SIMRAD®

HALO® 2000 SERIES and HALO® 3000 SERIES pulse compression radars

INSTALLATION MANUAL

ENGLISH

www.simrad-yachting.com


PULSE COMPRESSION RADAR
HALO®

Disclaimer

This product is not a substitute for proper training and prudent seamanship. It is the owner's sole responsibility to install and use the equipment in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing maritime safety practices.

Navigational features that appear in this guide are not a substitute for proper training and prudent seamanship. They do not replace a human navigator and SHOULD NOT be relied on as a sole or primary source of navigation. It is the operator's sole responsibility to use more than one navigational method to ensure the route suggested by the system is safe.

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This manual represents the product as at the time of printing. Navico Holding AS and its subsidiaries, branches and affiliates reserve the right to make changes to the product and/or specifications at any time without notice. Please contact your nearest distributor if you require any further assistance.

Governing language

This statement, any instruction manuals, user guides and other information relating to the product (Documentation) may be translated to, or has been translated from, another language (Translation). In the event of any conflict between any Translation of the Documentation, the English language version of the Documentation will be the official version of the Documentation.

Copyright

Warranty

The warranty card is supplied as a separate document.

In case of any queries, refer to the brand website of your display or system: www.simrad-yachting.com.

Declarations and conformance

This equipment is intended for use in international waters as well as coastal sea areas administered by countries of the E.U. and E.E.A.

Compliance statements

Declarations

The relevant declarations of conformity are available on the following website within the radar's documentation section: www.simrad-yachting.com.

United Kingdom

Simrad® HALO® 2000 SERIES and HALO® 3000 SERIES pulse compression radars comply with UKCA under The Radio Equipment Regulations 2017.

The Simrad HALO® RI-50 interface module complies with UKCA under The Electromagnetic Compatibility Regulations 2016.

Europe

Simrad® HALO® 2000 SERIES and HALO® 3000 SERIES pulse compression radars comply with CE under RED Directive 2014/53/EU.

The Simrad® HALO® RI-50 interface module complies with CE under EMC Directive 2014/30/EU.

United States of America

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

⚠ **Warning: Navico is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.**

RF emissions notice

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This device's antenna must be installed in accordance with provided instructions, and it must be operated with a minimum spacing of 177.97 cm (5.84 ft) for the HALO® 3000 SERIES and 106 cm (3.48 ft) for the HALO® 2000 SERIES between the antenna and a person's body (excluding extremities of hands, wrist and feet). Be aware that these FCC safety distances are calculated for a non-rotating antenna that is transmitting. For radio frequency safe distances for an antenna that is rotating and transmitting, see the **Radio frequency (RF) safe distances** table on the next page of this manual.

➔ *Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

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

➔ *Note: HALO® 2000 SERIES and HALO® 3000 SERIES radars don't transmit when the antenna isn't rotating, so pose not risk in this situation.*

Canada

English

This device complies with Innovation, Science and Economic Development Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Français

Le présent appareil est conforme aux Innovation, Sciences et Développement économique Canada (ISDE) applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Innovation, Science and Economic Development Canada (ISED) statement

English

Under ISED regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by ISED. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

The radio transmitters, 978B-HALO2000 and 978B-HALO3000, have been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Français

Conformément à la réglementation d'Innovation, Sciences et Développement économique Canada (ISDE), le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée quivalente (p.i.r.e.) ne dépassepas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Les présents émetteurs radio, 978B-HALO2000 et 978B-HALO3000, ont été approuvés par Innovation, Sciences et Développement économique Canada (ISDE) pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

HALO® antennas	Description	Max. permissible antenna gain (dBi)	Impedance
000-11464-001	Antenna, 3 ft, HALO®	26	50 Ohm (WR-90 waveguide)
000-11465-001	Antenna, 4 ft, HALO®	27.2	50 Ohm (WR-90 waveguide)
000-11466-001	Antenna, 6 ft, HALO®	29	50 Ohm (WR-90 waveguide)

Radio frequency (RF) safe distances

Figures in the table below show the radio frequency radiation safe distance for an operating (rotating) antenna is within the antenna's turning circle. Irrespective, users should stay well outside the turning circle of the antenna to avoid injury through physical impact as it spins.

System	100 W / m² occupational safe distance	10 W / m² public safe distance
HALO® 2000 SERIES radars	Within antenna turning circle	1.5 m (4.9 ft)
HALO® 3000 SERIES radars	0.8 m (2.6 ft)	2.5 m (8.2 ft)

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- Tef-Gel® is a trademark of Ultra Safety Systems, Inc.

About this manual

This manual is a reference guide for installing the Simrad® HALO 2000 SERIES and HALO 3000 SERIES pulse compression radars. It does not cover basic background information about how equipment such as radars, echosounders and AIS work. Such information is available from our website: www.support.simrad-yachting.com.

Intended audience

This manual assumes the reader has basic knowledge about this type of equipment with regards to:

- installation work to be carried out
- nautical terminology and practices.

Translated manuals

Translated versions of this manual can be found on the website: www.simrad-yachting.com.

CONTENTS

INTRODUCTION

This manual explains how to install the latest generation of HALO open array, pulse compression radars – the HALO 2000 SERIES and HALO 3000 SERIES.

This manual should be used in conjunction with the installation manual provided with your multi-function display. It is written for professional marine technicians, installation technicians and service technicians. Dealers may use information contained in this document.

HALO 2000 SERIES and HALO 3000 SERIES radars combine the best characteristics of traditional pulse and FMCW broadband radar systems. Pulse compression technology provides an unprecedented mix of long and short detection range, high target definition, and minimal clutter. Solid state technology means minimal warm-up time and maximum ocean-going reliability.

This latest generation of HALO open array radars incorporate updated hardware and mechanical design improvements that deliver increased power, improved long-range target detection performance and more system reliability.

HALO 2000 SERIES and HALO 3000 SERIES radar systems consist of a pedestal, antenna, RI-50 radar interface module and connection cables. A supplied Ethernet network cable connects the RI-50 radar interface module to the navigation Ethernet network.

➔ *Notes:*

- HALO 2000 SERIES and HALO 3000 SERIES radar systems are available with antennas in three sizes: 3 ft, 4 ft and 6 ft.
- At the time of release, HALO 2000 SERIES and HALO 3000 SERIES radars work with Simrad® GO XSR, GO XSE (9/12), NSS evo3, NSS evo3S, NSO evo3, NSO evo3S and NSO evo3S MPU systems. They also work with Simrad® R2009 and R3016 radar control units.

Warnings

⚠ Use the radar at your own risk. Your radar is designed as a navigation aid. Always compare the navigation information received from your radar with data from other navigation aids and sources. When a conflict arises between the navigation data from your radar and data from other navigation aids, make sure you resolve the conflict before proceeding with navigation.

A CAREFUL NAVIGATOR NEVER RELIES ON ONLY ONE METHOD TO OBTAIN NAVIGATION INFORMATION.

International Regulations for Preventing Collisions at Sea mandate that when radar is on a vessel, the radar must be used at all times, regardless of weather conditions or visibility. Numerous court decisions have ruled that the radar must be used, and the radar operator must know all operational aspects of radar performance. Otherwise they will face a greater risk of liability if an accident occurs.

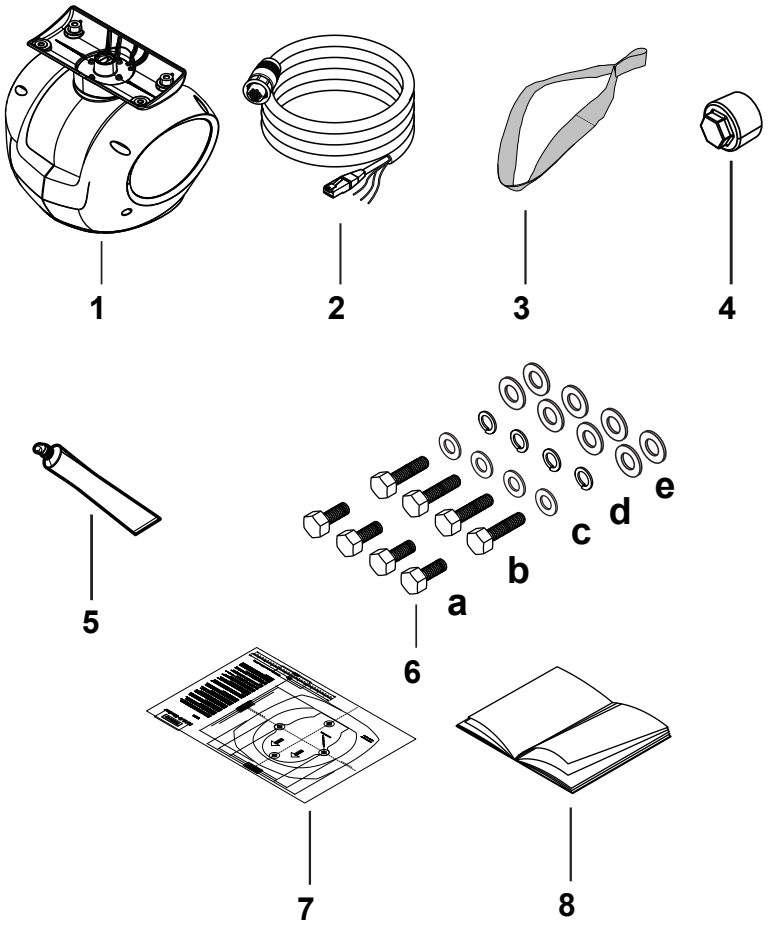
⚠ High current, stored and microwave energy hazard. Technicians must exercise extreme care when working with the unit. ALWAYS disconnect from the power source before removing the cover. Some capacitors may take several minutes to discharge, even after switching off the radar. Before touching any high voltage components, ground them with a clip lead.

⚠ The radar's blue 4-level static accent pedestal lighting may not be approved for use in your boating location. Please check your local boating regulations before turning the blue accent lights ON.

⚠ The microwave energy radiated by a radar antenna is harmful to humans, especially the eyes. NEVER look directly into an open waveguide or into the path of radiation from an enclosed antenna. Disconnect from the power source or use the service mode switch on the back of the pedestal whenever you need to work on the antenna or other equipment in the beam of the radar.

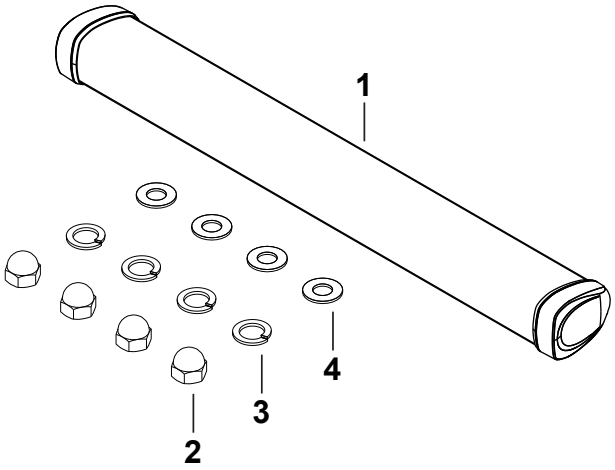
CHECK THE PARTS

Pedestal



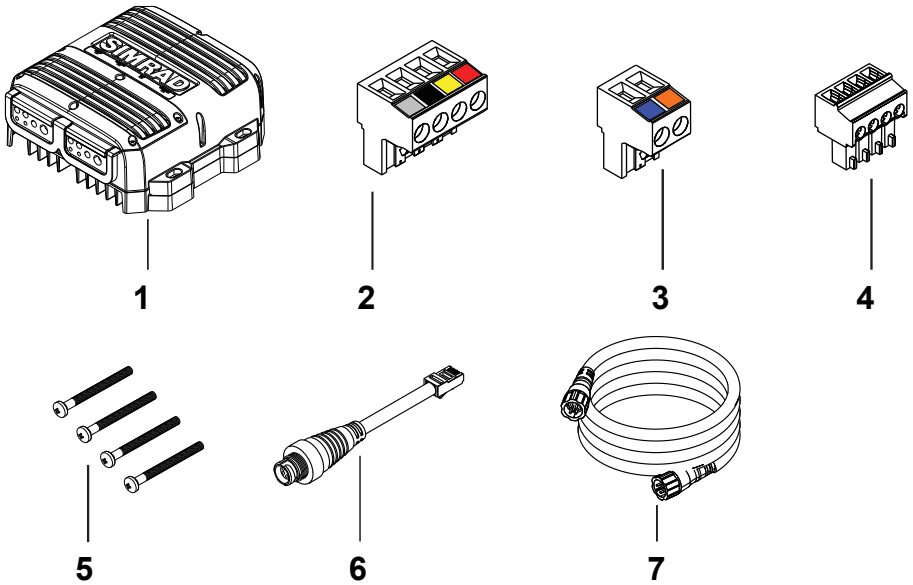
1	Radar pedestal	
2	Interconnection cable 20 m (65 ft). Other lengths are available from your nearest Simrad® dealer.	
3	Lifting strap	
4	Blanking plug (used when the interconnection cable is connected underneath the pedestal. Blanking plug is fitted underneath the pedestal when manufactured.)	
5	Tef-Gel anti-seize, anti-corrosion gel	
6	Mounting bolts and washers	
	a) Bolts, hex head, M12 x 35 mm, 316 s/s	x 4
	b) Bolts, hex head, M12 x 50 mm, 316 s/s	x 4
	c) Flat washer, M12 x 36 x 3, 316 s/s	x 4
	d) Spring washer, M12, 316 s/s	x 4
	e) Plastic isolating washer, M12 x 38	x 8
7	Mounting template	
8	This manual	

Antenna



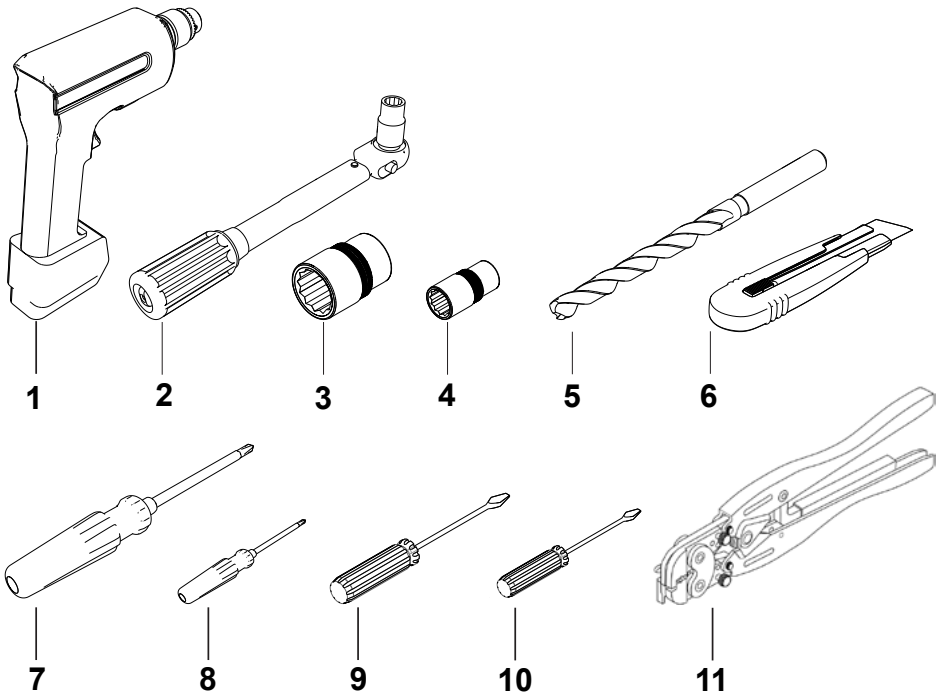
1	Radar antenna	3 ft model: 3.70 ft / 1128 mm / 44.41” 4 ft model: 4.70 ft / 1432 mm / 56.38” 6 ft model: 6.69 ft / 2039 mm / 80.28”	
2	Dome nuts, M8, 316 s/s		x 4
3	Spring washers, M8, 316 s/s		x 4
4	Flat washers, M8 x 16 x 1.2, 316 s/s		x 4

RI-50 radar interface module



1	RI-50 radar interface module	
2	4-way connector for the pedestal interconnection cable	
3	2-way connector for the pedestal interconnection cable	
4	Connector for Aux in (remote power and antenna park brake)	
5	Mounting screws, Phillips pan head, No. 6 x 45 mm, s/tap, 304 s/s	x 4
6	Ethernet adapter RJ45 male to 5-pin female 150 mm (5.9”)	
7	Ethernet cable 1.8 m (6.0”)	

TOOLS REQUIRED



1	Drill
2	Torque wrench
3	19 mm socket
4	13 mm socket
5	Drill bit 13 mm (0.5”)
6	Sharp knife
7	Screwdriver (Pozidriv, PZ2) for RI-50 mounting screws
8	Screwdriver (Phillips, #1) for RI-50 circuit board cover screws
9	Screwdriver (flat head, 4 mm) for SUPPLY and SCANNER POWER connectors
10	Screwdriver (flat head, 3 mm) for AUX connectors
11	RJ45 crimping tool (if refitting/replacing the RJ45 connector)

INSTALLATION GUIDELINES

⚠ **Warning: A radar should only be installed by a qualified marine technician, as improper installation poses risks to the installer, the public, and to the safety of the vessel.**

⚠ **Warning: Before starting the installation or any maintenance on a HALO 2000 SERIES or HALO 3000 SERIES radar, make sure the service mode switch at the back of the pedestal is set to 0 (power supply disabled).**

There is a transmit interlock that prevents radar transmissions if the antenna is not rotating. However, a high voltage remains for a period of time after the system is turned off. If you are not familiar with this type of electronics, consult a trained service or installation technician before trying to service any part of the equipment.

