

**SIMRAD**

# NSS7, NSS8 and NSS12 Installation Guide

ENGLISH





# Preface

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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 instrument and transducers in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing safe boating practices.

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Translation of the Documentation, the English language version of the Documentation will be the official version of the Documentation.

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.

## Copyright

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## Warranty

The warranty card is supplied as a separate document.

In case of any queries, refer to the brand web site of your display or system:

[www.simrad-yachting.com.com](http://www.simrad-yachting.com.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

The Simrad NSS;

- meets the technical standards in accordance with Part 15.103 of the FCC rules
- complies with CE under R&TTE directive 1999/5/EC
- complies with the requirements of level 2 devices of the Radio-communications (Electromagnetic Compatibility) standard 2008

For more information please refer to our website:

[www.simrad-yachting.com](http://www.simrad-yachting.com)

## Trademarks

- NMEA 2000 is a registered trademark of the National Marine Electronics Association
- Navionics is a registered trademark of Navionics SpA
- Simrad is a trademark of Kongsberg Maritime AS Company registered in the US and other countries and is being used under license
- B&G, StructureScan, Navico, SonicHub, SimNet, Skimmer, InsightHD, Broadband Radar and Broadband Sonar are trademarks of Navico, registered in the US and other countries

## 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.

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 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
- Consult the dealer or an experienced technician for help

### **About this manual**

This manual is a reference guide for installing Simrad NSS systems.

The manual assumes that the user has basic knowledge of navigation, nautical terminology and practices.

The manual does not cover basic background information about how equipment such as radars, echo sounders and AIS work.

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.

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# 1

## NSS overview

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NSS Sport Touchscreen multifunction display range includes three display sizes: 6.4" (VGA), 8.0" (SVGA), and 12" (XGA).

Ultrabright LED backlit screens are used across the range.

All three models include an internal GPS antenna.

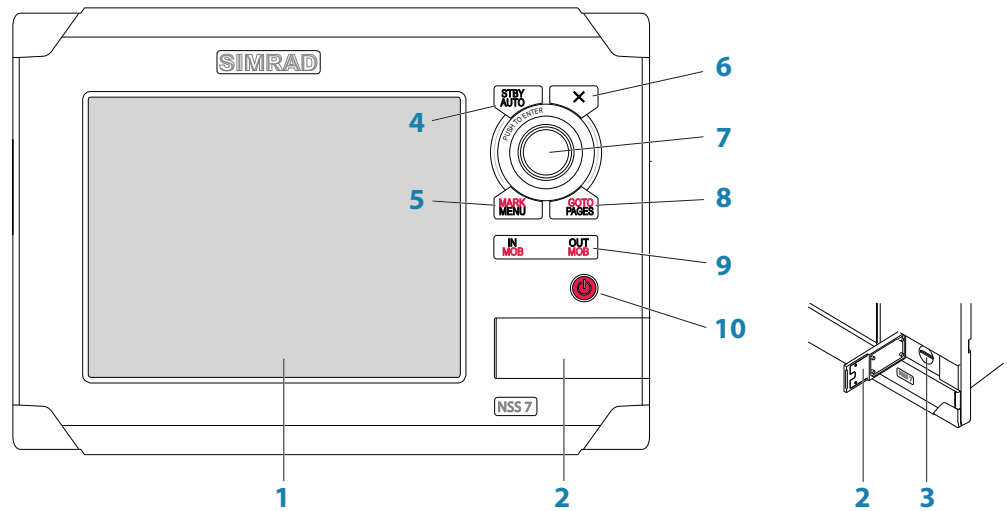
The NSS12 features an internal ethernet switch with 3 ethernet connectors for extra network connectivity, whereas the NSS7 and NSS8 have built-in echosounders and a single ethernet connector.

Built-in Insight or Navionics coastal cartography (depending on region) with optional Platinum + Support via micro SD.

Network capability with Simrad NSE and NSO multifunction displays.

Expansion options include: Integration with AC12N/AC42N and SG05 autopilot computers, external BSM-1, BSM-2, and LSS StructureScan echosounders, Broadband 3G, 4G, and HD Digital radar, SonicHub, SiriusXM™ Weather and Audio Support, SimNet/NMEA 2000, camera/video signal input, and BEP CZone integration.

## Front - Controls



### 1 Touchscreen

### 2 Card reader door

### 3 Micro-SD Card reader

Used for optional Navionics or InsightHD chart data, software updates, transfer of user data and system backup.

### 4 STBY / AUTO key

Used for Autopilot operation.

### 5 MARK / MENU key

A short press displays the active panel's menu. A long press places a waypoint at the vessel's position.

### 6 X key

Used to exit dialogs, to return to previous menu level and to remove the cursor from the screen on chart, radar and echosounder panels.

### 7 Rotary knob

Used for zooming chart and for scrolling through menus. Press rotary knob to confirm selection.

### 8 GOTO / PAGES key

A short press displays the Pages overview panel (Home page). Repeated short presses toggles between Pages overview, Tools and Settings panels. A long press displays the Go To menu.

### 9 IN / OUT / MOB key Zoom key

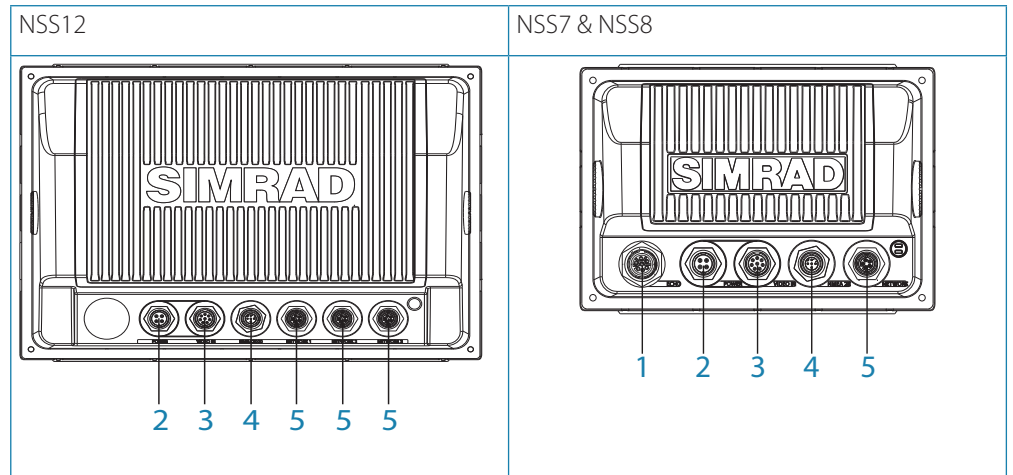
for chart, radar and echosounder panels. A simultaneous press on both key ends will position a Man Over Board (MOB) mark at vessel's position.

### 10 Power key

A long press turns the unit ON/OFF. A short press brings up the light options dialog. Repeated short presses toggles between preset brightness levels.

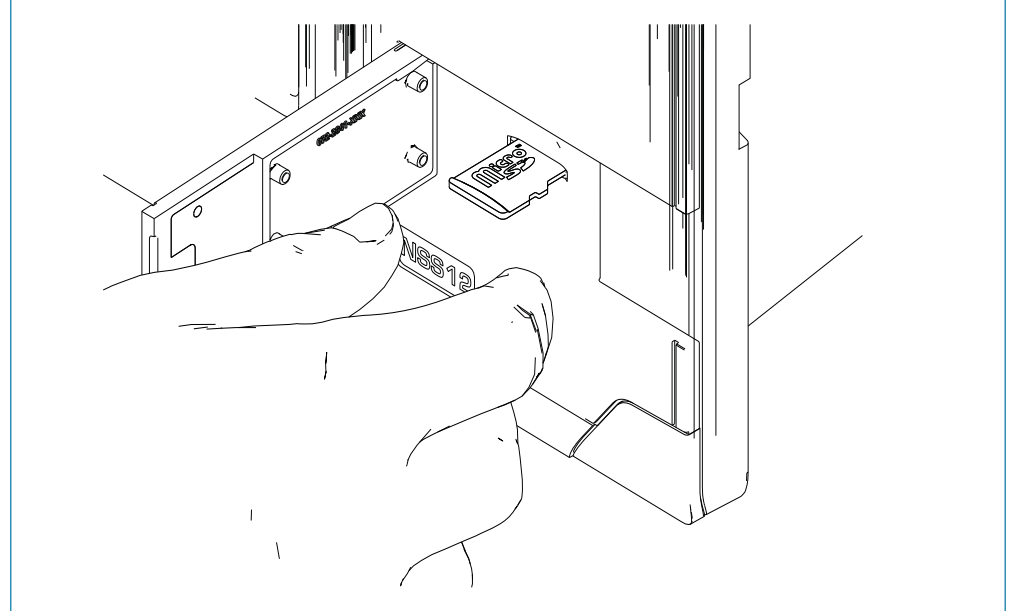


## Rear - Connectors



Key	Function	Description
1	ECHO	Built in Broadband Echosounder on the NSS7 and NSS8. NSS12 requires an optional echo sounder module connected via ethernet
2	POWER	For power input 12 or 24 V DC input, Power control, and external alarm.
3	VIDEO IN/ NMEA 0183	With optional cable provides two composite video inputs and one RS422 port (NMEA 0183 TX, RX) see NMEA 0183 Wiring
4	NMEA 2000 / SimNet	Connects NSS display to a NMEA 2000 or SimNet network
5	NETWORK	Three Ethernet network ports on the NSS12 or one on the NSS7 and NSS8 for connecting to other NSS displays and Network modules

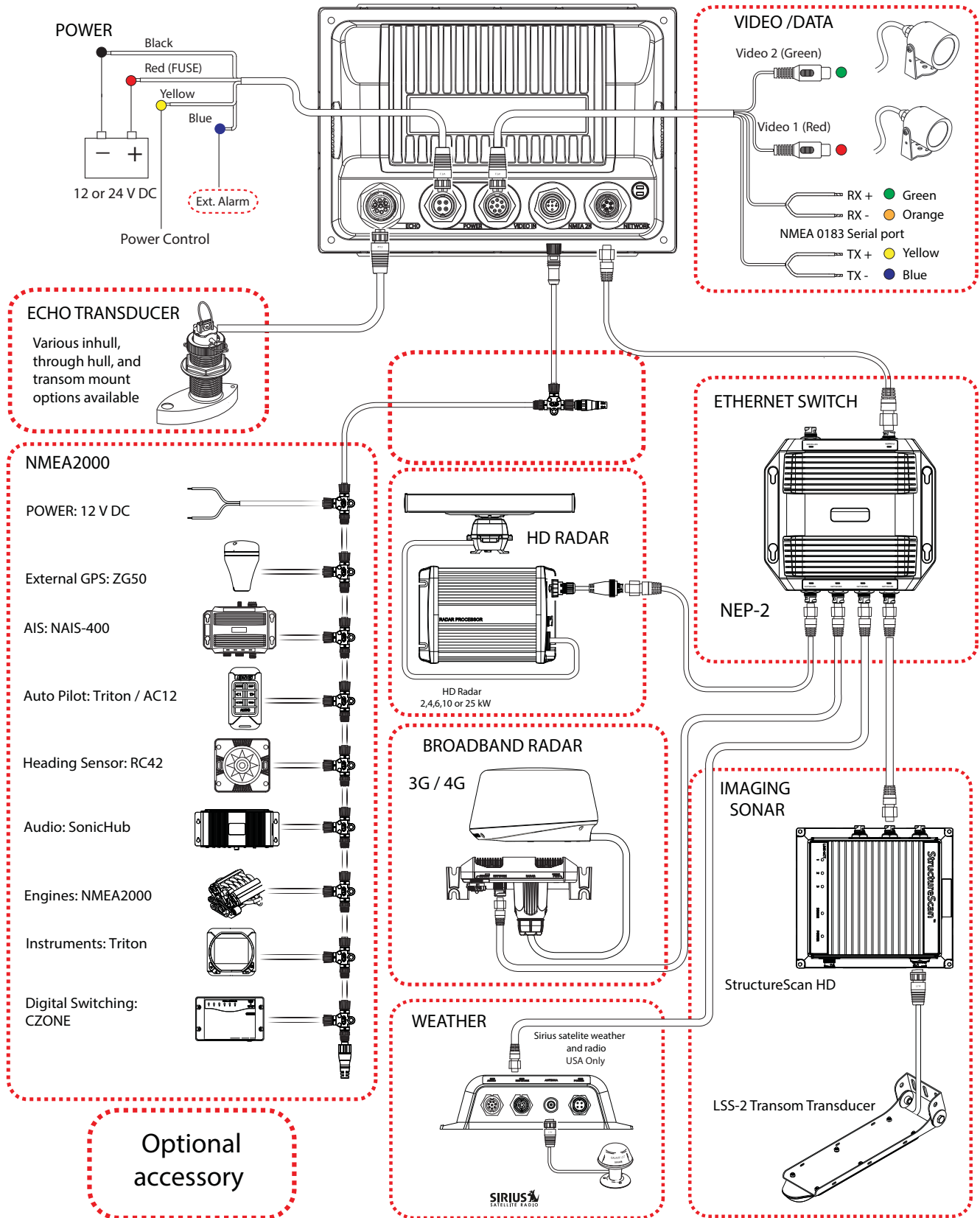
The card reader door is opened by pulling outwards the right hand edge of the door.



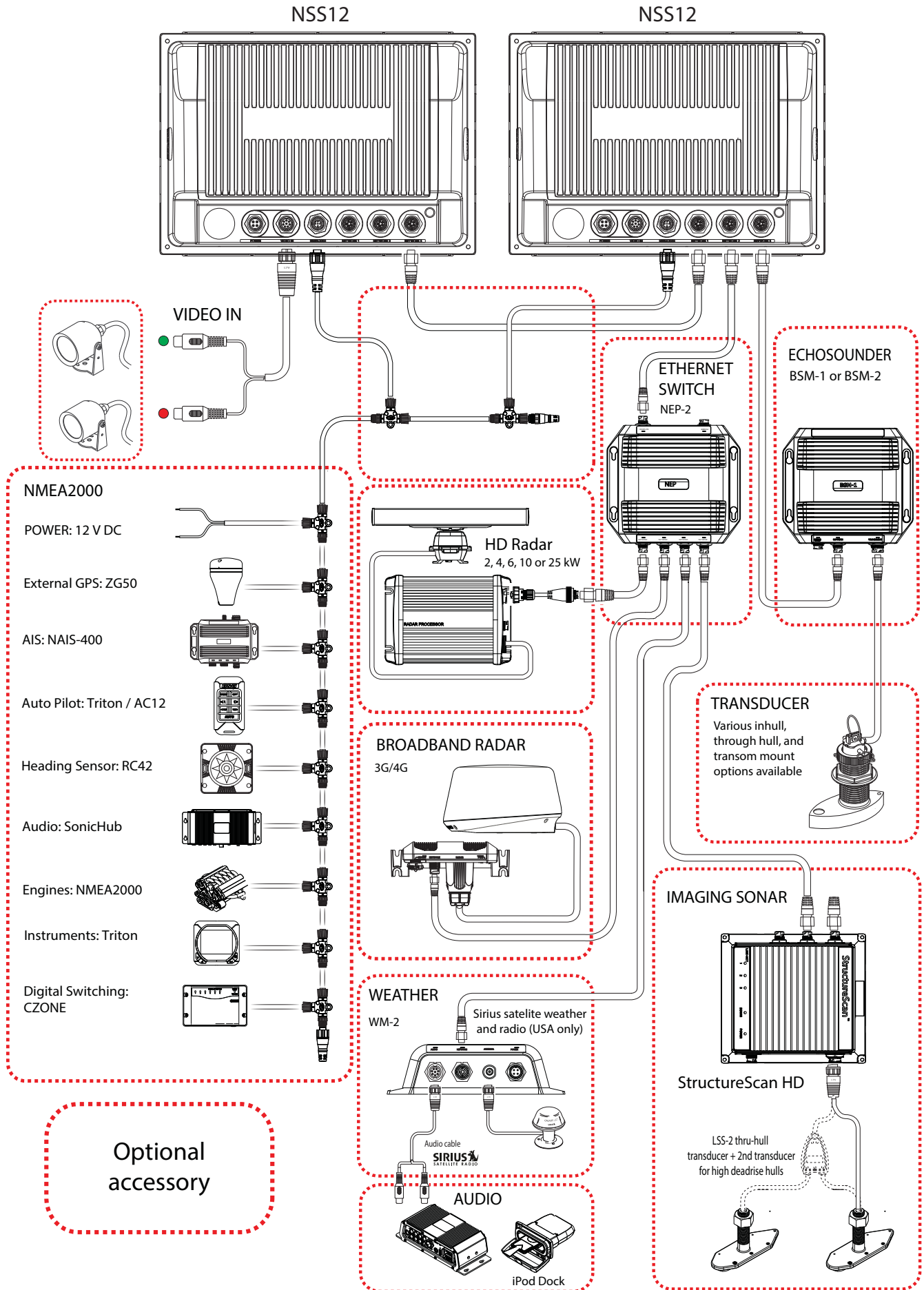
→ **Note:** The card reader door should always be shut immediately after inserting or removing a card, in order to prevent possible water ingress.

# NSS7/NSS8 potential system example

## NSS7 or NSS8



## NSS12 potential system example



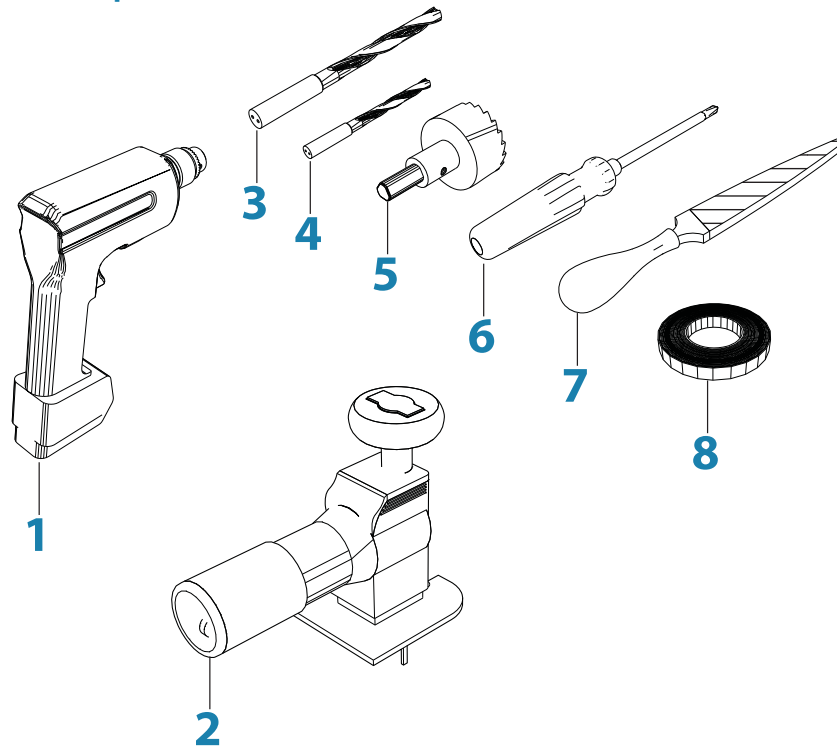
# 2

## Planning the installation

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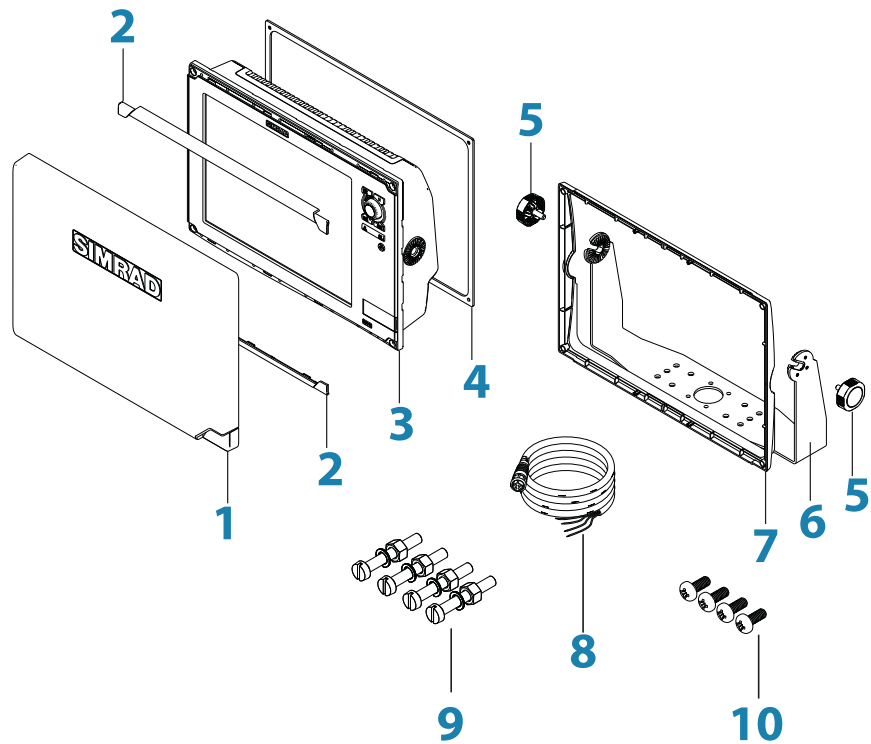
### Preparing for installation

#### Tools required



- 1 Drill
- 2 Jig Saw
- 3 Drill Bit
- 4 Drill Bit
- 5 Hole Saw (25mm / 1")
- 6 Pozi Screw Driver
- 7 File
- 8 PVC Electrical Tape

## Check the contents



Key	Description	Key	Description
1	Sun Cover	6	Mounting bracket (NSS7 & NSS8 only, option for NSS12)
2	Cosmetic screw covers (x2)	7	Bracket mount rear bezel (NSS7 & NSS8 only, option for NSS12)
3	NSS Display	8	Power cable
4	Flush mount gasget	9	Flush mount machine screws (x4)
5	Bracket knobs (x2 - NSS7 & NSS8 only, option for NSS12)	10	Bracket mount rear bezel securing screws (x4 - NSS7 & NSS8 only, option for NSS12)

## Mounting location

Choose the mounting locations carefully before you drill or cut. The display should be mounted so that the operator can easily use the controls and clearly see the display screen. Be sure to leave a direct path for all of the cables. Simrad displays are high-contrast and anti-reflective, and are viewable in direct sunlight, but for best results install the display out of direct sunlight. The chosen location should have minimal glare from windows or bright objects.

