TX |
| Transmitting Heading Device | THD |
| Trial | TRIAL |
| Trial Manoeuvre | TM |
| Trial Settings | TRIAL SET |
| Trigger Pulse | TRIG |
| True | T |
| True Motion | TM |
| Tune | TUNE |
| UltraHigh Frequency | UHF |
| Uninterruptible Power Supply | UPS |
| Universal Serial Bus | USB |
| Universal Time, Coordinated | UTC |
| Unstabilized | UNSTAB |
| Update Log | UPD LOG |
| Update Review | UPD REV |
| User Chart | USR CHT |
| User Maps | UM |
| Variable Range Marker | VRM |
| Variation | VAR |

| Term | Abbreviation |
|---|---|
| Vector | VECT |
| Very High Frequency | VHF |
| Very Low Frequency | VLF |
| Vessel Aground (applies to AIS) | GRND |
| Vessel at Anchor (applies to AIS) | ANCH |
| Vessel Constrained by Draught (applies to AIS) | VCD |
| Vessel Engaged in Diving Operations | DIVE |
| Vessel Engaged in Dredging or Underwater Operations (applies to AIS) | DRG |
| Vessel Engaged in Towing Operations (applies to AIS) | TOW |
| Vessel Not Under Command (applies to AIS) | NUC |
| Vessel Restricted in Manoeuverability (applies to AIS) | RIM |
| Vessel Traffic Service | VTS |
| Vessel Underway Using Engine (applies to AIS) | UWE |
| Video | VID |
| Visual Display Unit | VDU |
| Voltage Converter Module | VCM |
| Voyage | VOY |
| Voyage Data Recorder | VDR |
| Water | WAT |
| Waypoint | WPT |
| Waypoint Closure Velocity | WCV |
| Wheel Over Line | WOL |
| Wheel Over Point | WOP |
| Wheel Over Time | WOT |

| Term | Abbreviation |
| --- | --- |
| World Geodetic System | WGS |
| X-Band (applies to Radar) | X-BAND |

# CHAPTER 39: SPARES AND ACCESSORIES

## CHAPTER CONTENTS

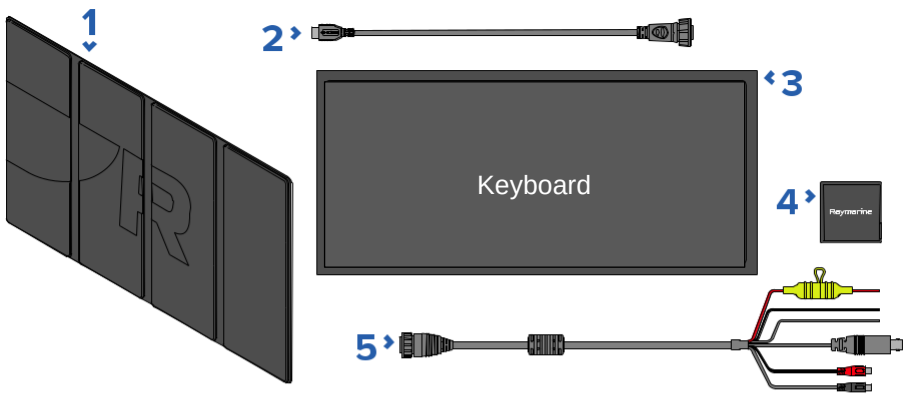


*Card reader: option

# 39.1 Accessories

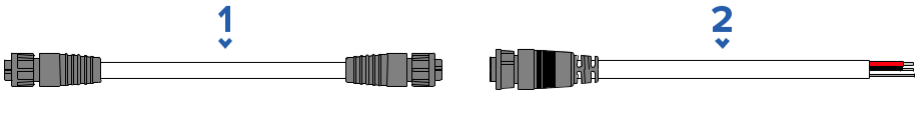
The following accessories are available:

## Display accessories




| Item | Description |
|---|---|
| 1 | • 16” Display suncover (Part number: A80733)<br>• 19” Display suncover (Part number: A80734)<br>• 22” Display suncover (Part number: A80735)<br>• 24” Display suncover (Part number: A80736) |
| 2 | HDMI cable 5 m (16.4 ft) cable (Part number: A80219) |
| 3 | KRS keyboard (part number A80790) |
| 4 | RCR-1 card reader* (Part number: A80585) |
| 5 | Straight power / video / audio cable - 1.5 m (4.92 ft) (Part number: A80744) |