Installation includes:

- hardware mounting
- electrical wiring
- configuring the display or network system to work with the radar
- adjusting the radar for proper performance.

The radar's ability to detect targets depends greatly on its location. The ideal location is high above the vessel's keel line where there are no obstacles.

A higher installation location improves the radar's ranging distance, but it also increases the range around the vessel where targets cannot be detected and increases sea clutter pick up.

When you are deciding on the location, consider the following:

- The length of the 20 m (66 ft) interconnection cable supplied with the radar is usually sufficient. A longer 30 m (98 ft) cable is available. 30 m (98 ft) is the longest the cable that can be used.
- If the roof of the wheelhouse is the highest existing location, consider installing a radar mast or tower on which you can mount the radar.
- If you install the radar on the mast, position it on the forward side so there is a clear view to the front of the vessel.
- It is preferable to install the antenna parallel to the line of the keel.

What not to do

- Do not install the radar too high, where its weight may compromise the stability of the vessel and degrade the radar picture over short ranges.
- Do not install the radar close to lamps or exhaust outlets. Heat, soot, and smoke emissions may degrade radar performance or cause a breakdown.
- Do not install the radar where a large obstruction (such as an exhaust stack) is at the same level as the beam. The obstruction is likely to generate false echoes and/or shadow zones. If there is no alternative location, use the radar's sector blanking setting on your multi-function display.
- Do not install the radar close to the antennas of other equipment, such as direction finders, VHF antennas and GPS equipment, as it may cause interference.
- Do not install the radar where may be subjected to strong vibrations that could degrade its performance.
- Do not install the radar close to halyards or flags because the wind could wrap these around the antenna and jam it.

Compass safe distance

Do not install your HALO radar or RI-50 inside of the recommended safe distances of navigational instruments like the magnetic compass and chronometer.

HALO 2000 SERIES and HALO 3000 SERIES pedestal

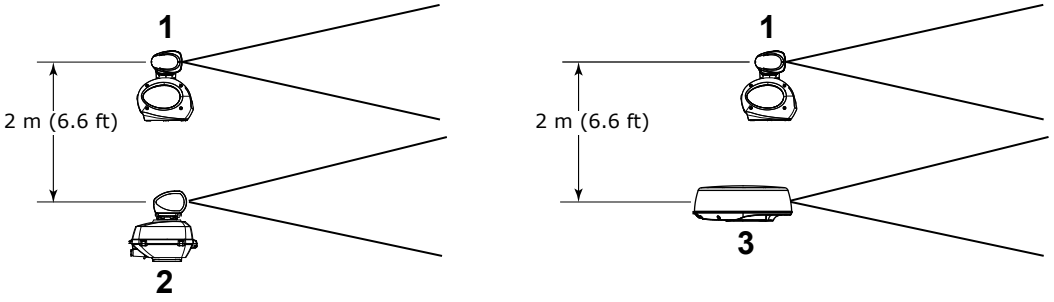
Antenna	Compass	Safe distance
Standard load	Standard	1.0 m (3.3 ft)
Standard load	Standby steering/emergency	0.5 m (1.6 ft)

RI-50 interface module

Compass	Safe distance
Standard	0.1 m (0.33 ft)
Standby steering/emergency	0.1 m (0.33 ft)

Multi-radar installations

Do not install your HALO 2000 SERIES or HALO 3000 SERIES radar on the same horizontal beam plane as any other radar. Separate them vertically by at least 2 m (6.6 ft).

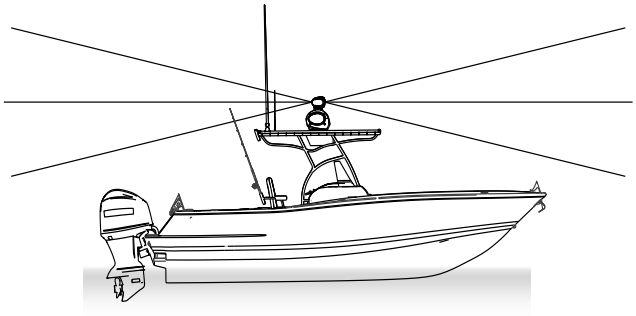


1	HALO 2000 SERIES or HALO 3000 SERIES radar
2	Conventional pulse radar or another HALO 2000 SERIES or HALO 3000 SERIES radar
3	HALO 20, 20+ or 24 dome radar

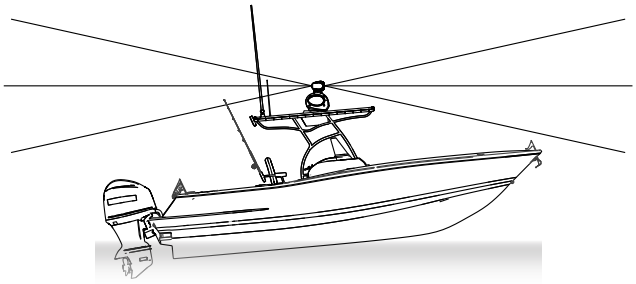
→ *Note: Possible interference can be reduced using the radar's sector blanking setting on your multi-function display.*

Power boat installations

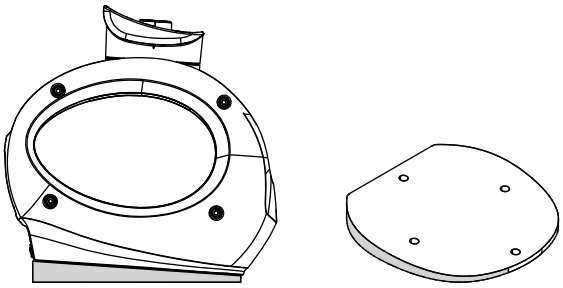
If possible, make sure the mounting location gives your radar a clear view all around the vessel.



If you install your HALO radar on a power boat with a steep planing angle, it is recommended you tilt the radar angle down at the front.



➔ *Note: Optional 4° base wedges are available from third-party suppliers.*



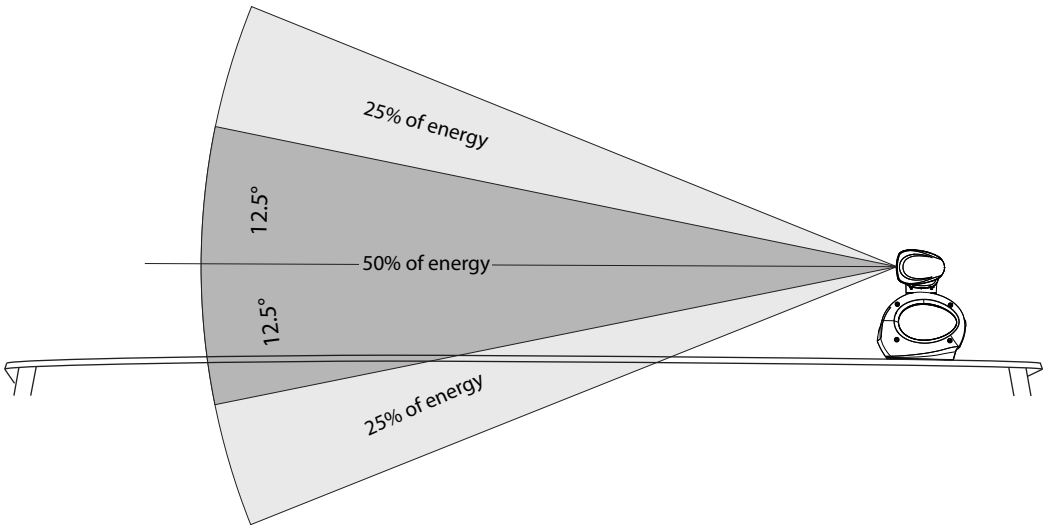
Considerations for roof mounting

When deciding a suitable mounting location for your HALO radar, be aware that the vertical radar beam extends to 25° either side of horizontal, with 50% of the emitted energy projecting in a beam 12.5° either side of horizontal.

If the radar beam cannot clear the roof line, this decreases the performance of the radar. Depending on the size of the hard top of the vessel, we recommend you elevate the antenna to ensure the radar beams clear the roof line.

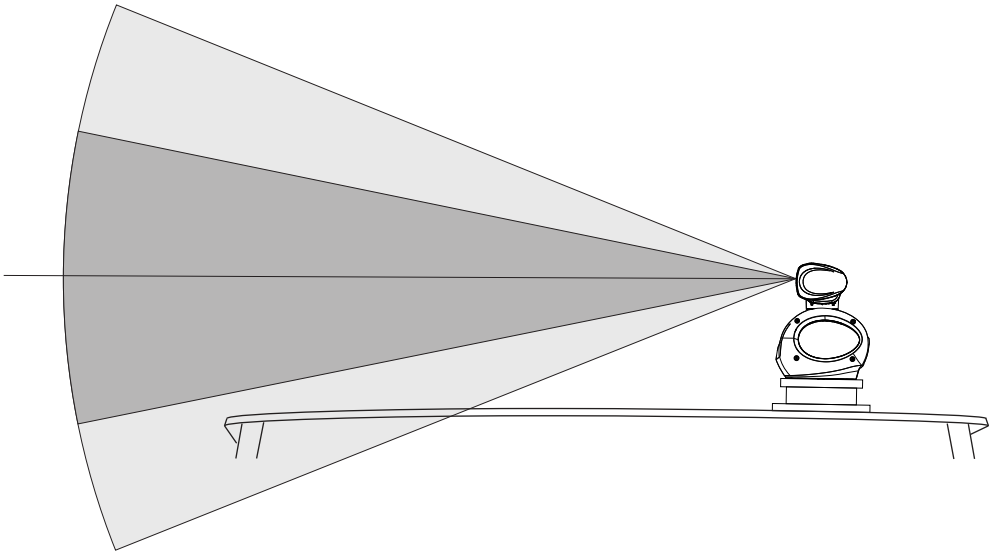
Possible performance loss

If you mount your HALO radar directly on to a large hard top, the radar's performance could suffer as the emitted energy is either reflected or absorbed by the hard top.



Good performance

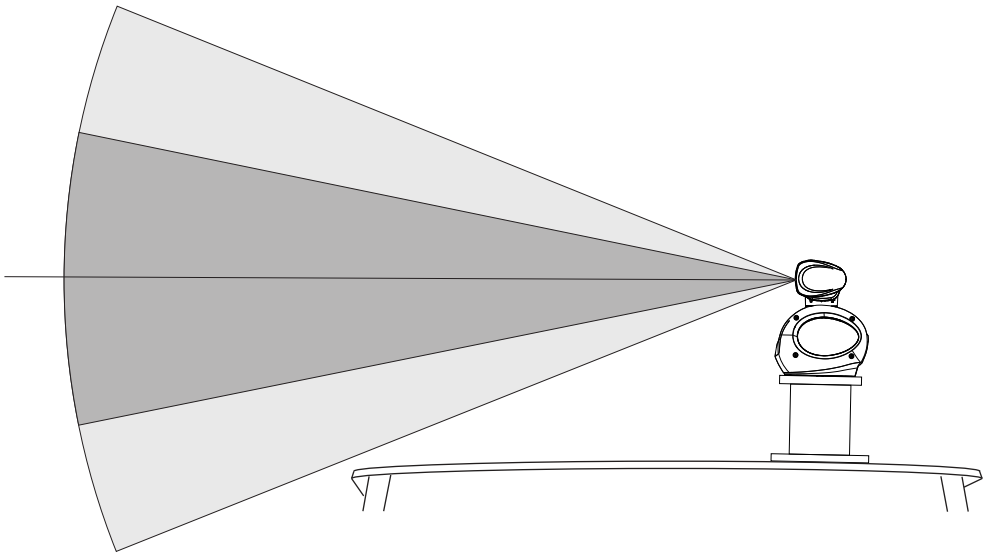
Raising the radar off the hard top allows most of the radar beam to clear the hard top.



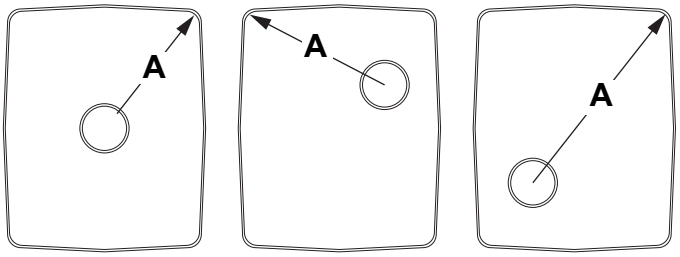
Best performance

For best performance, the radar should be positioned to allow the full beam to clear the superstructure of the vessel.

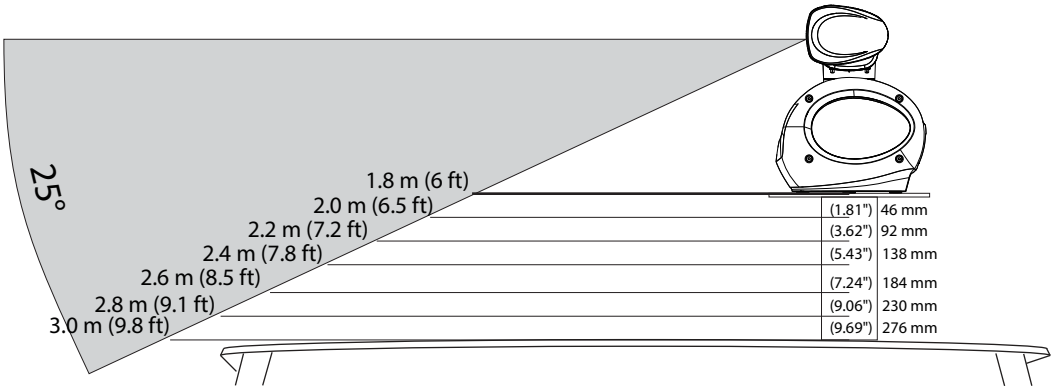
➔ *Note: If the mounting surface is made of metal, you must elevate the radar so the beam has complete clearance, otherwise its performance will be severely impaired.*



To calculate the antenna height for best performance, first measure the distance (**A**) from the installation location of the radar to the furthest forward corner of your vessel's hard top.



For every increase of 200 mm (7.9”) of hard top distance over 1.8 m (6.0”), increase the height of the antenna by 46 mm (1.8”).



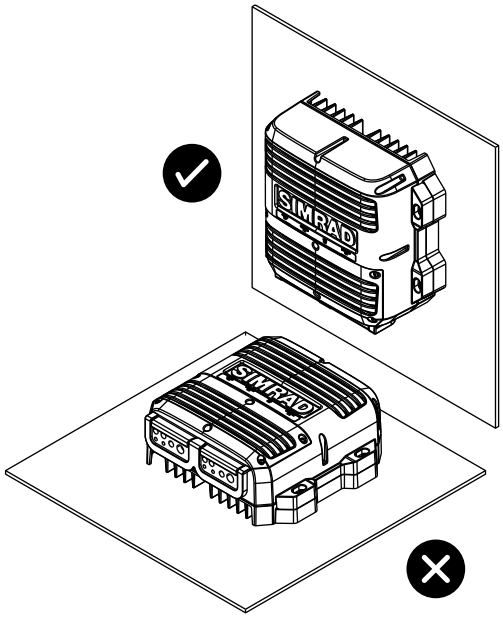
Install the RI-50 radar interface module

Install the RI-50 in a dry location away from spray, rain, drips, condensation or excessive heat. The mounting position should be easily accessible.

Always mount the RI-50 vertically, with the cable entry points facing downwards. This helps with cooling and helps prevent any water from entering the cable grommets.

Ensure there is enough unobstructed space above and below the RI-50 to ensure it cools adequately and the ambient temperature does not exceed 55°C (131°F). If overheating is a concern, consider additional ventilation, such as a vent or extraction fan.

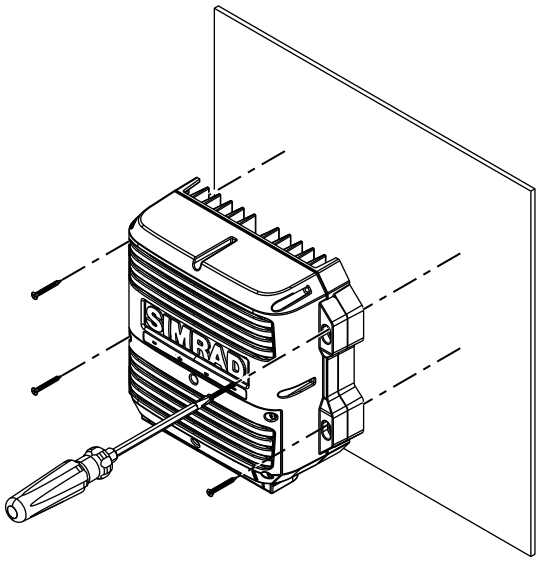
⚠ **Warning: Inadequate ventilation and subsequent overheating of the unit may cause unreliable operation and reduced service life.**



The RI-50 must be located where it can easily connect to the vessel's ground connection, the pedestal interconnection cable and the power cable.

