SIMRAD®

HALO® 5000

Installation manual

English



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PREFACE

Disclaimer

⚠ **WARNING: Refer to important safety information in the user app guides, product documentation and review all warnings, limitations, and disclaimers before using this product.**

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 use 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.

BRUNSWICK CORPORATION AND ITS SUBSIDIARIES, BRANCHES AND AFFILIATES DISCLAIM ALL LIABILITY FOR ANY USE OF THIS PRODUCT IN A WAY THAT MAY CAUSE ACCIDENTS, DAMAGE OR THAT MAY VIOLATE THE LAW.

This manual represents the product as at the time of printing. Brunswick Corporation and its subsidiaries, branches and affiliates reserve the right to make changes to 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.

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- HALO® is a registered trademark of Navico Group.
- Tef-Gel® is a trademark of Ultra Safety Systems, Inc.

Warranty

The warranty card is supplied as a separate document. In case of any queries, refer to the brand website of your unit or system: **www.navico-commercial.com**.

Compliance

Navico declare under our sole responsibility that the product conforms with the requirements of European Council Directive 2014/90/EU on Marine Equipment modified by Commission Implementing-Regulation (EU) 2023/1667 8 August 2023 - Wheelmark.

➔ ***Note:*** *The R5000 system is Wheelmark approved only when installed according to the relevant MED-B certificate.*

United States of America

This product has been assigned **U.S.Coast Guard Module B number** in accordance with the European Council Decision 2004/425/EC dated 21 April 2004 on the conclusion of an Agreement between the European community and the United States of America on Mutual Recognition of Certificates of Conformity for Marine Equipment.

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: The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

➔ ***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. 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 the 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 of the receiver is connected*
- *Consult the dealer or an experienced technician for help*

Canada

This device complies with Industry 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.

Le présent appareil est conforme aux CNR d'Industrie Canada 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.

About this manual

Intended audience

This manual is written for system installers, professional installation and service engineers. It assumes the reader has basic knowledge about this type of equipment in regards to:

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

Change log

Part number	Date and description
988-13139-001	2023-Oct-12
	First version
988-13139-002	2023-Dec-18
	Update compliance and copyright.

Safety precautions

Safety precautions described in this section are applicable to the radar system. They are general safety precautions that are not related to any specific procedure, and they might therefore not appear elsewhere in this manual. They are recommended precautions that personnel must understand and apply during the operation and maintenance of the system.

You are obliged to read these operating instructions prior to operation, and to adhere to the operating instructions in order to prevent possible danger. Prevention of danger includes that operator personnel are trained and authorized for safe operation of the equipment. We assume no liability for damage due to improper operation which could have been prevented.

The system must only be operated by persons who have passed the relevant mandatory training on the respective systems and applications. Only reading these operating instructions cannot replace such training. Persons authorized to operate, maintain, and troubleshoot the system are instructed and trained by Simrad. Persons operating or servicing systems must be familiar with the general safety regulations and specific safety systems, and they must have passed all the required training. They must have read the relevant operating instructions and manuals before starting to work.

Have these operating instructions always at hand on all relevant locations and ensure that copies are available to all operators. Operating personnel must always follow all safety regulations.

During normal operations, the unit can be quickly disconnected from the main power line by turning OFF the relevant circuit breaker located on the electric switchboard.

Do not replace components or make adjustments inside the unit when the voltage supply is turned ON. Always remove power and discharge to ground a circuit before touching it. Under no circumstances should any person initiate servicing or repairing the unit except in the presence of a qualified person.

Ensure unobstructed access to all operator panels, controls, and relevant switchgear cabinets in order to enable instant response to alarms.

Whenever it is necessary to disconnect the waveguide from a radar transmitter for maintenance purpose, the transmitter output should be terminated with a matched load. If this is not possible, care should be taken. Do not stand in front of an open-ended waveguide from which power is being radiated.

➔ ***Note:*** *Main power is always present on the terminal board unless the main break from the power distribution panel of the vessel is turned off.*

⚠ **WARNING: Never look down a waveguide from which power is being radiated.**

Warnings

Radio frequency (RF) exposure

Harmful effects (particularly to the eyes) may be caused by exposure of any part of the human body to high power radio frequency radiation. The system is designed to always disable the microwave radiation when the antenna is not rotating.

Hazard distances

System	Distance 100 W/m² point	Distance 50 W/m² point	Distance 10 W/m² point
Halo 5000 Series	0.8 m	0.11 m	2.5 m

X-Ray radiation

This radar system does not generate X-ray radiation.

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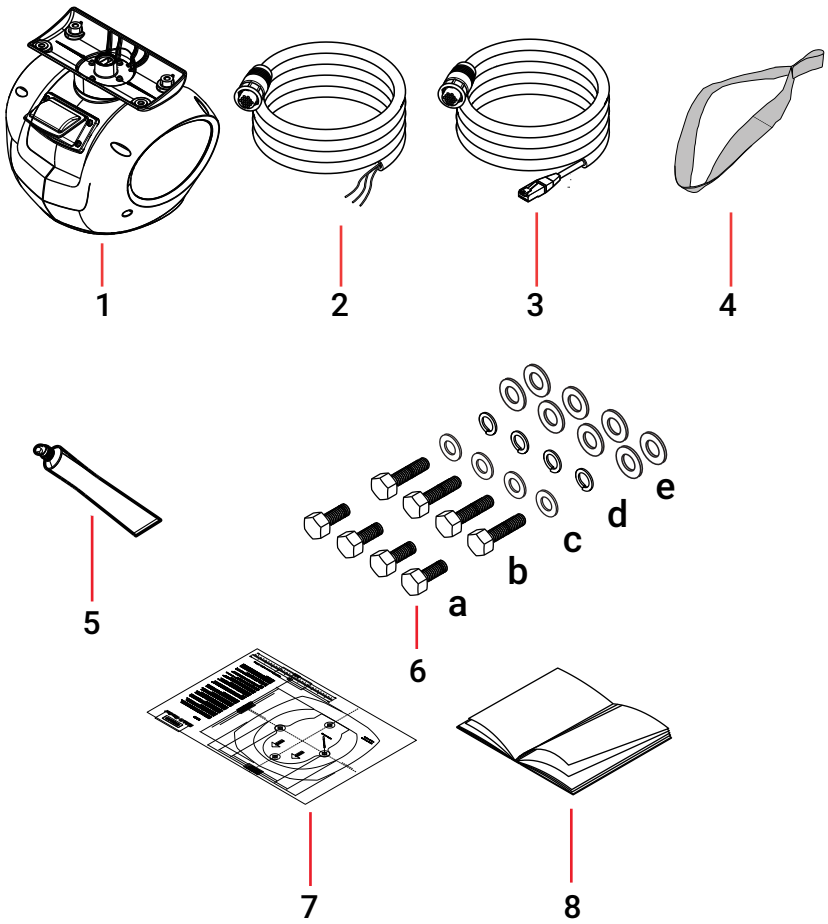
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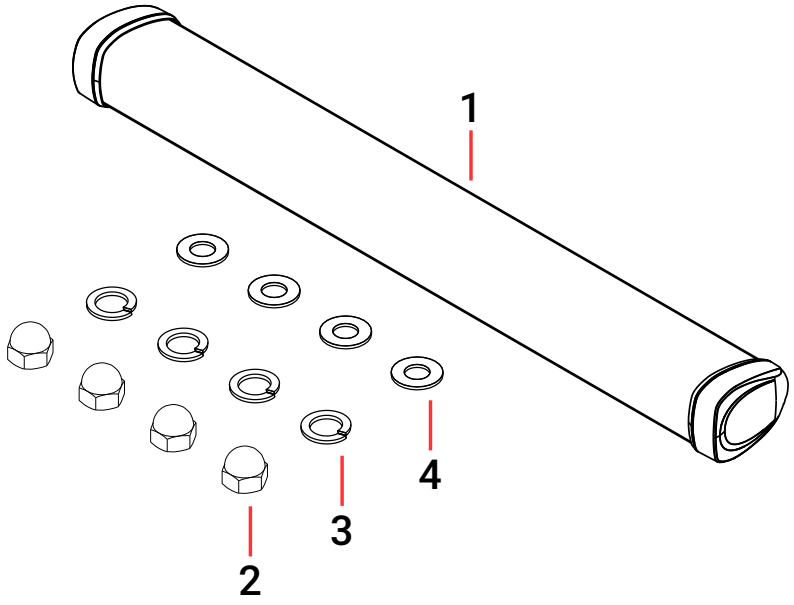
IN THE BOX