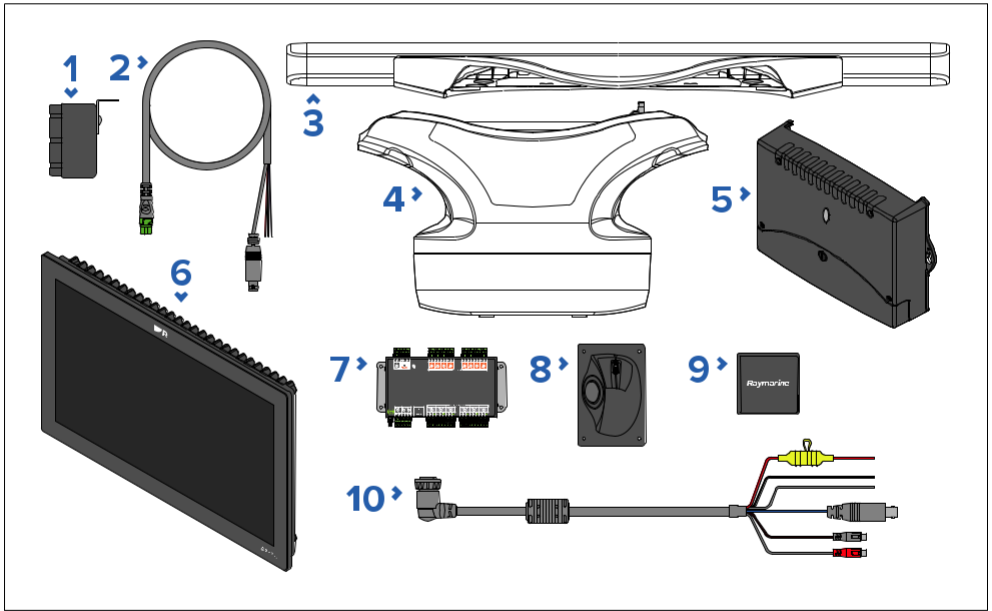
## Radar scanner accessories




| Item | Description |
|---|---|
| 1 | • Radar Data Cable 5 m (16.4 ft) (Part number: A80656)<br>• Radar Data Cable 10 m (32.8 ft) (Part number: A80657)<br>• Radar Data Cable 15 m (49.2 ft) (Part number: A80658)<br>• Radar Data Cable 25 m (82.0 ft) (Part number: A80659) |
| 2 | • Power Cable 5 m (16.4 ft) (Part number: A80651)<br>• Power Cable 10 m (32.8 ft) (Part number: A80652)<br>• Power Cable 15 m (49.2 ft) (Part number: A80653)<br>• Power Cable 25 m (82.0 ft) (Part number: A80654) |

# 39.2 Spares

The following spares are available:

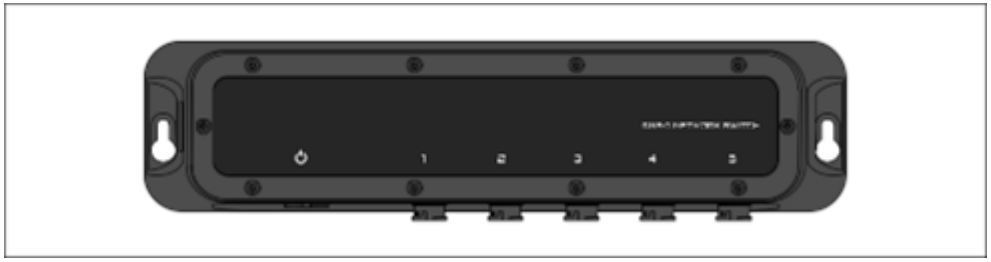



| Item | Description |
|---|---|
| 1 | Alarm buzzer (Part number: E26033) |
| 2 | Alarm output and analog video input 2 m (6.56 ft) cable (Part number: A80235) |

