SIMRAD

R5000 Radar processor

Installation Manual

ENGLISH

www.navico.com/commercial

Preface

Disclaimer

As Navico is continuously improving this product, we retain the right to make changes to the product at any time which may not be reflected in this version of the manual. Please contact your nearest distributor if you require any further assistance.

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.

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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 specifications without notice.

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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) 2018/773 (May 2018) - 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 in 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
988-12282-001	2018-sept-19
	First version.
988-12282-002	2018-oct-19
	Updates to Parts included and Technical specifications.

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.

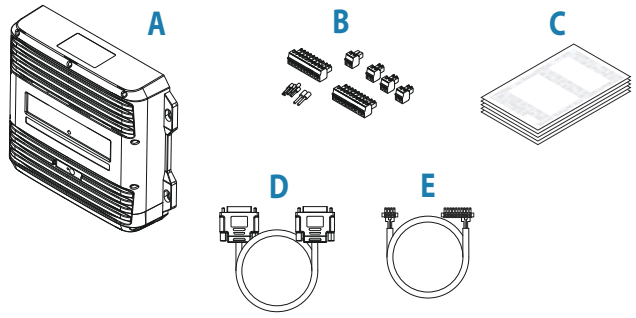
➔ ***Note:*** Main power is always present on the terminal board unless the main break from the power distribution panel of the vessel is turned off.

⚠ Warning: Never look down a waveguide from which power is being radiated!

Contents

1 Parts included

R5000 processor unit



A R5000 processor unit

B Terminal plugs
- 1x power (2 positions)
- 1x serial (14 positions)
- 1x serial (10 positions)
- 3x alarm/DGT/DMA (2 positions)
- Terminal connector kit

C Document pack

D DVI cable for monitor connection

E Serial cable for monitor control, with terminal plugs

2 Installation

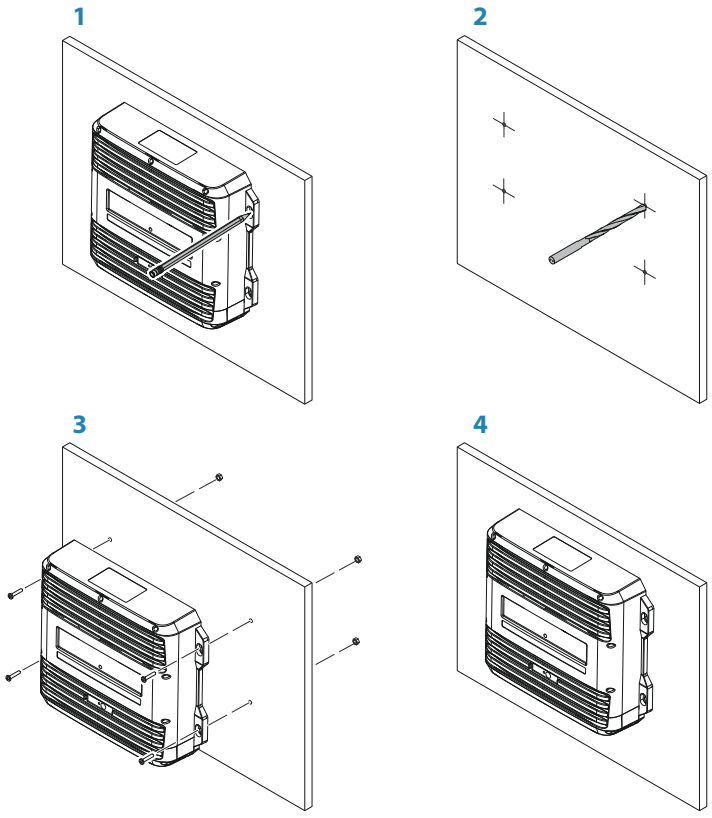
Mounting guidelines

- 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 17
- 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

→ ***Note:*** Where flush or panel mounted, the enclosure should be dry and well ventilated. In small enclosures, it may be required to fit forced cooling.