Pedestal



1	Radar pedestal		
2	Radar power cable 30 m (98.4 ft) or 65 m (213.3 ft)		
3	Radar data cable 30 m (98.4 ft) or 65 m (213.3 ft)		
4	Lifting strap		
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	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**

INSTALLATION

⚠ **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 5000 radar, make sure the service mode switch at the back of the pedestal is set to 0 disabling antenna rotation and RF transmission.**

The information provided by radar is of vital importance to skippers and the safe navigation of ships. Special care should be taken to ensure correct installation of the radar in order to ensure the performance of the radar system is not compromised.

Interference, either by reflecting structures or other RF transmitters, may significantly impair radar performance by creating blind sectors, clutter on the radar display, or false targets.

The antenna should be mounted clear of any structure that may cause signal reflection and resultant blind sectors. Large flat metallic structures perpendicular to the radar generally cause the worst reflections and should be avoided.

All hardware should be mounted with appropriate gauge and number of fasteners. The radar mounting structure should be determined to be fit for purpose, capable of supporting the radar in any weather or sea state.

Service platform

Safe service access should be provided using service platforms where necessary. Service platforms should have a minimum size of 1 m^2 with a safety rail both of a suitable height.

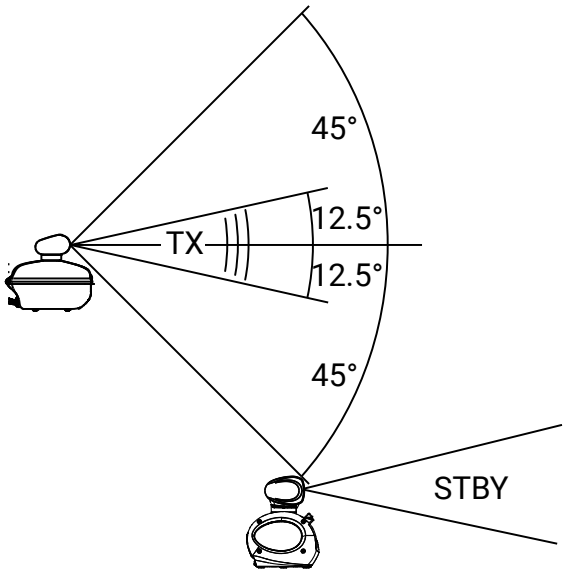
The design of the mounting platform for the HALO 5000 radar should take into account the vibration requirements defined by IEC 60945.

The mounting platform should be level when the vessel is loaded and underway at a typical cruise speed.

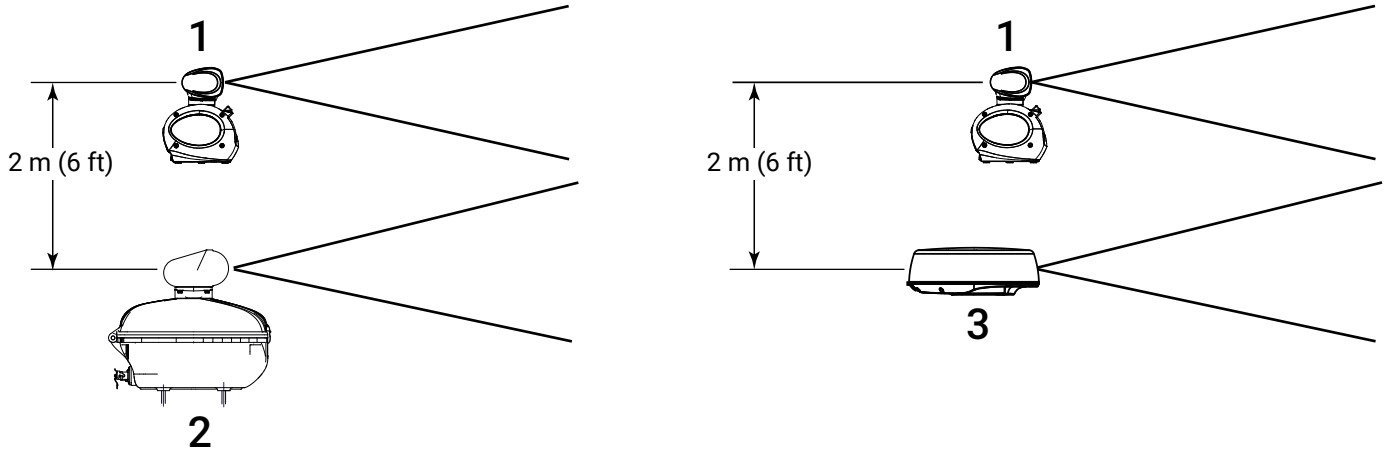
➔ ***Note:*** *When working at height, ensure appropriate safety harness and lanyard is used.*

Interference

Other radars and multi-radar installations



Do not install the HALO 5000 radar on the same horizontal beam plane as any other radar. Radar antennas in close proximity should have a minimum vertical separation angle of 45° and a minimum vertical separation of 2 m (6 ft).



1	HALO 5000 radar
2	Conventional pulse radar
3	HALO 20, 20+ or 24 dome radar

➔ ***Note:*** *Possible interference can be reduced using the radar's sector blanking.*

Other RF Sources

The radar antenna should be installed at a safe distance from interfering high-power energy sources and other transmitting and receiving radio antennas.

Sensitive equipment

Some electronics such as GPS and electronic heading sensors may be particularly sensitive to radar emissions. Follow the manufacturer's guide on suitable separation distance. Avoid having such equipment directly in the beam of the radar.

Obstructions and blind sectors

Railings

The underside of the radar antenna should be a minimum of 50 cm above a safety rail.

Swing diameter

Ensure all obstructions are clear of the rotation of the antenna. To avoid the antenna coming in contact with other installed objects while it is rotating, ensure that there is at least 200 mm between the swing circle (turning radius) and the other installed objects.

Blind sectors

Blind sectors should be kept to a minimum, and they should not occur in an area of the horizon from right ahead to 22.5° abaft the beam to either side. Any two blind sectors separated by 3° or less should be treated as one combined blind sector. Individual blind sectors of more that 5°, or a total of blind sectors more than 20° should not occur in the remaining area abaft the aforementioned area. For radar installations with two radar systems, where possible, the antennas should be placed in such a way as to minimize blind sectors.