| Item | Description |
|---|---|
| **3** | 6 ft antenna (Part number:  RSA-1SP) |
| **4** | Antenna scanner (Part number: RSB-111P) |
| **5** | Voltage Converter Module VCM100 (Part number: E70648) |
| **6** | • KRS 16” Radar display (Part number: RSD-16P)<br>• KRS 19” Radar display (Part number: RSD-19P)<br>• KRS 22” Radar display (Part number: RSD-12P)<br>• KRS 24” Radar display (Part number: RSD-14P) |
| **7** | KRS DCU (Part number: A80792) |
| **8** | KRS trackball (Part number: A80788) |
| **9** | RCR-SDUSB card reader* (Part number: A80440) |
| | Right angled power / video / audio cable - 1.5 m (4.92 ft) (Part number: A80745) |

## 39.3 Network hardware

### RNS–5 Network Switch (A80731)



5–port switch for network connection of multiple devices featuring data connectors. Equipment with RJ45 connectors can also be connected using suitable adapter cables.

# 39.4 Data cables and connectors


Standard data connection cable with a data cable socket on both ends.

## Data adapter cables


Adapter cable with a data cable socket on one end, and an RJ45 (male) plug on the other end.

# Appendix A Alerts list

The following Alerts can be raised by the system.

| Alert | Description | Type | Cate-gory | Alert Identifier |
|---|---|---|---|---|
| Man Overboard | Man Overboard | Alarm | B | 3097 |
| AIS Conn. Lost | AIS Connection Lost | Warning | B | 3008 |
| AIS Lost Target | AIS Lost Target | Warning | A | 3052 |
| Lost Target | Lost Target | Warning | A | 3052 |
| Interc Arrival | Intercepted Arrival | Alarm | A | 3031 |
| Obstruct Detect | Obstruction Detected | Warning | A | 3032 |
| Anchor Drag | Anchor Drag Risk | Alarm | A | 3031 |
| Bottom Lock Lim | Bottom Lock Limited | Warning | A | 11038 |
| No AvailSp SCRSt | No Available Space for Screenshot file | Caution | A | 11039 |
| No AvailSp SCRSt | No Available Storage for Screenshot file | Caution | A | 11040 |
| LiveD Gen Serv | Live Data Generic Services | Warning | A | 11088 |
| LiveD Bat Serv | Live Data Battery Services | Warning | A | 11089 |
| Dbi Alt Alarm | Dbi Alt Alarm | Alarm | A | 11090 |
| Dbi Alt Warning | Dbi Alt Warning | Warning | A | 11091 |
| Dbi Alt Info | Dbi Alt Info | Caution | A | 11092 |
| Anchor Watch Limit | Anchor watch limit exceeded | Warning | A | 3032 |
| AIS Cap. Neared | AIS Capacity Neared | Caution | B | 3043 |
| ARPA Cap. Neared | ARPA Capacity Neared | Caution | B | 3043 |
| AIS C.Exceeded | AIS Capacity has been exceeded | Warning | A | 3042 |
| ARPA C.Exceeded | ARPA capacity has been exceeded | Warning | A | 3042 |
| No Radar Detected | No Radar Detected | Alarm | B | 3002 |
| No Radar Detected | No Radar Detected | Warning | B | 3001 |
| No Conn.Radar | Radar is not connected | Warning | B | 3002 |
| Reference Target was lost | Reference target was lost | Warning | A | 3052 |
| No Speed Through Water | No Speed Through Water | Warning | B | 3015 |
| No Speed Over Ground | No Speed Over Ground | Warning | B | 3015 |
| No Depth | No Depth | Warning | B | 3015 |
| No Wind Speed | No Wind Speed | Warning | B | 3015 |
| No Humidity | No Humidity | Warning | B | 3015 |
| No Atmospheric Pressure | No Atmospheric Pressure | Warning | B | 3015 |
| No Air Temperature | No Air Temperature | Warning | B | 3015 |

| Alert | Description | Type | Cate-gory | Alert Identifier |
|---|---|---|---|---|
| Heartbeat Timeout | Heartbeat Timeout | Caution | B | 11104 |
| Invalid VBW Data | A VBW message contains invalid data | Warning | A | 3005 |
| Diff. Geo. Datum | A Different geodetic datum has been received | Warning | A | 3005 |
| No Position | No Position | Warning | A | 3015 |
| No Position | No Position | Caution | B | 3016 |
| No Heading | No Heading | Caution | B | 3016 |
| No Speed Over Ground | No Speed Over Ground | Caution | B | 3016 |
| No Speed Through Water | No Speed Through Water | Caution | B | 3016 |
| No Depth | No Depth | Caution | B | 3016 |
| Collison Alert | Collision Alert | Alarm | A | 3044 |
| New GZ Target | Guard Zone Alert | Warning | A | 3048 |