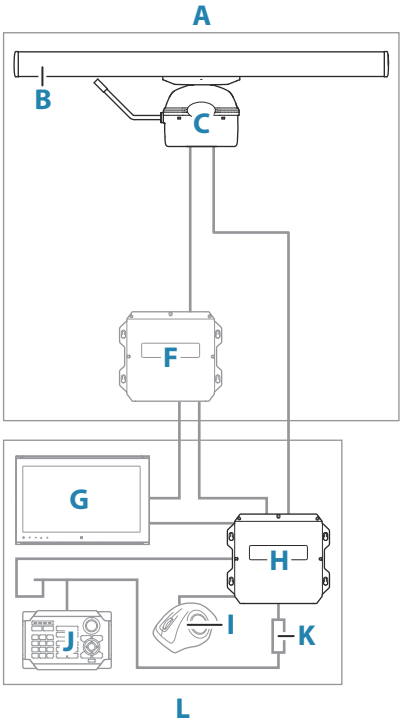
⚠ Warning: Inadequate ventilation and subsequent overheating of the unit may cause unreliable operation and reduced service life. Exposing the unit to conditions that exceed the specifications could invalidate your warranty, refer to the technical specification in the *"Technical specifications"* on page 17.

Wall mounting



3 Wiring

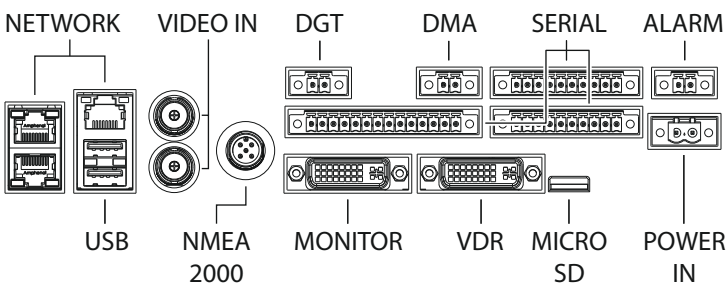
System example



	Description
A	SRT LAN radar sensor
B	Antenna
C	SRT LAN up-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

Connectors

R5000 radar processor unit



→ ***Note:*** The video in connectors are not used.

Power

The unit is designed to be powered by 24 V DC.

It is protected against reverse polarity, under voltage and over voltage (for a limited duration).

A fuse or circuit breaker should be fitted to the positive supply. For recommended fuse rating, refer to *"Technical specifications"* on page 17.

Power connector details

Unit socket (male)

Cable plug (female)

Pin	Purpose
1	+12/24 V DC
2	DC negative

Serial

The serial port provides input (Listeners) and outputs (Talkers) for the various interfaced sensors. The port uses the IEC 61162 (serial balanced) standard.

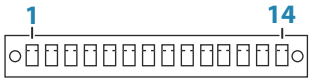
IEC 61162 messages

For details about how to configure the serial ports, refer to the commissioning manual.

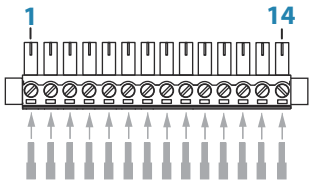
Sentence	Description	Standard	BAM	Legacy alert
THS	True heading status	port 1 in	port 1 in	port 1 in
HDT	Heading true	port 1 in	port 1 in	port 1 in
VDM	AIS VHF data-link message	port 2 in	port 2 in	port 2 in
VDO	AIS VHF data-link	port 2 in	port 2 in	port 2 in
TTD	Tracked target data	port 2 out	port 2 out	port 2 out
TLB	Target label	port 2 out	port 2 out	port 2 out
VBW	Dual ground/ water speed	port 3 in	port 3 in	port 3 in
VHW	Water speed and heating	port 3 in	port 3 in	port 3 in
ZDA	Time and date	port 4 in	port 4 in	port 4 in
GLL	Geographic position- latitude and longitude	port 4 in	port 4 in	port 4 in
GGA	Global positioning system (GPS) fix data	port 4 in	port 4 in	port 4 in