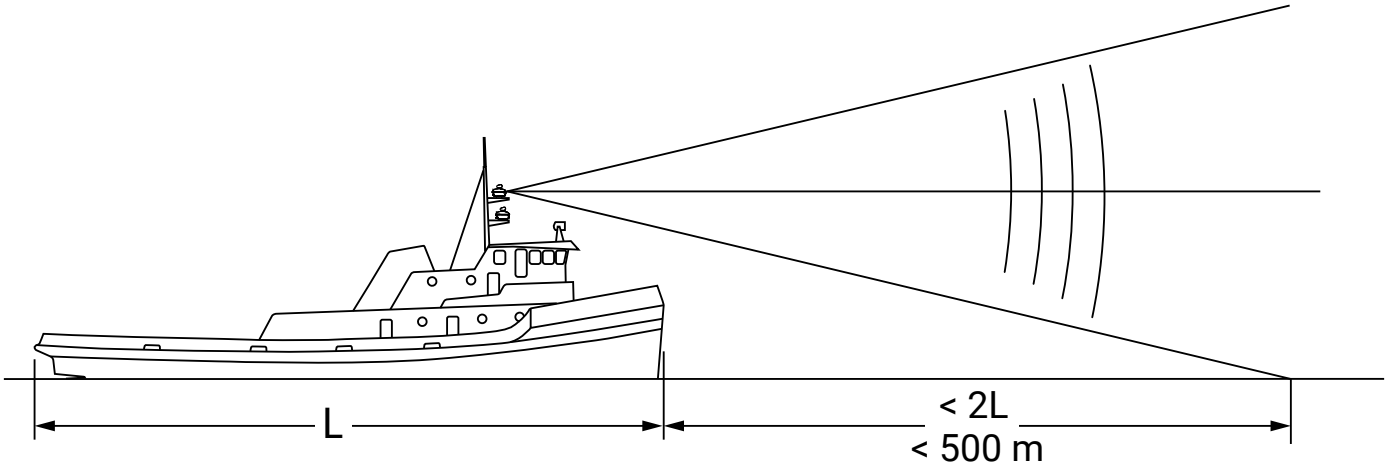
Performance monitor

The radar should be installed in an orientation that ensures no performance monitor antenna obstructions. The radar system will present a warning if sector blanking is set within the 30° area of the performance monitor.

Distance to water surface

For all radar systems, where practical, a line of sight from the radar antenna to the bow of the ship should reach the surface of the sea at no more than 500 m or twice the ship length, depending on which value is smaller. This goes for all load and trim conditions.

Radar antenna height implications



Antenna elevation table

The antenna elevation from the water surface determines the distance the radar beam travels before hitting the water surface.

Height (m)	1	2	3	4	5	7.5	10	15	20	25	30	40	50
Distance (m)	4.7	9.4	14.1	18.8	23.5	35.3	47.0	70.6	94.1	117.6	141.1	188.2	235.2

Elevation impact

The radar antenna should be installed in an elevated position to permit maximum target visibility, but not higher than necessary as sea clutter increases and short range performance is compromised with increased installation height. On smaller vessels excessive height may also have a negative impact on vessel stability.

Mounting guidelines

- Choose a location that will not expose the unit to conditions that exceed the specifications.
- The mounting surface needs to be structurally strong with as little vibration as possible.
- Ensure that any holes cut are in a safe position and will not weaken the boat's structure.
- Before cutting a hole in a panel, make sure there are no hidden electrical wires or other parts behind the panel.
- Check that it is possible to route cables to the intended mounting location. Leave sufficient clearance to connect all relevant cables.
- Make drip and service loops for cables.

⚠ **WARNING: Inadequate ventilation and subsequent overheating of the unit may cause unreliable operation and reduced service life. Exposing the unit to conditions that exceed the specifications could invalidate your warranty.**

HALO 5000 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.**

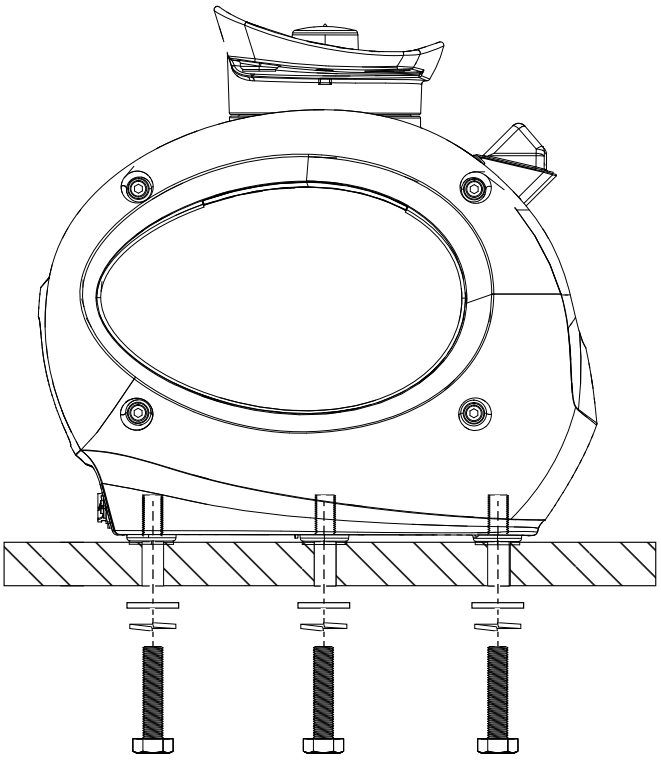
Bolts and washers

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

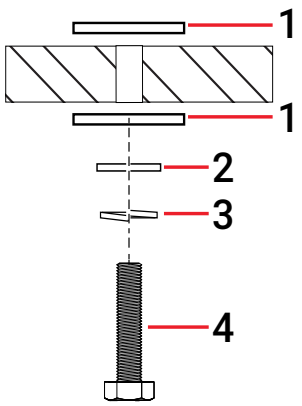
- Use the 4 x M12 x 35 mm for a surface thickness from 5 mm (0.2″) up to 13 mm (1/2″).
- Use the 4 x M12 x 50 mm for a surface thickness from 13 mm (1/2″) up to 25 mm (1″).

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.



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



1	Plastic isolating washer, M12 x 38
2	Flat washer, M12 x 36 x 3, 316 s/s
3	Spring washer, M12, 316 s/s
4	Bolt, hex head, M12, 316 s/s

Mounting

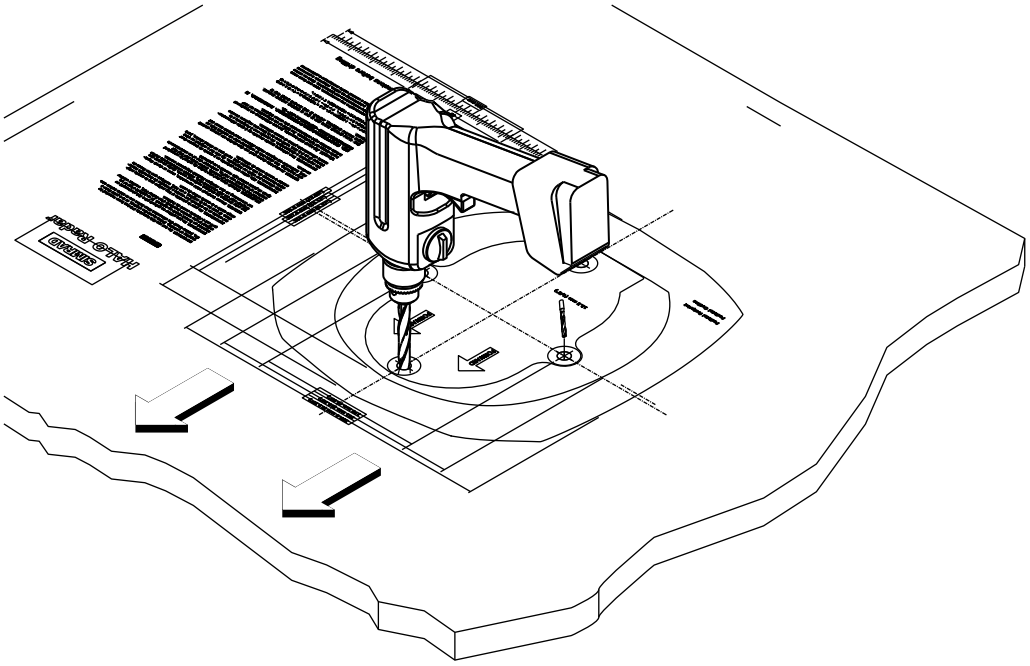
1 Place the mounting template in your desired installation location, observing the correct orientation.