# Appendix B DCU Settings overview

The KRS DCU is supplied pre-configured, ready for use with the KRS Radar system. The configuration is shown below and is provided for troubleshooting purposes.
Connect a laptop computer to a free network connection on the Radar display or RNS-5 network switch, using a data adaptor cable.

Any popular web browser can be used to access the DCU's user interface.

Enter the following web address into the web browser's address bar:

http://promux-xxxxxx (replacing the xxxxxx with the DCU's serial number.


1. *[Information]* icon.
2. *[Status]* icon.
3. *[Settings]* icon.

*[Information]***icon**

Selecting the *[Information]*icon will display relevant technical information relating to the DCU. This information is important if you need to troubleshoot the DCU, or require technical assistance at a future date.

*[Status]* **icon**

Selecting the *[Status]* icon displays the current status of the user-controlled settings:

- *[Data Servers]*– Displays the information about the data server, if enabled.

- *[Serial]*– Displays the current status of the serial ports, including their baud rate, alias name if applied, port direction, and the current data load on each port.
- *[Detailed Stats]*– Once the DCU is operational, this page shows the number of individual sentences being received or transmitted over a 10 second period.
- *[Routing]*– Matrix showing data flow between inputs and outputs.
- *[Alarms]*– Displays the status of any alarms which are currently set.

*[Settings]***icon**

The *[Settings]*icon provides access to the device configuration settings. To access these settings, log-in to the DCU.

By default the login details are:

Username: **admin**

Password: **admin**

The settings page provides the following functionality:

- *[Administration]*– Change password or re-start the DCU.
- *[Firmware Update]*– Displays current firmware version and provides the facility to update the DCU's firmware.
- *[Network]*– Allows the network to be configured correctly depending on your particular setup.
  – It is recommended that these settings are not altered.
- *[Operating Mode]*– Allows pre-configured modes to be selected.
  – It is recommended that these settings are not altered.
- *[Reset Password]*– Reset the password to factory default.
- *[Alarms]*– Do NOT use. The Plugins menu is used to set up alarm IDs.
- *[Data Server]*– Provides facility to turn the data server on / off, as well as specifying data format output, direction, and output protocol.
- *[Plugins]*— Set up a relay connection to an external alarm system.
- *[Routing]*– Main configuration table, allowing precise routing of data between inputs and outputs. Provides access to 'autoswitch' operation and setup.
- *[Serial]*– Provides configuration for each port, including baud rate setting, data direction, an 'alias' naming facility, and also shows the current data load on each port.

**DCU data server configuration**

The DCU's default data server configuration is shown below.

## Data servers

4 data servers are configured Server 1 to Server 4. The Data server settings are as follows:


| Server | Filter | Format | Direction | Protocol | Port |
|---|---|---|---|---|---|
| Server 1 | Enabled | NMEA 0183 | Both | UDP | 2001 |
| Server 2 | Enabled | NMEA 0183 | Both | UDP | 2002 |
| Server 3 | Enabled | NMEA 0183 | Both | UDP | 2003 |
| Server 4 | Enabled | NMEA 0183 | Both | UDP | 2004 |

### DCU Plugins configuration

The DCU's default plugins configuration is shown below.