Sentence	Description	Standard	BAM	Legacy alert
GNS	GNNS fix data	port 4 in	port 4 in	port 4 in
DTM	Datum reference	port 4 in	port 4 in	port 4 in
VTG	Course over ground and ground speed	port 4 in	port 4 in	port 4 in
OSD	Own ship data	port 4 out	port 4 out	port 4 out
RSD	Radar system data	port 4 out	port 4 out	port 4 out
TTM	Tracked target message	port 4 out	port 4 out	port 4 out
ACN			port 5 in	
HBT	Heartbeat supervision sentence		port 5 in	
ALC	Cyclic alert list		port 5 out	
ALF	Alert sentence		port 5 out	
ARC	Alert command refused		port 5 out	
HBT	Heartbeat supervision sentence		port 5 out	
ACK	Acknowledge alarm			port 5 in
ALR	Set alarm state			port 5 out
EVE	General event message			port 5 out
-	M5000 monitor	port 6 in	port 6 in	port 6 in
-	M5000 monitor	port 6 out	port 6 out	port 6 out

Serial 1-2



Unit socket (male)



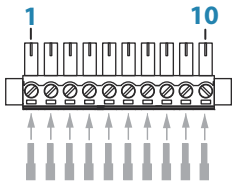
Cable plug (female)

Pin	Port	Purpose
1	Port 1 (IEC 61162-2)	Listener A (Rx_A)
2		Listener B (Rx_B)
3		Common
4		Ground
5		Talker A (Tx_A)
6		Talker B (Tx_B)
7		Shield

Pin	Port	Purpose
8	Port 2 (IEC 61162-2)	Listener A (Rx_A)
9		Listener B (Rx_B)
10		Common
11		Ground
12		Talker A (Tx_A)
13		Talker B (Tx_B)
14		Shield

Serial 3-4

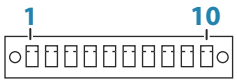
Unit socket (male)



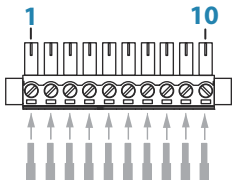
Cable plug (female)

Pin	Port	Purpose
1	Port 3 (IEC 61162-1)	Listener A (Rx_A)
2		Listener B (Rx_B)
3		Shield
4		Talker A (Tx_A)
5		Talker B (Tx_B)
6	Port 4 (IEC 61162-1)	Listener A (Rx_A)
7		Listener B (Rx_B)
8		Shield
9		Talker A (Tx_A)
10		Talker B (Tx_B)

Serial 5-6



Unit socket (male)



Cable plug (female)

Pin	Port	Purpose
1	Port 5 (IEC 61162-1)	Listener A (Rx_A)
2		Listener B (Rx_B)
3		Shield
4		Talker A (Tx_A)
5		Talker B (Tx_B)

Pin	Port	Purpose
6	Port 6 (IEC 61162-1)	Listener A (Rx_A)
7		Listener B (Rx_B)
8		Shield
9		Talker A (Tx_A)
10		Talker B (Tx_B)

Sensor connection

Any sensor connected to the system should meet IMO performance standards and be certified. Failure to do so would make the rest of the system non-compliant.

The system must be connected to an External Position Fixing System (EPFS), a gyrocompass/ heading sensor, and a SDME source via serial line.

Ground stabilization requires an external sensor signal capable of providing an input and an indication of own ship's speed over ground, for example from an EPFS, SDME or use of stationary tracked reference targets. If a ground-referenced speed log is used for ground stabilization, it must be of dual axis type.

Connections to a BAM device is mandatory if these devices are available on a vessel.

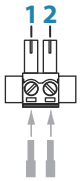
→ ***Note:*** The gyro-compass or heading sensor must have an update rate that is adequate for the ship's rate of turn – the performance should meet or exceed the relevant standards adopted by the IMO (IMO A.424(XI), A.821(19) and MSC.116(73)).