Use fasteners suited to the mounting surface material. If you are using the supplied self-tapping screws with a soft material like plywood, use a 2.3 mm to 2.8 mm (3⁄32") drill bit. For hard materials like GRP, acrylic and hardwoods, use a 2.9 mm (7⁄64") drill bit. If the material is too thin for the self-tapping screws, reinforce it or use machine screws, nuts and washers. Use only 304 or 316 stainless steel fasteners.

Mark the screw locations using RI-50 box as a template, and drill pilot holes.



Run the interconnection cable

The interconnection cable is 10.5 mm (0.4") in diameter.

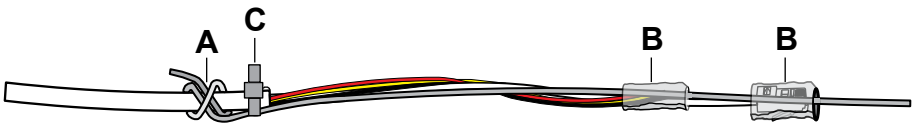
The 14-pin connector end of the cable connects to the pedestal. The RJ45 connector connects to the RI-50 radar interface module.

1 Drill a 14 mm hole to pass the RJ45 connector from the pedestal to the RI-50, or a 24 mm (0.95") hole to pass the 14-pin connector from the RI-50 to the pedestal.

2 To protect the connectors, especially the RJ45 connector, when pulling the cable through the vessel, connect a mouse line to the outer jacket of the interconnection cable so the strain of pulling is transferred to the strong outer jacket.

3 If there is enough clearance, use a small cable tie to secure the mouse line to the outer jacket.

4 Tape the wires and the RJ45 connector to the mouse line so they do not get caught and bend backwards.



A	Mouse line
B	Electrical tape
C	Cable tie

5 Carefully pull the interconnection cable through the vessel so it runs between the RI-50 radar interface module and your chosen pedestal location.

Install the pedestal

⚠ **Warning: Leave the waveguide protection cap on the pedestal while you mount it to your vessel. You should only remove the cap just before you fit the antenna to the pedestal.**

Bolts and washers

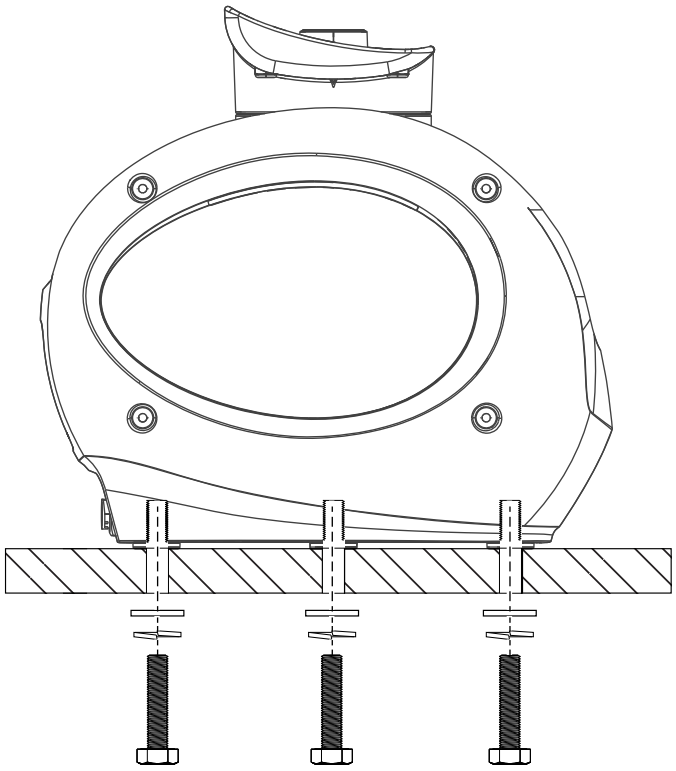
The eight hex head bolts supplied are suitable for surfaces up to 25 mm (1") in thickness.

- Use the 4 x M12 x 35 mm (1.4") for a surface thickness from 5 mm (0.2") up to 13 mm (0.5").
- Use the 4 x M12 x 50 mm (2.0") for a surface thickness from 13 mm (0.5") up to 25 mm (1").

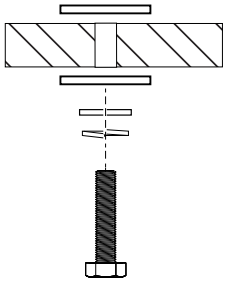
If using longer bolts, ensure they are marine-grade stainless steel and allow for a minimum of 12 mm (0.3") and maximum of 20 mm (0.7") of thread engagement in base of pedestal.

Use a flat washer and a spring washer for each bolt.

⚠ **Important: Apply a light coating of the supplied Tef-Gel® or other suitable nickel- or PTFE-based lubricant to the mounting bolts to prevent galling and corrosion.**



If you are installing the pedestal onto a steel surface, also use the supplied plastic isolating washers.



Surface mount: rear cable connection

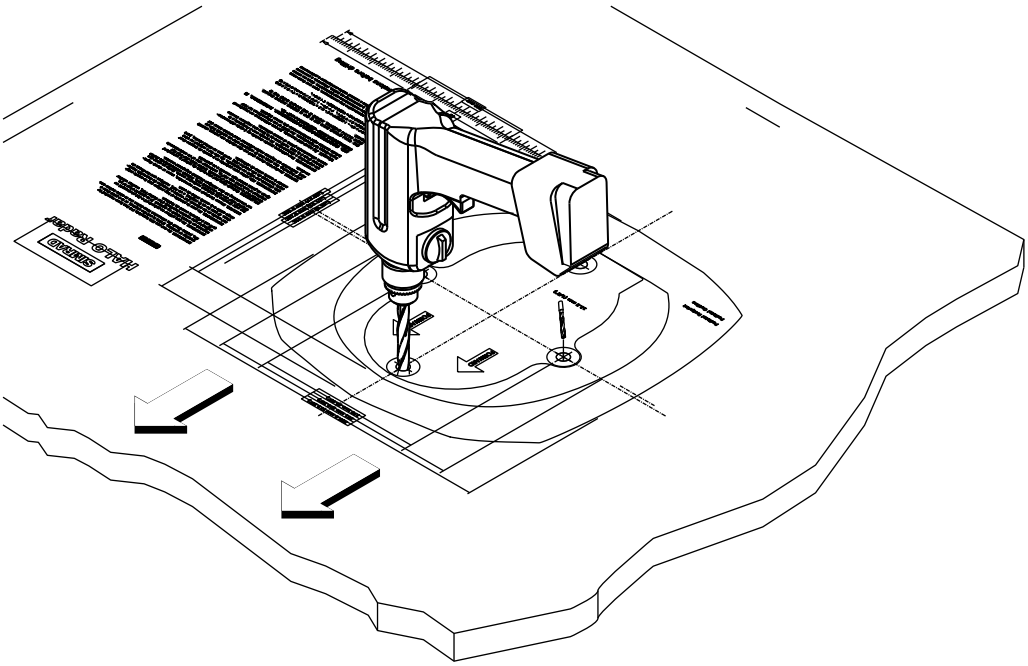
1 Place the mounting template in your desired installation location, observing the correct orientation.

➔ *Note: You can compensate for any minor deviations in orientation later by using the radar's bearing alignment setting on your multi-function display.*

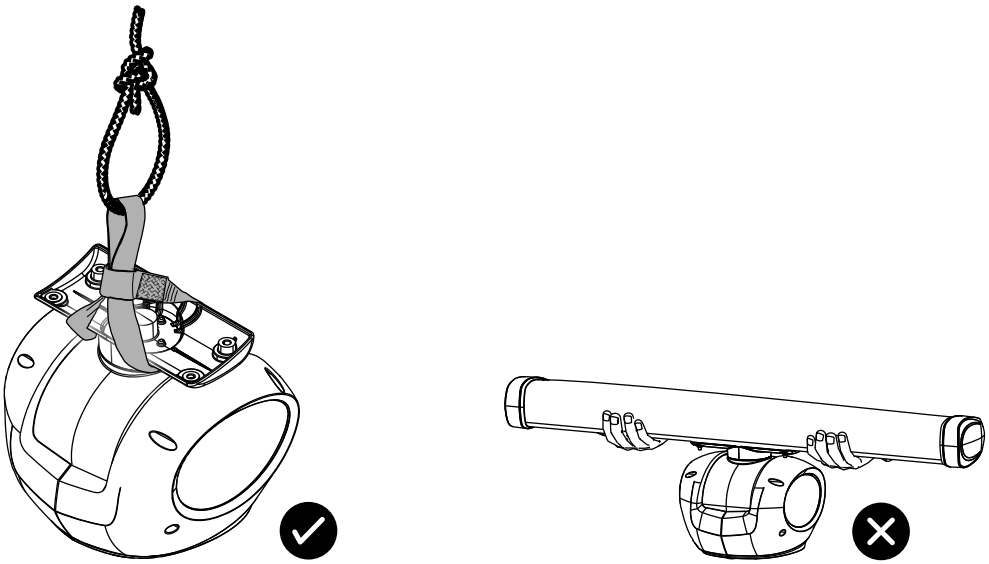
2 Check the location has enough room for the antenna to rotate.

3 Tape the template securely in place.

4 Drill pilot holes, then use a 13 mm (0.5”) drill bit to drill the four holes where shown on the mounting template.



5 Remove the mounting template .
6 Apply the supplied Tef-Gel® anti-corrosion gel to the four feet of the pedestal.
7 Lift the pedestal using the supplied lifting strap.

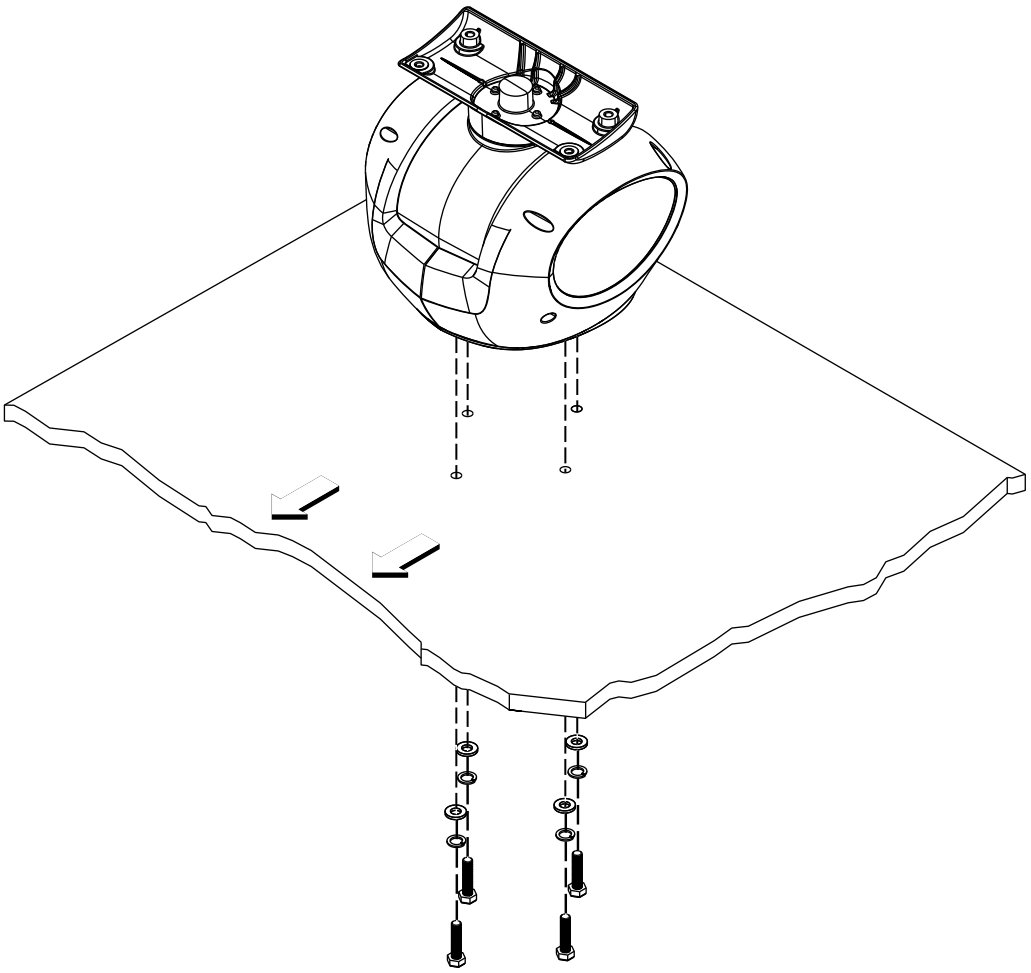


⚠ **Warning: Do not lift the pedestal with the antenna attached.**

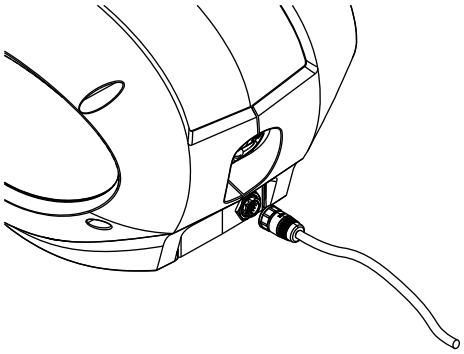
8 Lower the pedestal carefully so its mounting holes align with the drilled holes in the vessel.
9 Place a flat washer and spring washer onto each bolt.
➔ *Note: If you are installing the pedestal onto a steel surface, also use the supplied plastic isolating washers.*
10 Apply the Tef-Gel® anti-corrosion gel to the threads of each bolt.

11 Insert the bolts through the drilled holes and into the pedestal's threaded mounting holes. Tighten the bolts securely.

➔ *Note: The torque settings for the mounting bolts are 30 N.m – 40 N.m (22.1 lb-ft – 39.5 lb-ft).*



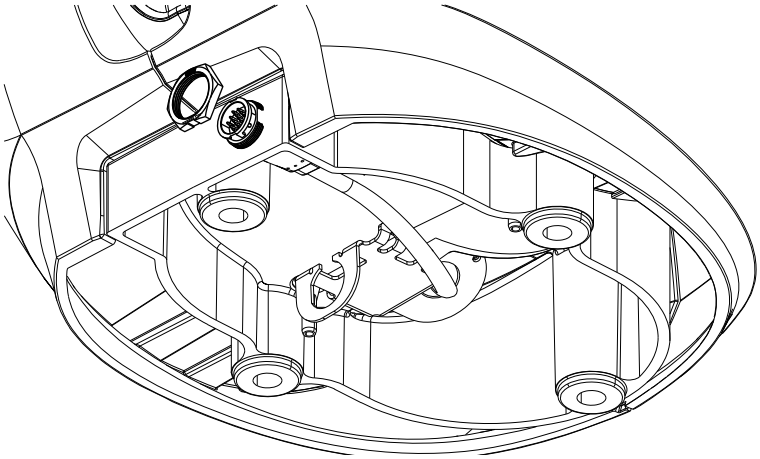
12 Connect the 14-pin end of the interconnection cable to the pedestal. Take care to align the connector correctly to avoid bending the pins. Secure the locking collar by rotating clockwise until it clicks.



Pole or tower mount: discreet cable connection

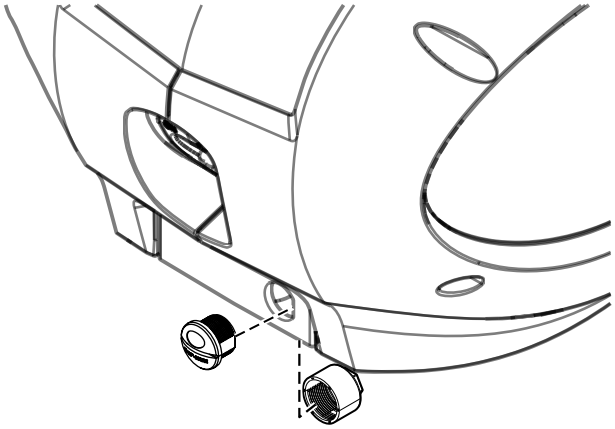
The interconnection cable can be optionally connected underneath the pedestal by moving the 14-pin connector at the back of the pedestal to a bracket underneath the pedestal.

1 Remove the retaining nut and pull out the connector.

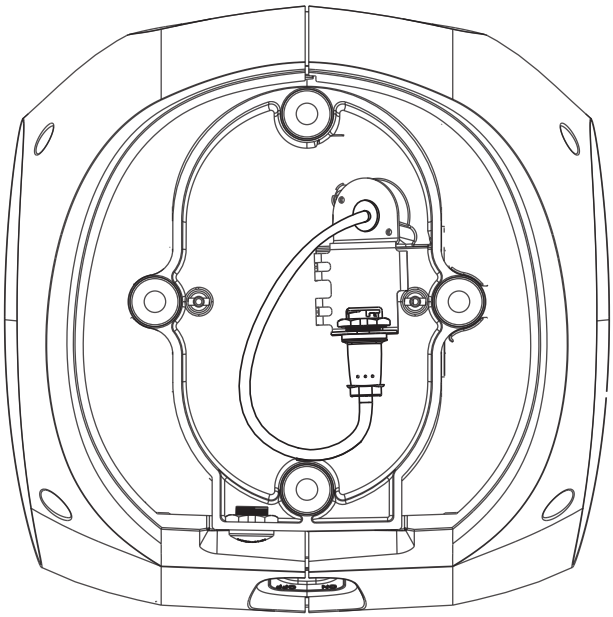


2 Remove the blanking plug from the bracket underneath the pedestal.

3 Insert the blanking plug where the connector used to be.



4 Re-route the connector to the bracket and secure it with the retaining nut.



5 Connect the 14-pin end of the interconnection cable to the pedestal. Take care to align the connector correctly to avoid bending the pins. Secure the locking collar by rotating clockwise until it clicks.