The enclosure that the display is mounted in should be dry and well ventilated. The ventilation of the space behind the unit should be enough to prevent excessive heat build up as a combined result of radiated heat off the heat sink, and sunlight heating of the enclosure. In very small enclosures, also subject to heating from the sun, it may be required to fit forced cooling.

Ensure that any holes cut are in a safe position and will not weaken the boat's structure. If in doubt, consult a qualified boat builder.

Before cutting a hole in a panel, make sure that there are no hidden electrical wires or other parts behind the panel.

Do not mount any part where it can be used as a hand hold, where it might be submerged, or where it will interfere with the operation, launching or retrieving of the boat.

If bracket mounting the display choose an area where the display will not be subjected to excessive vibration.

The mounting location will affect the internal GPS receiver. Ensure you test the unit in its intended location to ensure satisfactory reception. An external GPS source may be added to overcome poor reception areas.

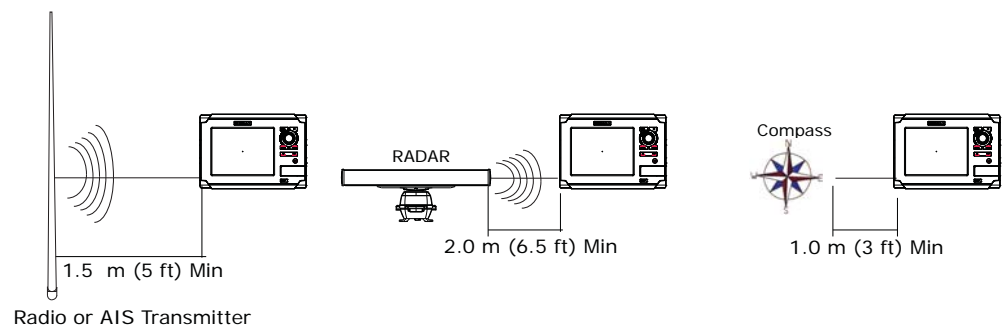
Leave sufficient clearance space to connect all relevant cables.

For overall width and height requirements, please see the dimensions section on page 52.

→ **Note:** The bracket kit is an optional accessory that needs to be ordered separately.

**Warning:** Poor ventilation combined with a small mounting enclosure could potentially cause the display to overheat - B&G displays are designed to operate in temperatures from -15° C to +55° C (+5° F to +131° F).

Ensure unit is not installed too close to devices that may emit harmful interference, or devices that may be sensitive to any electromagnetic field disruption caused by the unit. Typical minimum 'safe' distances are indicated below.



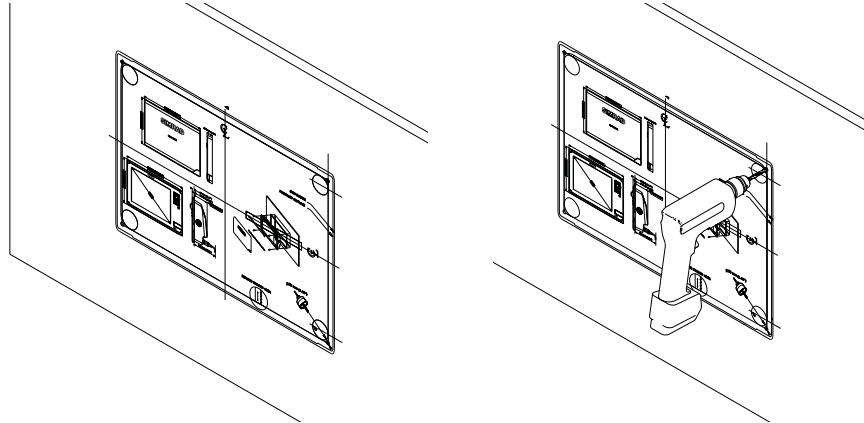
# 3

## Mounting the NSS display

### Panel mount

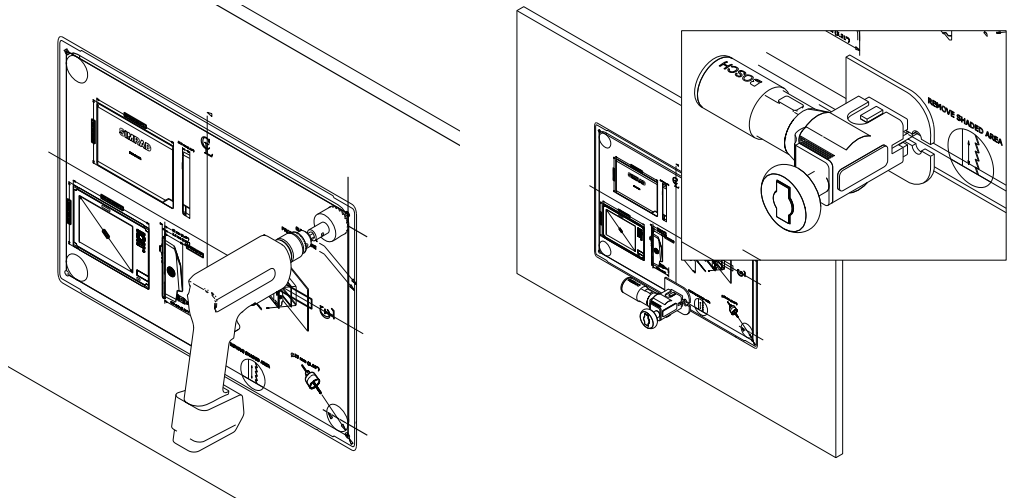
Attach the flush mounting template to the selected mounting position using adhesive tape.

Drill pilot holes for the four hole saw cuts and four self tapping screws used to secure the display. If using M4 machine screws use a 5 mm (0.20") drill bit.



Use a 25 mm (1") hole saw to cut the four corner radius.

Cut along the dotted line and remove the shaded area.



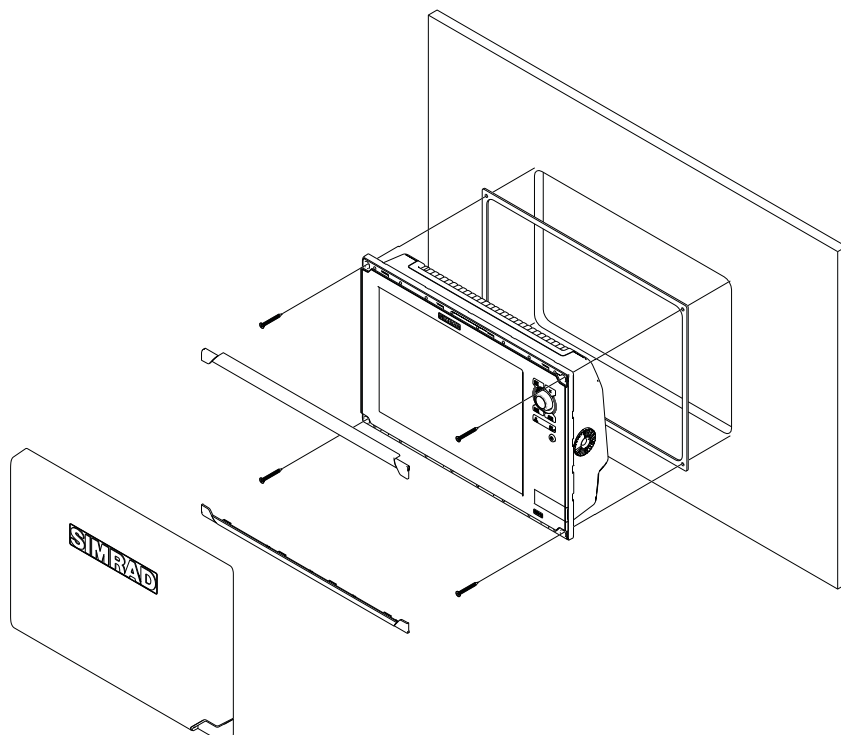
Peel backing off the gasket and apply to the surface.

Connect all cables to the rear of the unit before placing the unit into the console.

Secure the display to the surface.

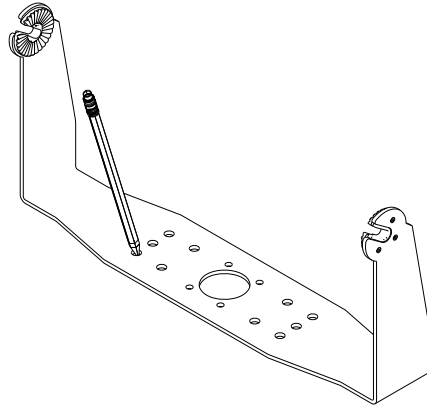
To finish off the installation, firmly clip the upper and lower bezels in place.

Note: For flush installations the supplied rear bezel (NSS7/8) is not used.

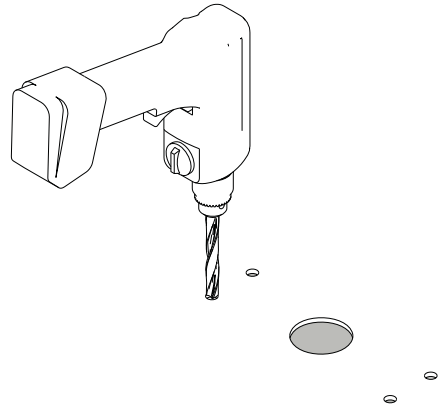


## Bracket mount

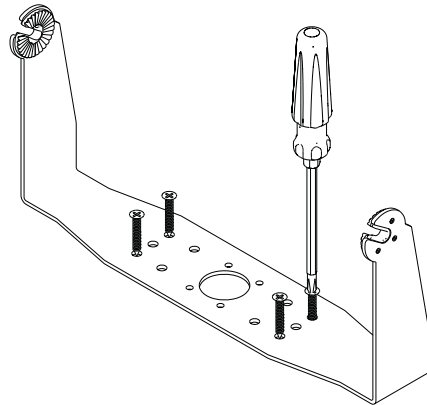
Using the bracket as a template, mark places to drill the central cable hole and four pilot holes for the bracket fasteners.



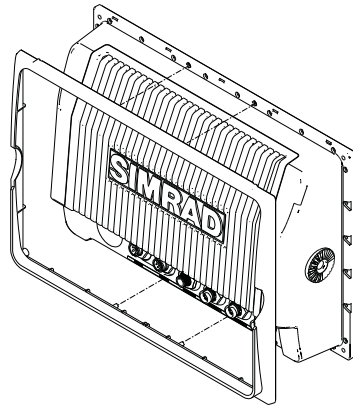
Drill cable and fastener pilot holes.



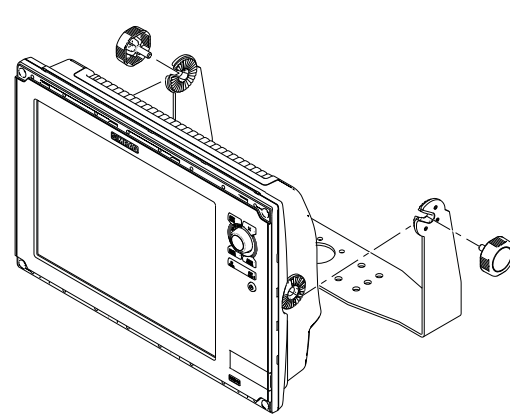
screw bracket down with fasteners.



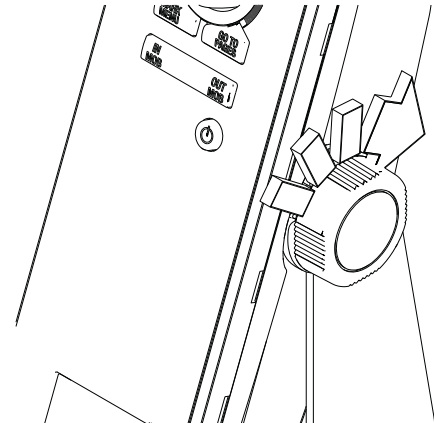
Fit rear bezel to NSS using supplied machine screws.



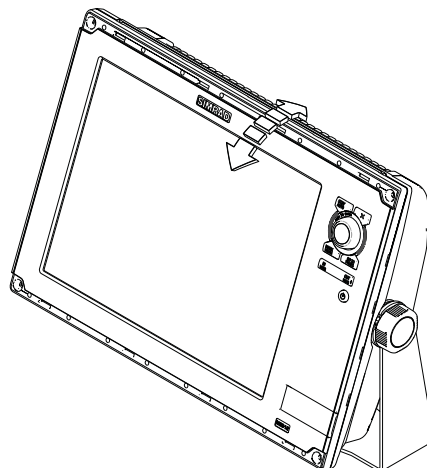
Align the NSS ratchet teeth with those of the bracket and partially screw in the bracket knobs one at a time.



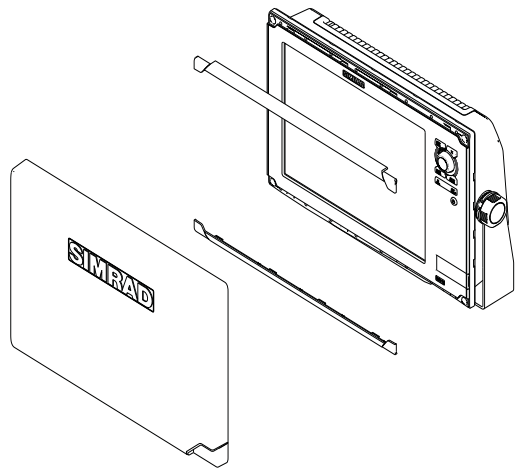
Further tighten both knobs to ensure the unit is held securely and can't tilt forward under its own weight.



Stand back and check if the viewing angle is correct. Loosen the knobs slightly if adjustment is required, then re-tighten.



To finish off the installation, clip the upper and lower bezels in place.





# 4

## Wiring the NSS

### Wiring guidelines

Don't do this	Do this
Don't make sharp bends in the cables	Do make drip and service loops
Don't run cables in a way that allows water to flow down into the connectors	Do tie-wrap all cables to keep them secure
Don't route the data cables in areas adjacent to radar, transmitter, or large current carrying cables	If cables are shortened, lengthened, or re-terminated, do insulate and protect all wiring connections
	Do leave room at the back to install and remove cables

**⚠ Warning:** Before starting the installation, be sure to turn electrical power off. If power is left on or turned on during the installation, fire, electrical shock, or other serious injury may occur. Be sure that the voltage of the power supply is compatible with the NSS display

**⚠ Warning:** The NSS has a voltage rating of 12 V DC or 24 V DC. (9 V DC - 32 V DC max range). SimNet is 12 V DC only

**⚠ Warning:** The red wire should always be connected to (+) DC V using a fuse or thermal breaker (10 Amp)

# 5

## Connecting power

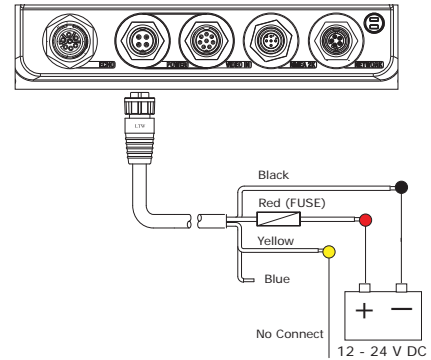
### Power connection (basic)

The NSS display can be powered by either 12 V or 24 V DC. Displays are protected against reverse polarity, under voltage and over voltage.

The supplied power cable has a four core cable used for:

- power into the system (Red and Black wires)
- controlling power state of the display or power state of other displays and devices (Yellow wire)
- connecting to an external alarm (Blue wire)

Connect Red to (+) DC using a 5 amp fuse for NSS12, and a 3 amp fuse for NSS7 and NSS8. Connect Black to (-) DC. The display can be powered on and off using the power button.



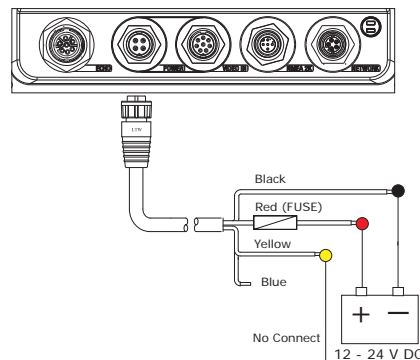
### Power Control (yellow wire)

Planning is required how you want to be able to turn on and off the NSS an connected compatible devices.

The yellow (Power Control) wire on the NSS power cable can either be an input that will turn on the display when power is applied, or an output that turns on other devices when the display is powered on. It can be configured at the installation stage to control the power state of displays and compatible devices. When commissioning the system, displays can be set to be a Power Control Slave or Power Control Master.

Power Control configuration options of the NSS are:-

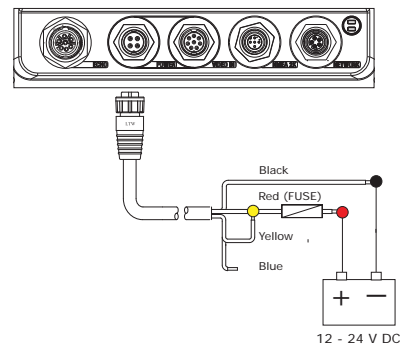
- use the Power button to turn on the display only: Yellow wire not connected
- display to turn on when power is applied to the display: Common red and yellow wires
- use the Power button to turn on the display and other displays and or compatible devices such as Broadband Radar: Yellow wire connected to a Power Control Bus. (Set one or more displays to be a Power Control Master)



#### No Power Control

Display will turn on and off when the power button on the front of the unit is pressed.

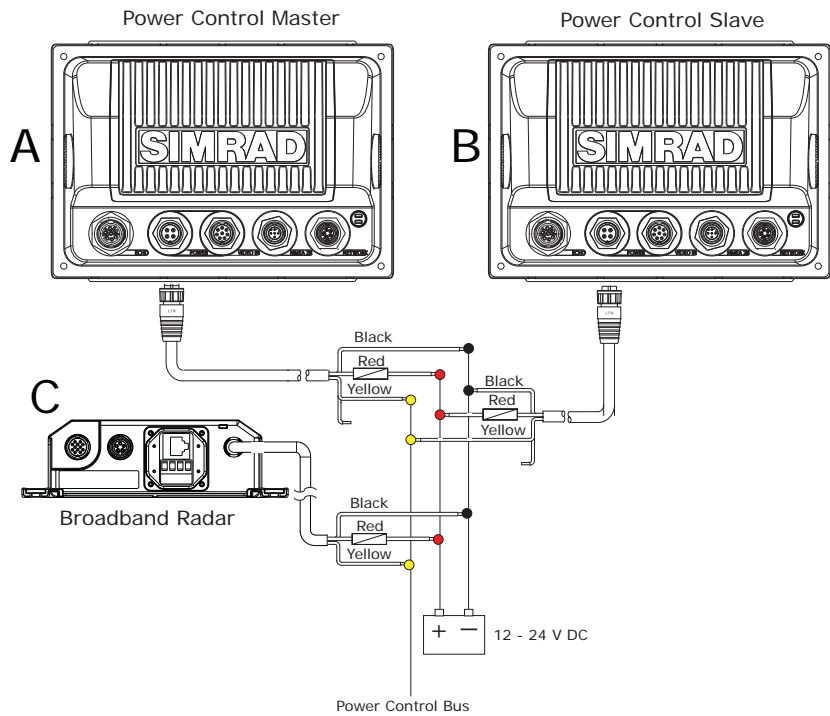
Leave yellow Power Control wire disconnected. Tape or heat-shrink end to prevent shorting.



