SIMRAD®

SRT LAN S-Band Down-Mast

Installation manual

English



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Preface

Disclaimer

⚠ Warning: Refer to important safety information in the 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 user of this product is solely responsible for observing maritime safety practices.

Navigational features that appear in this document 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 methods to ensure the route suggested by the system is safe.

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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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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 statement

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

The relevant declaration of conformity is available in the product's section at the following website:

- www.navico-commercial.com

About this manual

Intended audience

This manual is written for system installers.

This manual is written for professional installation and service engineers.

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

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

Important text conventions

Important text that requires special attention from the reader is emphasized as follows:

➔ ***Note:*** Used to draw the reader's attention to a comment or some important information.

⚠ Warning: Used when it is necessary to warn personnel that they should proceed carefully to prevent risk of injury and/or damage to equipment/ personnel.

Change log

Part no	Date and description
988-12285-001	2018-Sept-28
	First version.
988-12285-002	2018-Oct-31
	Updates to Hazard distances table and Technical specifications.
988-12285-003	2021-July-25
	Compliance updates.
988-12285-004	2023-Sept-25
	Update cover, compliance, and copyright.
988-12285-005	2023-December-15
	Updates to comply with IEC62288 Ed.3.

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 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 this radar system must be familiar with the general safety regulations and specific safety systems, and they must have passed all 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 at all times follow all safety regulations.

During normal operation, 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

High voltage

Radar equipment includes high voltage that can cause injury or loss of life. Danger exists only when the units are opened, exposing internal circuits, as when servicing the equipment.

This radar has been carefully designed to protect personnel from possible injury from high voltages. Although every effort has been made to eliminate danger to personnel, no responsibility is accepted for any injury or loss of life suffered in connection with this equipment.

Radio frequency radiation

Harmful effects (particularly to the eyes) may be caused by exposure of any part of the human body to high power radio frequency radiation.

However, the system is designed to always disable the microwave radiation when the antenna is not rotating.

Hazard distances table

Configuration	Distance 100 W/m^2 point (m)	Distance 50 W/m^2 point (m)	Distance 10 W/m^2 point (m)
30 KW Transceiver 12' S-band Antenna	-	-	0.4

X-Ray radiation

This radar system does not generate X-ray radiation.

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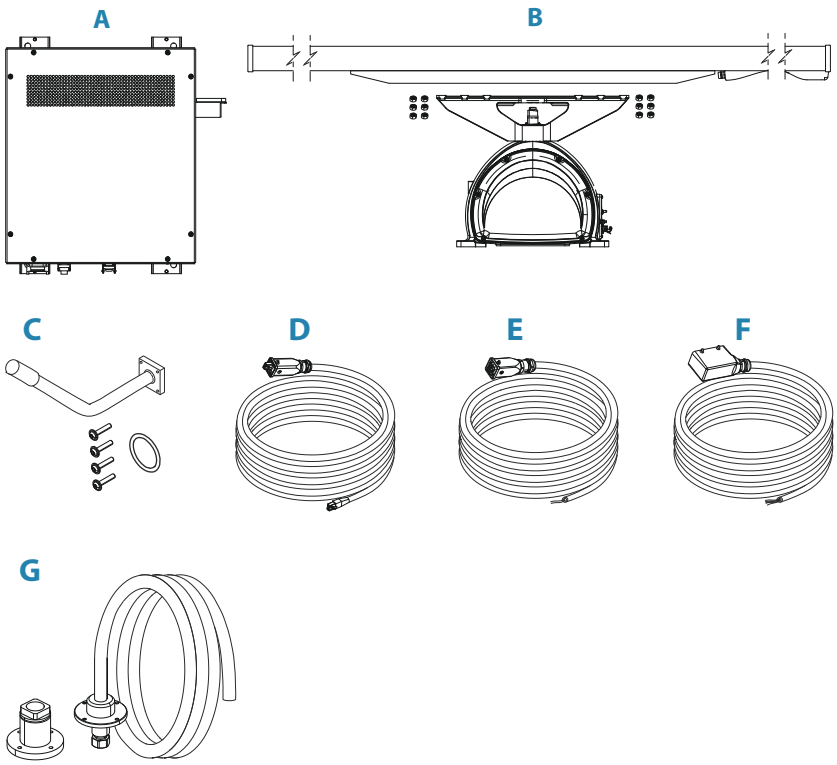
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1 Parts included

SRT LAN Radar sensor S-band down-mast



A SRT LAN down-mast transceiver
B Radar antenna (12 feet) and antenna pedestal
C Radar performance monitor arm kit
D Ethernet cable
E Power cable
F Down-mast cable
G Coaxial cable kit

2 Installation

Installation guidelines

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 generation of false targets.

The antenna should be mounted clear of any structure that may cause signal reflections 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, and structure radar is mounted to 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, having a minimum size of 1 m^2 at a suitable height and with a safety rail of suitable height.

The design of the mounting platform for the up-mast transceiver should take into account the vibration requirements defined by IEC 60945.

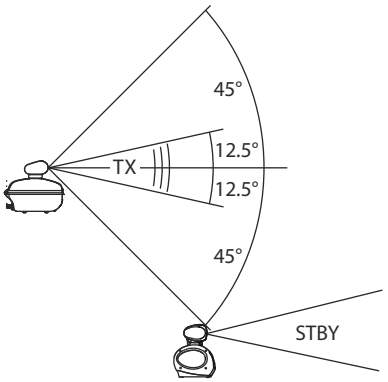
The platform that is being mounted to should be level when vessel is loaded and underway at typical cruise speed.

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

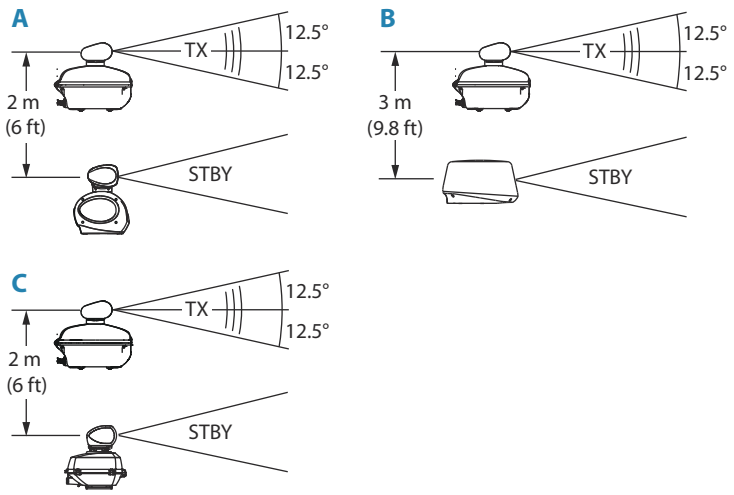
Interference

Other radars

Do not install the radar transceiver on the same beam plane as other radars, provide at least 45 degrees vertical separation. Use sector blanking as required to eliminate interference from same frequency radar on vessel.