6 Apply the supplied Tef-Gel® anti-corrosion gel to the four feet of the pedestal.

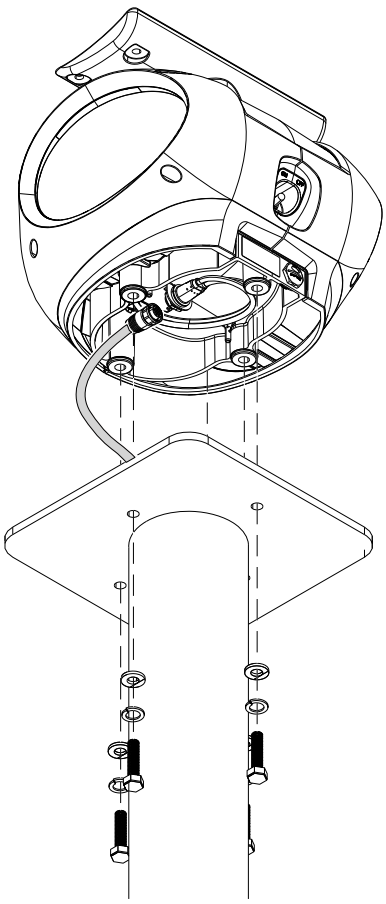
7 Lower the pedestal so its mounting holes align with the drilled holes in the mounting plate.

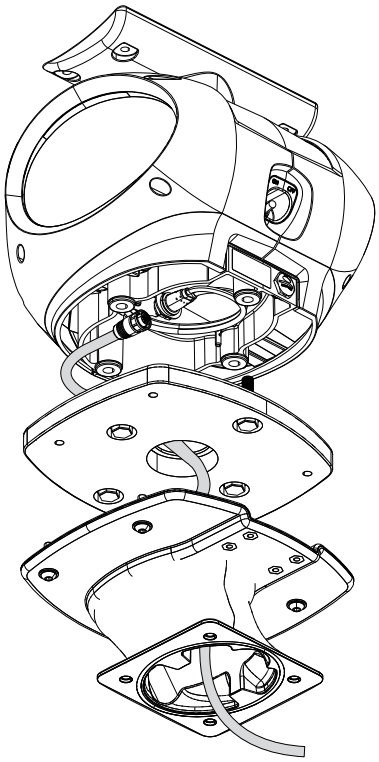
8 Place a flat washer and spring washer onto each bolt.

9 Apply the Tef-Gel® anti-corrosion gel to the threads of each bolt.

10 Insert the bolts through the drilled holes and into the pedestal's threaded mounting holes. Tighten the bolts securely.

➔ *Note: The torque settings for the mounting bolts are 30 N.m – 40 N.m (22.1 lb-ft – 39.5 lb-ft).*



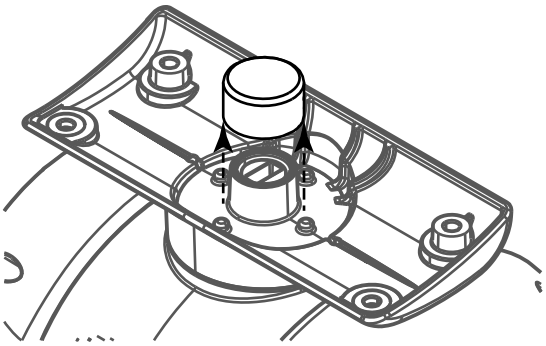


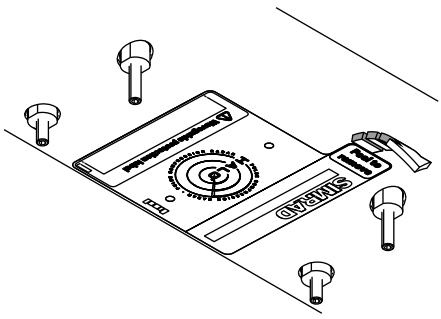
Fit the antenna to the pedestal

⚠ **Warning: Do not operate the radar without the antenna connected.**

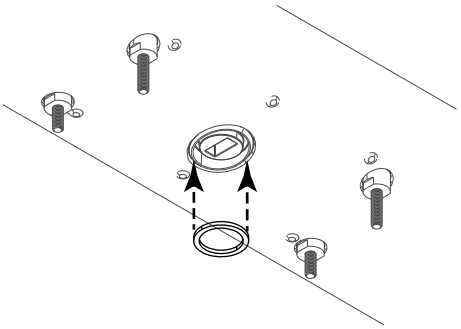
1 Remove the waveguide protection cap from the pedestal and the waveguide protection label from the underside of the antenna.

➔ *Note: The cap and label prevent contaminants from entering the waveguide. You should only remove these covers just before you fit the antenna to the pedestal.*



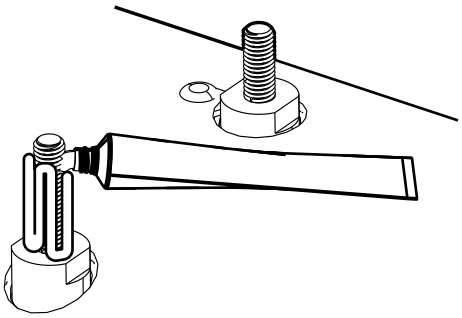


2 On the antenna, check the sealing ring is correctly positioned in the groove around the waveguide.



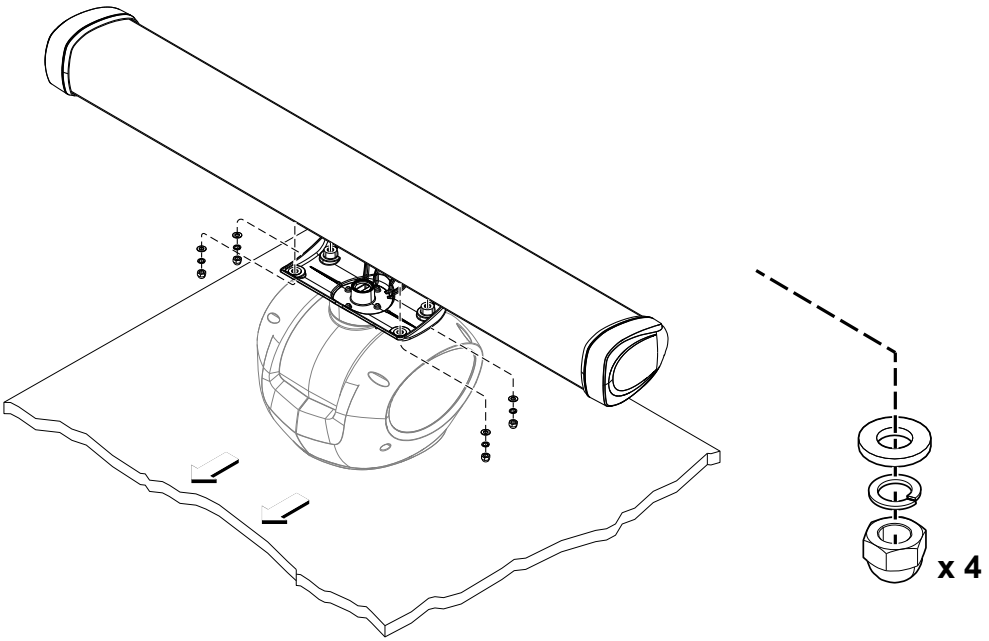
3 Apply the supplied Tef-Gel® anti-corrosion gel to the entire length of each of the four antenna studs.

➔ *Note: If black, isolating washers are factory fitted at the top of the antenna studs, do not remove.*



4 Carefully lower the antenna on to the pedestal.

➔ *Note: The antenna can only fit one way.*

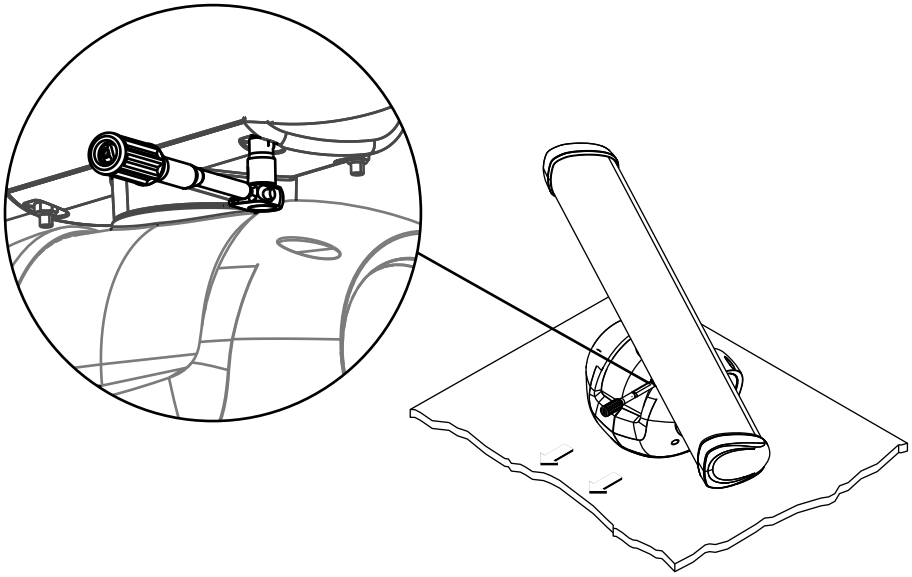


5 Place a flat washer then a spring washer followed by a dome nut on to each of the antenna studs.

➔ *Note: If black, isolating washers are factory fitted on the underside of the stud holes, do not remove.*

6 Tighten the dome nuts using a socket and torque wrench to 15 N.m (11 lb-ft).

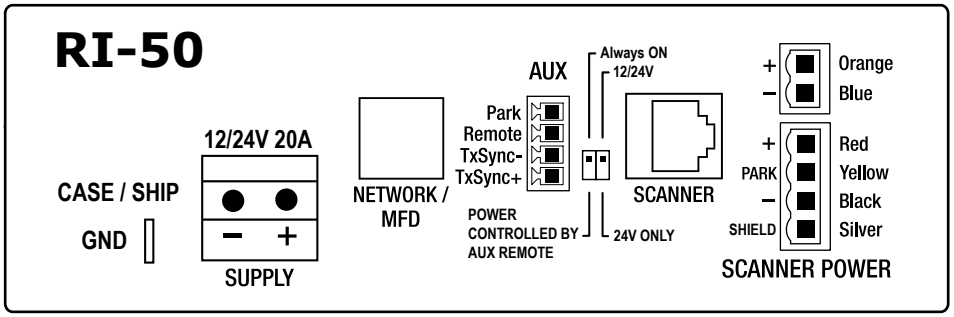
➔ *Note: Using a socket and torque wrench minimizes the risk of damaging the powder coated surface of the pedestal.*



WIRING

RI-50 circuit board

All wiring connections, except GND, are made inside the RI-50 interface box.

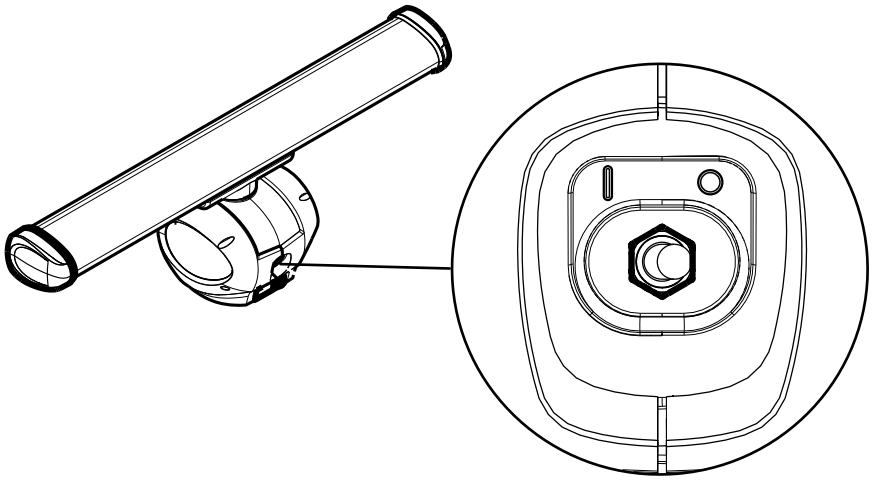


Connector	Description
CASE / SHIP GND	Alternative chassis ground connection.
SUPPLY	12 or 24 V DC input 12 volt system limits 10.8 V DC to 15.6 V DC 24 volt system limits 20 V DC to 31.2 V DC
NETWORK / MFD	Connects the radar to the multi-function display.
AUX	Inputs for the antenna park brake and remote power functions. Note: The TxSync and TxSync+ inputs are reserved for future functionality.
POWER CONTROL	Switch that sets the radar's power to: • **Always ON** (the radar turns on when power is applied to the radar's main power connector), or • **POWER CONTROLLED BY AUX REMOTE** (the radar turns on when a remote multi-function display or power control switch is turned on).
12/24V - 24V ONLY	Switch that sets to: • **12/24V** (default), or • **24V ONLY** (select to protect a 24V battery system from over discharge)
SCANNER	Input for receiving Ethernet data from the pedestal and sending control signals.
SCANNER POWER	2-way and 4-way connectors that provide 50 V DC up to the pedestal and power for the park brake.

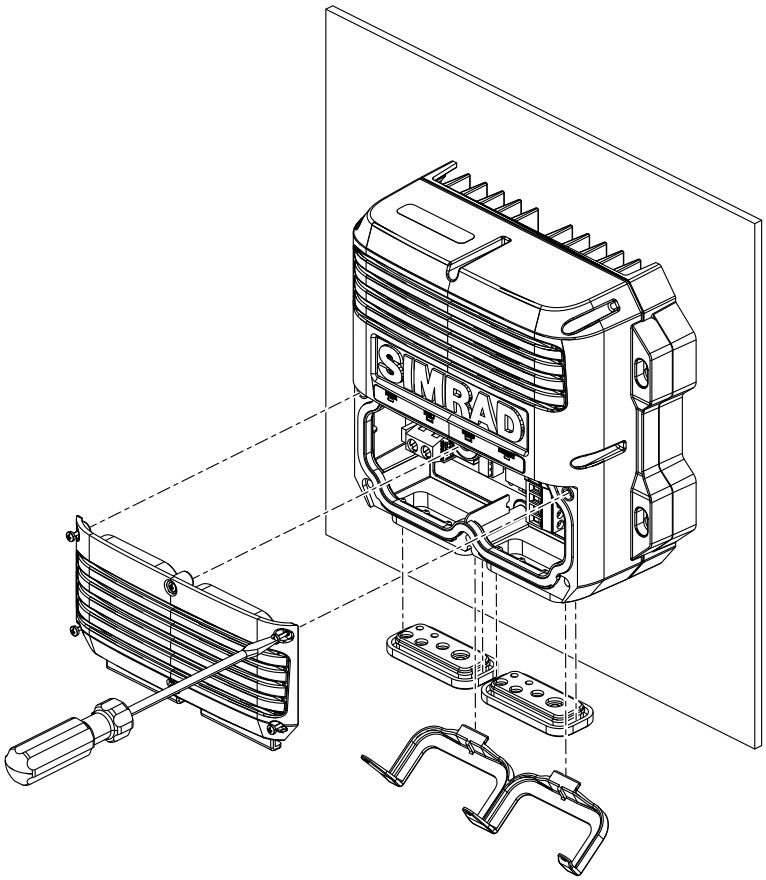
Run the cables

⚠ **Warning: The pedestal has a service mode switch, which disables power supply to the radar and stops the antenna rotating during maintenance and service.**

1 Check the service mode switch at the back of the pedestal is set to **0** (power supply disabled).

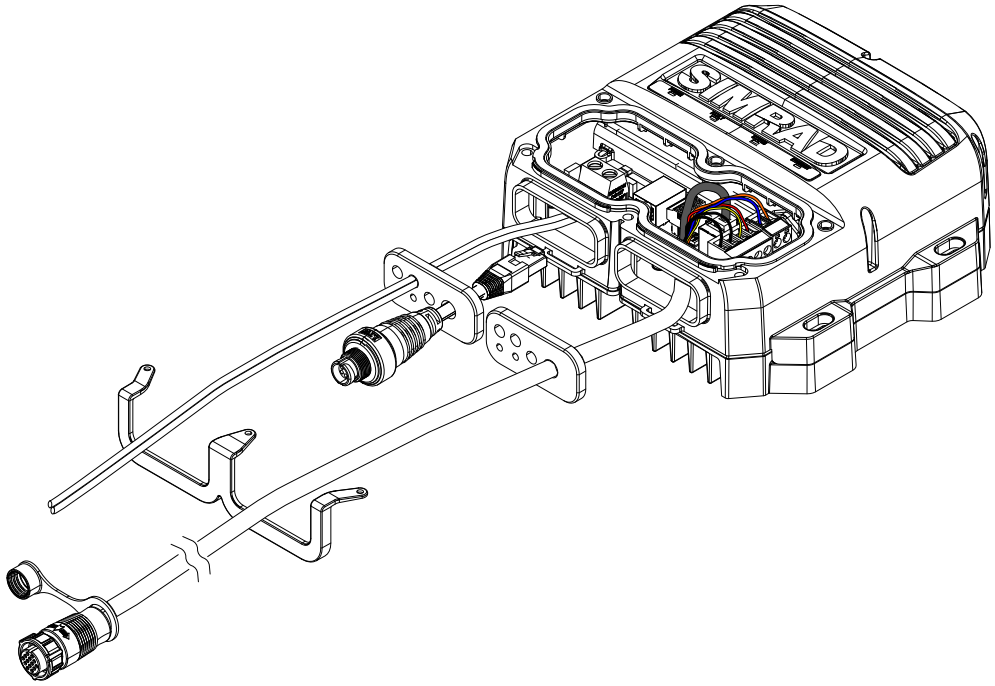


2 Remove the circuit board cover from the RI-50 by unscrewing the six retaining screws.
3 Remove the grommet retaining clip.
4 Remove the rubber grommets.