→ ***Note:*** *Minor deviations in orientation should be corrected with the bearing alignment setting.*

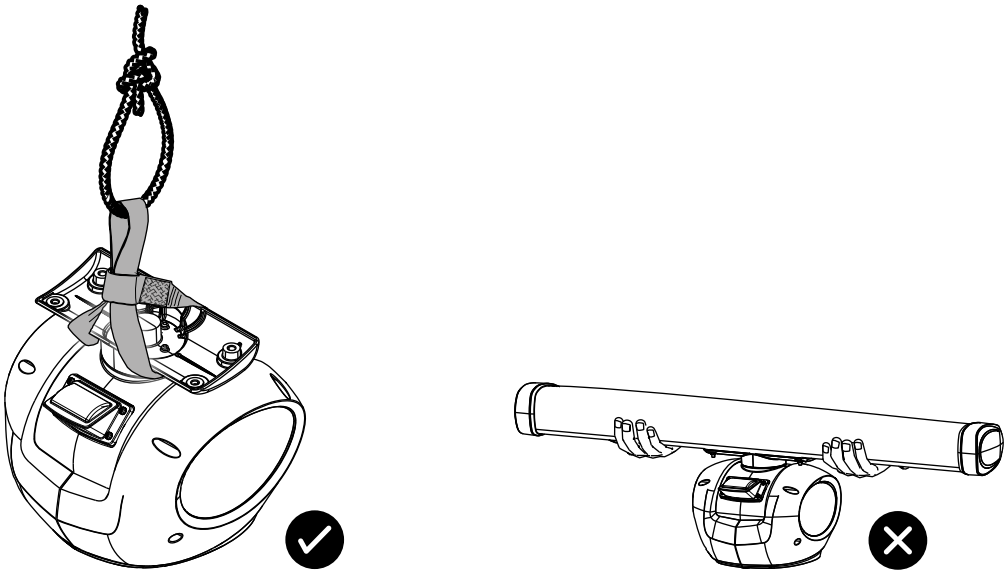
2 Check the location has enough room for the antenna to rotate.

3 Tape the template securely in place.

4 Drill pilot holes, then use a 13 mm (1/2″) drill bit to drill the four holes where shown on the mounting template.

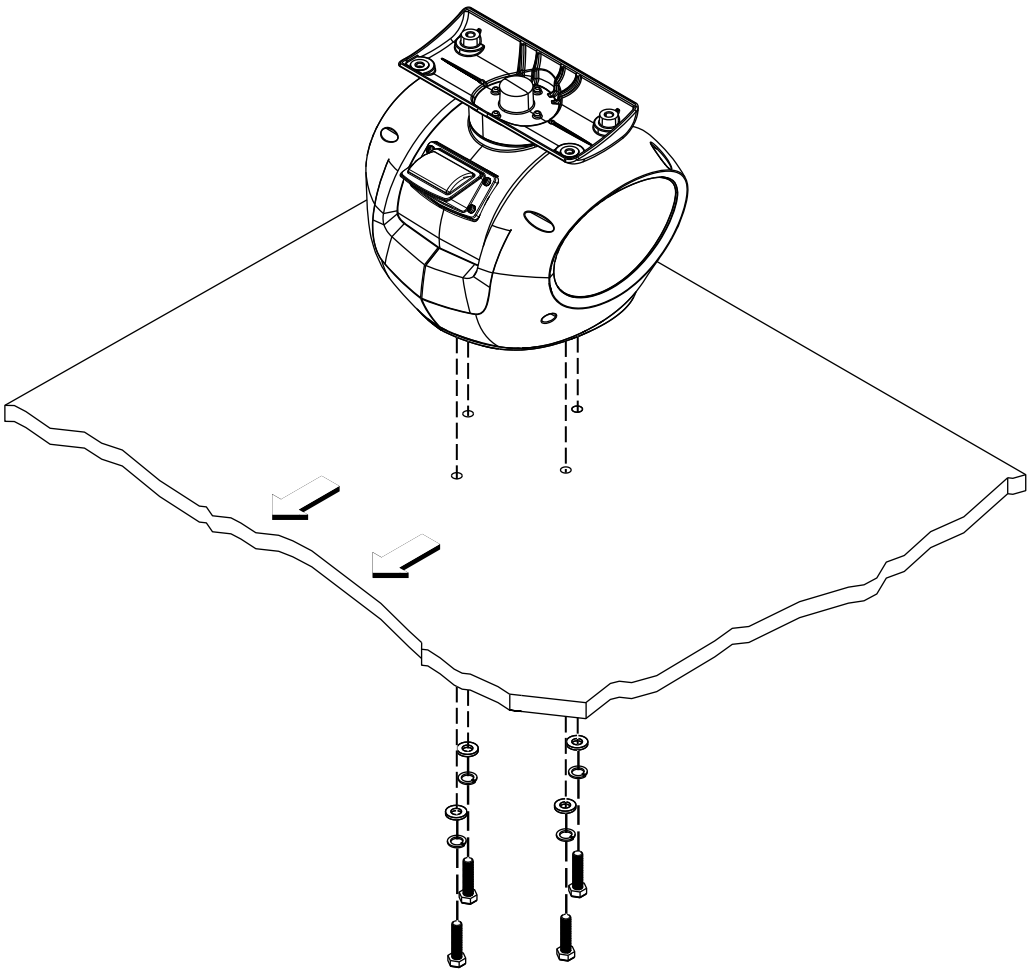


5 Remove the mounting template.
6 Apply the supplied Tef-Gel® anti-corrosion gel to the four feet of the pedestal.
7 Lift the pedestal using the supplied lifting strap.



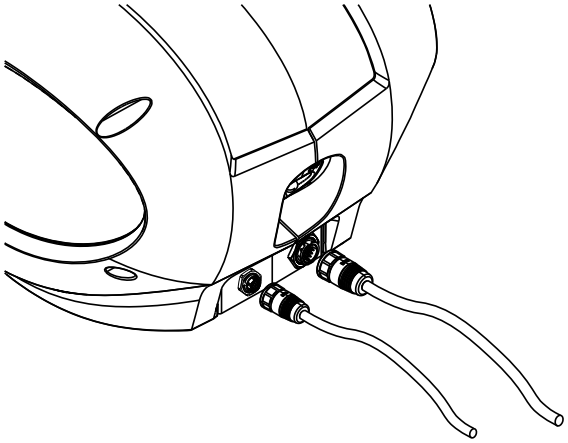
⚠ WARNING: Do not lift the pedestal with the antenna attached.