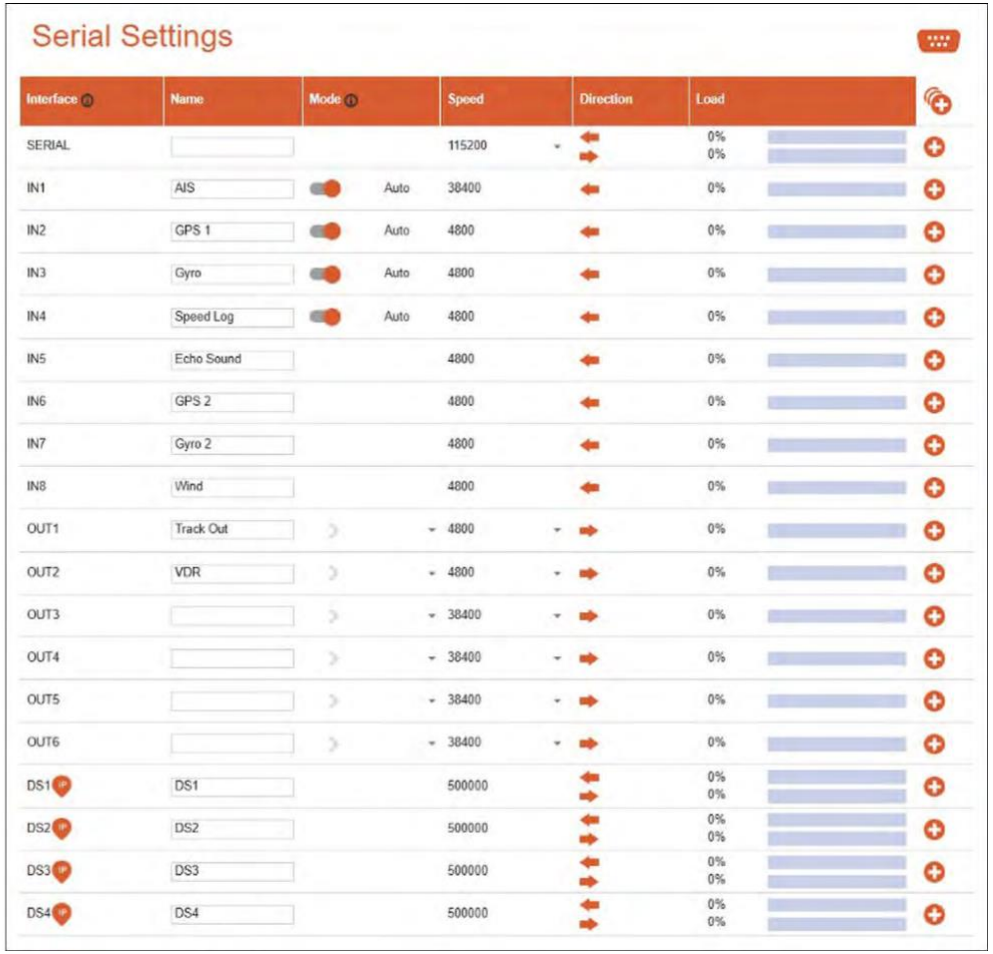
## Plugins


| Event | Relay On Time | Timeout | Unique Alarm Number | State |
|---|---|---|---|---|
| Alarm Message | 1s | | 0 | Disabled |
| Event Message | 1s | | | Disabled |
| Heartbeat Message | | 40s | | Enabled |

### DCU Serial configuration

The DCU's default serial configuration is shown below..