5 Line the following cables up so they face their respective connector on the circuit board:
- Power cable
- Ethernet adapter cable
- Pedestal interconnection cable
- Any AUX wires for the remote power and antenna park brake functions

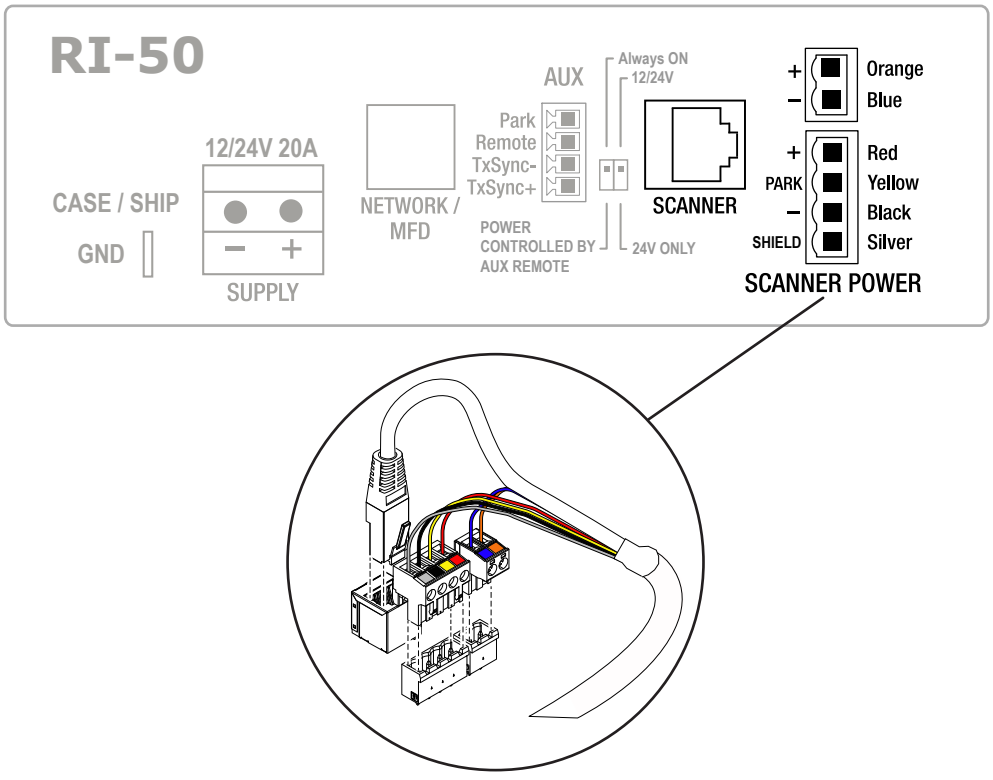
6 Pass the cables through the rubber grommets and into the RI-50. For cables with connectors, you need to cut a slit between the hole and edge of the grommet.



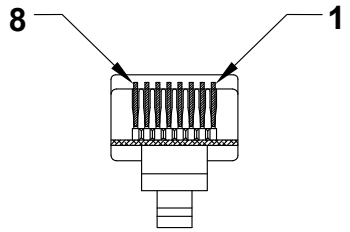
Connect the interconnection cable

To receive Ethernet data from the radar, connect the RJ45 connector end of the interconnection cable to the SCANNER connector on the circuit board.

To provide power to the radar and park brake, connect the six wires of the interconnection cable to the 4-way and 2-way SCANNER POWER connectors on the circuit board, matching the color-coded stickers on the connectors with the wire colors.

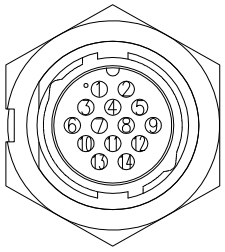


If you ever need to replace or refit the 8-pin RJ45 connector on the interconnection cable, use a RJ45 crimping tool and wire as follows:

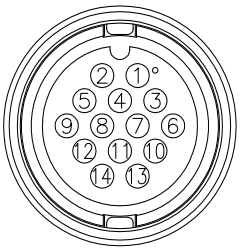


Pin	Wire color
1	White/orange
2	Orange
3	White/green
4	Blue
5	White/blue
6	Green
7	White/brown
8	Brown

If you need to test the 14-pin connector on the interconnection cable, it is wired as follows:



Pins on pedestal



Pins on cable

Pin	Wire color	
1	Black	Pedestal power DC (-)
2	Red	Pedestal power DC (+)
3	Yellow	Park angle retention
4	Drain	Tinned wire
5	Orange	Pedestal power DC (+)
6	Blue	RJ45 pin 4
7	White/blue	RJ45 pin 5
8	White/brown	RJ45 pin 7
9	Brown	RJ45 pin 8
10	White/green	RJ45 pin 3
11	Blue	Pedestal power DC (-)
12	White/orange	RJ45 pin 1
13	Green	RJ45 pin 6
14	Orange	RJ45 pin 2

Connect the power cable

The power supply for the radar is connected to the RI-50 interface module. Depending on radar power demand, the RI-50 can draw up to 20 A average (20 A nominal, 25 A peak) from both 12 and 24 V DC power systems.

The RI-50 is protected against reverse polarity, over-voltage and under-voltage. The RI-50 must be connected via a dedicated fuse/circuit breaker rated at 25 A for either 12 or 24 V DC systems. The fuse/circuit breaker should be labeled accordingly.

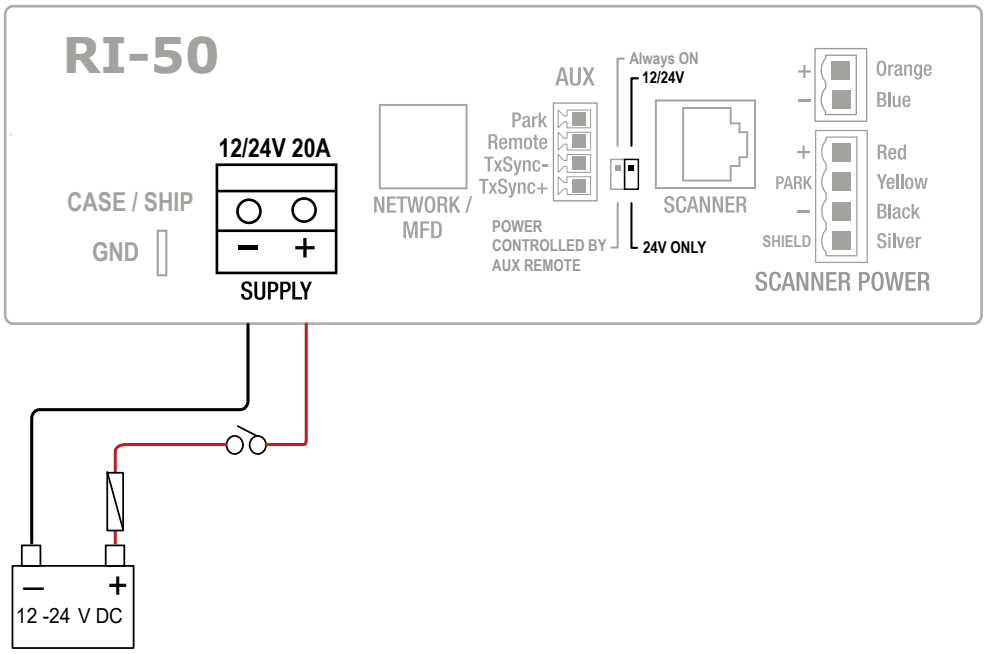
The further away the power supply, the thicker the cable you need.

Voltage	Cable length				
	0-2 m (0-6.6 ft)	2-3 m (6.6-9.8 ft)	3-5 m (9.8-16.4 ft)	5-7.5 m (16.4-24.6 ft)	7.5-12 m (24.6-39.4 ft)
12 V DC	4 mm^2 (12-AWG)	6 mm^2 (10-AWG)	10 mm^2 (8-AWG)	16 mm^2 (6-AWG)	25 mm^2 (4-AWG)
24 V DC	1.5 mm^2 (16-AWG)	1.5 mm^2 (16-AWG)	2.5 mm^2 (14-AWG)	4 mm^2 (12-AWG)	6 mm^2 (10-AWG)

➔ *Notes:*

- *Above values in mm^2 = area of copper conductor. Stranded core cables are recommended.*
- *Conductor sizes greater than 10 mm^2 (8-AWG) require a short length of thinner cable (6 mm^2 10-AWG) to connect into the RI-50 screw terminals.*

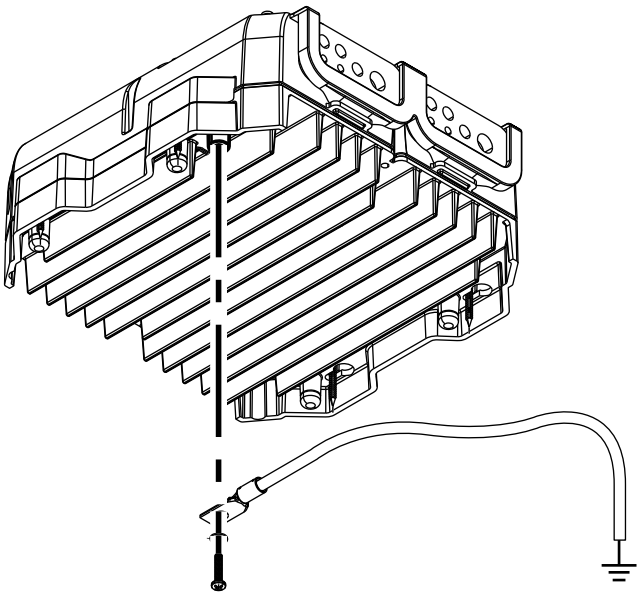
1 Strip away approximately 10 mm (0.4”) of insulation at the end of each wire.
2 Unscrew the terminal screw from the positive input **SUPPLY** connector (identified by the + sign) on the RI-50 circuit board.
3 Insert the bare end of the positive wire into the positive input connector to make a connection.
4 Tighten the terminal screw to hold the positive wire in place. Gently pull the positive wire to ensure it is secured.
5 Repeat this process to connect the negative wire to the negative input **SUPPLY** connector (identified by the – sign).
6 If you have a 24V battery system you want to protect from over discharge, change the **12/24V** switch to **24V ONLY**.



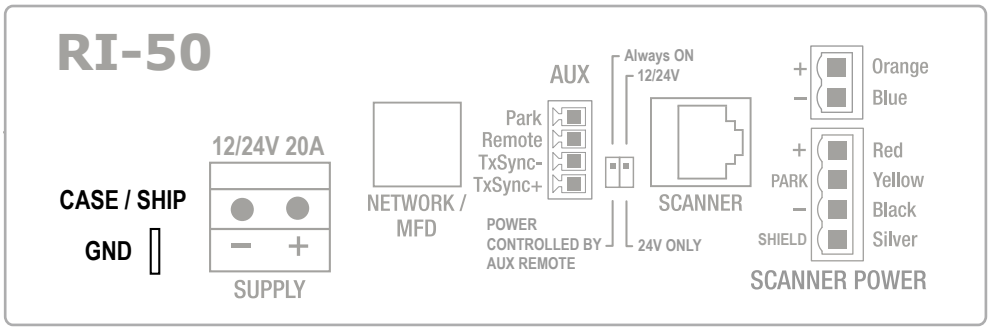
Ground the RI-50

You can ground the RI-50 using the ground terminal on the underside of the case. The chassis ground is DC isolated from power (–ve) to eliminate the risk of galvanic corrosion.

It is recommended that the RI-50 ground is connected to the vessel’s bonded ground or a non-bonded RF ground at the closest possible location, using 12 AWG wire (or thicker).



Alternatively, you can ground the RI-50 using the **CASE / SHIP GND** spade terminal on the circuit board.



Activate remote power control

The RI-50 has an optional remote power control mode that enables a compatible multi-function display or ignition switch to control the power state of the radar. When the display or switch is turned on, the radar will turn on.

To use the remote power control function:

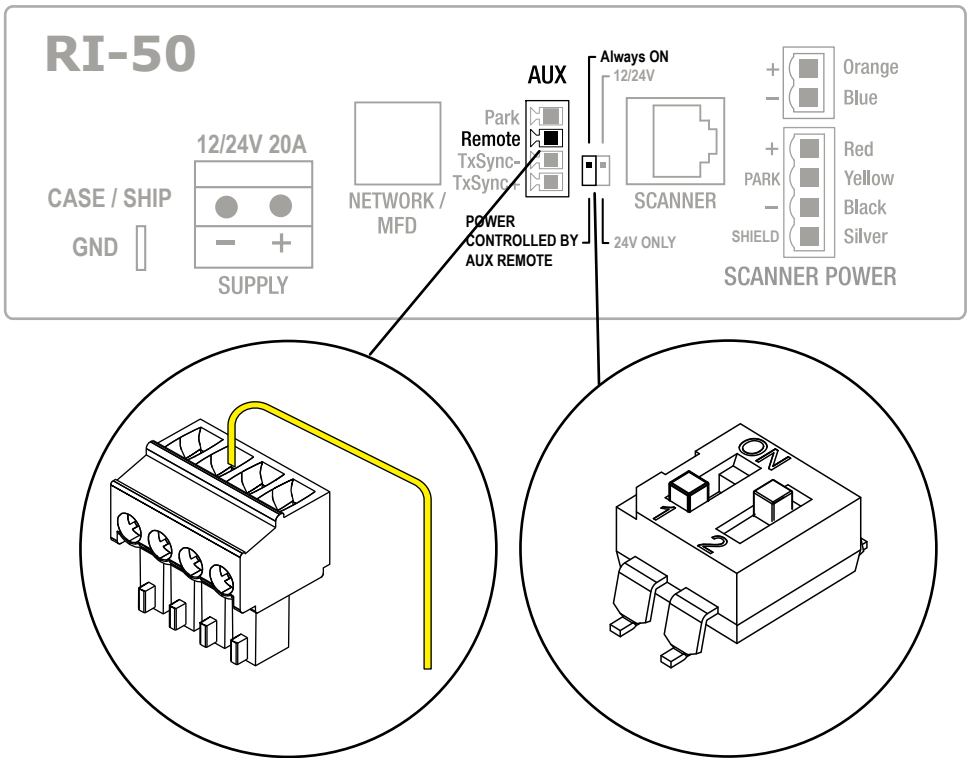
1 Move the power control switch from **Always ON** (indicated by **ON** on the switch itself) to **POWER CONTROLLED BY AUX REMOTE** (indicated by **1** on the switch).

2 Apply +V DC (5 V DC - 32 V DC) from a compatible multi-function display or ignition switch to the **Remote** input of the **AUX** connector. On a compatible multi-function display, this is the yellow wire in the power cable.