#### Auto Power on

Display will turn on when power is applied. Common the yellow wire with the red wire after the fuse.

Note: The unit can not be powered down by power button, but can be put in to standby mode. (screen backlight off).



### Power Control Master

Display (A) turns on using the power button. It is set as the Power Control Master and will output voltage on the Power Control bus to turn on display (B) and Broadband radar (C).

Display (B) is set to Power Control Slave and if turned on by display (A) cannot be powered down using its own power button, but can be set to standby.

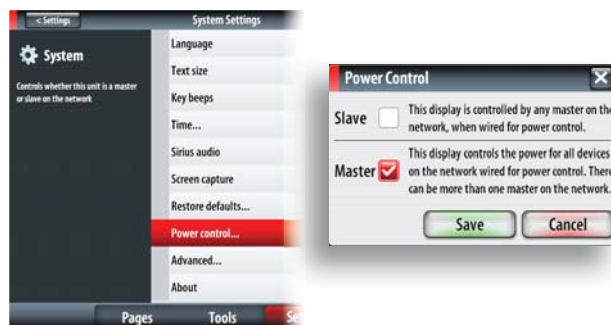
If display (A) is off, display (B) can be turned on using its power button, but won't turn on any other devices. Display (B) could, however also be set to Power Control Master.

➔ **Note:** If a display has its power state controlled by another display or ignition switch, it can't be totally powered down. It can enter a standby state to save power. If the power button is pressed and Power Off selected, a message will appear "Preparing to standby..."



### Power Control setup

To configure a display as a Power Control Slave or Master select Power control from the 'Settings' menu.



The following Simrad products require (+) DC Volts on the yellow wire in order to function: NEP-2, BSM-1, BSM-2, WM-2, Broadband radar, RI10, SonicHub.

The +DC volts can come via a switch, a breaker or from an NSS or NSE display yellow wire.

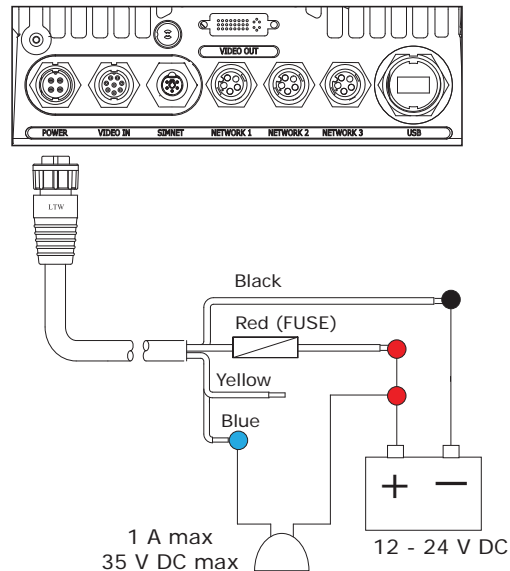
Not connected	Fused + DC power supply	Switch	NSS, NSE display yellow wire
Unit is turned on using the power key	Unit always on when power is on	Unit power controlled by switch	Unit turned on or off by display (if display power control master)

## External alarm

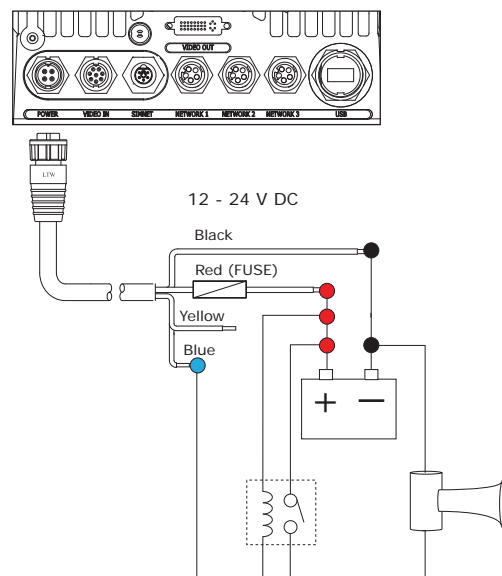
Blue wire on power cable:

An external alarm can be connected to one or more displays on the network. The external alarm can be a small peizo buzzer connected directly, or a horn siren connected via a relay.

Alarms are configured globally in the system i.e they can be configured on one display and seen, heard and acknowledged from all displays. However the external alarm siren can be enabled or disabled on individual displays. For information on configuring alarms, refer to the Alarms section in the Operation manual.

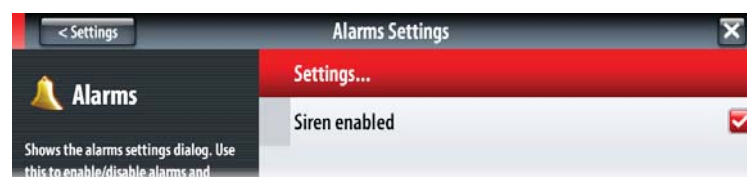


For sirens that draw more than 1 Amp use a relay



## External Alarm Setup

The SIREN ENABLED option must be set in order for the unit to drive the external alarm when an alarm condition arises.



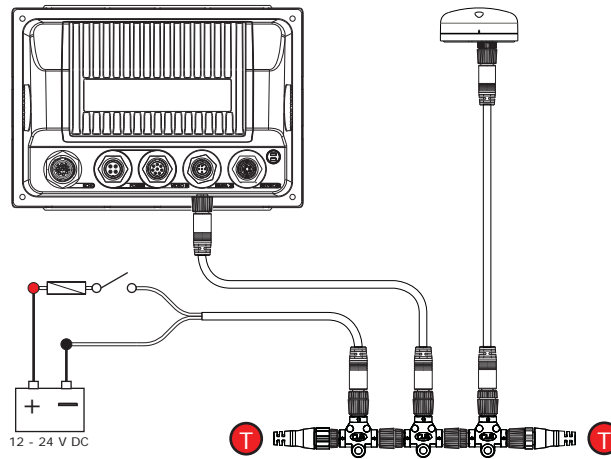
# 6

## External GPS

### Mounting location

Depending on vessel design and materials, certain mounting locations chosen for the NSS may not offer adequate GPS satellite signal reception using the internal receiver. An external GPS source such as the GS15 can be used to overcome this, by allowing remote installation in a location that has an unobscured view of the sky. An NMEA 2000 expansion kit may be required to connect the GPS antenna to the NSS, if no other network cabling is already installed.

Refer to "Device connection" on page 31 for further details on connecting to the network.



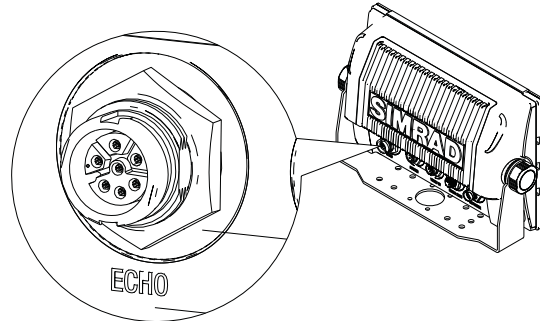
For setting the external NMEA 2000 / SimNet GPS as position source, refer to "NMEA 2000 / SimNet setup" on page 34

# 7

## Echosounder

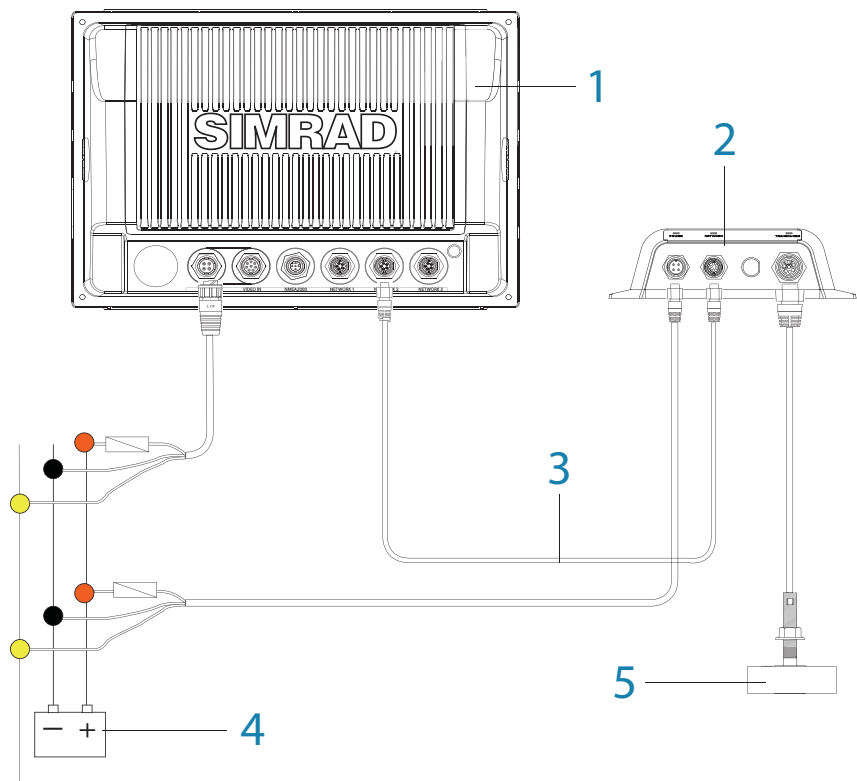
### Internal echosounder

The NSS7 and NSS8 have an Internal Broadband Echosounder. Navico transducers fitted with the 7 pin blue connector can be plugged directly into the corresponding blue socket adjacent to the power connector.



### External echosounder

An optional Navico external sounder module (eg. BSM-1, BSM-2, StructureScan HD) can be added to the NSS7, NSS8 and NSS12 via the ethernet port on any of these devices.



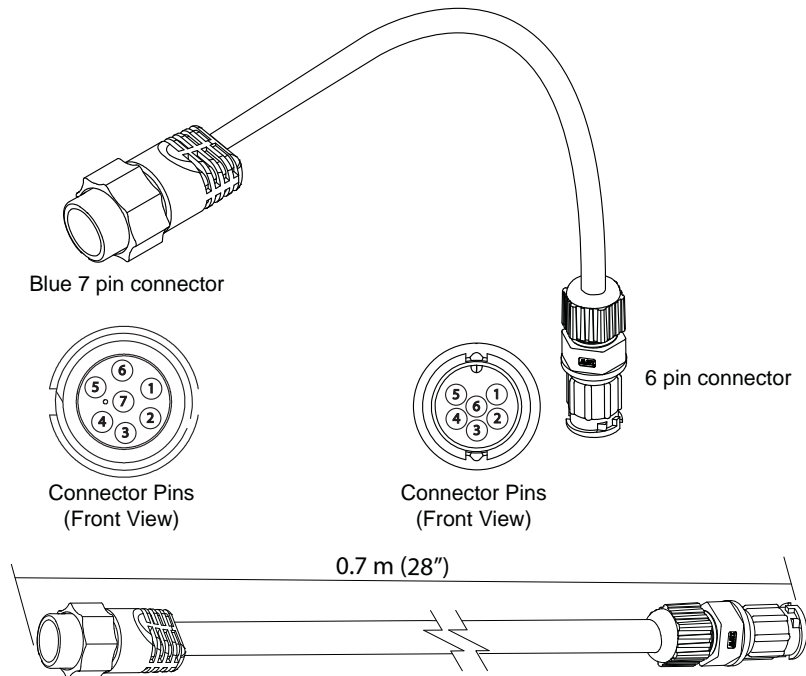
- 1 NSS display
- 2 BSM-1 Broadband Echosounder module
- 3 Ethernet cable yellow 5 pin. See page 57 for more cable length options. Cable can be connected directly to NSS or via a Network Expansion Port
- 4 12 or 24 V DC
- 5 Transducer

## Transducer adapter cables

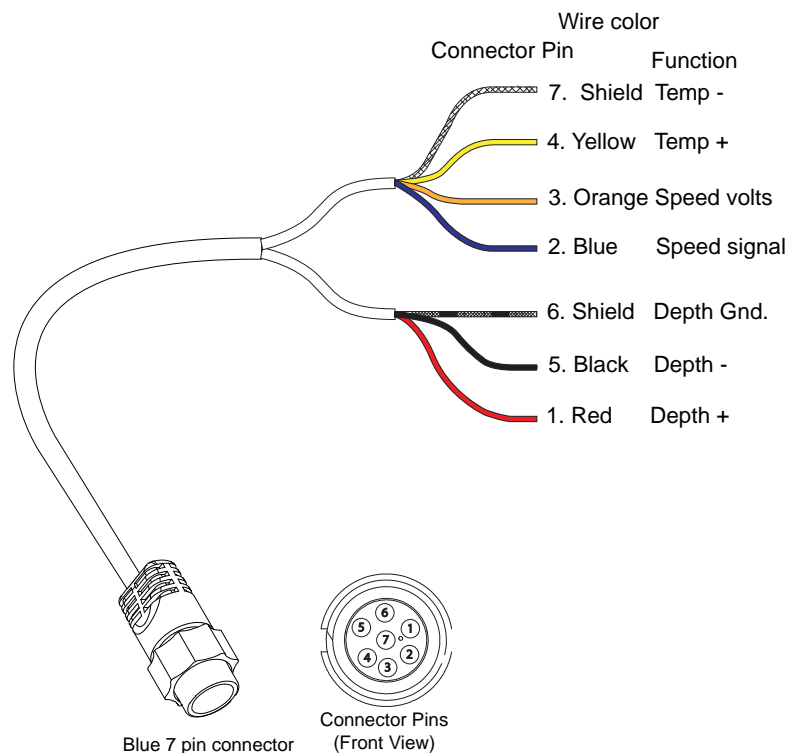
For vessels with existing transducers that do not have the Navico blue 7 pin connector, there are two adapter cables available to assist with installation.

For vessels that already have a transducer that was used with older Navico products that has 6 pin connector. Use 000-00022-001 6 pin to 7 pin transducer adapter cable.

These transducers will require the 10 k temp version of the transducer selected for transducer type in Echo Installation. See "Echosounder setup" on page 22 for further information.



For other transducers that do not have Navico blue 7 Pin or 6 pin (above) connector that require the connector to be removed. Use 000-10046-001 7 pin to bare wire adapter cable. Not all transducers are compatible with NSS or BSM-1. Refer to the transducer type selection list in the Echo Installation page to see if your transducer is mentioned for the selected echo source. If not contact your Simrad dealer or Simrad Technical Support for assistance with transducer compatibility. Simrad always recommends using Simrad transducers.



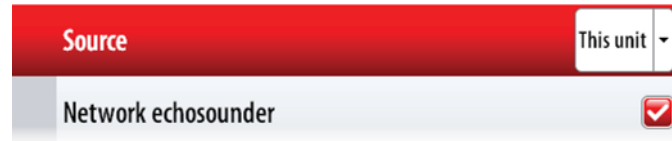


## Echosounder setup

### Select echosounder source

Choose the Echosounder source in the Echo Settings . MENU > MENU > ECHO.

This can be selected to be the echosounder built in to the display (NSS7 and NSS8 only), or an external sounder module such as the BSM-1.



Deselecting the Network Echosounder option, limits source selection to internal sonar only.

### Depth offset

This is a value that can be entered on the Echo Installation page to make depth readings relate to any point from the water surface, to the deepest point of the vessel.

Below are some typical ways in which the offset is used:

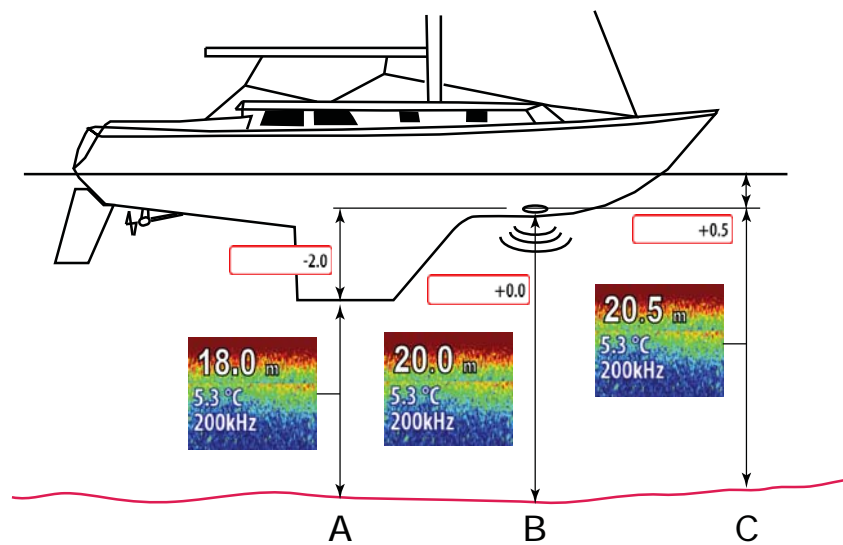
A) For Depth below Keel: Set the distance from transducer to the keel.

Enter a negative value, e.g.

B) For Depth Below Transducer: no offset required.

C) For Depth Below Surface (waterline): Set the distance from transducer to the surface:

Enter a positive value, e.g.



<p><b>Echosounder software version</b></p>	
<p>For external sounder modules, the software version is displayed under Sonar installation. To upgrade Sonar software, see page 49</p>	

### Water speed calibration (Echosounder transducer)

Water speed calibration is used to adjust the speed value from the paddle wheel to match the actual boat speed through the water. Actual speed can be determined from GPS speed over ground (SOG) or by timing the boat over a known distance. Water speed calibration should be performed in calm conditions, with minimal wind and current movement.

Select Auto correct to match water speed to ground speed (SOG).

Manual calculation. Increase this value above 100% if the paddle wheel is under reading, and decrease this value if it is overreading, e.g. if the average water speed reads 8.5 knots and SOG records 10 knots the calibration value needs to be increased to 117%. To calculate the adjust-



ment, divide the SOG by the paddlewheel speed, and multiply the product by 100.  
Calibration range: 50-100%. Default is 100%.

### Water speed averaging (echosounder transducer)

Averages water speed by measuring your speed at a selected interval of time. Water speed intervals range from one to thirty seconds, e.g. If you select five seconds, your displayed water speed will be based on averaging over 5 seconds of sampling.

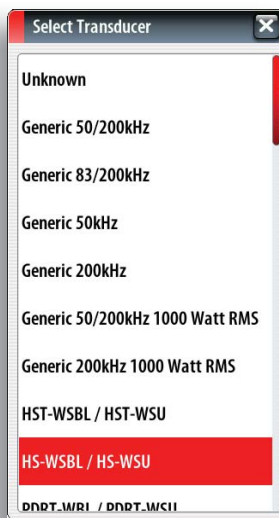
Calibration range: 1-30 seconds. Default is 1 second.

### Water temperature calibration (echosounder transducer)

Temperature calibration is used to adjust the water temperature value from the echosounder transducer to match the data from another temperature sensor. It may be required to correct for localised influences to the measured temperature.

Calibration range: -9.9° - +9.9°. Default is 0°.

→ **Note:** Water temperature calibration only appears if the transducer is temperature capable. Check transducer type selection if this option should be available.