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 Apply the Tef-Gel® anti-corrosion gel to the thread of the Ethernet connector.

13 Connect the 8-pin end of the Ethernet cable to the pedestal. Take care to align the connector correctly to avoid bending the pins. Secure the collar by rotating clockwise.



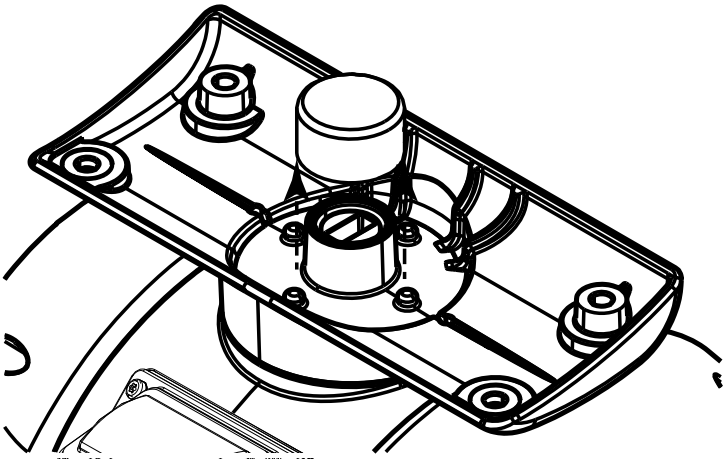
14 Connect the 3-pin power cable to the pedestal. Take care to align the connector correctly to avoid bending the pins. Secure the locking collar by rotating clockwise until it clicks.

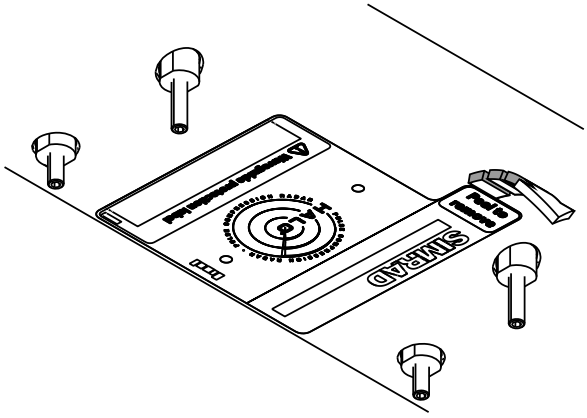
→ ***Note:*** *The cables must exit straight out from the pedestal without sharp angles that could strain the connections. Secure the cables to the ship's structure to protect the connectors from any strain in all conditions before connecting the cables to the pedestal.*

Fit the antenna to the pedestal

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

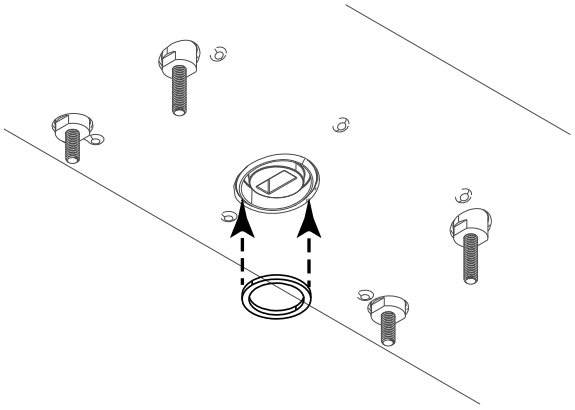
1 Remove the waveguide protection cap from the pedestal and the waveguide protection label from the underside of the antenna.



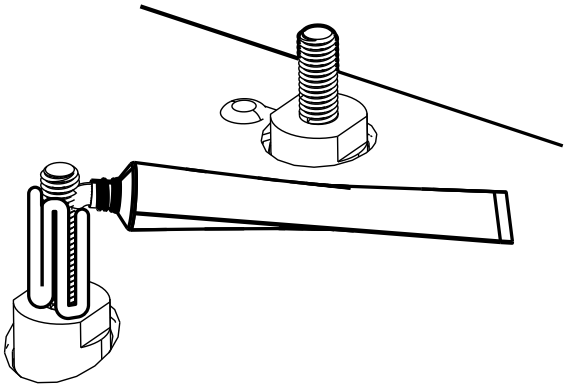


→ ***Note:*** *The cap and label prevent contaminants from entering the waveguide. Only remove these covers just before fitting the antenna to the pedestal.*