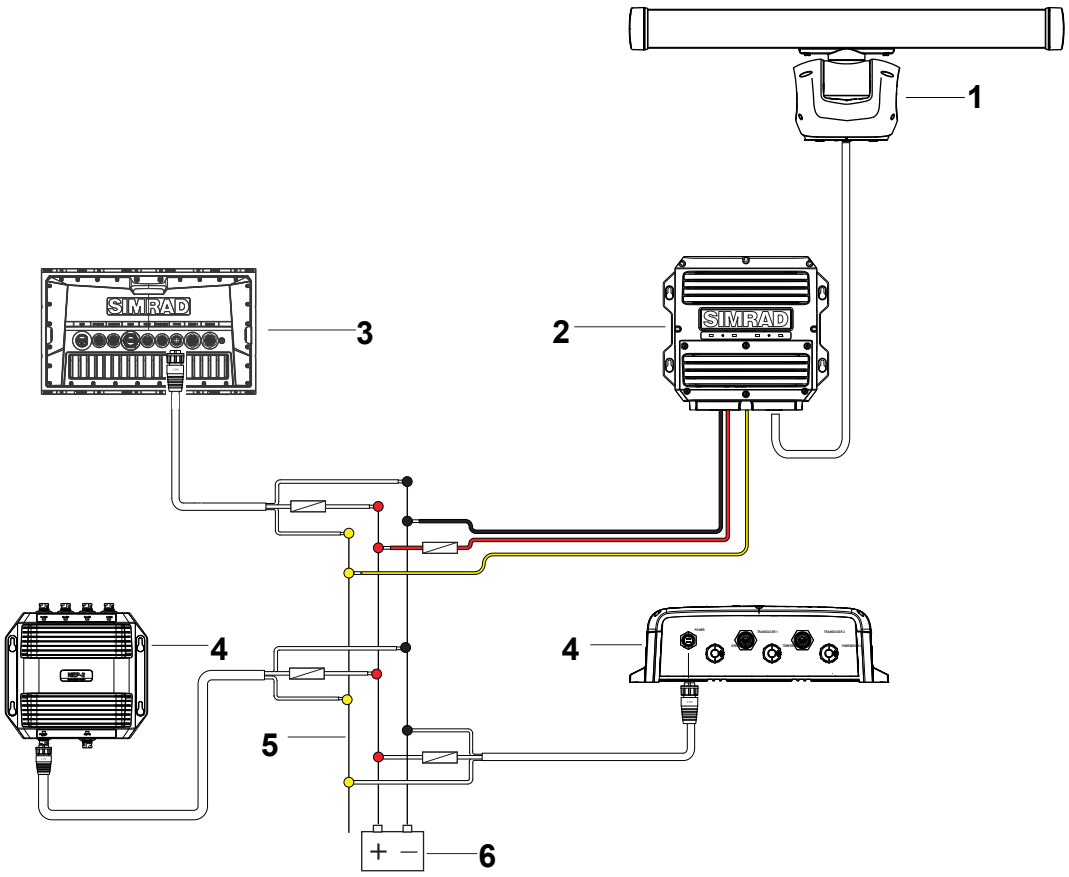
3 If you are using a multi-function display to power on the radar, set it to master (refer to the power control function in the display's user manual for instructions).

➔ *Notes:*

- If the power control switch is moved back to **Always ON**, the power wire in the **AUX Remote** port is ignored.
- If the radar is turned off via remote power control while transmitting, the radar will auto park the antenna before shutting down.
- There must be a common battery -ve for all devices on the power control bus.



The following illustration is an example of a system using remote power control:



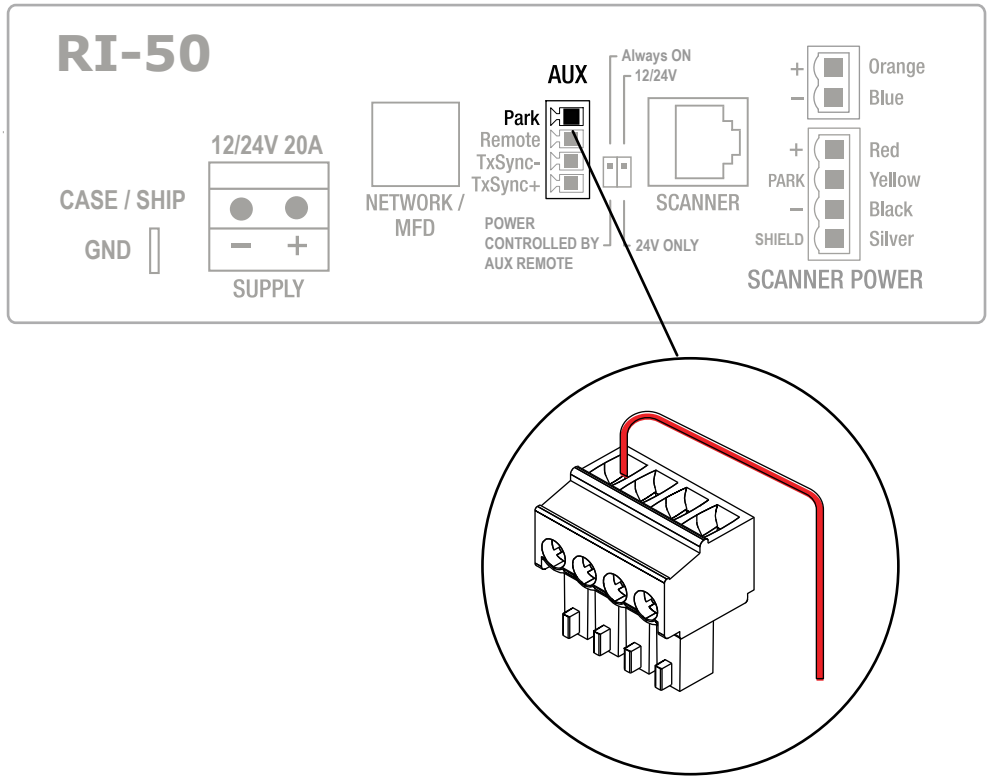
1	HALO radar pedestal and antenna
2	RI-50 radar interface module
3	Multi-function display set to power control master
4	Other Simrad® devices with remote power control
5	Power control bus
6	DC power

Activate antenna park

HALO 2000 SERIES and HALO 3000 SERIES radars have the ability to stop rotating the antenna and hold it at a predetermined angle in relation to the vessel's heading line. This park angle is set in the radar's software on your multi-function display.

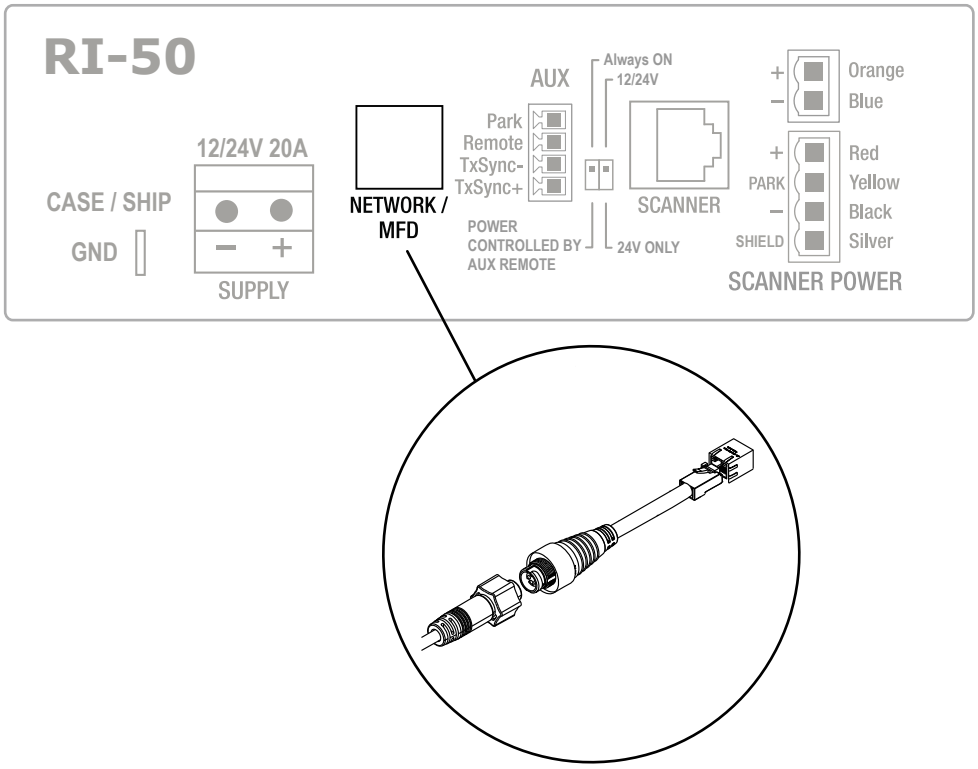
In addition, there is a park angle retention feature which is a very low current electromagnetic brake that provides resistance for the antenna to maintain a parked angle against wind and movement when the radar is not powered.

The park brake requires a continuous low current DC supply (10-32 V DC). This draws less than 100uA. To activate the antenna brake park function, connect a signal wire from the positive side of the power supply to the **Park** input on the **AUX** connector.

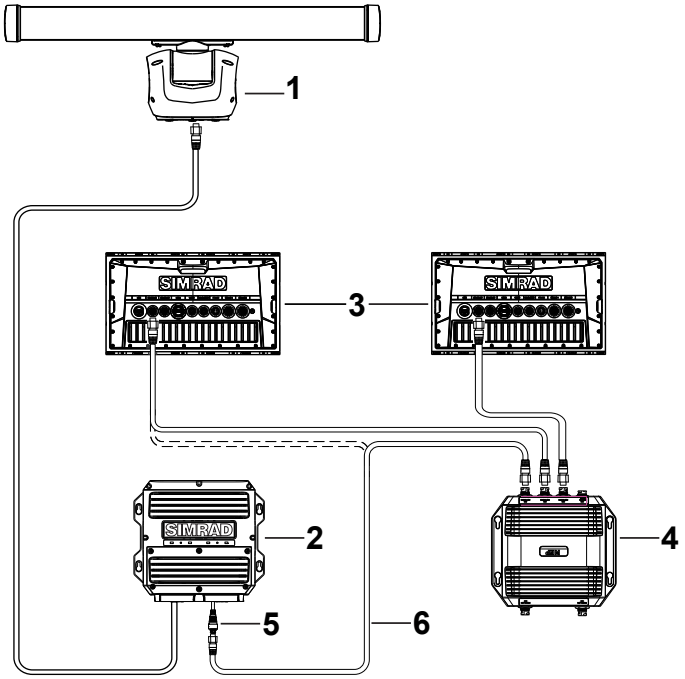


Connect the network cables

An Ethernet network is used to distribute the radar data to compatible multi-function displays. The RI-50 is connected to the Ethernet network using the supplied Ethernet cable and Ethernet adapter cable (RJ45 male to 5-pin female, 150 mm (5.9")).



The RI-50 can be connected directly to any Simrad®-compatible multi-function display or to a network switch such as an NEP-2.



1	HALO radar pedestal and antenna
2	RI-50 radar interface module
3	Compatible multi-function displays
4	NEP-2 or device with a built-in Ethernet switch
5	Ethernet adapter
6	Ethernet cable 1.8 m (6.0”)

Additional radar functions

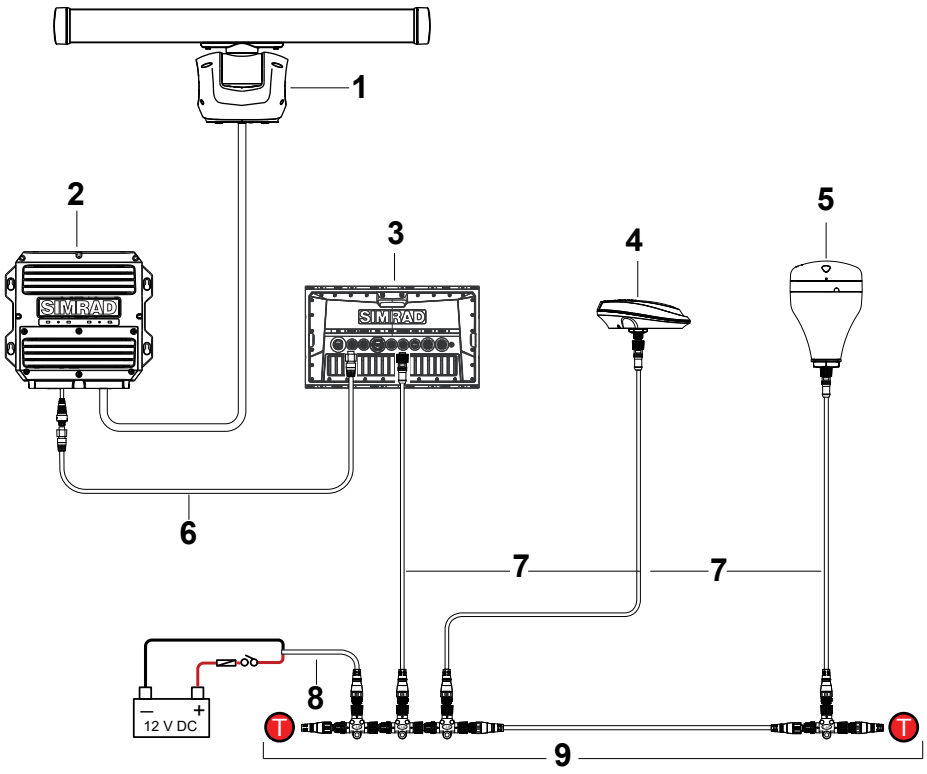
Additional radar functions such as VelocityTrack and ZoneTrack require good-quality, high-speed GPS position and heading data at 10 Hz or better. The GPS antenna must be mounted in a position that provides a clear view of the sky.

A quality 10 Hz compass such as the Precision 9 is suitable for heading, however for the very best performance, a GPS compass such as Simrad® HS75 or HS80A should be considered.

The connected multi-function display sends NMEA 2000® position and heading data to the radar via the Ethernet connection.

For radar chart overlay, an integrated GPS/compass sensor such as the Simrad® GS25 is suitable, however the compass is not suitable for VelocityTrack and ZoneTrack as it does not have 10 Hz heading output.

The following illustration is an example of a GPS and heading NMEA 2000® network:



1	HALO radar pedestal and antenna
2	RI-50 radar interface module
3	Compatible multi-function display
4	NMEA 2000®-compliant heading sensor (10 Hz minimum)
5	GPS position sensor
6	Ethernet cable
7	Micro-C drop cables
8	Network power 12 V DC
9	Micro-C backbone (NMEA 2000®) with terminators

Start the radar

When you finish connecting the cables to your RI-50, replace the cover on the circuit board and set the service mode switch on the back of the pedestal to **I** (power supply enabled).

RI-50 LED indicator lights

LED lights on the front of the RI-50 communicate its operating status.

LED	Color	Indication	Likely cause
Power	Green steady	Power is applied and AUX remote power control input is active	Normal operation
	Off	No supply voltage or remote power control input is not active	Check remote switch position. Ensure 12-24V switch is in correct position for supply voltage
Fault		The fault indicator shows existing conditions as steady colors and historic conditions as blink patterns. Re-power the RI-50 to clear a fault/warning indication.	Faults are defined as conditions that could cause damage to the equipment. Warnings indicate conditions that can cause the RI-50 to change the operating state of the radar, e.g. switching it to standby. The historic indication helps to identify the cause of intermittent problems.
	Off	Normal	
	Blue	**Under** or **Over voltage**	Low supply voltage to the RI-50
	Purple	**Over current** including short circuits	Input current > 20A or output current > 8A
	Red	**Over temperature**	The internal temperature > 90°C (194°F). Caution: The heatsink case may be too hot to touch.
	Red blink	Once the RI-50 returns to a stable state, either RUN or OFF, the fault LED will indicate its last condition.	Blink patterns indicate the type of fault or warning that is detected. The patterns repeat every 5s. Only one pattern displays at a time. Patterns consist of 1 to 4 blinks with each blink being short (.) or long (-). Warnings start with short; faults start with long. There are no patterns with all long.
		Warning .-.-	Input voltage is unstable. Check the wiring and condition of the battery or power source.
		Warning .-.	The AUX: Remote input was OFF, < 2.5V. Check the Remote Bypass switch or the external connection if used.
		Warning ..-.	Flat battery or very low input voltage, < 5V (12V) or < 9V (24V). Check the input voltage.
		Warning .	Low input voltage in 12V system, < 9.5V. The RI-50 switched to standby due to low input voltage. Could be engine cranking or other heavy load.
		Warning ..	Low input voltage in 24V system, < 19V. The RI-50 switched to standby due to low input voltage. Could be engine cranking or other heavy load.

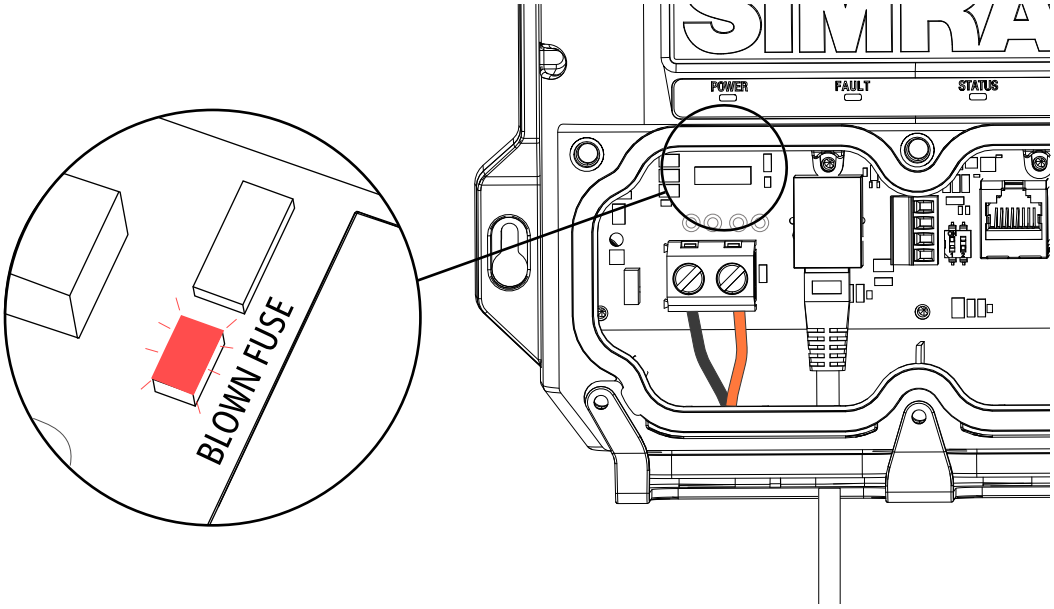
		Warning ...	The RI-50 detected voltage on its output before it turned on. If the radar was only off for a short time, it is normal for there to be residual voltage. However, it can also indicate the output switch in the RI-50 has been damaged and needs repair. This will not stop the radar from working, but does mean the only remaining fault protection in the RI-50 is the 40A input fuse.
		Warning	High input voltage, > 34V. Check your input power source. Input voltages > 36.5V can damage the RI-50.
		Fault -.	Output voltage too high, > 54V. There is a risk of damage to the connected pedestal. Get the RI-50 checked.
		Fault -..	Average input current too high, > 20A. The RI-50 will retry up to 5 times before shutting down. Can be caused by low input voltage and/or excessive load from the pedestal.
		Fault -...	Average output current too high, > 8A. The RI-50 will retry up to 5 times before shutting down. Caused by excessive load from the pedestal.
		Fault -.-.	Typically indicates a short circuit on the pedestal cable. The output current was > 10A. The RI-50 will retry up to 5 times before shutting down. Check the pedestal interconnection cable for damage.
		Fault -.-	Over temperature, > 90°C (194°F). The RI-50 will re-start after cooling down. The RI-50 should be mounted as shown in the **Hardware mounting** section of this manual so that air can flow over the heatsink. Low input voltage and heavy pedestal load will increase heating.
		Fault --.	The wrong pedestal type has been connected. Pedestals designed to work with RI-12 interface modules (older) will not work with RI-50s and could be damaged.
		Fault -..-	A software upgrade is required. Return the RI-50 for service.
Status	Green	Normal operation	Output voltage > 45V. The radar will operate regardless of any fault or warning indication.
	Green/orange fast blinking	Wrong or no radar connected	Output voltage 16V to 45V. Check the pedestal is connected and it is a compatible model.
	Orange	Pending shutdown	Output voltage 16V to 45V. Typically the radar is given 30 seconds to prepare for shutdown.
	Red	Radar is off	Output voltage <16V. Typically the output is off.