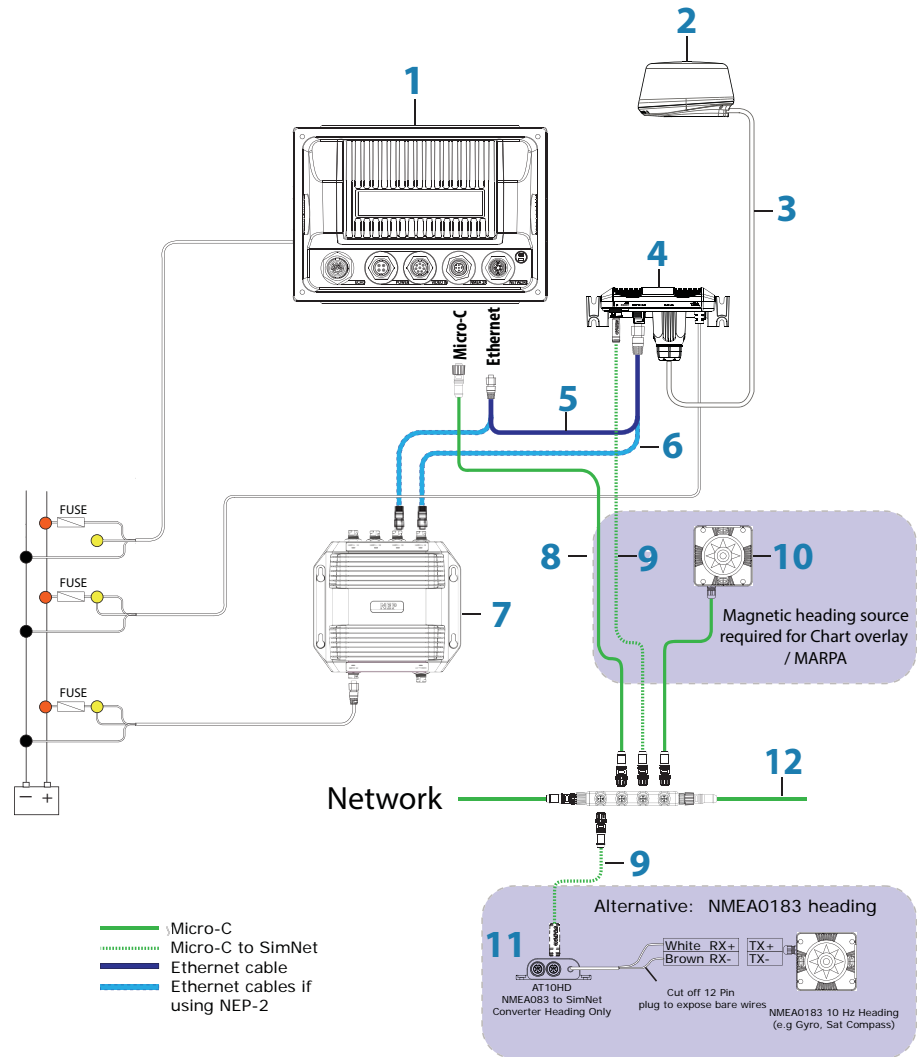
### Transducer type

Transducer type is used for selecting the transducer model connected to the echosounder module. In some transducers with built-in temperature sensors, the temperature reading may be inaccurate if the wrong transducer is selected from the transducer type menu.

# 8

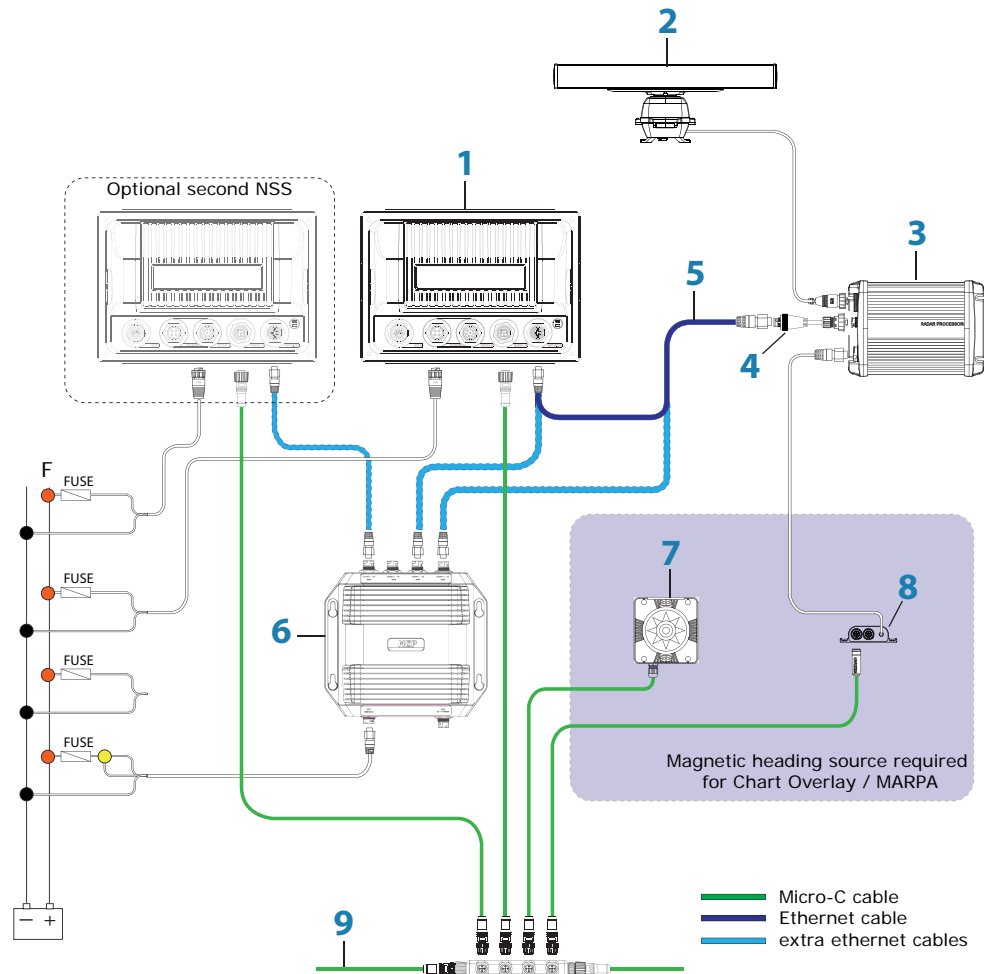
## RADAR

### Broadband radar (3G / 4G)



Key	Description	Notes
1	NSS display	
2	BroadBand™ Radar Scanner	
3	Interconnection cable	Standard 20 m (65 ft) cable. Optional lengths: 10 m (33 ft) and 30 m (98 ft)
4	RI10 Radar interface box	
5	Ethernet cable	Radar supplied with a 1.8 m (6 ft) cable
6	Ethernet cables	Additional required to connect radar via a NEP-2
7	NEP-2 expansion port module	
8	Micro-C drop cable	
9	Micro-C to SimNet drop cable	Allows display to receive heading information for chart overlay and MARPA
10	RC42N Heading Sensor	
11	AT10HD NMEA 0183 - NMEA 2000	Converts NMEA 0183 to NMEA 2000/SimNet (Only heading information is converted)
12	NMEA 2000 Micro-C backbone	

## HD radar



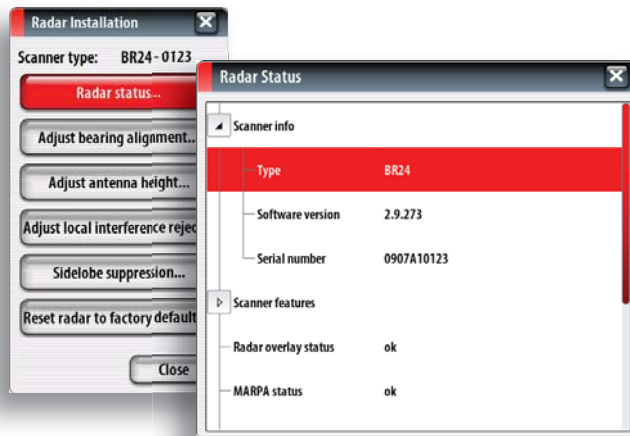
Key	Description
1	NSS Display
2	HD radar scanner
3	HD radar processor module
4	Ethernet adaptor cable
5	Ethernet cable (Navico 5 pin type)
6	NEP-2 Expansion Port module (optional - used where extra ports are required)
7	RC42N rate compass
8	AT10HD (provides heading data to radar processor for radar overlay and MARPA)
9	NMEA 2000 backbone

## Radar setup

Setup and configuration of the Broadband radar has been simplified compared to traditional pulse radars. There is no zero range (time delay), no warm up time, and no burn-in required..



## Radar status



### Scanner type

Identifies the model of scanner connected to the network.

### Software version

Check to make sure you have the latest software. check website for the latest version.

### Serial Number

This number should be recorded for support and insurance purposes.

### MARPA status

The MARPA status can identify if a heading sensor is on the network and that the radar is receiving heading information essential for MARPA calculations.

### Reset device ID

NSS displays only support one radar on the network. Should a radar be connected, that has been connected to a dual radar network in the past, it may not be detected by the display because it has an incorrect Device ID. With the radar connected and power up, select the Reset Device ID button to resolve this problem.

→ **Note:** This procedure must be performed with only one radar on the network.

### Adjust bearing alignment

This is to align with the heading marker on the screen with the center line of the vessel, this will compensate for any slight misalignment of the scanner during installation. Any inaccuracy will be evident when using MARPA or chart overlay.

Point the boat to be perpendicular to the very end of a breakwater or peninsula. Adjust the bearing alignment setting, so that the heading marker and land mass intersect.

### Adjust antenna height

Set the radar scanner height. The Radar uses this value to calculate the correct STC settings.

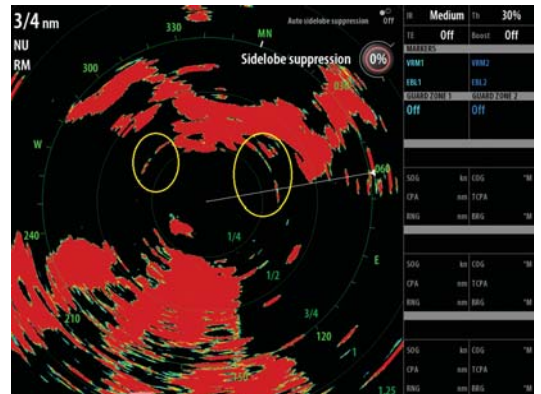
### Adjust local interference reject

Interference from some onboard sources can interfere with the Broadband radar. One symptom of this could be a large target on the screen that remains in the same relative bearing even if the vessel changes direction. Choose from Local interference rejection LOW, MED or HIGH. Default is LOW

## Sidelobe suppression

- **Note:** This control should only be adjusted by experienced radar users. Target loss in harbour environments may occur if this control is not adjusted correctly.

Occasionally false target returns can occur adjacent to strong target returns such as large ships or container ports. This occurs because not all of the transmitted radar energy can be focused into a single beam by the radar antenna, a small amount of energy is transmitted in other directions. This energy is referred to as sidelobe energy and occurs in all radar systems. The returns caused by sidelobes tend to appear as arcs:



When the radar is mounted where there are metallic objects near the radar, sidelobe energy increases because the beam focus is degraded. The increased sidelobe returns can be eliminated using the Sidelobe Suppression control in the Radar installation menu.

By default this control is set to Auto and normally should not need to be adjusted. However if there is significant metallic clutter around the radar, sidelobe suppression may need to be increased. The control should be adjusted as follows:

1. Set Radar range to between 1/2 nm to 1 nm and Sidelobe Suppression to Auto.
2. Take the vessel to a location where sidelobe returns are likely to be seen. Typically this would be near a large ship, container port, or metal bridge
3. Traverse the area until the strongest sidelobe returns are seen.
4. Change Auto sidelobe suppression to OFF then select and adjust the sidelobe suppression control until the sidelobe returns are just eliminated. You may need to monitor 5-10 radar sweeps to be sure they have been eliminated.
5. Traverse the area again and readjust if sidelobes returns still occur.
6. Exit the installation menu.

## Restore radar to Factory Default

This can be used to revert all user adjustments.

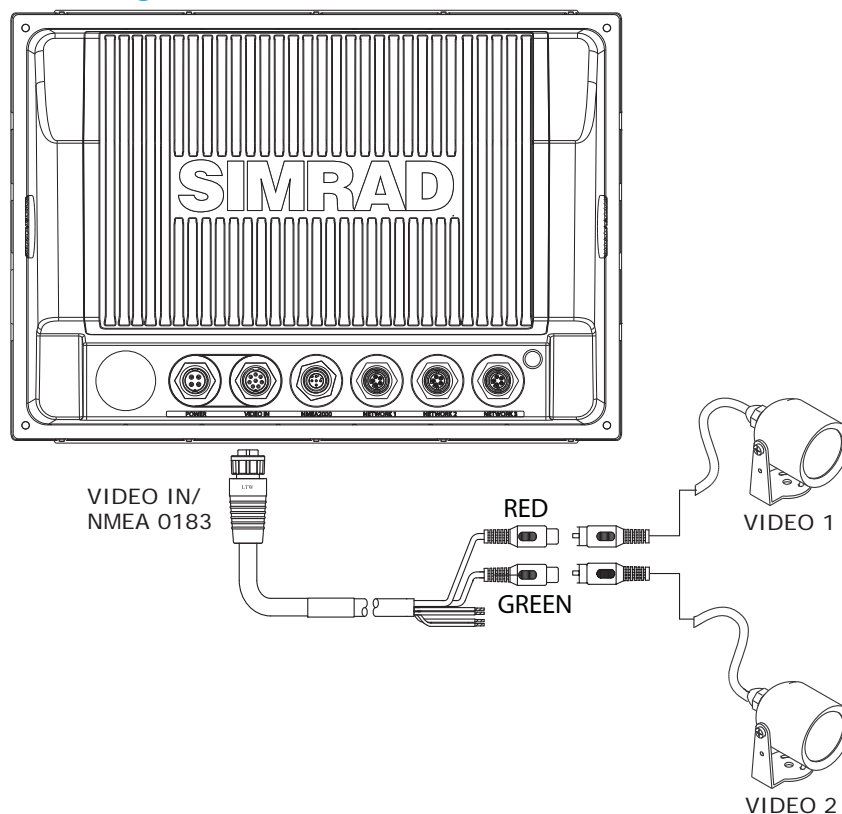
# 9

## Video In

Connect up to two composite video cameras to each display unit using the optional Video / Data cable. This connects to the VIDEO IN port on the rear of the display.

- **Note:** The video images will not be shared with other displays via the network. It is only possible to view video on the unit connected to the video source.


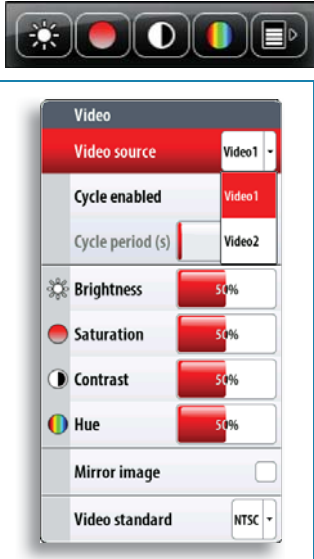

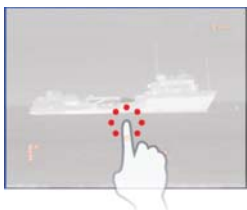
### Connecting video sources



- **Note:** Only connect NTSC and PAL video sources

### Video In configuration

Tapping the video panel will bring up the video panel buttons. Access the Video Menu by one of the following:

	Press the MENU key	
	Tap the MENU icon in the video panel buttons	
	Press and hold on the video panel	

Enable PAL or NTSC depending on the video output standard of the camera.

You can optimize the video display by adjusting the video image settings (brightness, saturation, etc.). The settings are adjusted individually for each video source.

# 10

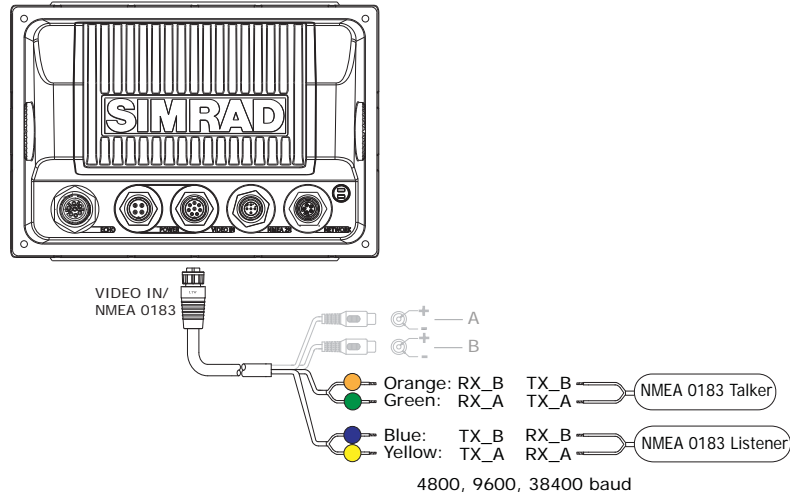
## NMEA 0183

To exchange NMEA0183 data, the NSS display has a NMEA 0183 serial port, providing both an input and an output.

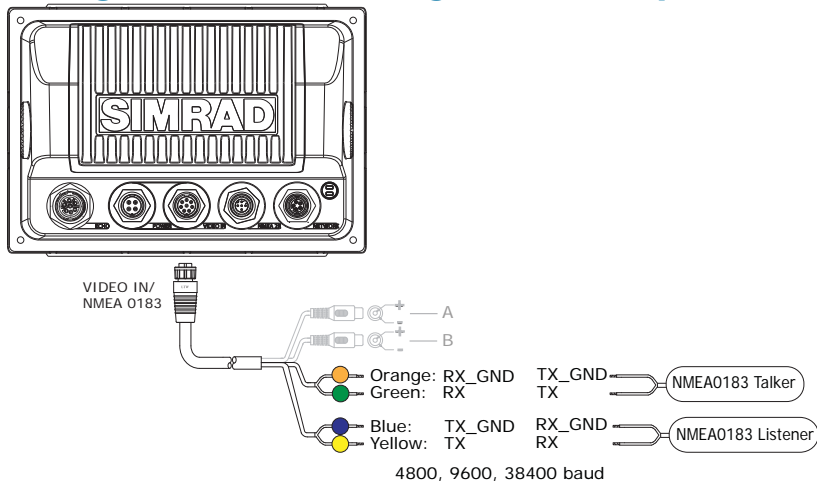
The port uses the NMEA 0183 (serial balanced) and RS232 (single ended) standards, and can be configured in the software for different baud rates up to 38,400 baud. NMEA 0183 sentences output by the NSS can be individually turned on or off.

Refer to “NMEA 0183 supported sentences” on page 61 for a complete list of sentences.

### Wiring NMEA 0183 for serial balanced output



### Wiring NMEA 0183 for single ended output



→ **Note:** some product literature may use different naming for connections. The following correlations can be assumed; (Tx\_A = Tx+), (Tx\_B = Tx-), (Rx\_A = Rx+), (Rx\_B = Rx-), (Tx = TxD), (Rx = RxD).

→ **Note:** when connecting to a DB-9 plug for interfacing to a PC, combine Rx\_GND and TX\_GND from the NSS, and connect to pin 5 (PC GND) of the plug. Rx is connected to pin 3, Tx to pin 2.

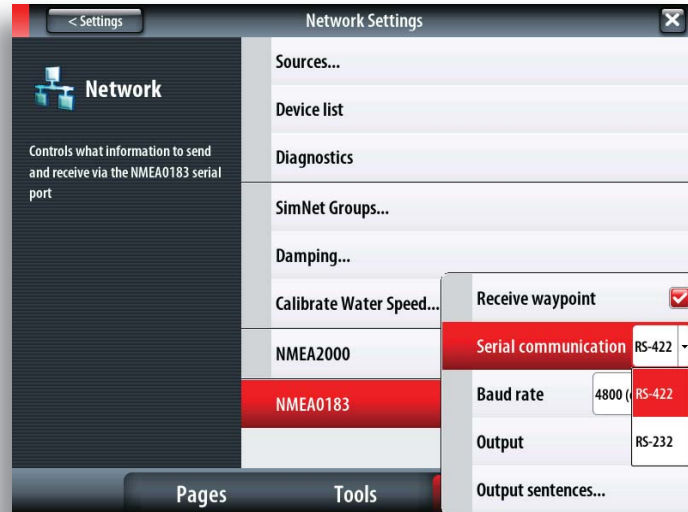
### Talkers and Listeners

Do not connect multiple devices outputting data (Talkers) on to the input (Rx) of the NSS display. The RS232/RS422 standards are not intended for this type of connection, and data will be corrupted if more than one device transmits simultaneously. The output however may drive multiple receivers (Listeners). The number of receivers is finite, and depends on the receiving hardware. Typically three devices is possible.



## Serial port setup

NMEA 0183 setup is done from the Network Settings page.



### Receive waypoint

Select this option to allow device capable of creating and exporting waypoints via NMEA 0183 to transfer directly to the NSS.

### Serial communication

This should be set according to correspond with devices connected to the NMEA 0183 input and output. RS422 is the default setting. The input and output always use the same standard.

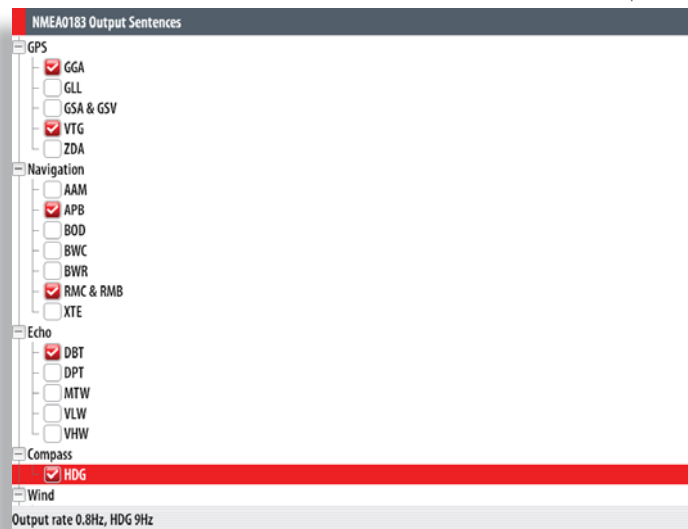
### Baud rate

Baud Rate is set simultaneously for the input and the output, it can not be set at a different speed for each. It should be set to match the speed of the device connected to it. Most NMEA 0183 devices send data at 4800 baud.