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

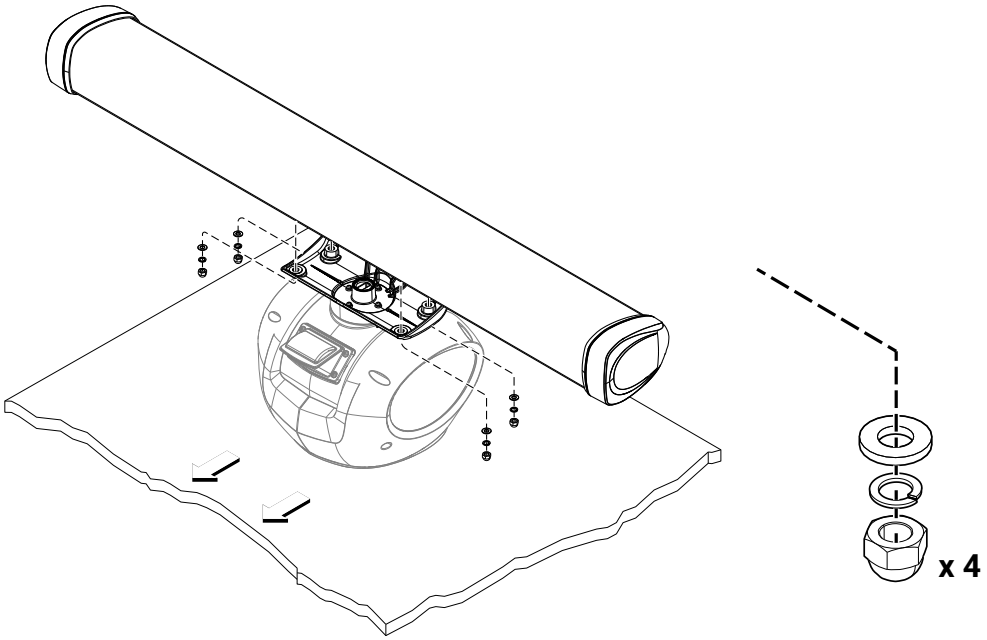


3 Apply the supplied Tef-Gel® anti-corrosion gel to the entire length of each of the four antenna studs.

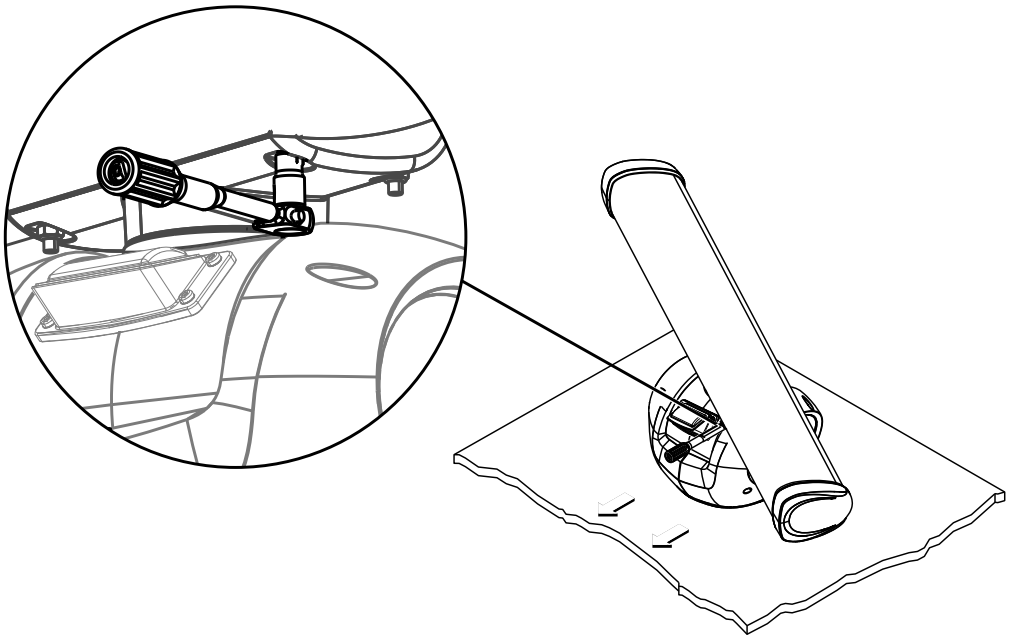


4 Carefully lower the antenna on to the pedestal.

➔ ***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.



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.*

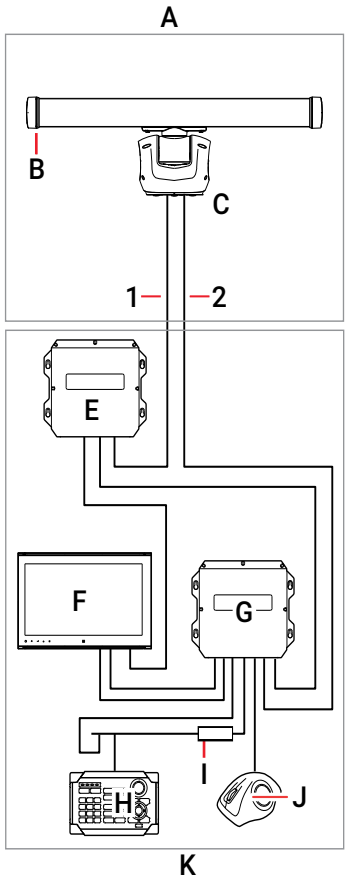
WIRING

General wiring guidelines

- Check all ground connections.
- Create drips loops where cable connects to product, to prevent water collecting on device connectors.
- All cables should be routed as directly as possible, consistent with consideration for other equipment, in order to reduce electromagnetic interference effects and voltage drop.
- Cables should not be installed close to high-power or high-frequency conducting cables, such as radar or radio-transmitter lines or large DC motor cables.
- Where cables intersect, try to stay at right angles (90°) to minimize inductance of noise.
- Only use suitable waterproof connectors when joining cables.
- If a cable being pulled through a concealed area requires excessive force to finish pulling through the remaining cable, consider rerouting cable via an alternative route – otherwise cable conductors may get broken, the cable sheath and insulation may be damaged, or the same damage may be done to adjacent cables, which may cause a fire.

System examples

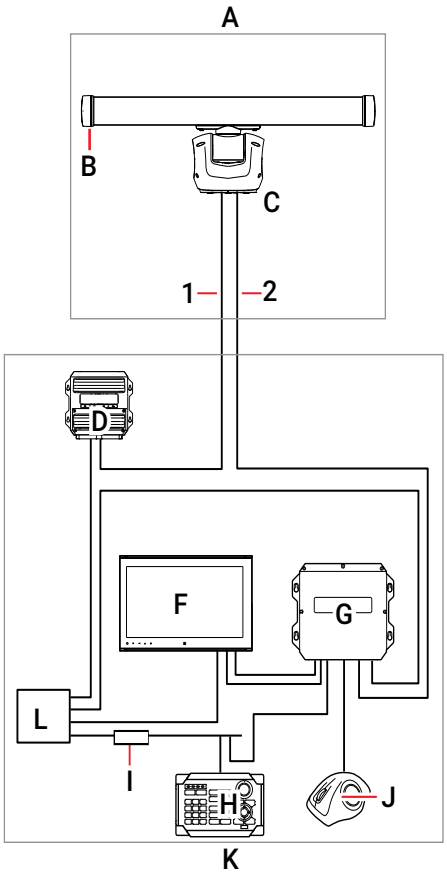
System example 1



A Outdoor
B Antenna
C HALO 5000 pedestal
E R5000 power supply unit
F M5000 monitor
G R5000 radar processor
H O2000 controller
I O2000 power supply
J O2000 trackball
K Indoor

1 Power cable
2 LAN cable

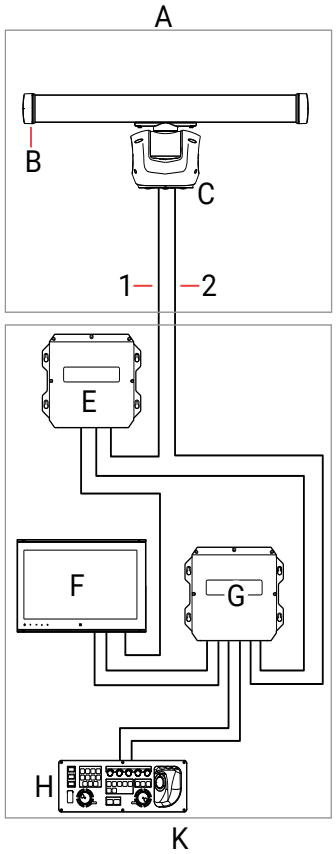
System example 2



A Outdoor
B Antenna
C HALO 5000 pedestal
D RI-50 power supply unit
F M5000 monitor
G R5000 radar processor
H O2000 controller
I O2000 power supply unit
J O2000 trackball
K Indoor
L 24 V DC supply

1 Power cable
2 LAN cable

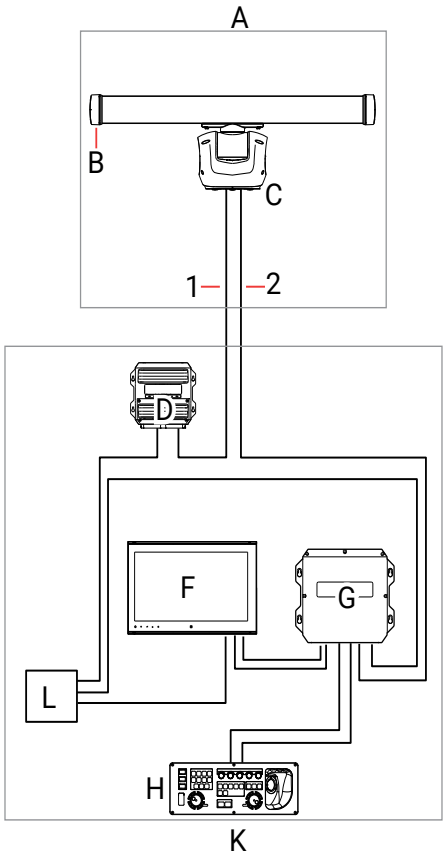
System example 3



A Outdoor
B Antenna
C HALO 5000 pedestal
E R5000 power supply unit
F M5000 monitor
G R5000 radar processor
H Extended keyboard
K Indoor