The following illustrations shows suggested minimum vertical separation for different radar combinations, where radars are installed one above the other:



A Pulse radar and pulse compression radar

B Pulse radar and broadband radar

C Two pulse radars

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 manufacturers guide on suitable separation distances. 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 any safety rail.

Swing diameter

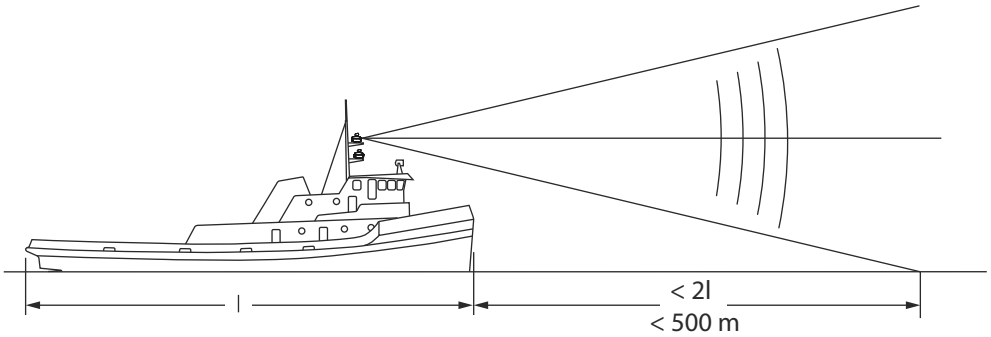
Ensure all obstructions are clear of the rotation of the antenna. To avoid the antenna coming in contact with other installed objects while it is rotating, ensure that there is at least 200 mm between the swing circle (turning radius) and the other installed objects.

Blind sectors

It should be kept to a minimum, and 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 than 5°, or a total of blind sectors of 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 the blind sectors.

Distance to water surface

For all radar systems and where practical, a line of sight from the radar antenna to the bow of the ship should hit the surface of the sea at no more than 500 m or twice the ship length, depending 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
Distance (m)	4.7	9.4	14.1	18.8	23.5

Height (m)	7.5	10	15	20	25
Distance (m)	35.3	47.0	70.6	94.1	117.6

Height (m)	30	40	50		
Distance (m)	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

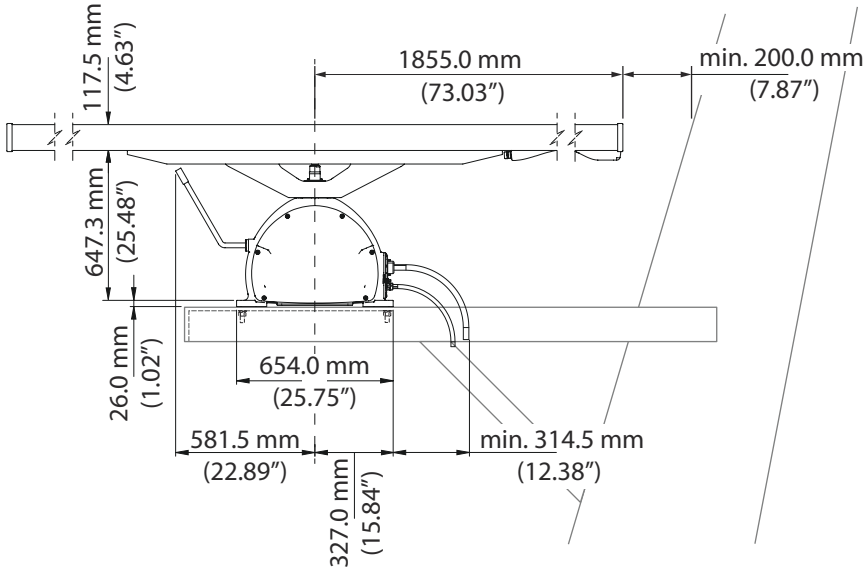
Mounting guidelines

- Choose a location that will not expose the unit to conditions that exceed the specifications, refer to the technical specification in the *"Technical specifications"* on page 26
- 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 that 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, refer to the technical specification in the *"Technical specifications"* on page 26.

Radar pedestal

Ensure that there is adequate space for the pedestal housing and antenna. Securely mount the radar pedestal prior to fitting the antenna. For dimensional drawings, refer to *"Dimensional drawings"* on page 29.



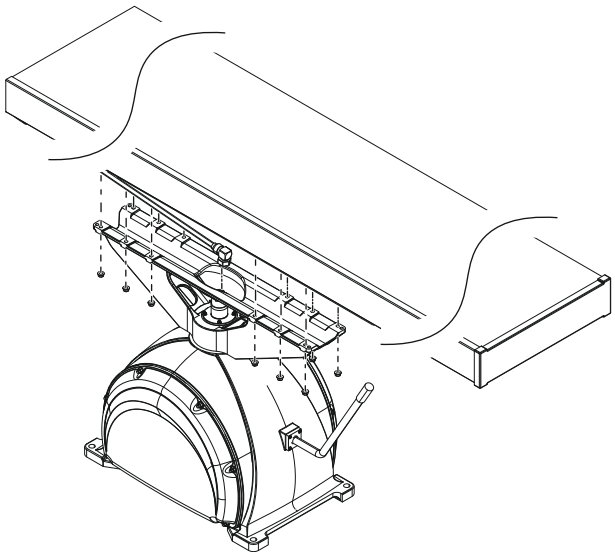
Fasteners should be of AISI 304 or 316 stainless steel, M16 size or equivalent and of property class 70 or better (bolt heads will be marked accordingly), or similar strength high tensile steel with a permanent protective coating system applied.

→ ***Note:*** A length of at least 0.5x the diameter of the screw should be visible when the pedestal is properly secured. Use a good quality isolating or anti-seize compound on the thread, to prevent electrolysis.

Radar antenna

Remove the 4 lifting eye bolts from the antenna pedestal.