- **Note:** AIS transponders typically operate at NMEA 0183-HS (high speed), and will require the baud rate to be set to 38,400.

### NMEA 0183 output

To enable data output, enable the 'Serial output' option, and then select which sentences the NSS needs to transmit to other devices from the 'Serial output sentences' list.



Only a select list of the most commonly used sentences are enabled by default.



# 11

## NMEA 2000 / SimNet

### Device connection

All models of NSS are equipped with an NMEA 2000 port, which allows the receiving and sharing of a multitude of data from various sources.

### Essential network information

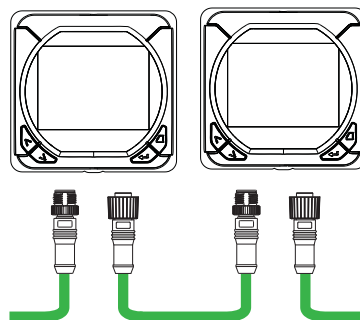
- A NMEA 2000 network consists of a linear “backbone” from which “drop cables” connect to NMEA 2000 devices
- NMEA 2000 cables used for Simrad products are of the ‘micro-c’ style, which is a cable/connector specification approved for use in NMEA 2000 certified networks. Some Simrad products use SimNet proprietary connectors, but are compatible via adaptor cables.
- A single drop cable has a maximum length of 6 m (20 ft). The total length of all drop cables combined should not exceed 78m (256 ft)
- A NMEA 2000 network has a maximum cable length of 100 m (328 ft), between any two points
- A NMEA 2000 network needs to have a terminator at each end of the backbone. A terminator can be one of the following:
  - a terminator blank plug
  - a wind transducer (where the mast cable is one end of the backbone)

### Planning and installing a network backbone

The NMEA 2000 backbone needs to run between the locations of all products you want to install, typically in a bow to stern layout, and be no further than 6 m from a device to be connected.

Choose from the following components to make up your NMEA 2000 backbone:

- Micro-C cables: 0.4 m (1.3 ft), 2 m (6,6 ft), 5 m (16.6 ft), and 9 m (29.5 ft) cables
  - Micro-C power cables with or without termination
  - T-connector. Use at locations where you want to connect a device by drop cable
- **Note:** When using a wind sensor, the mast cable should be connected as the final length of cable in one end of the backbone, as the sensor is fitted with a termination resistor.
- **Note:** Most NMEA 2000 devices can be connected directly to a Simrad SimNet backbone and SimNet devices can be connected to a NMEA 2000 network by using adapter cables. (“NMEA 2000 cables” on page 57)
- **Note:** The NSS has a Micro-C NMEA 2000 connector but is fully compatible to work in a SimNet network by using an adapter cable.
- **Note:** IS40 displays have two connectors, and can either be connected inline with the backbone, or wired individually off a drop cable. Connecting from device to device is known as ‘daisy chaining’ This network topology is not officially NMEA 2000 compliant.



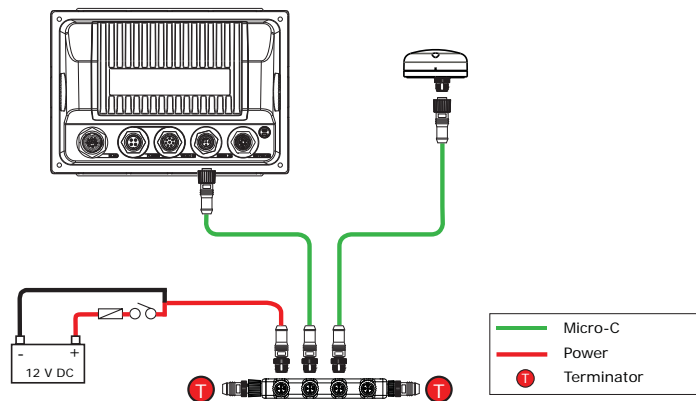
## Power the network

A NMEA 2000 network requires its own 12 V DC power supply protected by a 5 amp fuse or breaker. For 24 V systems, use a DC-DC converter to supply 12 V

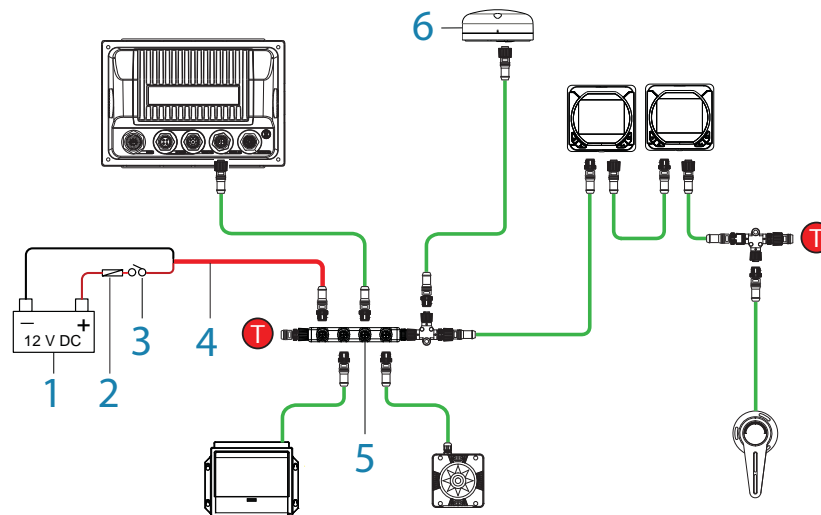
Connect power at any location in the backbone for smaller systems.

For larger systems introduce power at central point in the backbone to “balance” the voltage drop of the network.

- **Note:** If joining to an existing NMEA 2000 network or similar CAN bus network that already has its own power supply, do not make another power connection.
  - **Note:** Do not connect the NMEA 2000 power cable to the same terminals as the start batteries, Autopilot Computer, Radar, thruster or other high current devices.
- The drawing below demonstrates a typical small network. The backbone is entirely made up of T-piece joiners, which are terminated at each end.



In the larger system below, the backbone is extended by cable and is also daisy chained through Triton displays.



- 6 SimNet power source. Stable 12 V DC only**
- 7 5 Amp fuse or breaker**
- 8 Switch**
- 9 SimNet power cable with termination (red disc) (24005902)**
- 10 SimNet 7 way joiner**
- 11 SimNet or NMEA 2000 GPS antenna**
- 12 SimNet backbone daisy chained using instruments with two SimNet ports.**
- 13 SimNet backbone**

## Data bridging

### NMEA 0183 to NMEA 2000

All supported NMEA 0183 sentences entering the system are internally bridged (converted) to NMEA 2000, and output via the NMEA 2000 port for any other devices to use. The only exception is AIS data.

### NMEA 2000 to NMEA 0183

The NMEA 0183 sentences shown in the 'Transmit' rows of the NMEA 0183 Supported Sentences table will be generated if the data is available from a NMEA 2000 data source.

### Ethernet to NMEA 2000

Limited data is bridged from the Ethernet echosounder: Speed, depth and temperature are bridged to NMEA 2000 and NMEA 0183.

### Multiple Displays

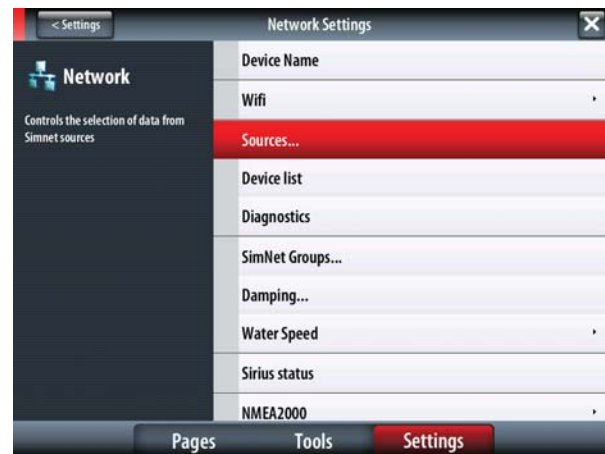
In multi display setups, each display can be used to convert data from a different NMEA 0183 talker, and will be available to any device on NMEA 2000. Each display can be setup for outputting different NMEA 0183 sentences.

- **Note:** When bridging data from ethernet, an NSS display has to be nominated to bridge the data. If this nominated display is turned off, no data will be displayed, until the display is turned on or another display is selected to bridge the data.
- **Note:** NMEA 0183 to NMEA 2000 bridging only applies to the NMEA 0183 sentences outlined in the "NMEA 0183 supported sentences" on page 61.
- **Note:** For high speed heading data input in to a radar for MARPA functionality, conversion should be done via an AT10HD.



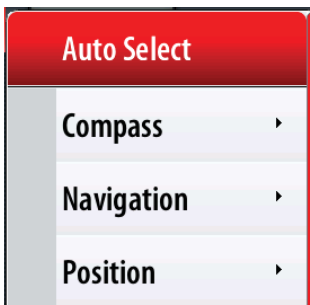
## NMEA 2000 / SimNet setup

Setup is required on initial start up of the system, or if any part of the NMEA 2000 network has been changed or replaced.



From 'Network' in the main system settings menu you can:

- select NMEA 2000 data sources - either automatically or manually
- configure instance numbers for NMEA 2000 devices (where multiple sources of same data exist)
- control how device parameters backlighting, units, damping, and alarms are grouped on the network
- select to share waypoints via NMEA 2000
- monitor NMEA 2000 network bus state and reliability
- control data damping
- calibrate water speed derived from a NMEA 2000 source



### Auto Select (Source Selection)

The Auto Select option will look for all sources connected to the NSS system. If more than one source is available for each data type, the NSS will automatically select from an internal priority list.

Make sure all devices are connected and are turned on before selecting the Auto Select option.

### Manual source selection

Manual selection is generally only required where there is more than one source for the same data, and the automatically selected source is not the one desired.

### Group source selection

Simrad products such as NSS, NSE, and IS40, have the ability to;

- use data sources (eg position, wind direction, etc) that all other products on the network use, or alternatively use a data source independently from other units.
- globally change all displays over to a different source from any display. (This will only include products set to a Group mode.)

In order to enable group selection, the display must be set to 'Default' group.

In some cases it may be desired that an NSS on a network receives the same type of data, but from different sources to that of the rest of the network devices. To do this set the data Group setting to None, and select a source for the data

### Advanced source selection

This allows the most flexible and precise manual control over which devices provide data to the NSS

Some data sources, such as those for fuel level, or engine RPM, can only be changed via the Advanced menu. Occasionally Auto Select may assign sources incorrectly, which may be

corrected using the Advanced Source Selection. An example of this is where twin installations with NMEA 2000 compliant engines are not programmed with unique instance numbers. This means that the auto select feature can't determine which engine is fitted on the port and which is fitted on the starboard side.

### **Network Groups**

It is also possible to group certain settings so they are duplicated across the network on multiple displays. Display (ie backlighting), units, damping, and alarms can be grouped either in 'Default' group, or groups '1' through to '6'. If any of the settings require discrete control, set it to 'none'.

# 12

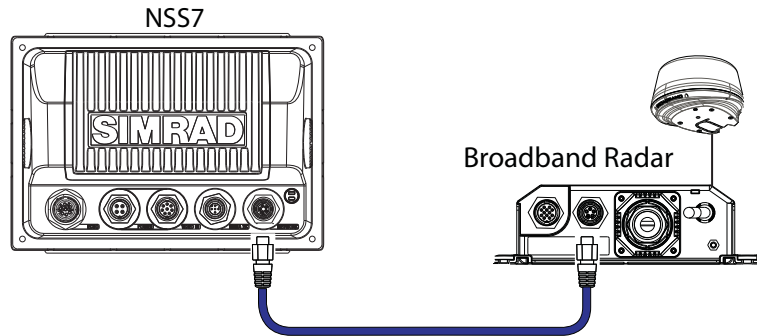
## Ethernet (NETWORK port)

The NSS system uses an Ethernet network to interconnect high bandwidth devices such as radar, echosounder and to another NSS, NSE or NSO displays. The NSS7 and NSS8 displays have one network port each, whereas the NSS12 has three Ethernet ports. Navico Ethernet network cables have orange connectors that are retained by a bayonet type locking collar.

→ **Note:** a maximum of two NSS may be connected to the same network.

### Connecting directly to a single device

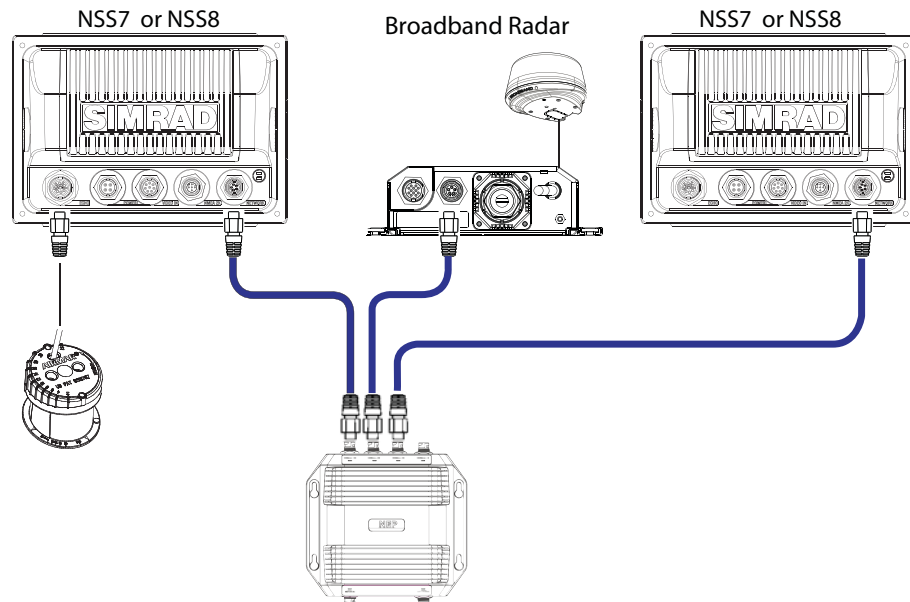
The Ethernet port is auto sensing, meaning that the NSS can connect to one Network module directly without the use of a cross over cable or switch.



### Connecting to multiple devices

#### Expanding the NSS7 and NSS8

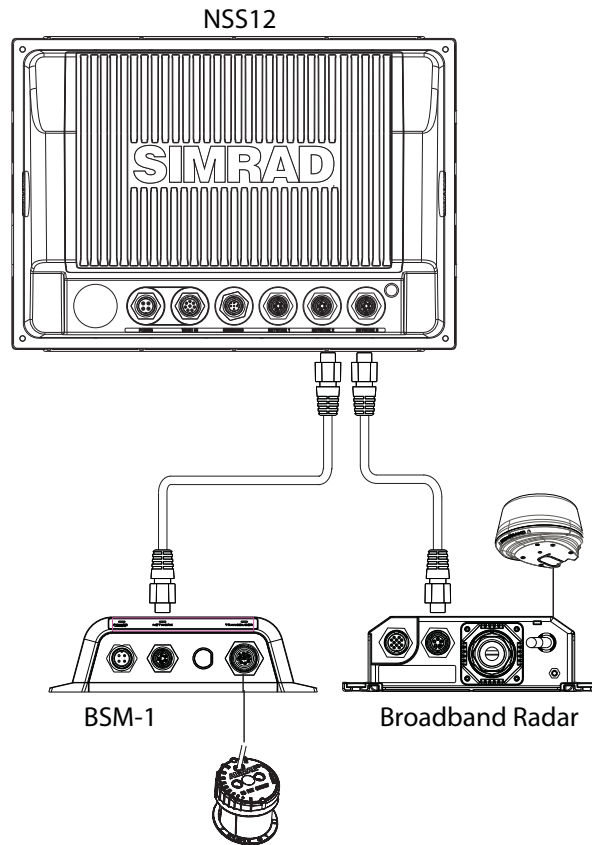
For NSS7 and NSS8; If connecting more than one Ethernet device use the optional network expansion Port (NEP-2).



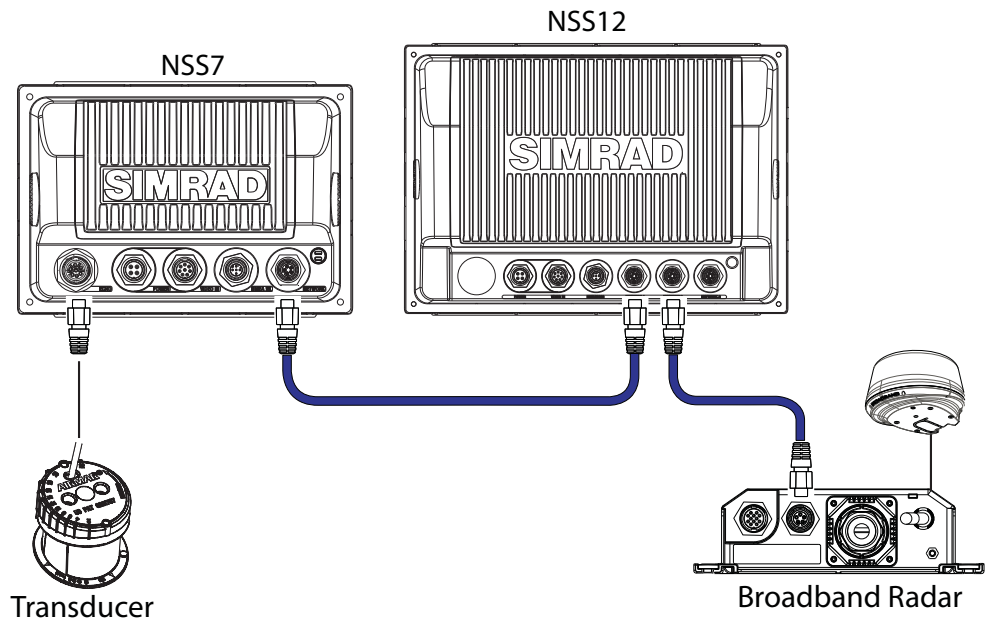
If the number of ethernet devices exceeds the number of available ports on the NEP-2, it is possible to link two or more NEP-2 modules together to provide the required ports. Every additional NEP-2 will provide an extra 4 ports, but will use up one port on the NEP-2 it is connected to.

## Expanding the NSS12

With the NSS12, up to three ethernet devices can be connected directly to the unit. If more than three modules need connection, use the optional network expansion port (NEP-2).



A second NSS connected to one of the NSS12's three built in ports will have full visibility and control over any devices connected to another port on the NSS12, in the same way it would if all devices were connected via an NEP-2 expansion port.



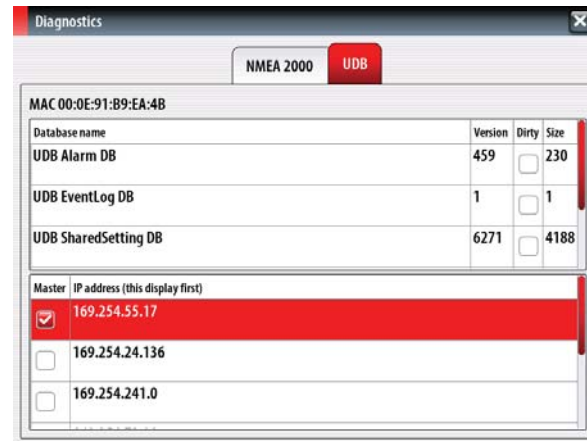


## Ethernet setup

No special setup is required for establishing an ethernet network, it is all 'plug and play'. An NEP-2 connected between an NSS and another network module (e.g. BSM-1) will automatically start working, and relay data between the two devices.

## Diagnostics

The UDB (User Data Base) tab on the diagnostics page, provides information on Ethernet activity, which is presented in two tables as shown below.



### Databases

The upper table gives an account of the various automatically synchronised databases that ensure Simrad display units (NSS, NSE, NSO, plus B&G Zeus, and Zeus Touch) are all using the same user settings and data. Each unit stores the database locally, so that all information is available if the device is run in standalone. Databases can become unsynchronised when one or more displays in a multi display network are not powered up while other displays are being operated. Creation of waypoints, routes, tracks, and altering global settings all affect databases. When the tick box 'Dirty' is ticked, the unit has identified that it's database is older than that of another device on the network. The tickbox should clear within seconds of both devices being powered up, and the databases synchronising. If it does not clear, it is recommended that all devices have the power cycled.