Alarm

The unit can be connected to a Bridge Alert System through the alarm output connector.

Alarm connector details

Unit socket (male)



Cable plug (female)

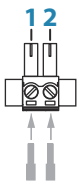
Pin	Purpose	Note
1	External alarm output	normally closed, isolated contact
2		

DGT (Dangerous Target)

The DGT output is active when a radar target or AIS target is classified as dangerous.

DGT connector details

Unit socket (male)



Cable plug (female)

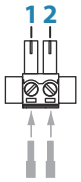
Pin	Purpose	Note
1	DGT output	normally closed, isolated contact
2		

DMA (Dead Man Alarm)

The DMA output is active when an action is made by the operator on the control station.

DMA

Unit socket (male)



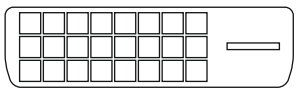
Cable plug (female)

Pin	Purpose	Note
1	DMA output	normally closed, isolated contact
2		

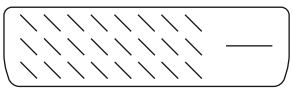
VDR

A DVI-D video output is provided for interface to a 3rd party Voyage Data Recorder (VDR). The output mirrors the screen display at the same resolution. The VDR connected to should accept digital video input.

DVI-D connector details



Unit socket (female)



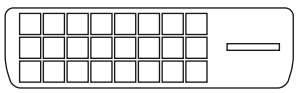
Cable plug (male)

The unit is equipped with standard DVI connector(s). The unit should be turned off prior to connecting or disconnecting a DVI cable.

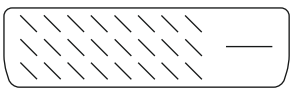
Monitor

The unit can be connected to an external monitor. The image is shown on the external monitor at the units own native resolution, so the external monitor should support the same resolution or be able to scale.

DVI-D connector details



Unit socket (female)



Cable plug (male)

The unit is equipped with standard DVI connector(s). The unit should be turned off prior to connecting or disconnecting a DVI cable.

Monitor control wiring

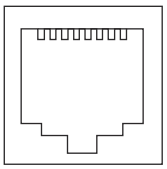
A serial connection to the monitor is required to control the monitor brightness.

For wiring details, refer to the System Installation Manual.

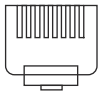
Ethernet

The Ethernet ports can be used to connect radar sensors and other radar processing units to utilise the inter-switching functionality.

Ethernet connector details



Unit socket (female)



Cable plug (male)

The unit is equipped with standard RJ45 connector(s).

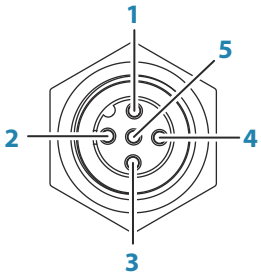
Ethernet expansion device

Connection of network devices can be made via an Ethernet expansion device. Additional expansion devices can be added to provide the required number of ports.

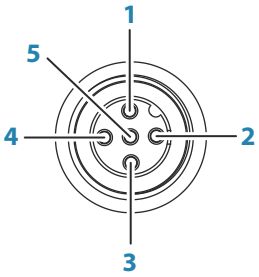
NMEA 2000

The NEMA 2000 network is used to connect a remote controller to the unit.

NMEA 2000 connector details



Unit socket (male)



Cable plug (female)

Pin	Purpose
1	Shield
2	NET-S (+12 V DC)
3	NET-C (DC negative)
4	NET-H
5	NET-L

Video in

Video in is not to be used.

USB devices

The USB port(s) can be used to:

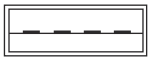
- connect a keyboard
- connect a mouse
- connect a storage device

The USB devices should be standard PC compatible hardware.

➔ ***Note:*** USB cable length should not exceed 5 m when using regular cables. Lengths over 5 m may be possible with the use of an active USB cable.