## Serial



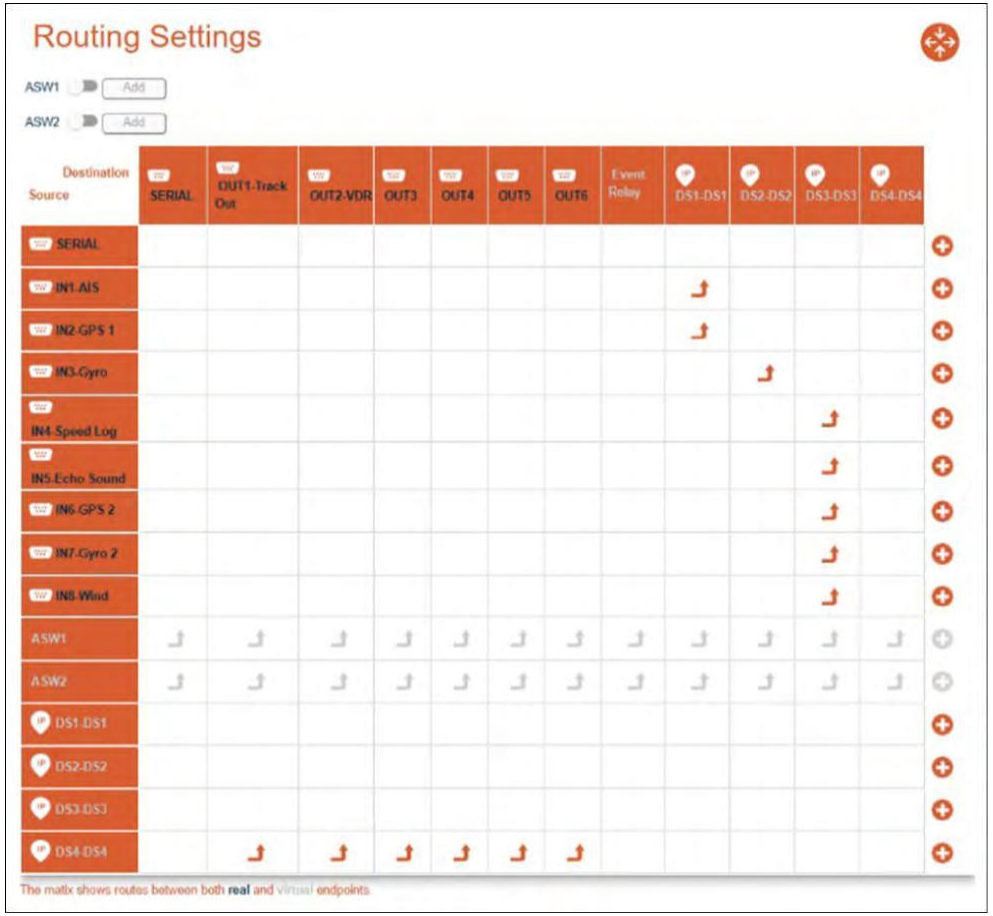

| Interface | Name | Mode | Speed |
|---|---|---|---|
| IN1 | AIS | Auto | Set by Auto |
| IN2 | GPS 1 | Auto | Set by Auto |
| IN3 | Gyro | Auto | Set by Auto |
| IN4 | Speed Log | Auto | Set by Auto |

| Interface | Name | Mode | Speed |
|---|---|---|---|
| IN5 | Echo Sound | | 4800 |
| IN6 | GPS 2 | | 4800 |
| IN7 | Gyro 2 | | 4800 |
| IN8 | Wind | | 4800 |
| OUT1 | Track Out | | 4800 |
| OUT2 | VDR | | 4800 |
| DS1 | DS1 | | |
| DS2 | DS2 | | |
| DS3 | DS3 | | |
| DS4 | DS4 | | |

### DCU Routing configuration

The DCU's default routing configuration is shown below.

## Routing




| Source | Name | Destination |
|---|---|---|
| IN1 | AIS | DS1 |
| IN2 | GPS 1 | DS1 |
| IN3 | Gyro | DS2 |
| IN4 | Speed Log | DS3 |
| IN5 | Echo Sound | DS3 |

| Source | Name | Destination |
|---|---|---|
| IN6 | GPS 2 | DS3 |
| IN7 | Gyro 2 | DS3 |
| IN8 | Wind | DS3 |
| DS1 | DS1 | |
| DS2 | DS2 | |
| DS3 | DS3 | |
| DS4 | DS4 | OUT1, OUT2, OUT3, OUT4, OUT5, OUT6 |

# Appendix C Default external devices

### Default IEC 61162–450 devices

The following IEC 61162–450 devices are configured by default. Usually there should be no need to change the default settings for these devices. These devices will need to be enabled.

## TGTD

1. *[Name]*: **TGTD**.
2. *[Device]*: **Disabled**
3. *[IEC 61162–450]*: **Enabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **239.192.0.2** .
6. *[Receive Port]*: **60002**.
7. *[Transmit address]*: **239.192.0.2** .
8. *[Transmit Port]*: **60002**.
9. *[Input Telegrams]*:SRP, TTD, VDM and VDO.
10. *[Output Telegrams]*:SRP, TLB and TTD.