### IP addresses

The lower table shows the IP address of the display being viewed (top of list), the Master display (with a tick next to it), and any other displays in a multi display network. The function of the Master is invisible to the end user - It manages database synchronisation, however this task automatically shifts to another display if the current master is shut down. The IP address list only refreshes after all devices on the network have been powered down - a single device that is shutdown on the network will not be removed from the table shown on other devices. When powering up a system that has been completely shutdown, a network connectivity issue can be identified if a display does not show any other IP addresses than it's own.

The 'UDB version' is dependant on the software version installed on the display. It will never change on it's own, unlike the 'Version' of the Databases on the upper table. It is preferable to have all UDB versions the same. This can usually be achieved by loading the latest software on to your display - refer to "NSS software updates" on page 50.

### Module network light

The network LED on modules such as NEP-2, BSM-1, and RI10, can be useful for determining if the network is fundamentally operational. No light indicates no connection. A rapidly blinking green LED means the network module is communicating with another device.



# 13

## Autopilot

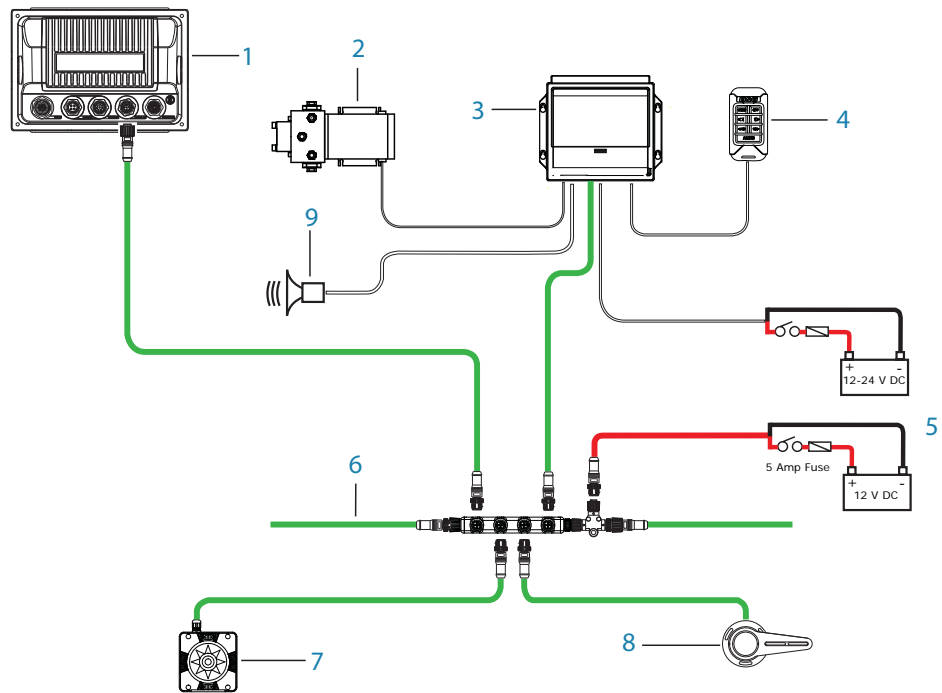
The Simrad NSS includes complete autopilot integration. When an NSS is connected to a compatible Simrad Autopilot Computer (AC12, AC42, and SG05), you will have complete control, setup and integration with your autopilot. The NSS display can be used in conjunction with Simrad OP10, AP24, or AP28 Control units or the NSS can be used alone to conserve dash space.

### Wiring the autopilot system

#### Using the AC12 or AC42 autopilot computer

The AC12/AC42 is connected to the NSS system using the SimNet network.

For more information about how to install and wire the autopilot, refer to the separate AC12N/AC42N Installation manual.

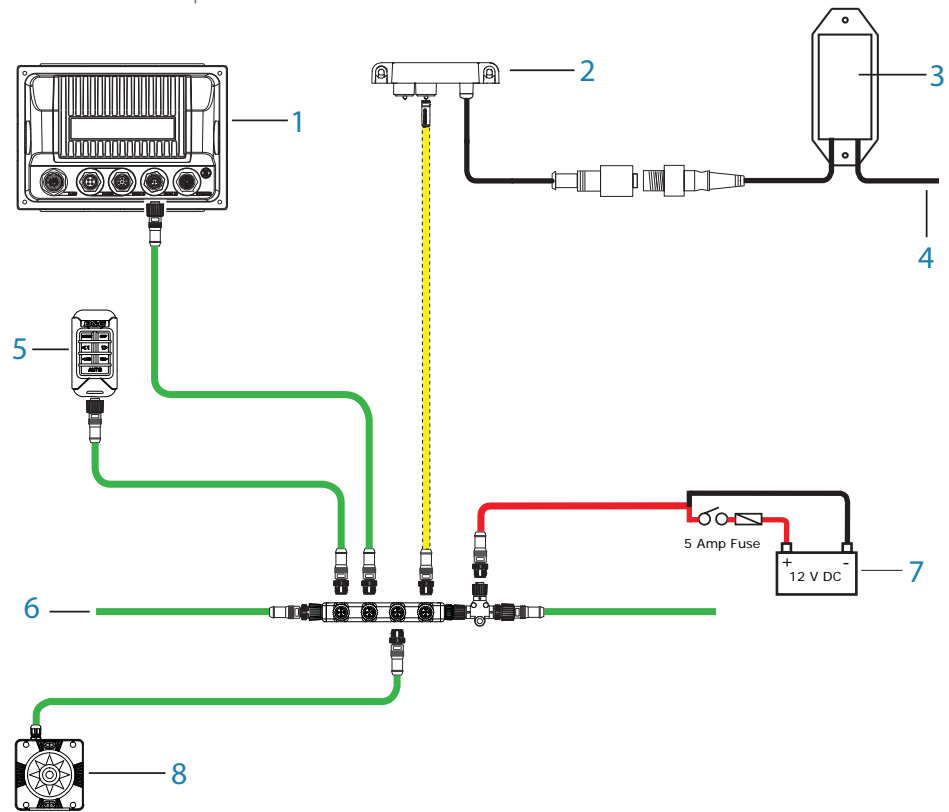


- 1 NSS Display
- 2 Pump / Drive (RPU160, RPU300, DD15, HDL2000x)
- 3 AC12N or AC42N Autopilot computer
- 4 OP10 Pilot Controller
- 5 DC Supply
- 6 NMEA 2000 Micro-C backbone with T-pieces
- 7 RC42N Rate Compass
- 8 RF25N Rudder Feedback

## Using the SG05 EVC gateway

The SG05 is connected to the SimNet network in place of Autopilot computer. It connects to a Volvo Gateway for communication with Volvo's EVC system.

→ **Note:** rudder angle data is sourced from the EVC system and a separate rudder angle indicator is not required.



- 1 NSS Display
- 2 Simrad SG05 SimNet - Volvo Gateway
- 3 Volvo Gateway (p/n: 000-1-258-001)
- 4 12V DC Supply
- 5 SimNet 7 way connector
- 6 RC42 Rate Compass



## Autopilot setup

### Verifying the autopilot connection

When an AC12N, AC42N, or SG05 is connected to the NSS system, the NSS will automatically detect the autopilot and an Autopilot menu item will be included in the 'Settings' menu.

If no 'Autopilot' item is available in the menu, establish the connection by running the auto select process.

The auto select process may also be used if the list of data sources needs to be updated when a unit has been physically replaced.

If the AC12, AC42 or SG05 is later disconnected, the 'Autopilot' menu item will remain available, but only a few of the menu items will be available.

### Commissioning the autopilot

When the autopilot installation is completed, the commissioning procedures must be performed. Failure in setting up the autopilot correctly may prohibit the autopilot from functioning properly.

The setup of the autopilot computers (AC12N/42N) can be done in full from either an NSS/NSE/NSO unit, IS40 Display, or from an AP24/AP28 control head. The following sections describe how you configure the autopilot from the NSS unit.

If you connect the NSS to an already commissioned autopilot system, you only have to do an automatic source selection as described above before the autopilot is ready to be used.



### Dockside setup

Initiating the required dockside setup is done from within the Commissioning dialog. Completed procedures are labelled with a tick.

When the autopilot computer is delivered from factory AND ANY TIME AFTER AN AUTOPILOT RESET HAS BEEN PERFORMED, you will have to run a complete setup again.

All steps in all commissioning procedures are clearly described on-screen, and you will be guided step by step through the process.

1. Press the 'STBY/AUTO' key to ensure that the autopilot is in standby mode
2. Activate the autopilot commissioning dialog as shown above
3. Select boat type
  - The boat type setting is used by the system to select appropriate preset steering parameters. It will also affect available autopilot features.
4. Perform the rudder calibration
  - Used if you have a rudder feedback unit installed. This calibration is used to ensure that the physical rudder movement corresponds to the rudder angle displayed on the NSO unit.

### VRF (Virtual Rudder Feedback) calibration

- The Virtual Feedback option enables your autopilot to steer without a conventional rudder feedback unit. This function is designed for vessels up to 40 ft. powered by outboard or stern drives only.
- The Virtual Feedback option will only be available when there is no feedback unit connected at first time turn on, or at turn on after an autopilot reset.

➔ **Note:** Installing a feedback unit will enhance the performance of the autopilot and provide an

accurate rudder angle indicator on the autopilot display. Unless impractical or impossible, a rudder feedback unit should be installed.

5. Set the drive voltage
    - Refer to the drive unit table in the AC12N/AC42N Installation manual or to your drive unit documentation for information.
  6. Run the rudder test as described in the on-screen instructions
- **Note:** If the boat uses power assisted steering, it is important that the engine or electric motor used to enable the power assist steering is turned on prior to this test.

**Stand CLEAR of the wheel and do not attempt to take manual control of the wheel during this test!**

- When this test is started the autopilot computer will issue a series of PORT and STBD rudder commands and automatically verify correct rudder direction. It detects minimum power to drive the rudder and reduces the rudder speed if it exceeds the maximum preferred speed (8°/sec.) for autopilot operation. The system will also detect whether the drive unit is a reversible motor or if a solenoid valve is operated.



### Rudder drive setup

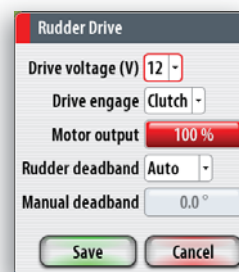
The rudder drive setup controls how the autopilot computer controls the steering system.

#### Drive voltage

Voltage specified for your drive unit.

The Drive unit voltage setting does not apply when the system operates solenoids on a continuous running pump/steering gear. Hence, the output voltage to the solenoids will be the same as the input voltage.

Refer to the drive unit table in the AC12N/AC42N Installation manual or to your drive unit documentation for information.



**Warning:** Selection of improper voltage level for your drive unit may damage both the drive unit and the AC12N/AC42N even if the protection circuits are activated.

#### Drive engage

Clutch	This is the default setting and it allows you to steer the boat with the helm or wheel when in STBY mode (FU and NFU modes) as well as in all auto steering modes
Auto	This option is typically used to switch between two rudder speeds on a continuous running pump, used when different rudder speeds are required for automatic and Follow-up/Non-Follow-up steering

#### Motor output

Shows the amount of power needed to achieve the correct rudder speed. The reading is obtained from the Rudder test.

The automatically set value may be increased or decreased.

#### Rudder deadband

This parameter is used to prevent the rudder from hunting. The reading is obtained from the Rudder test which optimizes the deadband to the speed of the boat and the pressure on the rudder.

If the auto-setting does not perform properly due to high inertia from the wheel or a loose steering gear, it can be adjusted manually. Find the lowest possible value that will prevent the rudder from continuous hunting. A wide deadband will cause inaccurate steering.

- **Note:** The rudder deadband setting is not available when the autopilot is configured for Virtual Rudder Feedback.

### Seatrials

A seatrial can only be performed if the dockside settings are completed and confirmed.

The seatrial must always be performed in open waters at a safe distance from other traffic.

→ **Note:** You can switch the autopilot to standby mode and take manual control of the boat at any time during the seatrial by pressing the 'STBY/AUTO' key.

The following seatrial calibration should be done:

- Compass calibration; used to automatically compensate for on-board magnetic interference
- Compass offset adjustment, used to compensate for a fixed offset in the final heading readout
- Wind vane offset to compensate for a wind vane that is not mounted facing in exactly the same direction as the bow of the vessel (dead ahead)
- Boat speed calibration
- Transition HI/LO speed setting (the speed at which you want to change the set of steering parameters)
- Automatic tuning of the steering parameters
- Setting the seastate filter
- 'Saiboat Setup' menu items

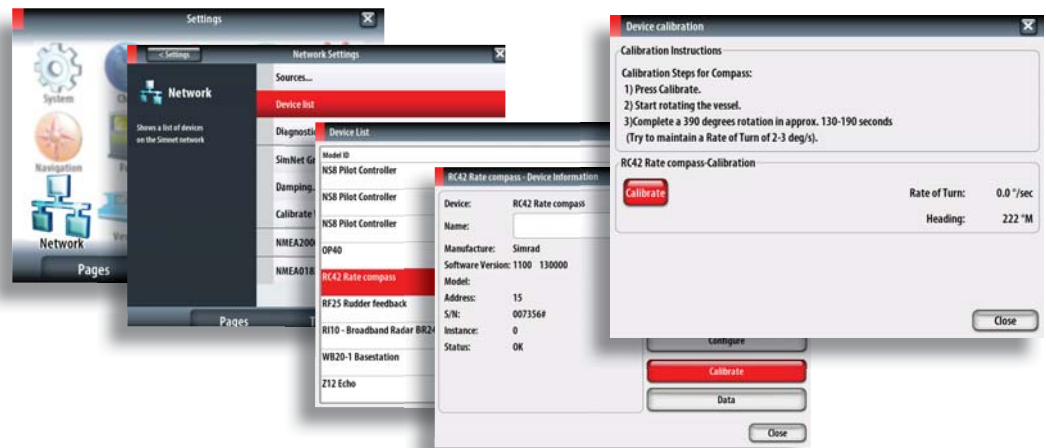
### Compass calibration

Before the compass calibration is started, make sure that there is enough open water around the vessel to make a full turn.

The calibration should be done in calm sea conditions and with minimal wind to obtain good results. Follow the on-screen instruction, and use about 60-90 seconds to make a full circle.

During the calibration, the compass will measure the magnitude and direction of the local magnetic field.

- If the local magnetic field is stronger than the earth's magnetic field (the local field is reading more than 100%), the compass calibration will fail
- If the local field is reading more than 30%, you should look for any interfering magnetic objects and remove them, or you should move the compass to a different location. The (local) field angle will guide you to the local interfering magnetic object.

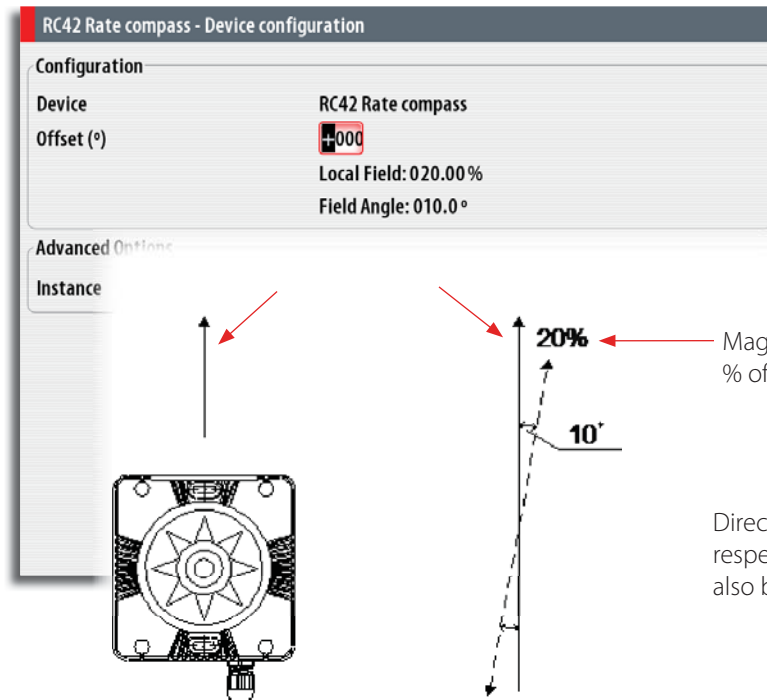


→ **Note:** Calibration must be made on the compass that is active for the autopilot. If the compass is not possible to initiate calibration from the device list on the NSS, refer to the compass' own instructions regarding calibration.

→ **Note:** In certain areas and at high latitudes the local magnetic interference becomes more significant and heading errors exceeding  $\pm 3^\circ$  may have to be accepted.

### Compass mounting offset

After compass calibration, the difference between the compass lubber line and the boat's center line should be compensated for.



1. Find the bearing from the boat position to a visible object. Use a chart or a chart plotter
  2. Steer the boat so that the center line of the boat is aligned with the bearing line pointing towards the object
  2. Change the offset parameter so that the bearing to the object and the compass readout becomes equal. Refer graphic above
- **Note:** Make sure that both the compass heading and the bearing to the object have the same unit (°M or °T).

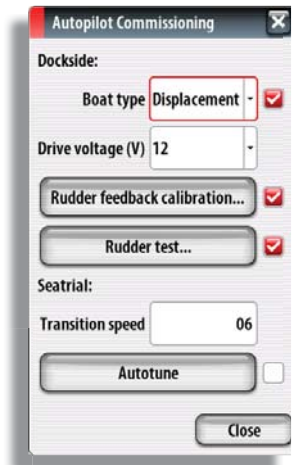
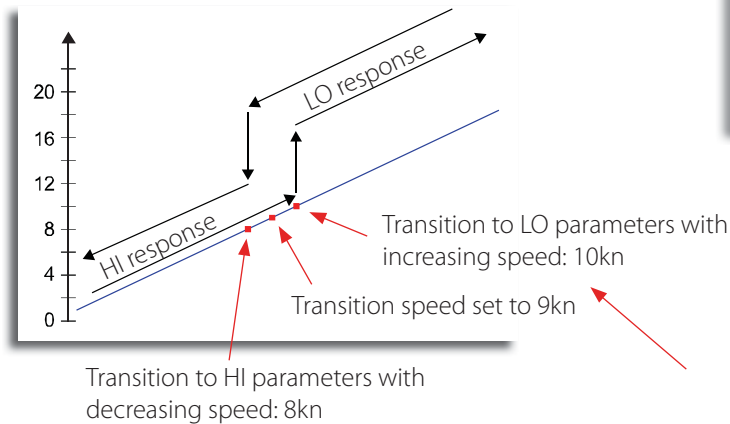
### Setting the Transition speed (HI/LO)

This is the speed at which the system automatically changes from LO to HI steering parameters.


On power boats it is recommended that you set a value that represents the speed where the hull begins to plane or the speed where you change from slow to cruising speed.

On sailboats the transition speed should be set to around 3-4 knots to give the best response in a tack.

A deadband of 2 knots is incorporated to prevent oscillation of HI/LO settings when vessel is travelling at the transition speed.



Active response parameter set is shown in the autopilot popup, and the following abbreviations are used:

	HI-A	High response parameters set automatically
	LO-A	Low response parameters set automatically
	HI-M	High response parameters set manually
	LO-M	Low response parameter set manually

### Autotuning

The autotune feature will run the boat through several tests and then automatically set the most important steering parameters.

Autotune is not required for the autopilot to function, as it is preset with steering parameters that should steer most boats in the 30-50 foot range.

You can manually adjust all parameters that are set during autotuning.

### Seastate filter

The Seastate filter is used to reduce rudder activity and autopilot sensitivity in rough weather.

OFF	Seastate filter is disabled. This is default
AUTO	Reduces rudder activity and autopilot sensitivity in rough weather by an adaptive process. The AUTO setting is recommended if you want to use the seastate filter
MANUAL	Linked to the steering response control settings described previously. It may be used to manually find the optimum combination of course keeping and low rudder activity in rough but steady sea conditions

### Setting sailing parameters

→ **Note:** Sailing parameter settings are only available if the boat type is set to Sail.

#### Tack time

When performing a tack in WIND mode, the rate of turn (tack time) can be adjusted. This will give single-handed sailors time to handle the boat and the sails during a tack.

A turn performed without shifting wind side, will also be made at a controlled turn rate.



Range	Change per step	Default	Units
2 - 50	1	12	seconds

#### Tack angle

This value is used to preset the course change used when tacking in AUTO mode. By pressing the left/right arrow keys the course will change as much as this value.

Range	Change per step	Default	Units
50 - 150	1	100	°

#### Wind function

With wind function set to Auto, the autopilot will automatically select between apparent and true wind steering. Auto is default and recommended for cruising.