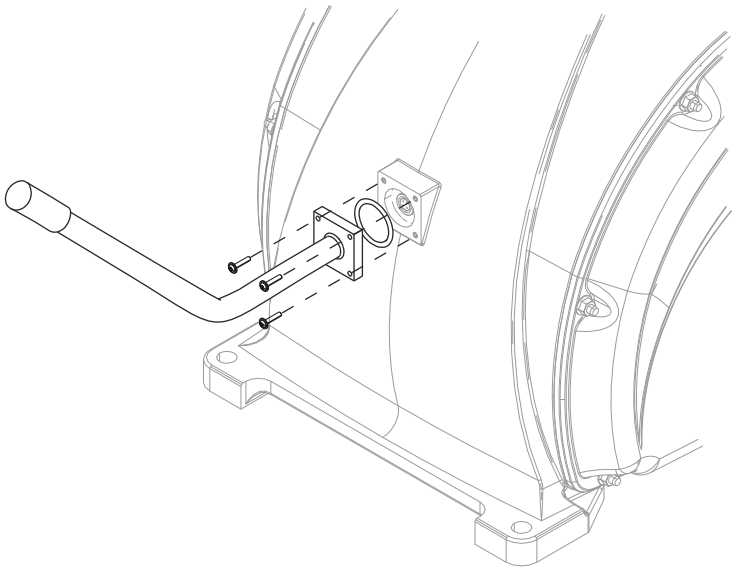
Mount the antenna over its support and make sure that the antenna is correctly aligned. Rest the antenna on the antenna pedestal and tighten the 12 nuts holding the antenna. Attach the coaxial connector to the rotary joint below the antenna and tighten. Tighten the 12 nuts to a torque of 20 Nm.



→ ***Note:*** The rotary joint protection cover on the antenna pedestal must not be removed until immediately prior to antenna fitment.

Radar performance monitor arm

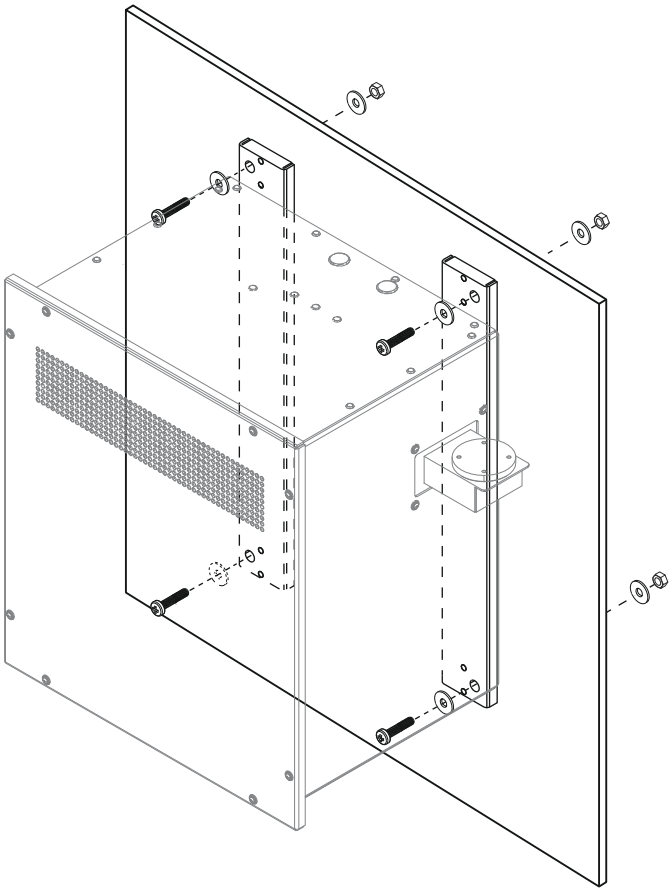
Attach the performance monitor arm to the pedestal housing. The arm should be oriented to point upwards. Ensure the gasket ring is fitted between the housing and the base of the arm.



All electrical connections are made when the performance monitor arm is attached to the pedestal. It is not necessary to complete any further connections inside pedestal enclosure.

SRT LAN down-mast transceiver

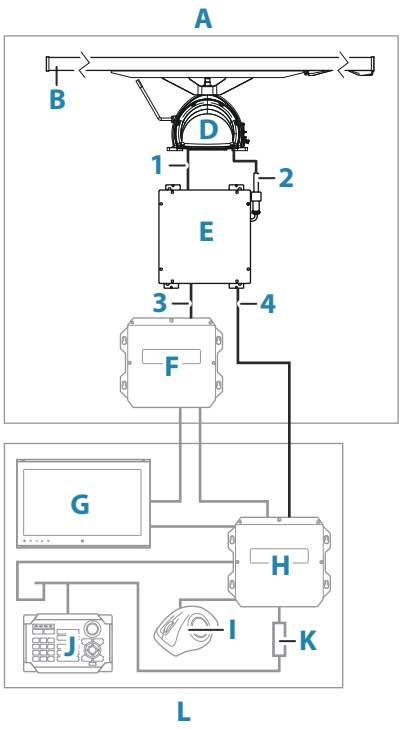
Ensure that there is adequate space for the SRT and cabling. For dimensional drawings, refer to *"Dimensional drawings"* on page 29.



➔ ***Note:*** Fasteners should be of AISI 304 or 316 stainless steel and property class 70 or better. Use M12 screws and nuts or equivalent.

3 Wiring

System example



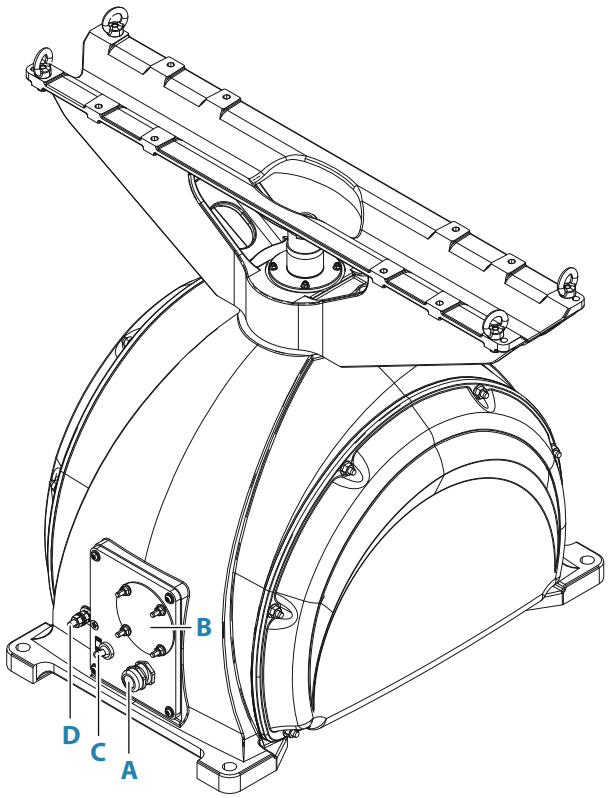
A	SRT LAN radar sensor
B	Antenna
D	Antenna pedestal
E	SRT LAN down-mast transceiver
F	R5000 power supply unit
G	M5000 monitor
H	R5000 radar processor
I	O5000 trackball
J	O2000 controller
K	O2000 power supply unit
L	R5000 control station
1	Down-mast cable
2	Coaxial cable
3	Power cable
4	LAN cable