1 Power cable
2 LAN cable

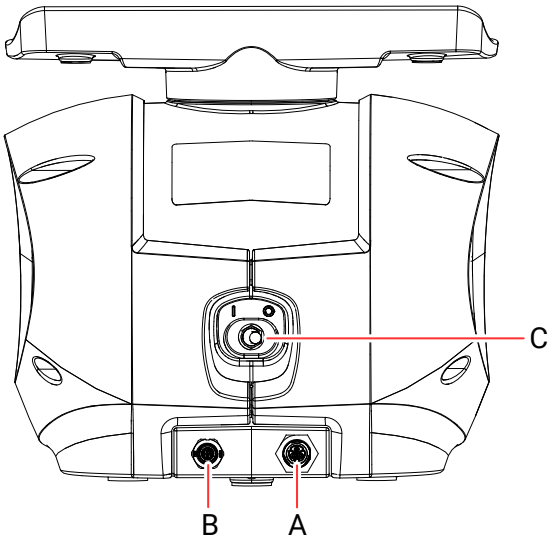
System example 4

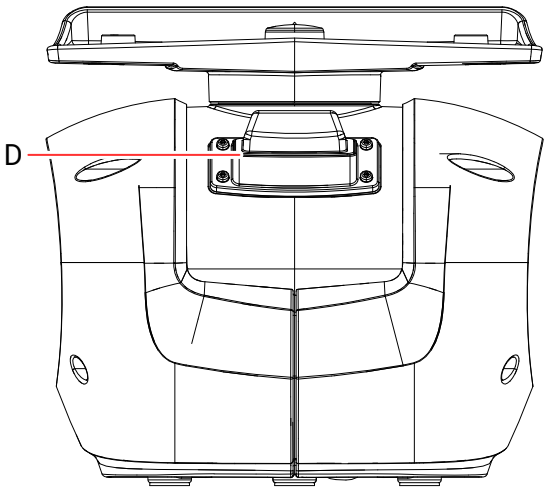


A Outdoor
B Antenna
C HALO 5000 pedestal
D RI-50 power supply unit
F M5000 monitor
G R5000 radar processor
H Extended keyboard
K Indoor
L 24 V DC supply

1 Power cable
2 LAN cable

HALO 5000 pedestal overview





A	Power connector
B	LAN connector
C	Safety switch
D	Performance monitor antenna

Ethernet cable

For Ethernet wiring details, refer to the R5000 System Installation Manual.

Power cable

For power wiring details, refer to the R5000 System Installation Manual.

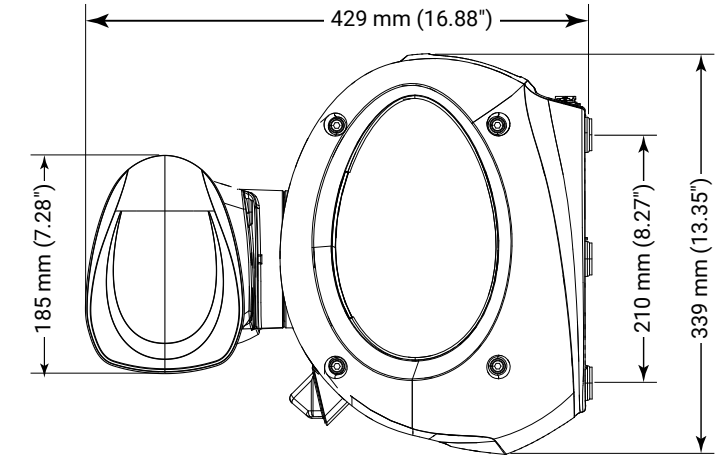
TECHNICAL SPECIFICATIONS

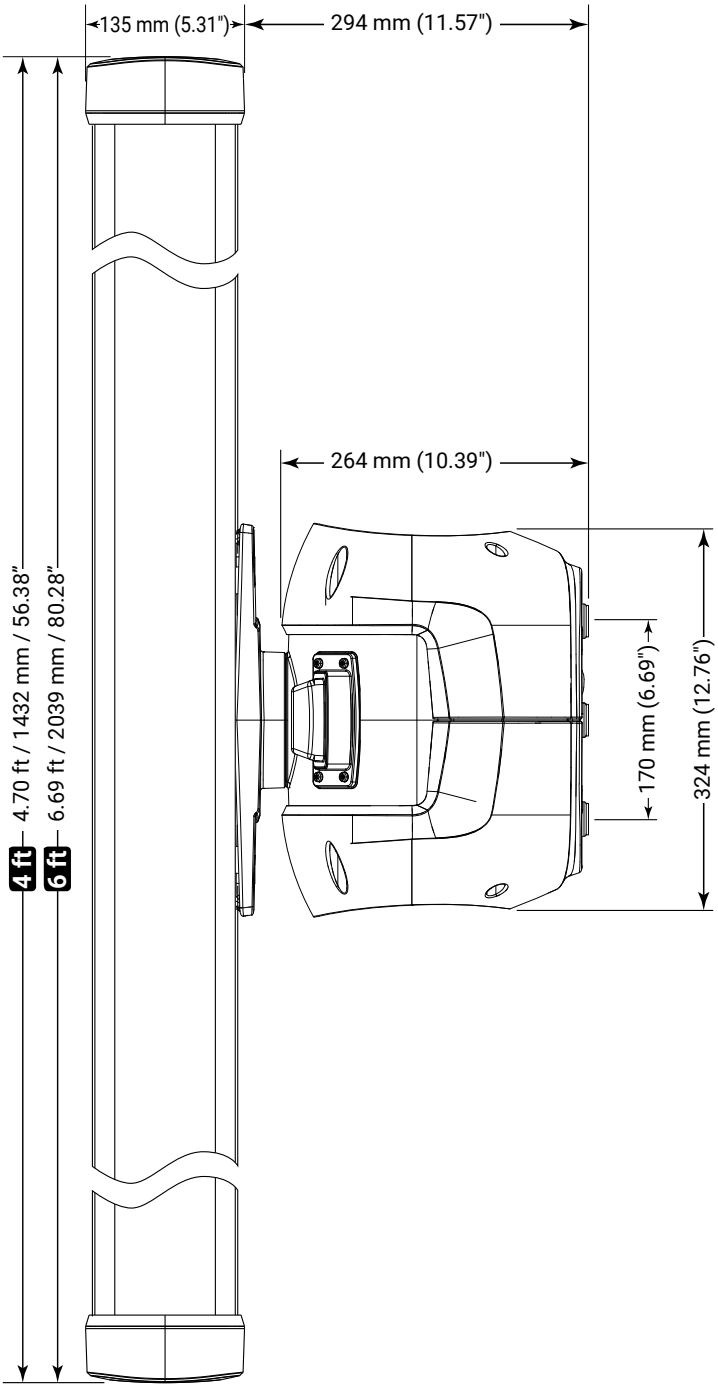
General		
Type of emission	FCC/IC Type Certification HALO 5000 Radar FCC ID: 2AJJ3HALO5000 IC ID: 21849-HALO5000 Marine Equipment Directive (MED) 2014/90/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 July 2014 on marine equipment, COMMISSION IMPLEMENTING REGULATION (EU) 2023/1667 of 08 August 2023. IEC62388 ed 2.0: Emissions compliant to SM1541-4 (including -40 dB/dec future design objectives).	
Environmental		
Operating temperature	IEC60945 ed 4.0: -25°C to 55°C (-13°F to 131°F)	
Relative humidity	IEC60945 ed 4.0: 40°C, 93% Exposed product	
Shock and vibration	IEC60945 ed 4.0: Exposed product and 100,000 cycles of 20 G	
UV	IEC60945 ed 4.0: Exposed product	
Waterproofing	IPX66 for the pedestal and antenna IPX55 for the RI-50 interface module IPX44 for the R5000 PSU	
Relative wind velocity	100 kn for 4 ft and 6 ft antenna at 24 rpm and 48 rpm	
Power		
Power consumption	395 W (peak, 24 V) at maximum wind velocity 45-60 W (average) at zero wind velocity 8 W (average) in standby mode	
DC input	Radar system input 24 V DC into the RI-50 24 V Systems 20 - 31.2 V DC Pedestal voltage input is 50 V DC nominal generated by RI-50	
AC input	Radar system input 110/230 V AC, 50/60 Hz (+/- 10%) Pedestal voltage input is 50 V DC nominal generated by R5000 PSU	
Power up time	30-40 seconds from POWER OFF to TRANSMIT	
	< 5 seconds from STANDBY to TRANSMIT	
Physical		
Height	429 mm (16.88”) with antenna mounted	
Antenna swing circle diameter	4 ft model: 4.73 ft / 1443 mm / 56.81” 6 ft model: 6.72 ft / 2047 mm / 80.59”	
Component weights	Pedestal Antenna 4 ft Antenna 6 ft RI-50 R5000 PSU 30 m (98 ft) dual cable 65 m (213 ft) dual cable	20.7 kg (45.6 lb) 4.9 kg (10.8 lb) 6.5 kg (14.3 lb) 1.6 kg (3.5 lb) 7 kg (15.4 lb) power cable 2.5 kg (5.5 lb) LAN cable 1.5 kg (3.3 lb) power cable 7.7 kg (17 lb) LAN cable 3.1 kg (6.8 lb)