When the boat is running or on a broad reach, there is a heightened chance it will surf on the waves. This may lead to significant changes in boat speed, and thereby changes in apparent wind angle. True wind steering is therefore used to prevent undesired corrections by the autopilot when heading downwind (or close to), while steering to apparent wind is used when beating or reaching.

Apparent wind steering is preferred when you want to maintain maximum boat speed without continuous trimming of the sails.

#### VMG optimizing

You can optimize the VMG to wind. When selected the function will be active for 5-10 minutes after a new wind angle has been set and only when beating.



### Layline steering

Layline steering is useful when navigating. Cross Track Error (XTE) from the navigator will keep the boat on the track line. If the XTE from the navigator exceeds 0.15 nm, the autopilot will calculate the layline and track towards the waypoint.

### Manually adjusting steering parameters

The autotune function in the autopilot is so refined that the majority of boats will need no further adjustments of the steering parameters. On some boats however, or in particular sea conditions, fine tuning of the steering parameters may improve the performance of the autopilot.

### Transition speed

Refer previous description.

### Rudder

This parameter determines the ratio between commanded rudder and the heading error. The higher rudder value the more rudder is applied.

If the value is too small it will take a long time to compensate for a heading error, and the autopilot will fail to keep a steady course.

If the value is set too high the overshoot will increase and the steering will be unstable.

### Counter rudder

Counter rudder is the amount of rudder used to try to prevent the boat from yawing around the set course. Higher counter rudder settings result in more rudder being applied.

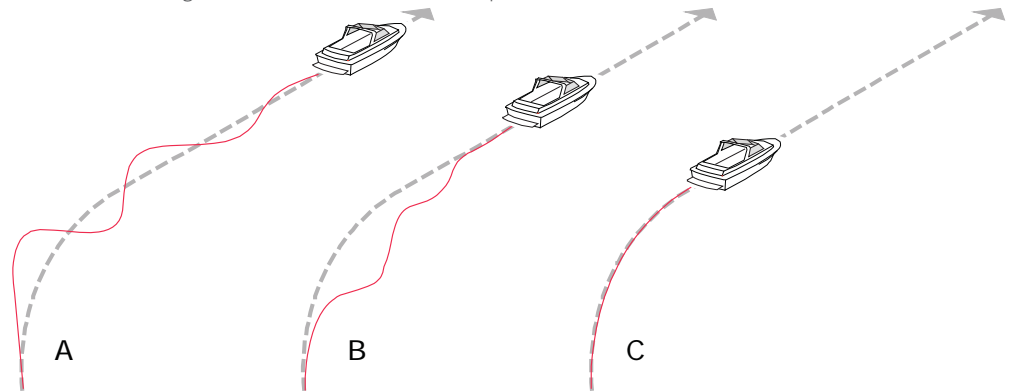
The best way of checking the value of the Counter rudder setting is when making turns.

The figures illustrate the effects of various Counter Rudder settings;

A: Counter rudder too low; overshoot response

B: Counter rudder too high; sluggish and creeping response

C: Correct setting or counter rudder; ideal response



### Auto trim

This parameter defines how fast the autopilot shall correspond after having registered a heading error.

The standard value is 40 seconds which should work well on most boats. Rule of thumb: Set to same value (seconds) as the boat's length in feet. On boats operating on VRF the value should be set to 20 seconds.

### Rate limit

Sets the maximum allowed rate of turn.

The value should be kept at 6.0°/second unless there is a need for more rapid response in turns.

### Minimum rudder

This parameter filters small rudder commands to prevent high rudder activity.

Some boats may have a tendency to not respond to small rudder commands around the "course keeping" position because of a small rudder, a rudder deadband, whirls/disturbance of the water-stream passing the rudder or it is a single nozzle water jet boat.



By increasing the Minimum rudder parameter you may improve the course keeping performance on some boats. This will however increase the rudder activity.

#### **Minimum wind angle to port and starboard**

These parameters should be set identical to the minimum apparent wind angle that will keep the sails from stalling and maintain boat speed. The parameters will vary from boat to boat.

The settings are used for the tack-prevent function. They also apply when the autopilot is operating in WindNAV mode.

You can select different minimum wind angles for port and starboard. The difference between port and starboard will be taken into account when calculating the Distance To Turn (DTT).

#### **Navigation change limit**

This parameter defines the maximum course change that the autopilot is allowed to make when the NSS is following a route (NAV steering).

If the required course change to the next waypoint in a route is more than the set limit, you are prompted and must acknowledge the course change before the autopilot will turn the vessel.

# 14

## CZone connection to NMEA 2000

When interfacing to C-ZONE network it is recommended to use a BEP Network interface bridge (A) to join the two network backbones together.

The CZONE / NMEA 2000 Network interface bridge isolates the power of the two networks, but allows data to be freely shared between both sides.

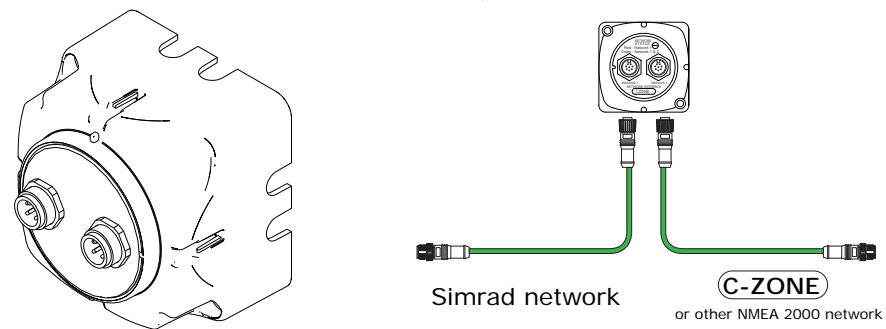
The Network Interface has built in terminators so needs to be placed at the extremity of each network backbone.

The Interface Bridge can also be used for expansion of the NMEA 2000 network, when the maximum node limit (node = any device connected to network) for the network has been reached or the maximum cable length of 150m will be exceeded. Once an Interface Bridge has been fitted, a further 40 nodes and additional cable length can be added.

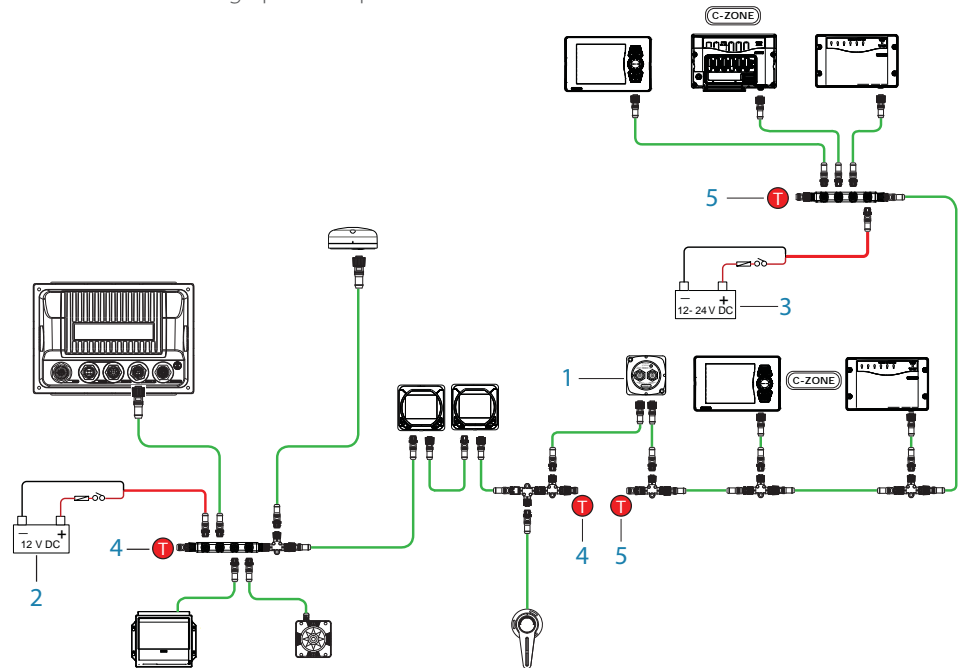
The Network Interface is available from your BEP dealer. For more information please refer to the BEP web site [www.bepmarine.com](http://www.bepmarine.com).

BEP part number 80-911-0057-00

A SimNet to Micro-C cable (24006413 ) is required to connect to a SimNet network.



Below is the correct method to interface to a C-ZONE network. In this example, power is injected twice but connecting the two networks together via the BEP Network interface bridge provides power isolation and correct termination.



- 1 Network interface bridge
- 2 Simrad network power
- 3 Czone network power
- 4 Simrad network termination
- 5 CZone network termination

## CZone setup

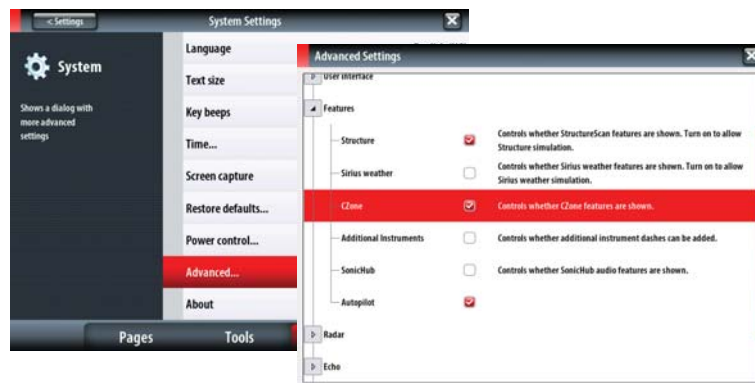
In order to communicate with the CZone modules connected to the network, the NSS display must be assigned a unique CZone Display Dipswitch setting.

The functionality of the CZone system is determined by the CZone Config File (.zcf), which is stored on all CZone modules and supported Simrad displays, such as the NSS. The file is created using the CZone Configuration Tool, a specialised PC application available from BEP Marine Ltd, and associated CZone distributors.

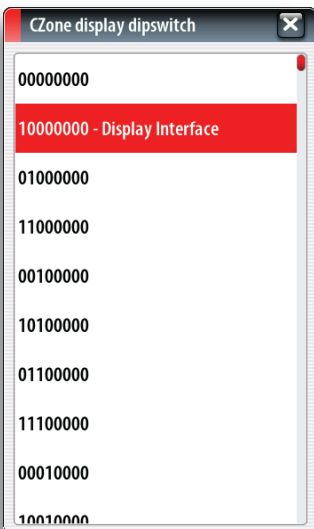
The NSS system provides a means to load the Config file, as well as apply updates to module firmware, removing the need to take a laptop computer aboard the vessel.



## Enabling CZone functionality



Once CZone is enabled, an additional CZone menu appears at the bottom of the Settings page.



## Assigning the dipswitch setting

Every Simrad product capable of controlling and viewing CZone devices must be assigned a virtual dipswitch setting. This setting is unique for each device. Typically it is set after the config file already exists on the CZone system, but it may also be set in advance. To do so, access the CZone menu on the Settings page.

When the config is already available on the network, it will immediately commence uploading to the NSS once the dipswitch is set. Allow this to complete, without interruption.

## Setting CZone to display at startup

With this option selected, the CZone control page will be shown first, every time the NSS is powered up.

## CZone backlight control

Enabling this will cause the NSS to synchronize its backlight setting with that of any CZone Display Interfaces set up to share backlight settings.

## Import and backup a config file

The files page may be used to import CZone config files, or export a copy to a Micro SD card. Importing will overwrite the existing file on the NSS and all connected CZone devices.

For further information refer to "Backing up user data" on page 50

## Upgrading module firmware

The files page also allows the loading of CZone module firmware updates. For further information refer to "NMEA 2000 and Ethernet device updates" on page 51

# 15

## Software Updates and Screen Calibration

From time to time Simrad releases software updates to its existing products. Updates are created for a variety of reasons; to add or improve features, to add support for new external devices, or to fix software bugs.

Updates can be found on the Simrad website: <http://www.simrad-yachting.com/Downloads/Software-Updates/>

The NSS may be used to apply software updates to itself, and to supported NMEA 2000 and CZone devices, with files read off a Micro SD card.

Before initiating an update to the NSS itself, be sure to back up any potentially valuable user data.



### Backing up user data

There are two files that can be backed up that relate to user changes:

- Waypoints Routes and Tracks
- Settings (includes preferences such as unit settings, custom new pages, and Czone configuration files)

The backup procedure is similar for both.

The file formats for waypoint backup:



- User data file version 4: Use with current Navico MFDs (NSE, NSO, HDS). Offers most detail
- User data file version 3 (with depth): Use with legacy Lowrance GPS chartplotters
- User data file version 2 (no depth): Use with legacy Lowrance GPS chartplotters
- GPX (GPS Exchange): Use with some other manufacturers' GPS products, and PC applications
- Northstar .dat (no Tracks): Use with legacy Northstar chartplotters

The Serial port option outputs the waypoints over NMEA 0183. The receiving GPS/PC will typically need to be set to allow import of waypoints.

The Settings and Czone config can be copied simply by selecting which you want to backup and selecting the destination to save to.

If the NSS is defaulted, or user data is accidentally deleted, simply return to the files page, highlight the backup file, and select 'Import'. View file details for creation date.

### NSS software updates

The update file must be loaded to the root directory of the SD card.

In the files menu, locate the update file on the SD card and select 'Upgrade'. Accept the prompt to reboot the unit, and wait a few moments as the unit restarts. After a few seconds the unit will display something similar to the following image:

```
Select update to run
* 0: Cancel
  1: "NSS-xxxx.upd"
```


Turn the rotary knob so that the asterisk appears next to the update file. Press the rotary knob

to commence update. Do not remove the Micro SD card or repower the NSS until the process is completed (this will typically take no more than a couple of minutes).

## NMEA 2000 and Ethernet device updates

To update SimNet and ethernet devices select the **Upgrade** option presented when the file is highlighted, followed by confirmation of the device you wish to upgrade. Do not interrupt the upgrade process.

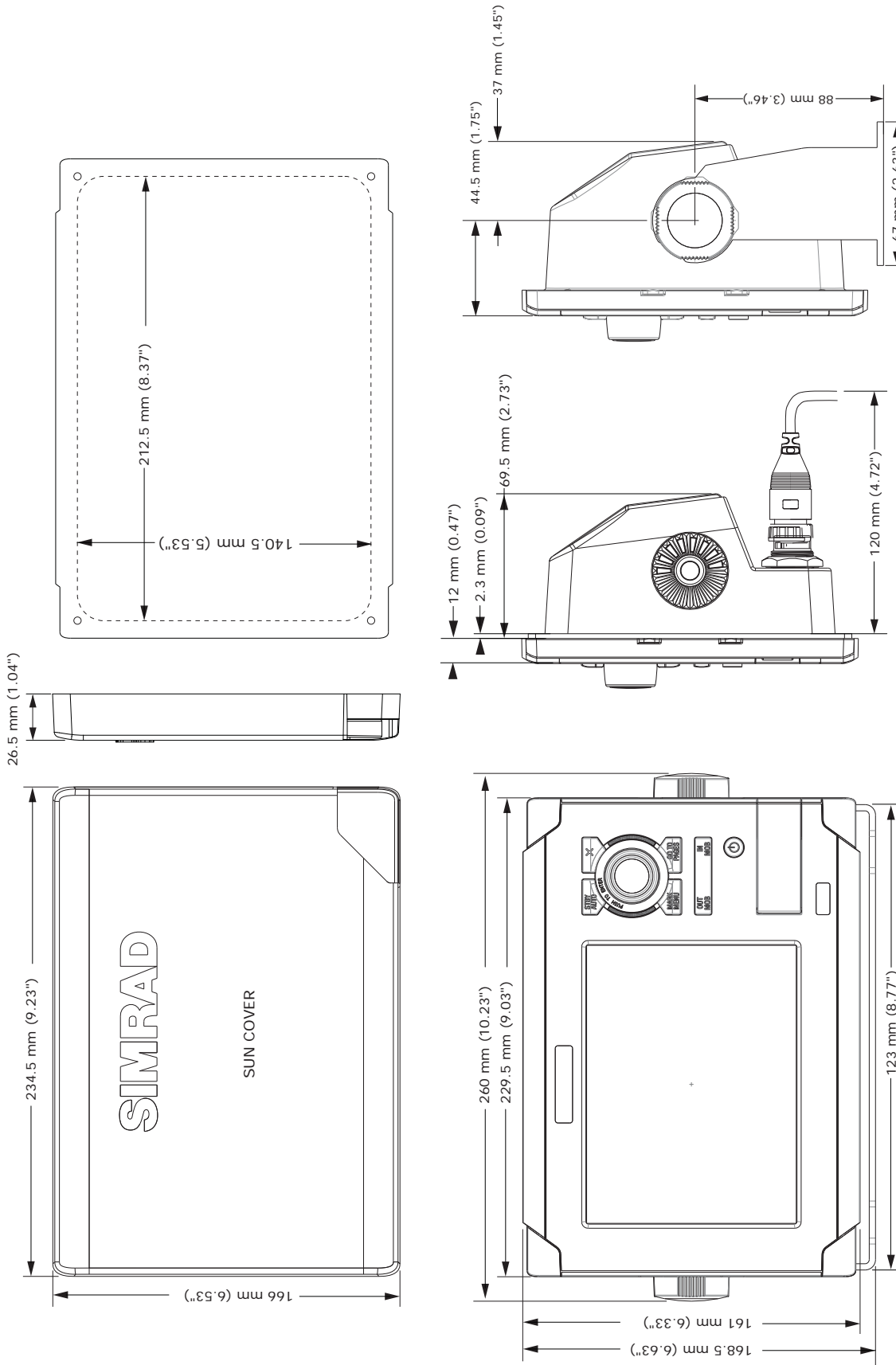
## Touch Screen Calibration

1. Turn the unit off
2. Press and hold the MENU key, then turn the unit on
3. Hold the MENU key during power on, until the calibration utility screen comes up
4. Touch crosshair  shown on screen to perform nine point calibration
5. After successful calibration the unit will return to normal application screen