General wiring guidelines

- Check all ground connections. During the hardware installation they must be completed before power and communication cabling
- 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 & insulation may be damaged, or the same damage may be done to adjacent cables, which may cause a fire

Antenna pedestal overview



A SRT down-mast cable gland

B Coaxial cable connector (shown with protective cover attached)

C Safety switch

D Ground terminal

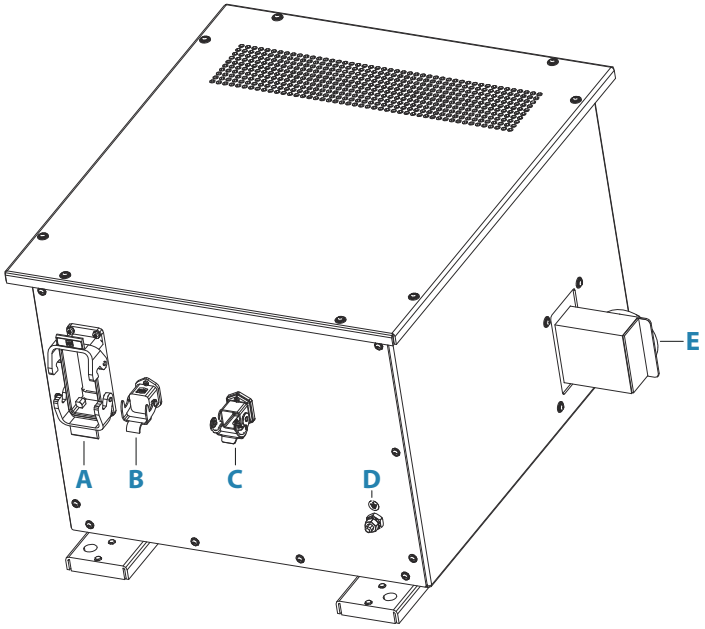
Grounding the antenna pedestal

Connect a tinned copper cable (>25 mm2) between the ground terminal on the radar pedestal and the ship´s structure. Cable should be kept to minimum necessary length. Ensure it is fastened using a suitable stainless bolt and lock nut or spring washer. Self-tapping screws should not be used. Good electrical connection is essential, ensure paint or other isolating coatings on surface are properly removed around area of bolt and ring terminal contact. After fitting, apply a suitable anti-corrosive coating to the assembly.

→ ***Note:*** Radar mast should be a good conductor (i.e. metal), and be bonded to rest of ships ground. If not, earth cable should be run to nearest grounded structure.

→ ***Note:*** Earth strap is ideally braided tinned copper, but tinned power cable is also suitable.

SRT LAN down-mast transceiver overview



A Down-mast cable connector
B Power cable connector
C Ethernet cable connector
D Grounding terminal
E Coaxial cable connector

Grounding the SRT LAN down-mast transceiver

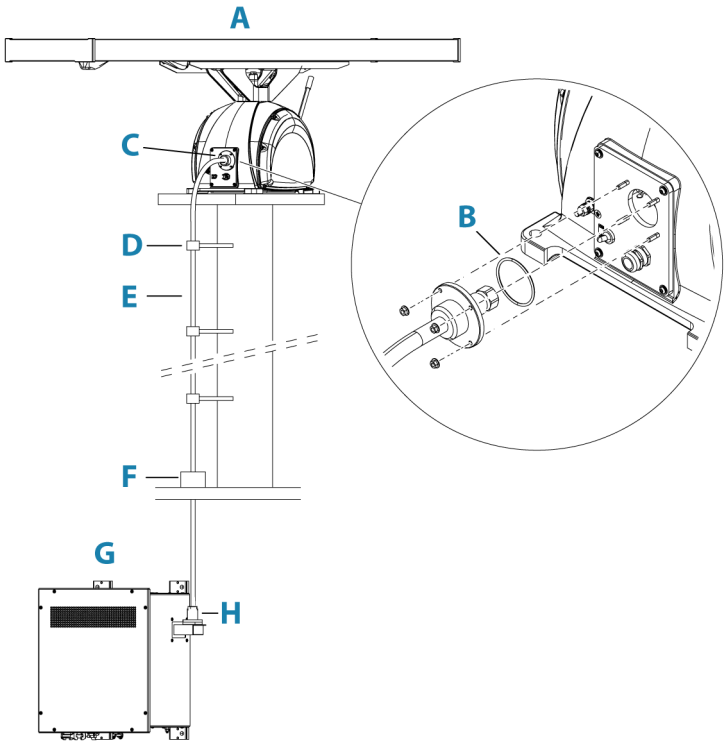
Connect a tinned copper cable (>25 mm2) between the ground terminal on the SRT and the ship´s structure. Cable should be kept to minimum necessary length. Ensure it is fastened using a suitable stainless bolt and lock nut or spring washer. Self-tapping screws should not be used. Good electrical connection is essential, ensure paint or other isolating coatings on surface are properly removed around area of bolt and ring terminal contact. After fitting, apply a suitable anti-corrosive coating to the assembly.

→ ***Note:*** Earth strap is ideally braided tinned copper, but tinned power cable is also suitable.

Coaxial cable

Installation, maintenance, or removal of the coaxial cable requires qualified, experienced personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance and condition of equipment.

Overview



A	Antenna and antenna pedestal
B	Gasket
C	Attached connector
D	Hanger
E	Coaxial cable
F	Cable gland
G	SRT LAN down-mast transceiver
H	Field attached connector

Guidelines

- Inspect the coaxial cable for possible shipping damage prior to installation
- When installing the cable, start from the base of the Antenna Pedestal
- Leave a length of about 30 cm, sufficient to allow any necessary repair (replacement of connectors) without removing the cable, at both ends of the cable
- The minimum bending radius for the coaxial cable is 250 mm (9.84")
- Make bends and fixing of the coaxial cable prior to attaching the connector at the transceiver end of the cable
- Install the cable far from hot exhaust ducts

Installation

Remove the protective cover and the 4 washers from the antenna pedestal.

Connect the cable to the Antenna Pedestal.

Fix the cable into the supports at intervals of at least than 1 meter. Pay attention to avoid tension. The outside diameter of the cable is 23 mm (7/8"). Protect the cable with a U-shaped shield, where it may suffer damage.