USB connector details

Unit socket (female)



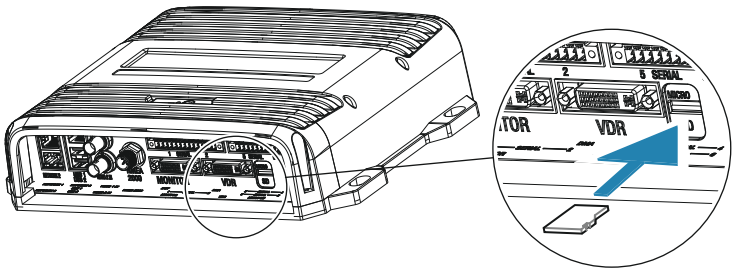
Cable plug/Device plug (male)

The unit is equipped with standard USB type-A connector(s).

Card reader

A memory card can be used for:

- Software updates
- Transfer of user data
- System backup



Card details

The unit supports standard MicroSD cards.

4 Technical specifications

R5000 processor unit

General	
Type approval	Radar Equipment CAT 1 (H), CAT 2 (H) and CAT 3
Environmental	
Temperature	
Operating temperature	-15°C to 55°C (According to IEC 60945 ed. 4.0)
Storage temperature	-15°C to 70°C (According to IEC 60945 ed. 4.0)
Vibration	According to IEC60945 ed. 4.0
Shock	According to RMRS rules (2-020101-040-E Vol 2 - Environmental Test of Equipment)
Equipment category	Protected
IP class	IP2X
Compass safe distance	
Safe distance to the standard magnetic compass	0.7 m (2.3 ft)
Safe distance to the steering magnetic compass	0.3 m (0.99 ft)
Physical	
Dimensions	Refer to dimensional drawings
Weight	1 kg (2.20 lbs.)
I/O interface	
NMEA 0183	4x IEC 61162-1 2x IEC 61162-2
NMEA 2000	1 port
Ethernet	3 ports
Alarm output	2 wire interface
VDR	DVI output
DGT (Dangerous Target)	DGT output, active when a radar target or AIS target is classified as dangerous
DMA (Dead Man Alarm)	DMA output, active when an action is made on the control panel
Monitor	DVI output to remote display
Card reader	1 MicroSD card reader

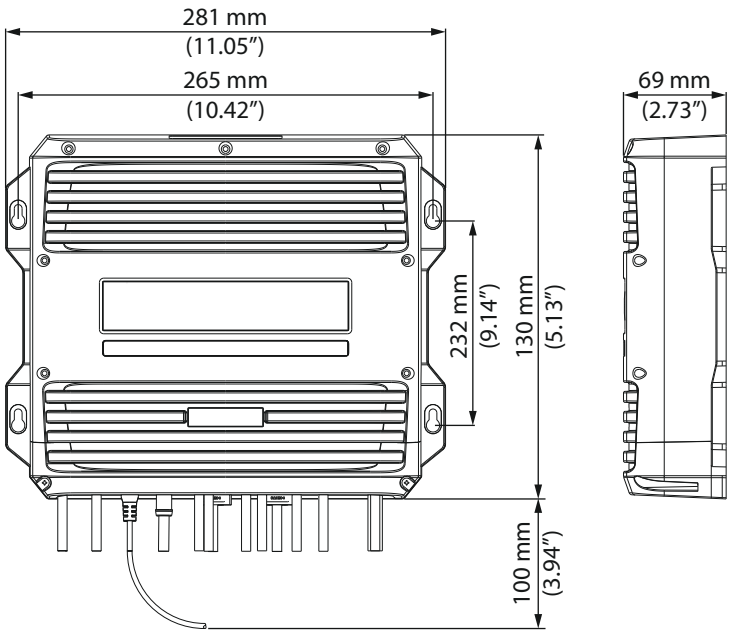
5 Accessories

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

- www.navico-commercial.com

6 Dimensional drawings

R5000 processor unit



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