Ethernet	Green blink	Successful communication with a multi-function display	Normal operation. The LED activity increases with increasing Ethernet traffic.
	Off	Communication not established	Ethernet cable disconnected or faulty Ethernet cable to display.

Fuse

In the rare event that the non-replaceable fuse blows on your RI-50 circuit board, the **BLOWN FUSE** LED will light up while power is supplied to the RI-50. This indicates an internal fault and you will need to replace your RI-50 unit.

➔ *Note: A blown fuse indicates an internal fault with your RI-50. It does not indicate a fault with the external wiring to the RI-50 or a fault with the radar pedestal.*



SETUP AND CONFIGURATION

Make the following settings before use. Refer to the documentation supplied with your display unit to locate and adjust the settings.

Radar source

In a system with more than one radar, the device to configure is selected from here.

➔ *Note: Radars that support dual radar mode are represented twice in the source list, with an A and a B suffix.*

Radar status

Used to view information about your radar, such as the software version, serial number and operating hours.

Antenna setup

X-axis and **Y-axis.** Used to set the approximate position of the antenna on the vessel. This enables your vessel icon to be positioned correctly on the PPI.

Height. Used to set the height of the antenna above the water line. Ensure the antenna height is set correctly, as it affects the sea clutter function. Do not set the height to zero.

Span. Used to select the length of your antenna.

Adjust bearing alignment

Used to compensate for any slight misalignment of the pedestal during installation and to make sure targets and bearings taken with the electronic bearing line display accurately. The adjustment is made by aligning the heading marker on the screen with the center line of the vessel.

Sidelobe suppression

Used to increase the suppression if there are false targets appearing as arcs radiating from either side of an actual target (typically large structures such as steel hulled ships, container wharves and large buildings). By default this control is set to Auto, and normally should not need to be adjusted.

➔ *Note: This setting should only be adjusted by experienced radar users. Target loss in harbor environments can occur if it is not adjusted correctly.*

Sector blanking

Used to stop the radar transmitting in the direction of structures that could cause unwanted reflections or interference to appear on the radar image. Four sectors can be set, the bearing of which is measured from the bow of the vessel to the center line of the sector.

Adjust open array park angle

Used to set the resting position of the antenna relative to the heading line of the radar when the radar is set to standby. The antenna will stop rotating at the desired offset. Optionally, the antenna can be held in place against wind by connecting the antenna park wire.

➔ *Note: When entering standby, the antenna may rotate multiple times before coming to rest.*

HALO light

Used to control the brightness level of the blue LED accent light on the pedestal. There are four brightness levels. The level can only be adjusted when the radar is in standby mode.

⚠ **Warning: The pedestal's blue accent lighting may not be approved for use in your boating location. Check your local boating regulations before turning the blue accent light on.**

Reset radar to factory defaults

Used to reset the radar's control settings (not installation settings) to their factory defaults.

Error codes

If you encounter an error code, power cycle the radar. If the error code reappears, refer to this list for guidance.

Error code	Description	Recommendation
0x00000001	Radar saved settings corrupted	Radar will revert to factory defaults. Re-enter your settings including installation settings.
0x0001000C	Scanner not detected	Check the pedestal interconnection cable connections. Power cycle the radar. Check input voltage.
0x0001000D	Transmitter overheat (soft)	Try changing to shorter ranges <6 NM. Switch to STBY. Allow unit cool.
0x0001000E	Transmitter overheat (hard)	Switch to STBY. Isolate power to the radar and contact service.
0x0001000F	Signal processing error	Unit should revert to STBY. Select transmit. If problem persists, power cycle the radar.
0x00010017	Scanner failure	Contact service
Power supply		
0x00010010	Power supply overheating	Switch to STBY. Allow unit to cool then retry.
0x00010011	Power supply voltage error	Check pedestal interconnection cable for corrosion or damage.
0x00010012	Power supply overload	Contact service
0x00010013	Power supply hardware fault	Contact service
0x00010014	Power supply comms fault	Contact service
0x00010019	Low battery voltage (Supply voltage low)	Recharge and check supply voltage. Restart the radar.
0x00010016	LED Lighting fault	Turn accent lighting off then retry.
0x00010018	Radar interface box fault	Check LED status light. Check the pedestal interconnection cable for damage.
Mechanical		
0x00010001	Zero bearing sensor fault	Contact service
0x00010002	Bearing sensor fault	Contact service
0x00010015	Mechanical transmission fault	Contact service
0x00010003	Motor drive fault	Contact service
0x0001001A	Motor or antenna has stalled	Power down the radar. Check and clear antenna obstructions such as ice.

UPGRADING

HALO 3000 SERIES radars have higher current draw than HALO 3/4/6 SERIES radars due to a more powerful motor and higher transmit power.

If you are upgrading from a HALO 3/4/6 SERIES radar to a HALO 3000 SERIES radar, you should change the interconnection cable.

If you are upgrading from a HALO 3/4/6 SERIES radar to a HALO 2000 SERIES radar, you may use the existing interconnection cable but we recommend you inspect the condition of the connectors.

➔ *Note: At the time of release, HALO 2000 SERIES and HALO 3000 SERIES radars work with Simrad® GO XSR, GO XSE (9/12), NSS evo3, NSS evo3S, NSO evo3, NSO evo3S and NSO evo3S MPU systems. They also work with Simrad® R2009 and R3016 radar control units.*

Record the old settings

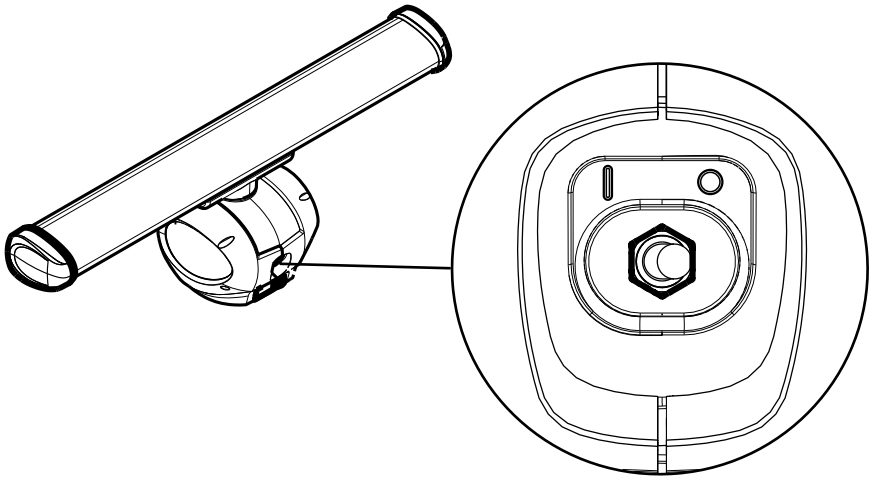
1 Take note of the old radar settings, i.e. antenna height and span (if re-using the antenna), range offset, bearing alignment, sidelobe suppression, sector blanking and open array park angle. This will help you set up your new radar on the display unit.

Isolate power to the radar

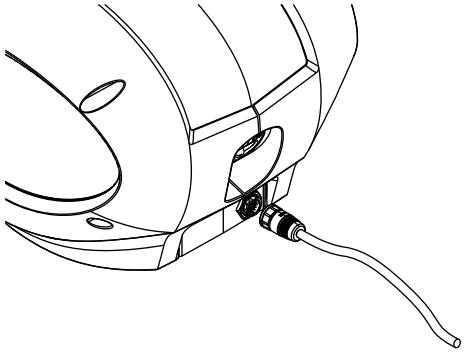
2 Turn off the circuit breaker or remove the fuse.

Remove the old pedestal

3 Set the service mode switch at the back of the pedestal to **0** (power supply disabled).



4 Disconnect the interconnection cable from the pedestal.

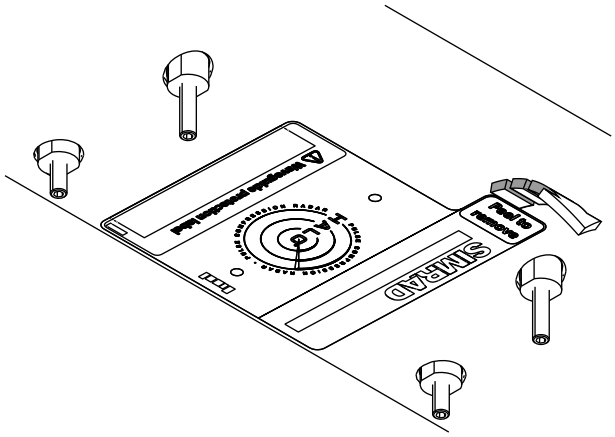


5 Cover the 14-pin end of the interconnection cable to protect it from water and contaminants.

6 Use a socket and torque wrench to remove the dome nuts that hold the antenna to the pedestal.

7 Carefully lift the antenna off the pedestal.

8 If re-using the antenna, cover the waveguide to protect it from water and contaminants.

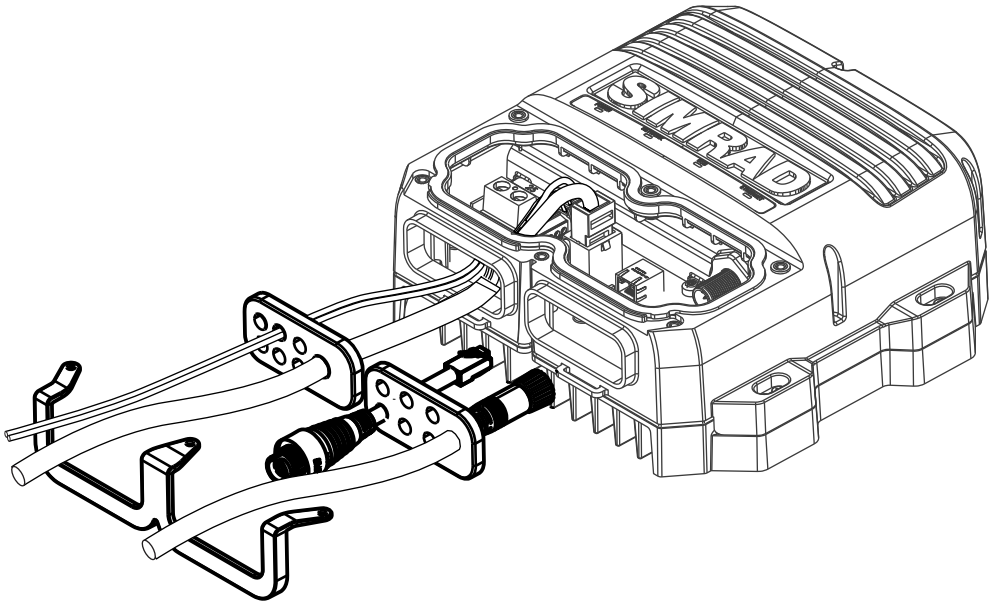


Remove the RI-12

9 Remove the circuit board cover from the RI-12 by unscrewing the six retaining screws.

10 Remove the grommet retaining clip.

11 Remove the rubber grommets.



12 Disconnect the power cable from the **SUPPLY** connector.

13 Unplug the RJ45 connector end of the interconnection cable from the **SCANNER** connector.

→ *Note: Keep wires connected to RJ45 connector.*

14 Unplug the green 4-way connector from **SCANNER POWER** connector.

→ *Note: Keep wires connected to 4-way connector.*

15 If used, unplug the AUX connector.

→ *Note: Keep wires connected to the AUX connector.*

16 Unplug the Ethernet cable.

17 Unplug the Micro-C NMEA 2000® connector (This cable can be removed as it is not needed with the RI-50 interface module.)

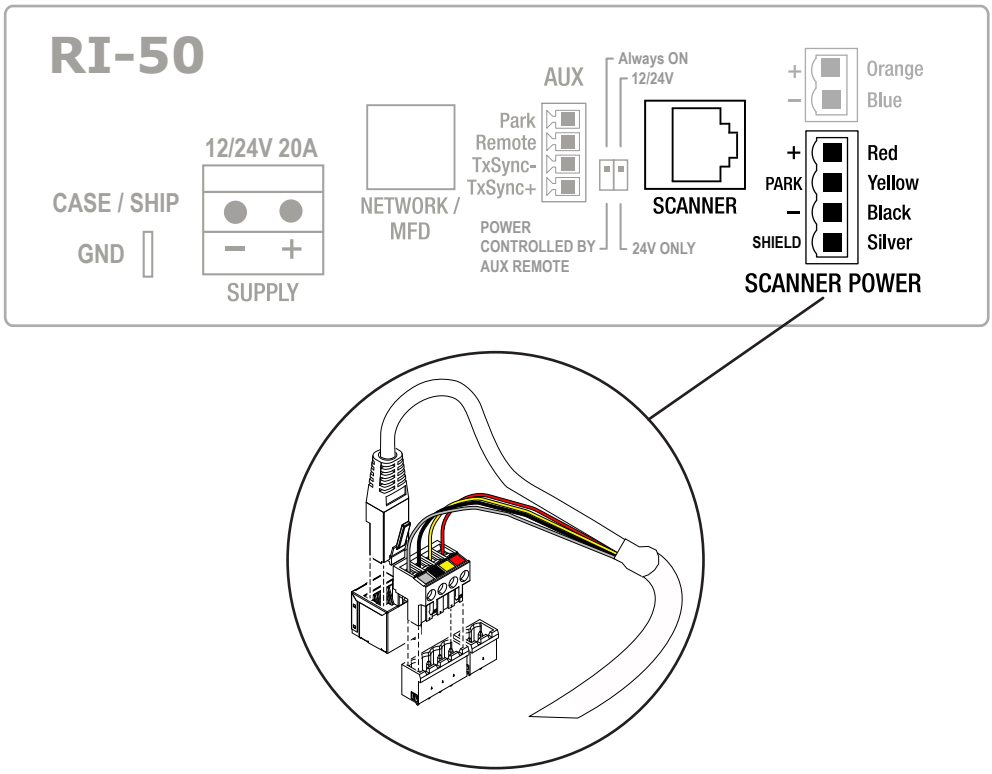
18 Unscrew the RI-12 from its mounted location.

19 Remove the grounding wire if used.

Install the RI-50 and new pedestal

To install the RI-50 and your new HALO 2000 SERIES or HALO 3000 SERIES pedestal, follow the steps in the **Hardware mounting** and **Wiring** sections in this manual.