A standard cable gland should be used as deck gland. The hard PVC type is recommended, as this is compatible with all deck materials and limits the amount of pressure which can be applied to the cable. Enough pressure should be exerted on the gland to ensure a watertight seal. Too much pressure will deform the cable and cause a high standing-wave ratio.

Make bends and fixing of the coaxial cable prior to terminate the connector to the transceiver. This keeps the sliding of the inner conductor to minimum in case of minor cable reshaping.

Coaxial cable cutting, trimming and flaring must be performed with the cable on vertical position, its end looking down. This is to avoid fillings and chips entering the cable. Do not use compressed air for cleaning, wipe the cable termination with a moisturized cloth.

Attach the lose connector to the coaxial cable and connect the cable to the SRT LAN down-mast transceiver.

Mounting the connector

1. Cut and trim the free end of the cable as indicated in Fig. A. Slightly bevel the inner conductor.
2. Slide the thermo shrinkable sleeve over the cable, and then components 1 through 4, in sequence as shown in Fig A.
   - external retaining ring (**1**) pointing to the direction shown in Fig. A
   - flat washer (**2**)
   - silicon rubber "O" ring (**3**)
   - internal ring (**4**)
3. Slowly screw the lower retaining ring into the threaded outer conductor of the coaxial cable (**5**). Proceed now with care and position the lower edge of the retaining ring to the point where it is even with the outer conductor. Check the position of these last two items and verify again the above step 2
4. Slide the flange (**6**) into the cable.
5. Insert the end of the cable (with relevant items) into the connector body (**7**) and push against its bottom end.
   Check that the inner conductor is centered and then start tightening the external retaining ring, refer to Fig. B. Check the length of the protruding inner conductor. It must be 28 mm +/- 0.1 mm. In case it is longer, file it up to the proper length.
   Keep always the cable connector pointed downward during this process.
   Before inserting the connector in the waveguide adapter, check very carefully that the coaxial cable is aligned with the waveguide. Put the "O" ring in the relevant slot of flange.
   Do not force the teflon plug while inserting the connector in the guide. Tighten the flange firmly to the waveguide adapter. Make sure that the retaining "O" ring is properly in place.

Figure A

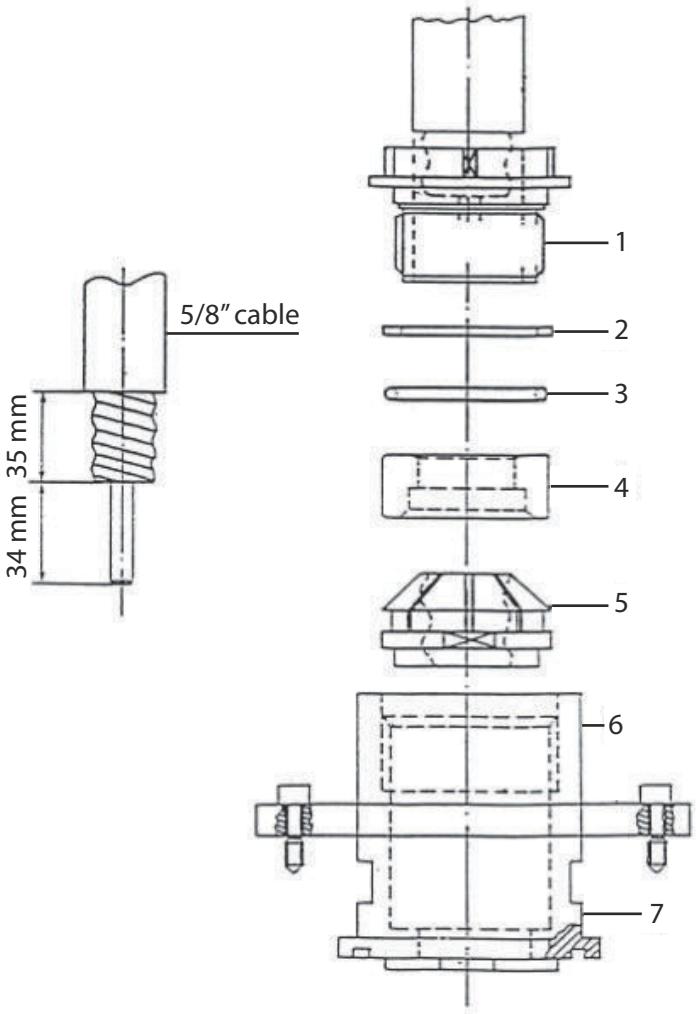
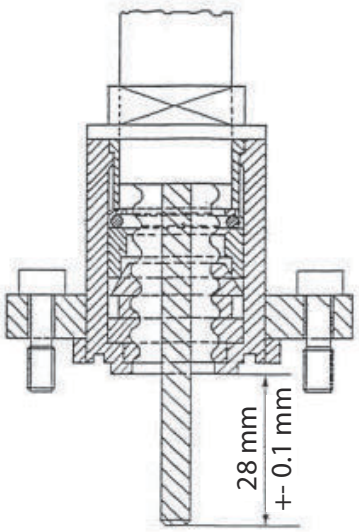
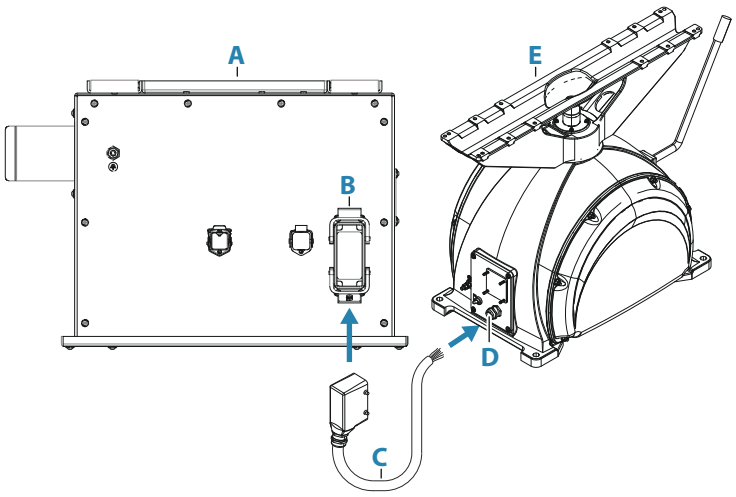