## SATD

1. *[Name]*: **SATD**.
2. *[Device]*: **Disabled**
3. *[IEC 61162–450]*: **Enabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **239.192.0.3** .
6. *[Receive Port]*: **60003**.
7. *[Transmit address]*: **239.192.0.3** .
8. *[Transmit Port]*: **60003**.
9. *[Input Telegrams]*:HDT, ROT, SRP and THS.
10. *[Output Telegrams]*:SRP.

## NAVD

1. *[Name]*: **VAVD**.
2. *[Device]*: **Disabled**
3. *[IEC 61162–450]*: **Enabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **239.192.0.4** .
6. *[Receive Port]*: **60004**.
7. *[Transmit address]*: **239.192.0.4** .
8. *[Transmit Port]*: **60004**.
9. *[Input Telegrams]*:DBT, DPT, GGA, GLL, RMC, SRP, VBW, VDM, VHW, VTG and VDA.
10. *[Output Telegrams]*:SRP.

## VDRD

1. *[Name]*: **VDRD**.
2. *[Device]*: **Disabled**
3. *[IEC 61162–450]*: **Enabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **239.192.0.5** .
6. *[Receive Port]*: **60005**.
7. *[Transmit address]*: **239.192.0.5** .
8. *[Transmit Port]*: **60005**.
9. *[Input Telegrams]*:SRP.
10. *[Output Telegrams]*:HBT, OSD, SRP, TLB, TTD and TTM.

## VDR Screen Output

1. *[Name]*: **VDR Screen Output**.
2. *[Device]*: **Disabled**
3. *[IEC 61162–450]*: **Enabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **239.192.0.26** .
6. *[Receive Port]*: **60026**.
7. *[Transmit address]*: **239.192.0.26** .
8. *[Transmit Port]*: **60026**.
9. *[Input Telegrams]*:SRP.

10. *[Output Telegrams]*:SRP and VR.

The VDR Screen Output device also has the following default *[VDR Advanced settings]*:

- *[Transmission delay]*: **0sec**.
- *[Transmission period]*: **5sec**.
- *[Destination SFI]*: **VR001**.
- *[Binary File Transfer Type]*: **JPG**.
- *[VDR Source]*: **MFD**.
- *[Device Location]*: **-**.

**Default DCU external devices**

The following data server devices are configured by default. Usually there should be no need to change the default settings for these devices.

## DS1

1. *[Name]*: **DS1**.
2. *[Device]*: **Enabled**
3. *[IEC 61162–450]*: **Disabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **198.18.7.255** .
6. *[Receive Port]*: **2001**.
7. *[Transmit address]*: **198.18.7.255** .
8. *[Transmit Port]*: **3001**.
9. *[Input Telegrams]*:GGA, GLL, RMC, VDM, VDO, VTG and ZDA.

## DS2

1. *[Name]*: **DS2**.
2. *[Device]*: **Enabled**
3. *[IEC 61162–450]*: **Disabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **198.18.7.255** .
6. *[Receive Port]*: **2002**.
7. *[Transmit address]*: **198.18.7.255** .
8. *[Transmit Port]*: **3002**.
9. *[Input Telegrams]*:HDT, ROT and THS.

## DS3

1. *[Name]*: **DS3**.
2. *[Device]*: **Enabled**
3. *[IEC 61162–450]*: **Disabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **198.18.7.255** .
6. *[Receive Port]*: **2003**.
7. *[Transmit address]*: **198.18.7.255** .
8. *[Transmit Port]*: **3003**.
9. *[Input Telegrams]*:DBT, DPT, GGA, GLL, HDT, MWV, RMC, ROT, THS, VBW, VHW, VTG and ZDA.

## DS4

1. *[Name]*: **DS4**.
2. *[Device]*: **Enabled**
3. *[IEC 61162–450]*: **Disabled**.
4. *[Show Telegrams]*: **Enabled**.
5. *[Receive address]*: **198.18.7.255** .
6. *[Receive Port]*: **3004**.
7. *[Transmit address]*: **198.18.7.255** .
8. *[Transmit Port]*: **2004**.
9. *[Output Telegrams]*:TLB, TTD and TTM.

**Note:**

The Transmit port on *[DS4]*is **2004** as this outputs to the DCU.

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