Antenna		
Type	End-fed slotted waveguide	
Rotation speed	24 to 48 rpm depending on operating mode	
Beam width	4 ft model: 1.8° 6 ft model: 1.2°	
Beam width vertical	25°	
Plane of polarization	Horizontal polarization	
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	120 W ± 20% under any transmit condition — up to 13% duty cycle max	
Transmitter	Solid state module with no long-term transmitter power degradation	
Transmitter frequency	Synthesized: Set 0: 9.380 - 9.430 GHz Set 1: 9.360 - 9.480 GHz	
Pulse length/PRF and compression ratio	Pulse duration: 0.04 µsec Chirp duration: 2÷64 µsec Chirp bandwidth: 2÷48 MHz Up to 1 pulse and 2 chirps in a burst with burst repetition rate of 500-3000 Hz — range and mode dependent. Effective pulse compression ratio less than 150 in all modes	
Instrumented range	All antenna sizes: 50 m - 48 nm	
SART/RACON triggering	Yes — trigger distance: about 3.5 nm max – weather, sea state, and SART position dependent.	
Duplexer	Circulator and isolator	
UNA	GaAs front-end	
IF section	Center frequency: 31.25 MHz Bandwidth: 50 MHz max A/D; 16 bit 125 MSPS. → ***Note:*** *Narrower bandwidths are defined by signal processing.*	
Noise figure	5 dB typical	
Compass safe distance	Pedestal	STD: 1.0 m (3.3 ft) Steer: 0.5 m (1.6 ft)
	RI-50	1.0 m (3.3 ft)
	R5000 PSU	STD: 1.0 m (3.3 ft) Steer: 0.3 m (1 ft)
Other		
Communication ports	Ethernet 10/100 Base-T RJ-45 for radar data and control	
Antenna park hold	Yes	
Motor	Brushless with solid state commutation and electromagnetic braking for parking	
Interconnecting cable	Dual cable (power and LAN) 30 m (98 ft) or 65 m (213 ft)	

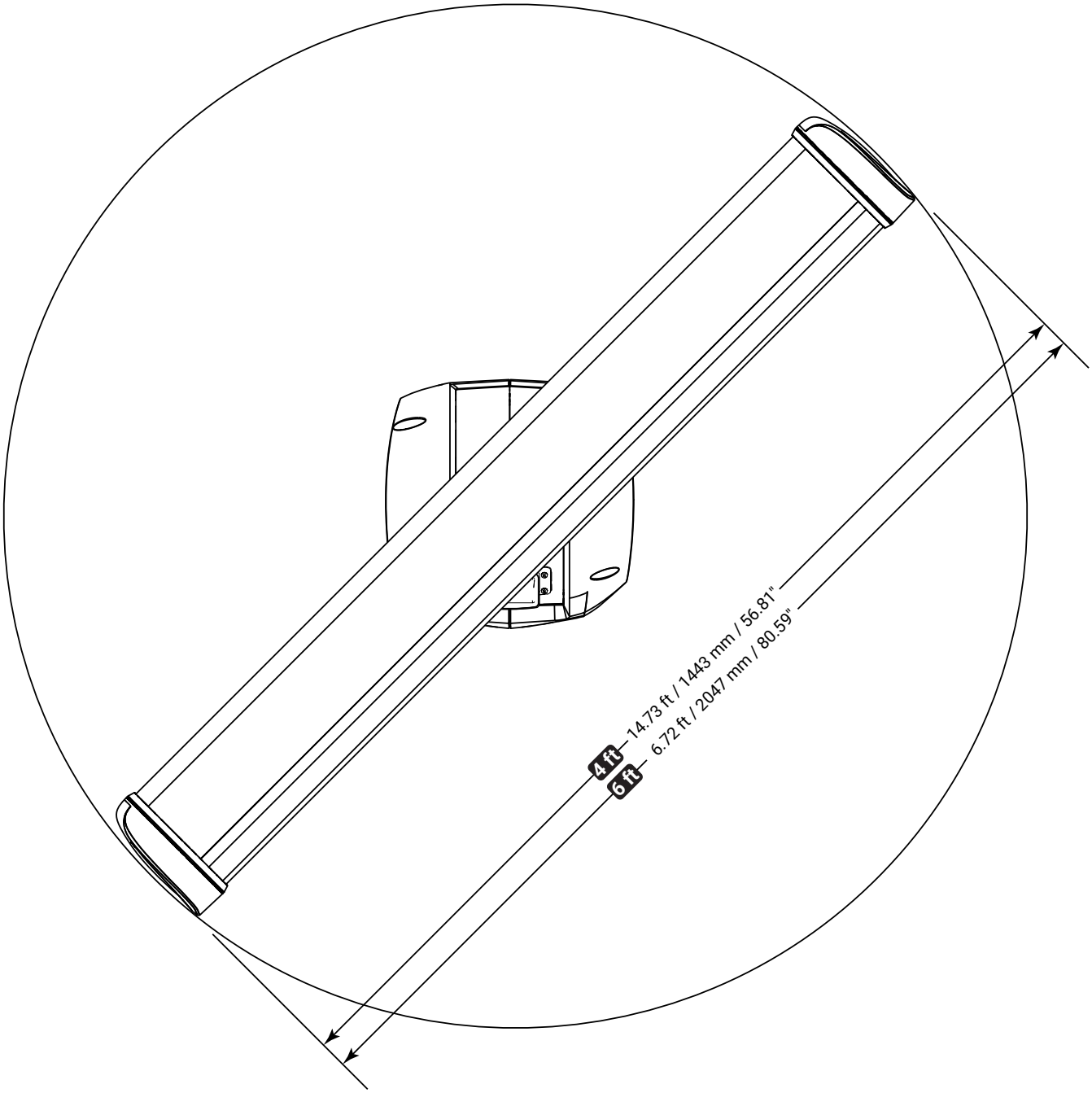
DRAWINGS

Pedestal and antennas





Antenna turning circle diameters



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