Figure B



SRT down-mast cable



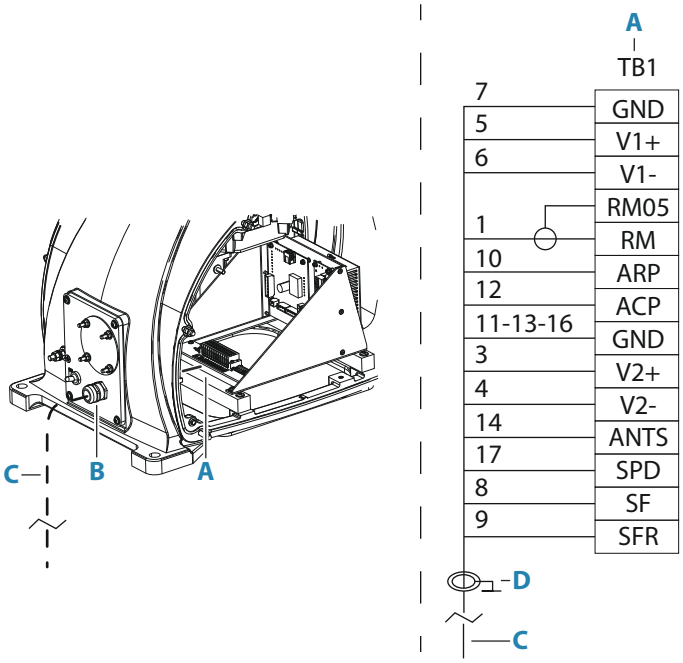
A SRT LAN transceiver
B Down-mast cable connector
C Down-mast cable
D Down-mast cable gland
E Antenna pedestal

SRT down-mast cable overview

Number	Description	Color
1	RG59 coaxial	Black
2	RX174 coaxial	Black
3	1.5 mm^2 single core	Red
4	1.5 mm^2 single core	Black
5	2.5 mm^2 single core	Red
6	2.5 mm^2 single core	Black
7	2.5 mm^2 single core	Green/Yellow
8	2 x 0.35 mm^2 shielded twisted pair	Blue
9		Black
10	2 x 0.35 mm^2 shielded twisted pair	White
11		Black
12	2 x 0.35 mm^2 shielded twisted pair	Green
13		Black
14	2 x 0.35 mm^2 shielded twisted pair	Red
15		Black
16	0.35 mm^2 single core	White
17	0.35 mm^2 single core	Blue
18	0.35 mm^2 single core	Red

Antenna pedestal connection

The SRT down-mast cable is terminated at TB1 (Termination Board).



	Description
A	TB1 terminal
B	Cable gland
C	Cable to SRT LAN down-mast transceiver
D	Connect the shield of the cable and the shield from internal wires in the cable to the cable holder or cable gland

Power cable

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

Ethernet cable

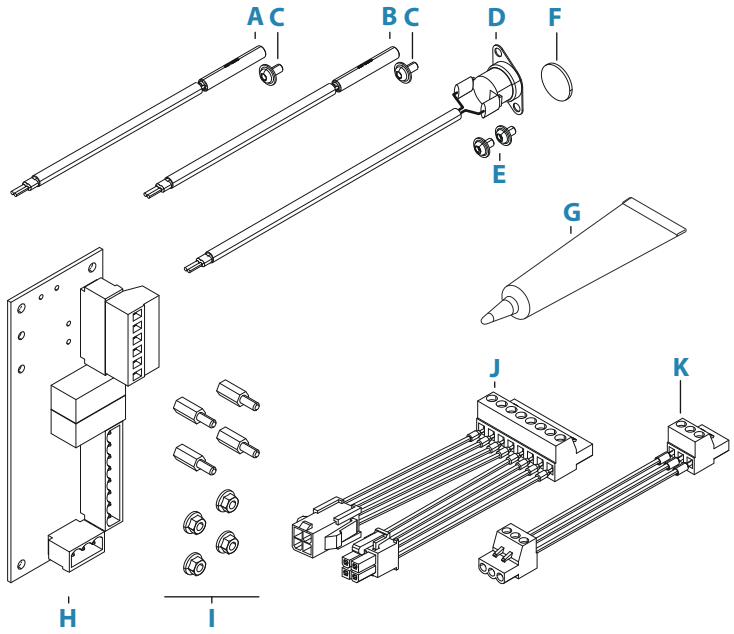
For Ethernet wiring details, refer to the System Installation Manual.

4 Heater kit (optional)

The heater kit

The optional heater kit is used to ensure safe start-up and operation in harsh conditions. For details, refer to *"Technical specifications"* on page 26.

Parts included

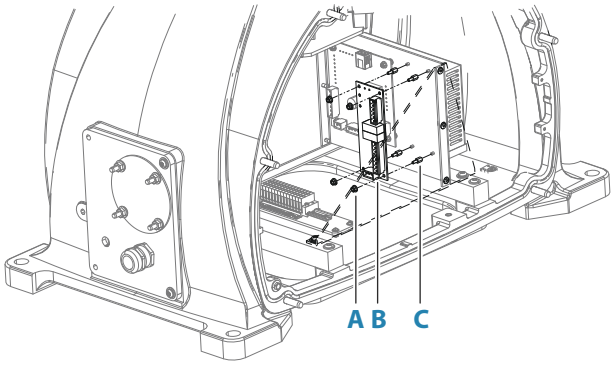


A Electronic side heater element
B Motor side heater element
C Screws, M4
D Temperature sensor
E Screws, M3
F Thermal conductive pad for the temperature sensor
G Thermal conductive compound for the heater elements
H Heater PCB
I PCB fasteners
J Power cable 1
K Power cable 2

Installing the heater kit

1 Ensure that the radar system is shut down, and a warning sign has been placed at the radar control station. Make sure that the safety switch located on the antenna pedestal is switched OFF.