➔ *Note: If you are re-using the original interconnection cable, only connect four wires to the 4-way **SCANNER POWER** connector on the circuit board. You won't use the 2-way connector.*



SPECIFICATIONS

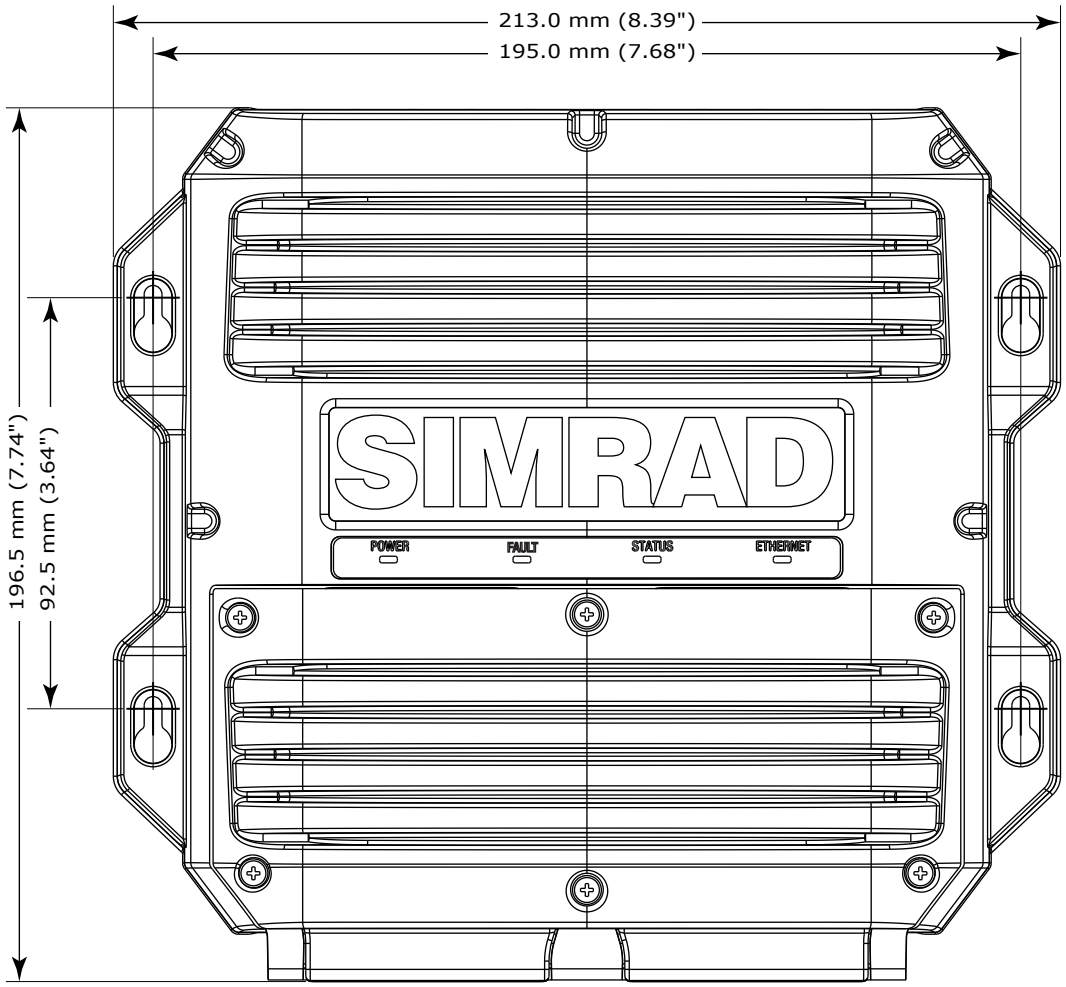
Type of approval	FCC/IC/RED Type Certification HALO 2000 SERIES FCC ID: RAYHALO2000 (Navico Inc.) IC ID: 978B-HALO2000 (Navico Inc.) HALO 3000 SERIES FCC ID: RAYHALO3000 (Navico Inc.) IC ID: 978B-HALO3000 (Navico Inc.) EU RED: Emissions compliant to SM1541-4 (including -40 dB/dec future design objectives) and EN302-248 V2.1.1	
Environmental		
Operating temperature	-25°C to +55°C (-13°F to +131°F)	
Relative humidity	IEC60945 Exposed product	
Vibration	IEC60945 Exposed product	
UV	IEC60945 Exposed product	
Waterproofing	IPX6 for the pedestal and antenna IPX5 for the RI-50 interface module	
Relative wind velocity	HALO 2000 and HALO 3000 radars with 3 ft, 4 ft or 6 ft antenna have a wind rating of 80 knots at 48 rpm in both 24V and 12V systems.	
Power		
Power consumption	HALO 2000 SERIES	235 W (peak, 12V) at maximum wind velocity 380 W (peak, 24V) at maximum wind velocity 45-60 W (average) at zero wind velocity 11 W (average) in standby mode Refers to RI-50 input terminals
	HALO 3000 SERIES	250 W (peak, 12V) at maximum wind velocity 395 W (peak, 24V) at maximum wind velocity 45-75 W (average) at zero wind velocity 11 W (average) in standby mode Refers to RI-50 input terminals
DC input	Radar system input 12 OR 24 V DC into the RI-50 12 V Systems 10.8 - 15 V DC 24 V Systems 20 - 31.2 V DC Pedestal voltage input is 50 V DC nominal generated by RI-50	
Power up time	30-40 seconds from POWER OFF to TRANSMIT	
Physical		
Height	429 mm (16.88”) with antenna mounted	
Antenna turning circle diameter	3 ft model: 3.75 ft / 1142 mm / 44.96” 4 ft model: 4.73 ft / 1443 mm / 56.81” 6 ft model: 6.72 ft / 2047 mm / 80.59”	
Component weights	Pedestal Antenna 3 ft Antenna 4 ft Antenna 6 ft RI-50 10 m (33 ft) cable 20 m (66 ft) cable 30 m (100 ft) cable	20.3 Kg (44.8lb) 4.1 Kg (9.0 lb) 4.9 Kg (10.8 lb) 6.5 Kg (14.3 lb) 1.6 Kg (3.5 lb) 1.6 Kg (3.5 lb) 3.2 Kg (7.1 lb) 4.7 Kg (10.4 lb)

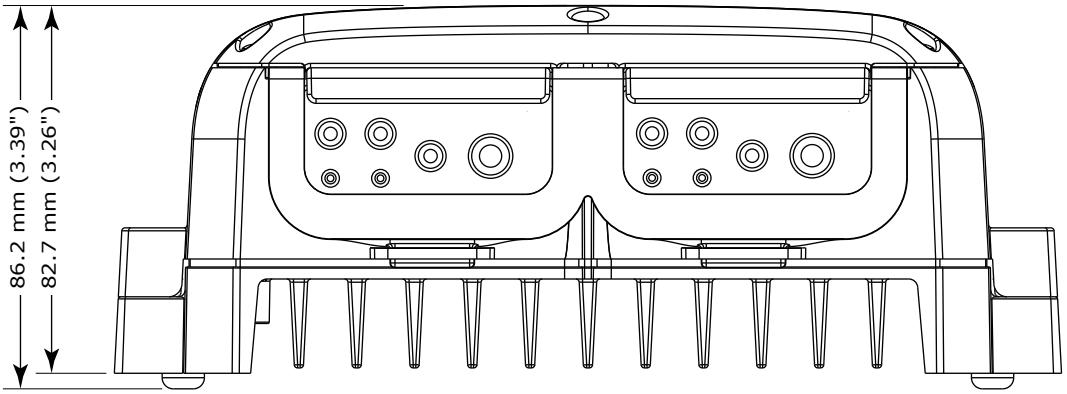
Antenna		
Rotation speed	16 to 48 rpm depending on operating mode.	
Beam width	3 ft model: 2.4°+/-10% (-3 dB width) – 1.7° with Beam sharpening mode on 4 ft model: 1.8°+/-10% (-3 dB width) – 1.3° with Beam sharpening mode on 6 ft model: 1.2°+/-10% (-3 dB width) – 0.8° with Beam sharpening mode on	
Beam width vertical	25° +/-10 % (-3 dB width)	
Plane of polarization	Horizontal polarization	
Sidelobe level 3 ft	Below -23 dB max. (within ±10°) Below -30 dB max. (outside ±10°)	
Side lobe level 4 ft	Below -23 dB max. (within ±10°) Below -30 dB max. (outside ±10°)	
Side lobe level 6 ft	Below -23 dB max. (within ±10°) Below -30 dB max. (outside ±10°)	
Radar		
Peak power output	HALO 2000 SERIES	50 W ± 10% under any transmit condition – up to 10% duty cycle max
	HALO 3000 SERIES	130 W ± 10% under any transmit condition – up to 13% duty cycle max
Transmitter	Solid state module with no long-term transmitter power degradation	
Transmitter frequency	Synthesized - Upper half of X-Band 9.390 - 9.495 GHz	
Pulse length/PRF and compression ratio	Pulse length: 0.04 usec Chirp length: 2-64 usec Chirp bandwidth: 2-48 MHz Up to 1 pulse and 4 chirps in a burst with burst repetition rate of 500-3000Hz. Range and mode dependent. Effective pulse compression ratio less than 150 in all modes.	
Instrumented range	HALO 2000 SERIES (all antenna sizes)	72 nm
	HALO 3000 SERIES (all antenna sizes)	96 nm
SART/RACON triggering	Yes – trigger distance: about 1nm max – weather, sea state, and SART position dependent	
Duplexer	Circulator and isolator	
LNA	GaAs front-end	
IF section	Center frequency: 31.25 MHz Bandwidth: 50 MHz max.* A/D; 16 bit 125 MSPS *Narrower bandwidths defined by signal processing	
Noise figure	5 dB (Min) at antenna input	
Compass safe distance	Pedestal	Standard compass: 1.0 m (3.3 ft) Steering compass: 0.5 m (1.6 ft)
	RI-50	Standard compass: 0.1 m (0.33 ft) Steering compass: 0.1 m (0.33 ft)

Other	
Communication ports	Ethernet 10/100 Base-T RJ-45 for radar data and control
Transmit synchronization	RS-422 output
Remote power on	Yes
Antenna park hold	Yes (while radar is unpowered)
Motor	Brushless with solid state commutation with electromagnetic braking for parking.
Interconnecting cable	Available in 10 m (33 ft), 20 m (66 ft), 30 m (100 ft) lengths. 20 m (66 ft) length cable included with unit. Options for cable to exit from rear of pedestal or pole mount. 3G/4G or HALO 3/4/6 SERIES interconnection cables can be used with the HALO 2000 SERIES only.

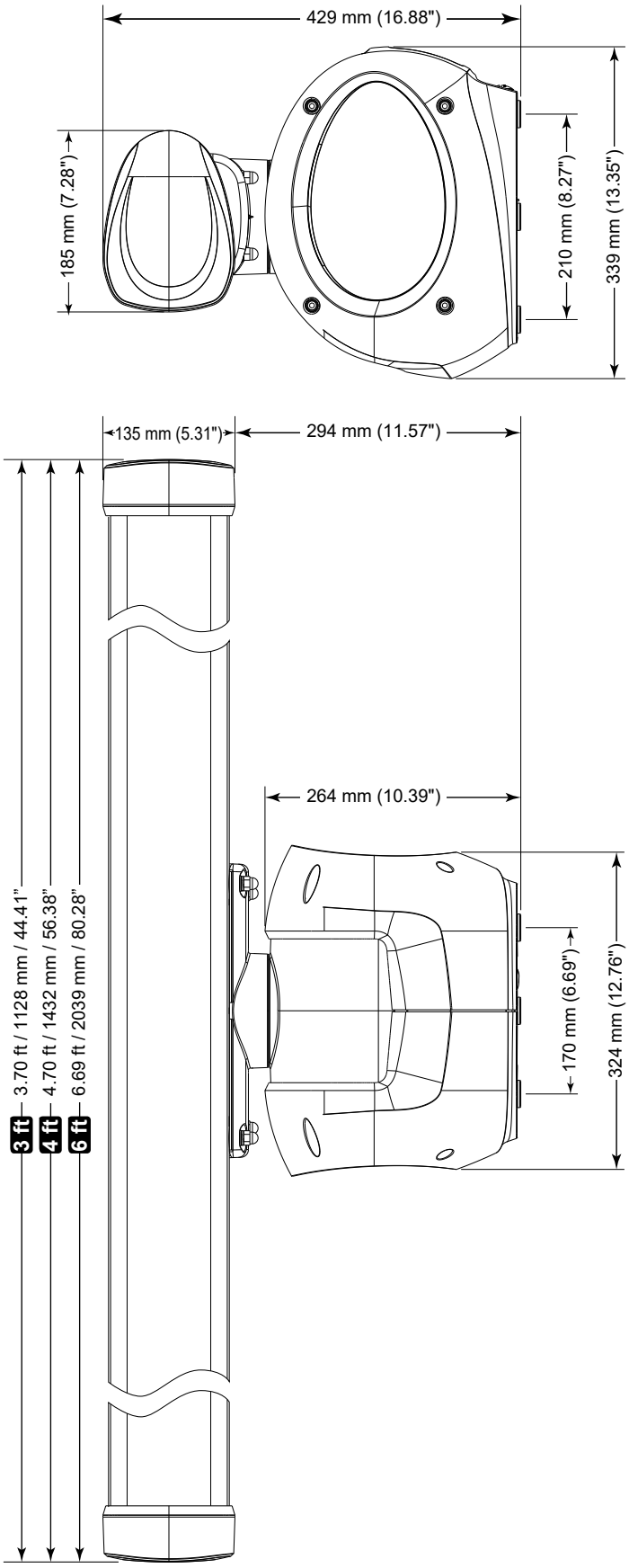
DRAWINGS

RI-50

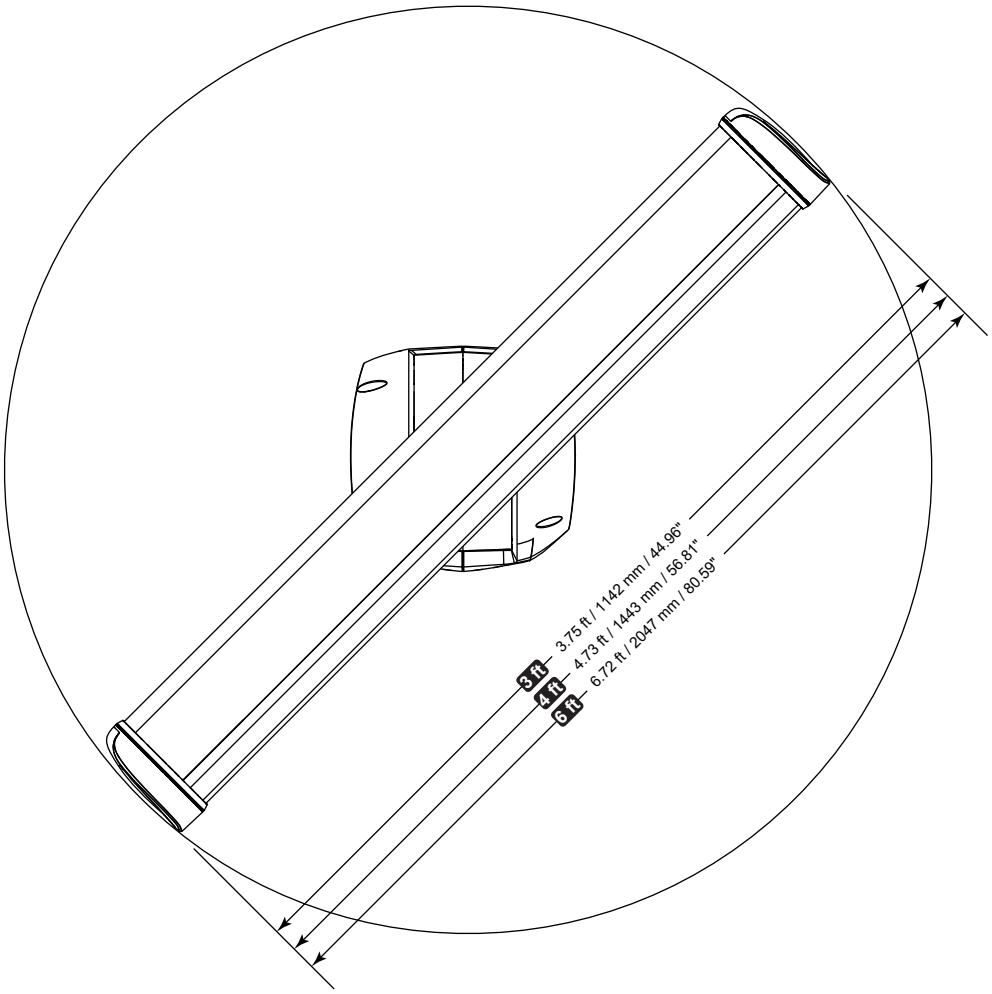




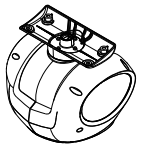
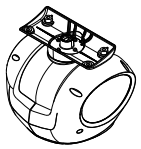
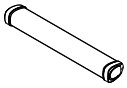
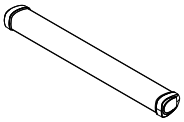
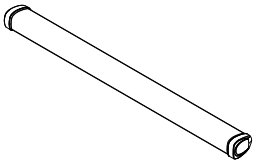
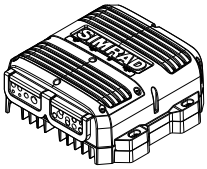
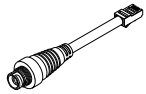
Pedestal and antennas



Antenna turning circle diameters



PARTS LIST

	000-15762-001	HALO 2000 SERIES pedestal
	000-15766-001	HALO 3000 SERIES pedestal
	000-11464-001	3 ft antenna 3.70 ft / 1128 mm / 44.41″
	000-11465-001	4 ft antenna 4.70 ft / 1432 mm / 56.38″
	000-11466-001	6 ft antenna 6.69 ft / 2039 mm / 80.28″
	000-15757-001	RI-50 radar interface module
	000-15767-001	Interconnection cable 10 m (33 ft)
	000-15768-001	Interconnection cable 20 m (65.6 ft)
	000-15769-001	Interconnection cable 30 m (98.5 ft)
	000-11246-001	Adapter cable: yellow Ethernet female to RJ45 male. 150 mm (5.9″)

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