2 Install the heater PCB.



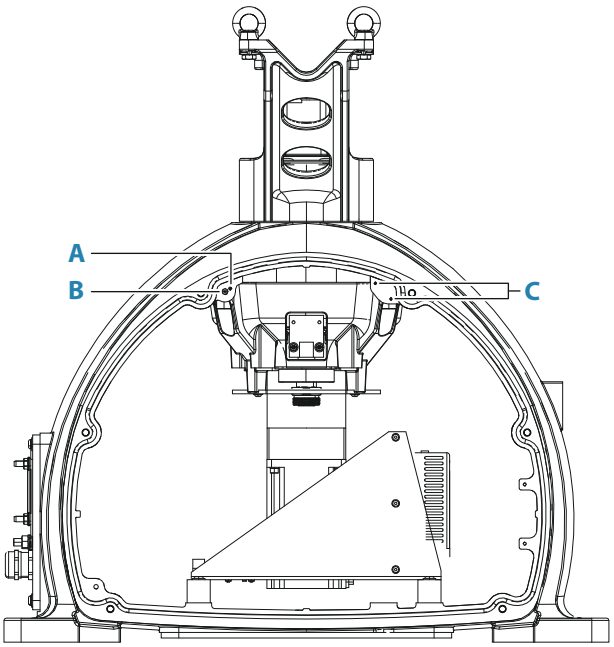
A Nuts

B Heater PCB

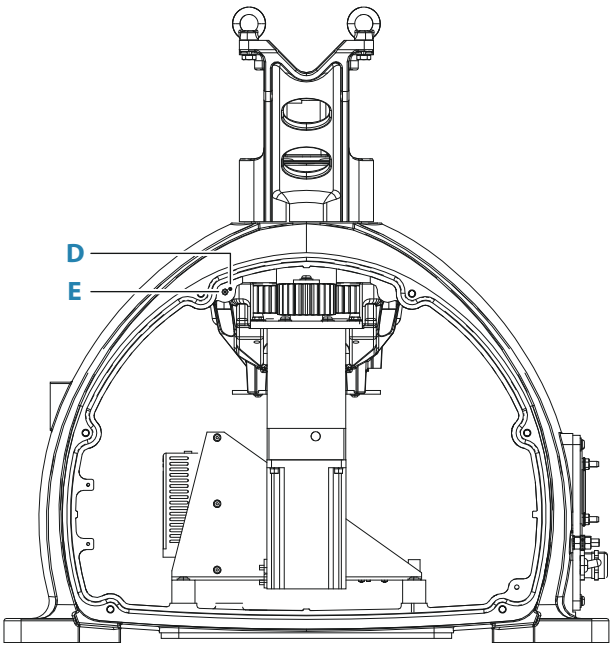
C Spacers

3 Identify the temperature sensor and heater element mounting locations by referring to the diagram. Ensure no part of the cable has enough slack to risk coming in to contact with moving parts like the main gear wheel.
Apply a layer of thermal conductive compound to the surface of the heater elements. Insert the heater elements into the mounting holes and secure them in place using the M4 screws.
Place the thermal conductive pad between the temperature sensor and the surface of the antenna pedestal. Secure the temperature sensor with the supplied M3 screws.

Electric side:

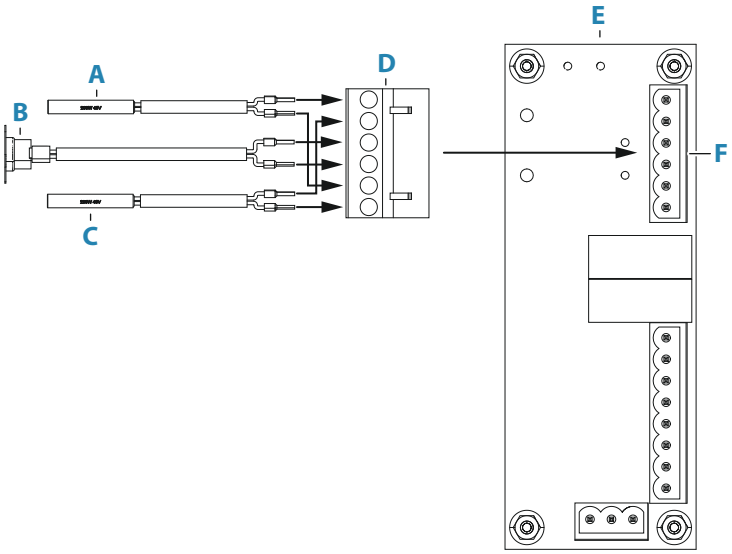


Motor side:



A Temperature sensor mounting screw holes
B Electronic side heater element mounting hole
C Temperature sensor mounting screw hole
D Temperature sensor mounting screw holes
E Motor side heater element mounting hole

4 Connect the heater elements and the temperature sensor to the PCB.



A Electronic side heater element

B Temperature sensor

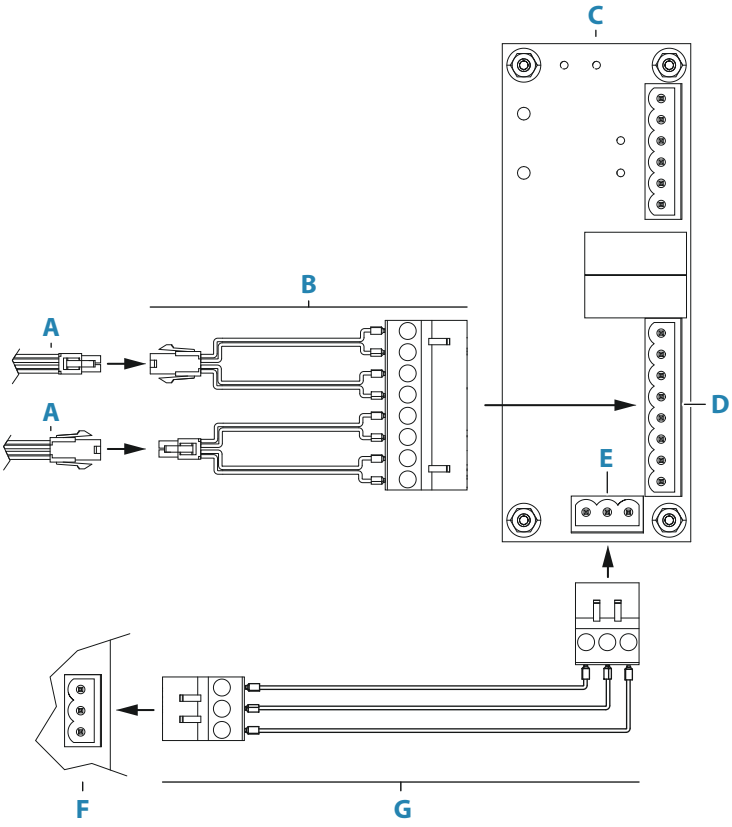
C Motor side heater element

D Connector block (attached to the PCB when delivered)

E Heater PCB

F Heater PCB TB3

5 Connect power to the PCB. The antenna pedestal wiring connectors (**A**) are located close to the heater kit PCB.



A Antenna pedestal wiring connectors

B Power cable 1

C Heater PCB

D Heater PCB TB2

E Heater PCB TB1

F ADA PCB TB6

G Power cable 2

5 Technical specifications

SRT LAN Radar sensor S-band down-mast

General	
Antenna type	End-fed-slotted waveguide
Type approval	Radar Equipment CAT 1 (H), CAT 2 (H) and CAT 3
Environmental	
Temperature	
Operating temperature	-25°C to 55°C (According to IEC 60945 ed. 4.0)
Operating temperature with heater kit installed	-40°C to 55°C according to RMRS rules (2-020101-040-E Vol 2 - Environmental Test of Equipment)
Storage temperature	-25°C to 70°C (According to IEC 60945 ed. 4.0)
Storage temperature with heater kit installed	-60°C to 70°C according to RMRS rules (2-020101-040-E Vol 2 - Environmental Test of Equipment)
Vibration	According to IEC60945 ed. 4.0
Shock	According to RMRS rules (2-020101-040-E Vol 2 - Environmental Test of Equipment)
Product category	
Radar pedestal and antenna	Exposed
SRT LAN down-mast transceiver	Protected
IP class	
Exposed units	IPX6
Protected units	IPx2
Relative wind velocity	100 knots wind tunnel test (According to IEC 62388)
Compass safe distance	
Safe distance to the standard magnetic compass	3.70 m (12.14 ft)
Safe distance to the steering magnetic compass	2.55 m (8.37 ft)
Physical	
Dimensions	Refer to dimensional drawings
Weight	
Pedestal and 12 ft antenna	120 kg (264.6 lbs.)
SRT LAN transceiver	22 kg (48.5 lbs.)
Performance	
RPM	20 or 40 RPM (selectable)
Nominal peak power	30 kW
Operating frequency	3050 ± 30 MHz
Pulse length	
Short pulse	60 ns
Medium pulse	250 ns
Long pulse	800 ns
PRF	

Short pulse	3000 Hz
Medium pulse	1500 Hz
Long pulse	750 Hz
Modulator	MOSFET Solid State
IF amplifier	Logarithmic
IF dynamic	≥ 90 dB +15 pre STC
IF center frequency	50 MHz
IF bandwidth	
Short pulse	24 MHz
Medium pulse	5 MHz
Long pulse	2 MHz
Horizontal beam width	1.9 degrees
Vertical beam width	24 degrees
Antenna gain	≥ 27 dB
Antenna polarization	Horizontal
VSWR	< 1.20
Overall noise figure	< 5 nominal dB
MDS on long pulse	
Overall at receiver level	≤ - 100 dBm
At IF level	≤ - 110 dBm

6 Accessories

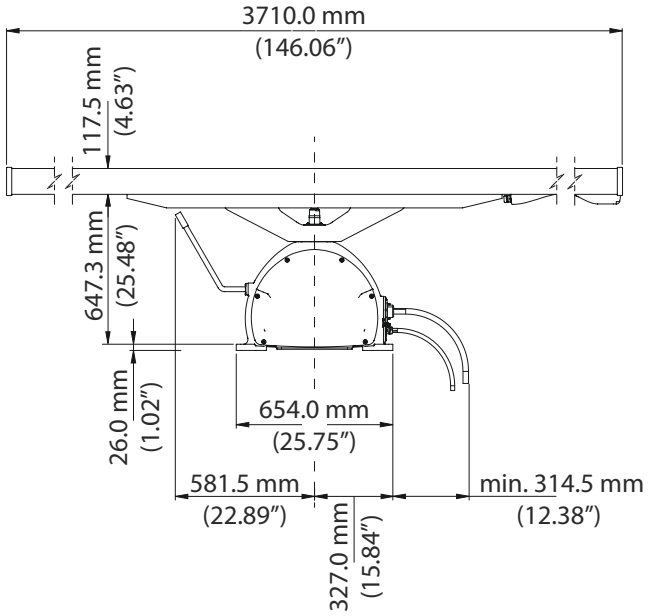
The most up-to-date accessories list is available at:

- www.navico-commercial.com

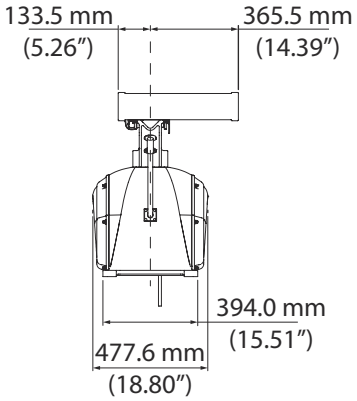
7 Dimensional drawings

Antenna pedestal and antenna

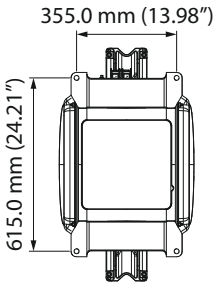
Front:



Side:

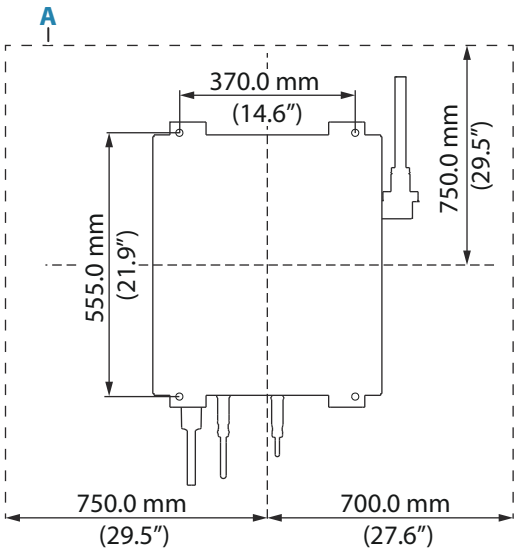


Bottom:



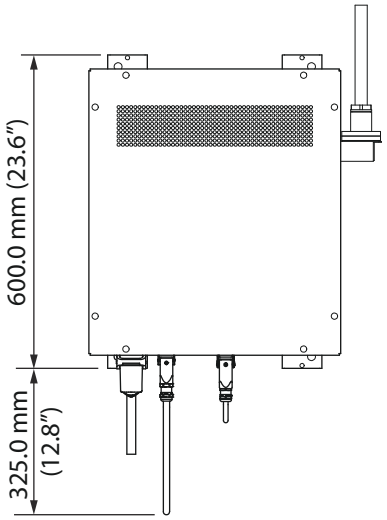
SRT LAN down-mast transceiver

Mounting:

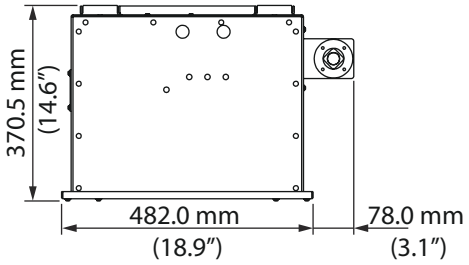


The dashed line (**A**) indicates the minimum free space required around the unit.

Front:



Top:





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