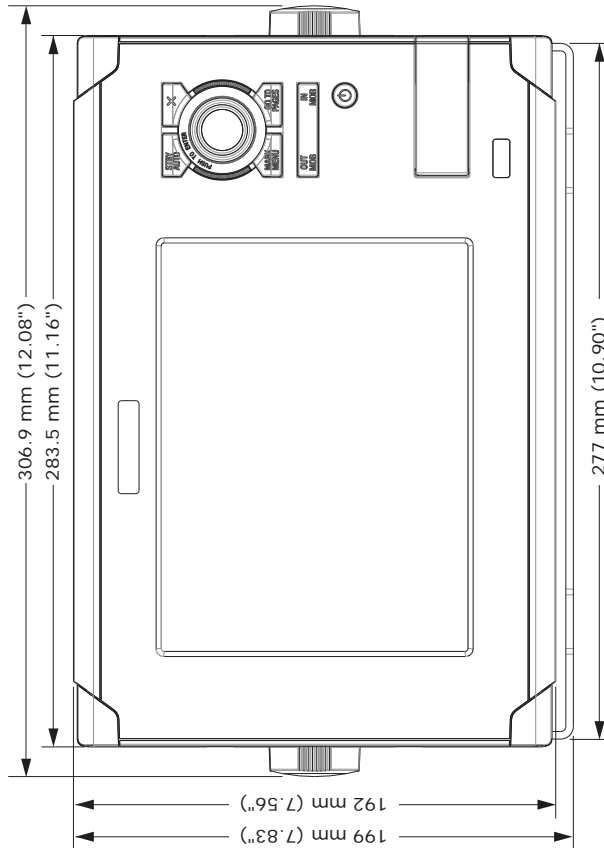
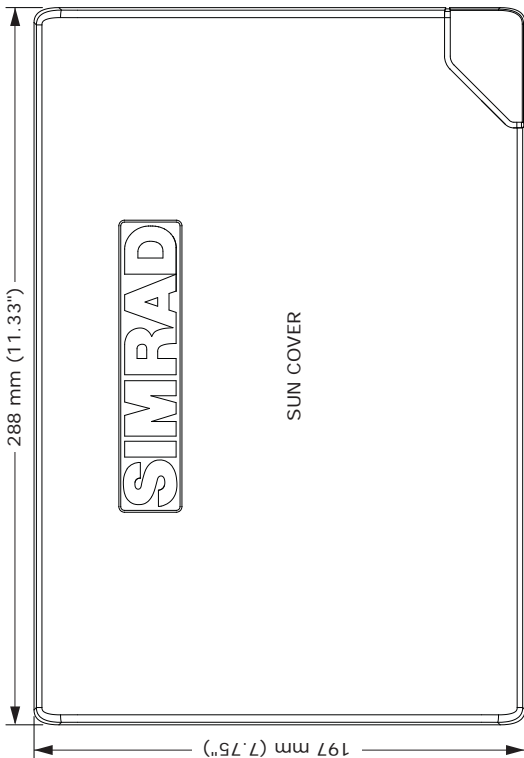
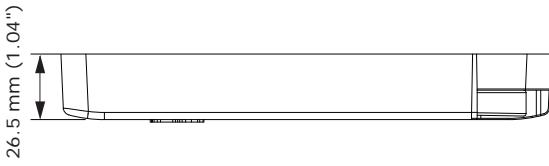
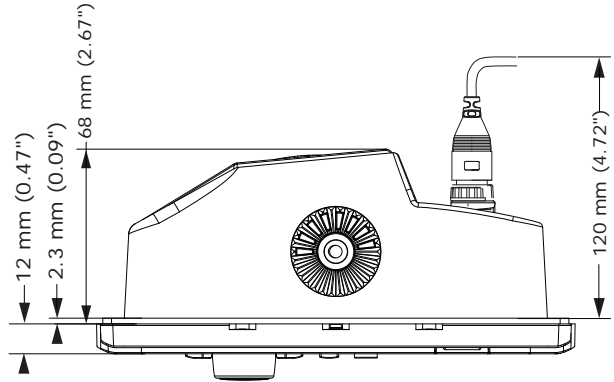
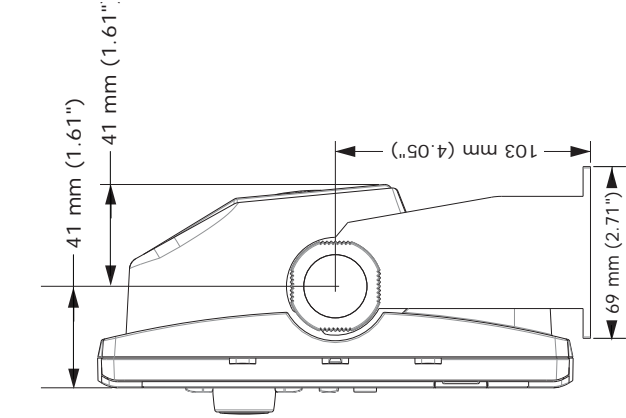
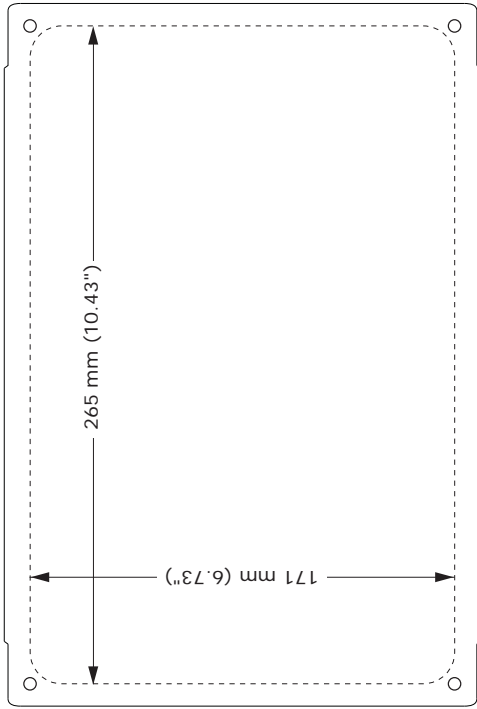
# 16

## Dimensioned Drawings

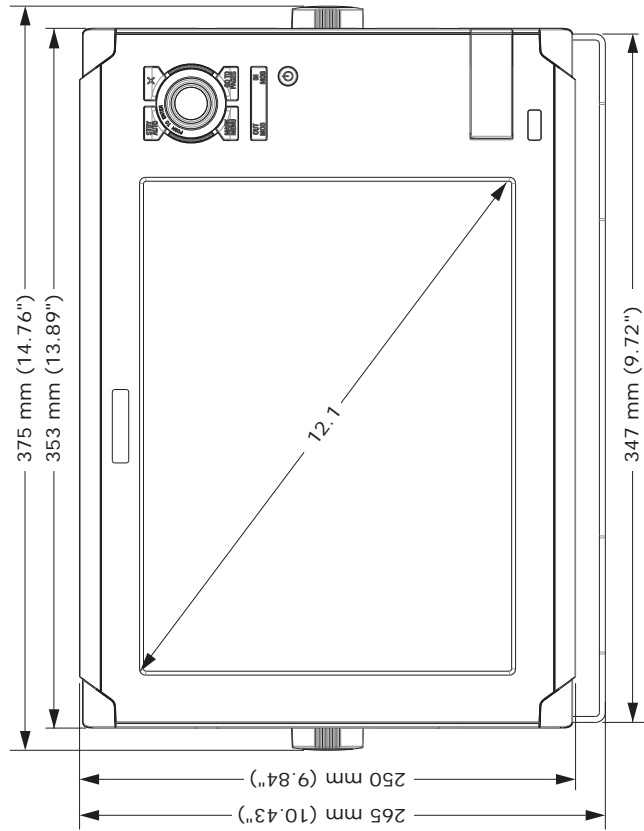
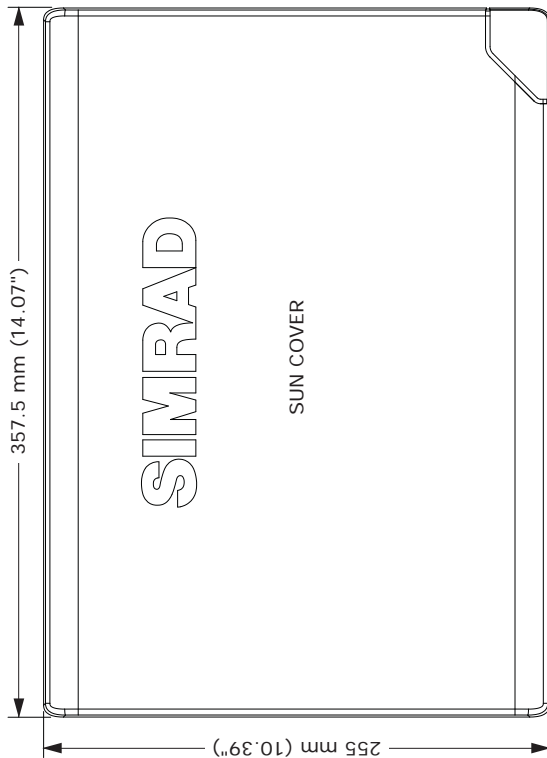
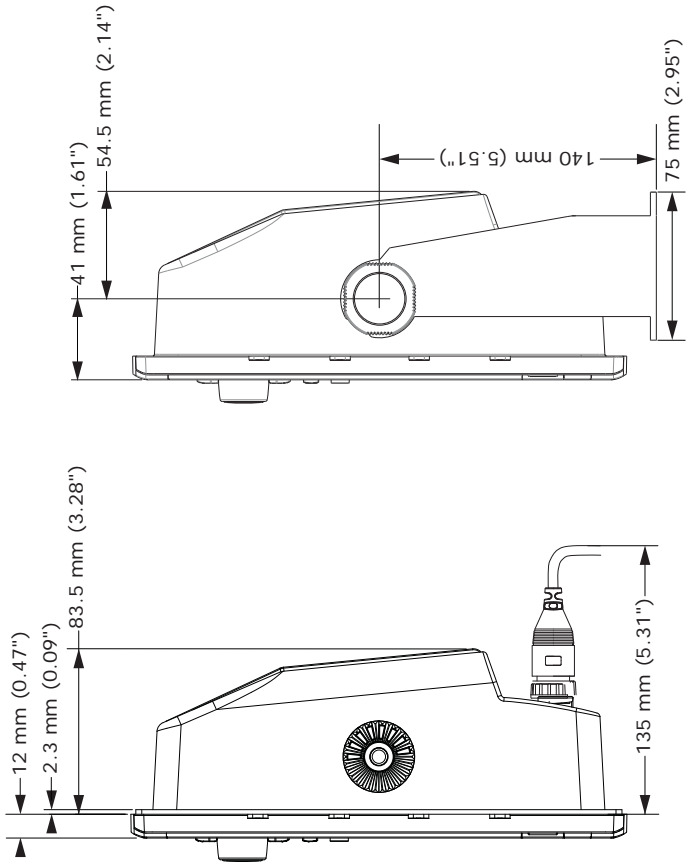
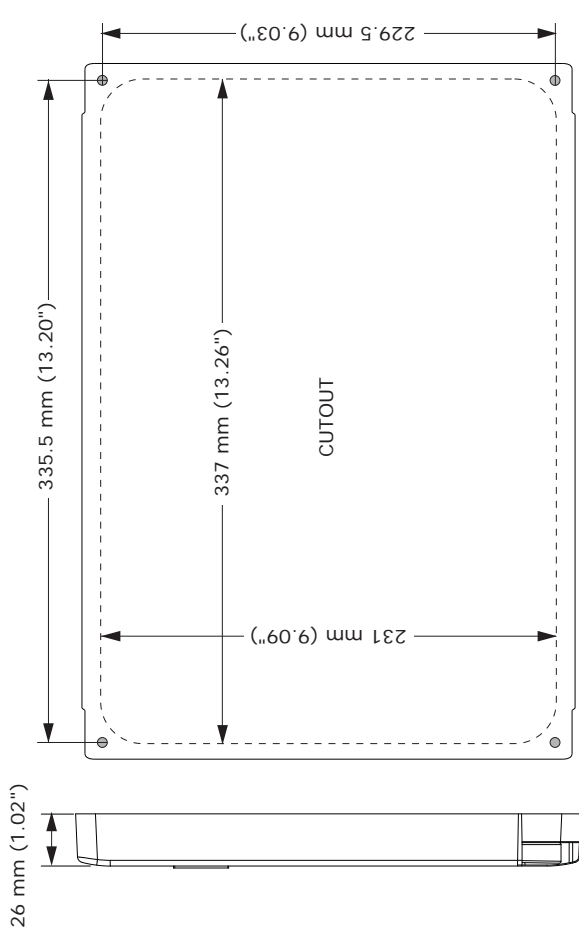
NSS7



# NSS8



# NSS12



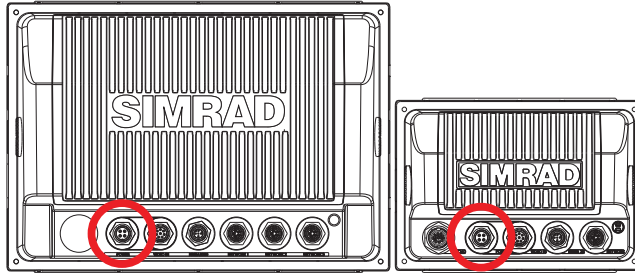


# 17

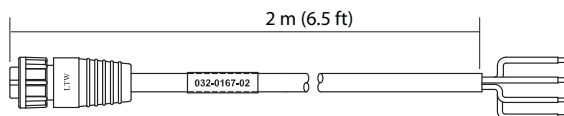
## Connector Pinouts

### Power

#### Power Connector



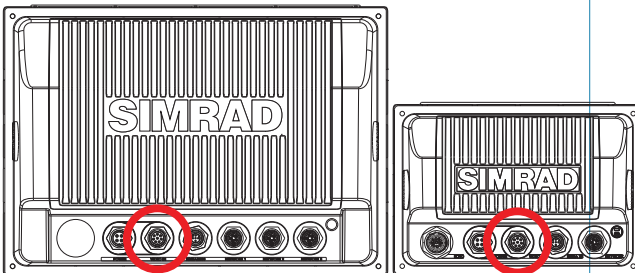
Power Cable: 000-00129-001 (included)



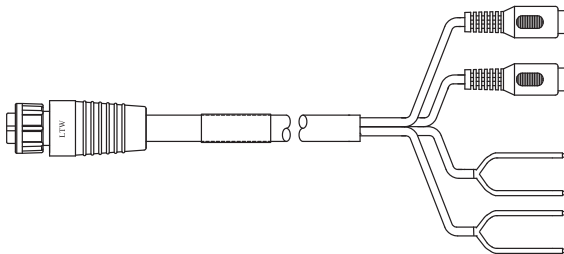
Pin	Wire Color	Function
1	Black	Battery
2	Blue	External Alarm
3	Yellow	Power Control
4	Red	Battery (+) 12 - 24V DC

### Video / Data

#### Video / Data Connector



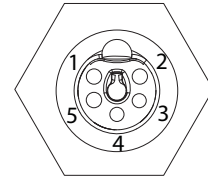
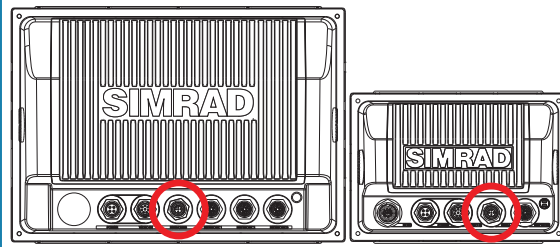
Video Cable: 000-00129-001 (included)



Pin	Wire Colour	Function
1	Red	Video 1 Ground
2	(coax)	Video 1 (+)
3	Green	Video 2 Ground
4	(coax)	Video 2 (+)
5	Blue	RS422 TX -
6	Yellow	RS422 TX +
7	Orange	RS422 RX -
8	Green	RS422 RX +

## NMEA 2000

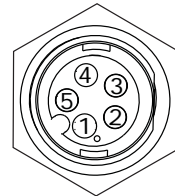
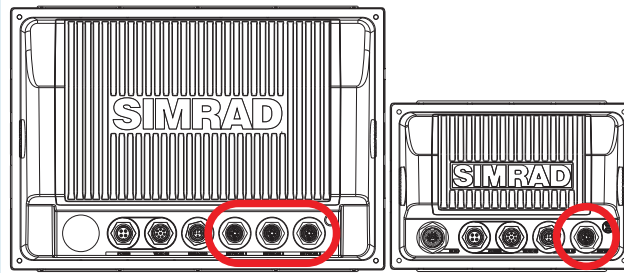
### NMEA 2000 Connector



Pin	Function
1	CAN_H
2	SimNet power (+) 12 V DC
3	SimNet power (-)
4	Shield
5	CAN_L

## Network (Ethernet)

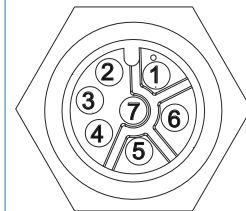
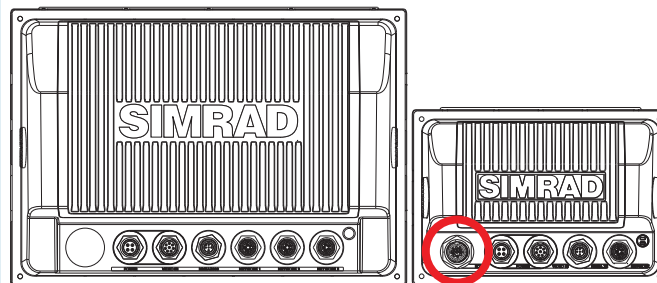
### NETWORK (Ethernet) Connector



Pin	Function
1	TX +
2	TX -
3	RX +
4	RX -
5	Gnd

## Echosounder

### Echosounder Connector



Pin	Function
1	Depth +
2	Speed
3	Speed power
4	Temp
5	Depth -
6	Shield
7	Temp / speed Gnd

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## Accessory cables

### NMEA 2000 cables

Part Number	Description
000-0124-69	NMEA 2000 STARTER KIT: 120 OHM RES FEM BLK 120 OHM RES MALE BLK N2K-T-RD T-CONNECTOR N2KEXT-2RD 2' (0.61M) EXTENSION CABLE N2KEXT-15RD 15' (4.55M) EXTENSION CABLE N2K-PWR-RD POWER CABLE
000-10996-001	N2K 4-WAY BLOCK MICRO -C
000-0127-52	TERMINATING RESISTOR KIT (MALE AND FEMALE)
000-0119-79	N2K-T-RD T-CONNECTOR
000-0119-75	N2K-PWR-RD POWER CABLE
000-0119-88	N2KEXT-2RD 2' (0.61M) EXTENSION CABLE
000-0127-53	N2KEXT-6RD 6' (1.82M) EXTENSION CABLE
000-0119-86	N2KEXT-15RD 15' (4.55M) EXTENSION CABLE
000-0119-83	N2KEXT-25RD 25' (7.58M) EXTENSION CABLE
000-0127-45	SIMNET - NMEA 2000 ADAPTER KIT: SIMNET CABLE JOINER CABLE MICRO-C MALE to SIMNET 0.5M N2K-T-RD T-CONNECTOR
24005729	SimNet to Micro-C male plug, 0.5m (cable for connection of a SimNet device to a NMEA 2000 backbone)
24006199	SimNet to Micro-C female plug, 1m (cable for connection of a NMEA 2000 device to SimNet backbone)
24006413	SimNet to Micro-C female, 4m (13 ft) (cable for connection of a NMEA 2000 device to SimNet backbone)

### Ethernet cables

Part Number	Description
000-0127-28	Ethernet cable yellow 5 Pin 0.6 m (2 ft)
000-0127-51	Ethernet cable yellow 5 Pin 2 m (6.5 ft)
000-0127-29	Ethernet cable yellow 5 Pin 4.5 m (15 ft)
000-0127-30	Ethernet cable yellow 5 Pin 7.7 m (25 ft)
000-0127-37	Ethernet cable yellow 5 Pin 15.2 m (50 ft)

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## Supported data

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### NMEA 2000 PGN List

#### NMEA 2000 PGN (receive)

59392	ISO Acknowledgement
59904	ISO Request
60928	ISO Address Claim
61184	Parameter Request/Command
65285	Temperature with Instance
65289	Trim Tab Insect Configuration
65291	Backlight Control
65292	Clear Fluid Level Warnings
65293	LGC-2000 Configuration
65323	Data User Group Request
65325	Reprogram Status
65341	Autopilot Mode
65480	Autopilot Mode
126208	ISO Command Group Function
126992	System Time
126996	Product Info
127237	Heading/Track Control
127245	Rudder
127250	Vessel Heading
127251	Rate of Turn
127257	Attitude
127258	Magnetic Variation
127488	Engine Parameters, Rapid Update
127489	Engine Parameters, Dynamic
127493	Transmission Parameters, Dynamic
127503	AC input status
127504	AC Output Status
127505	Fluid Level
127506	DC Detailed Status
127507	Charger Status
127508	Battery Status
127509	Inverter Status
128259	Speed, Water referenced
128267	Water Depth
128275	DistanceLog
129025	Position, Rapid Update
129026	COG & SOG, Rapid Update
129029	GNSS Position Data
129033	Time & Date
129038	AIS Class A Position Report
129039	AIS Class B Position Report
129040	AIS Class B Extended Position Report
129283	Cross Track Error
129284	Navigation Data
129539	GNSS DOPs

129540	GNSS Sats in View
129794	AIS Class A Static and Voyage Related Data
129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129808	DSC Call Information
129809	AIS Class B "CS" Static Data Report, Part A
129810	AIS Class B "CS" Static Data Report, Part B
130074	Route and WP Service - WP List - WP Name & Position
130306	Wind Data
130310	Environmental Parameters
130311	Environmental Parameters
130312	Temperature
130313	Humidity
130314	Actual Pressure
130576	Small Craft Status
130577	Direction Data
130840	Data User Group Configuration
130842	SimNet DSC Message
130845	Parameter Handle
130850	Event Command
130851	Event Reply
130817	Product Info
130820	Reprogram Status
130831	Suzuki Engine and Storage Device Config
130832	Fuel Used - High Resolution
130834	Engine and Tank Configuration
130835	SetEngineAndTankConfiguration
130838	Fluid Level Warning
130839	Pressure Insect Configuration
130843	Sonar Status, Frequency and DSP Voltage

## NMEA 2000 PGN (transmit)

61184	Parameter Request/Command
65287	Configure Temperature INSOcts
65289	Trim Tab Insect Calibration
65290	Paddle Wheel Speed Configuration
65291	Backlight Control
65292	Clear Fluid Level Warnings
65293	LGC-2000 Configuration
126208	ISO Command Group Function
126992	System Time
126996	Product Info
127237	Heading/Track Control
127250	Vessel Heading
127258	Magnetic Variation
128259	Speed, Water referenced
128267	Water Depth
128275	DistanceLog
129025	Position, Rapid Update
129026	COG & SOG, Rapid Update
129029	GNSS Position Data
129283	Cross Track Error
129284	Navigation Data
129285	Route/Waypoint Data
129539	GNSS DOPs
129540	GNSS Sats in View
130074	Route and WP Service - WP List - WP Name & Position
130306	Wind Data
130310	Environmental Parameters
130311	Environmental Parameters
130312	Temperature
130577	Direction Data
130840	Data User Group Configuration
130845	Parameter Handle
130850	Event Command
130818	Reprogram Data
130819	Request Reprogram
130828	Set Serial Number
130831	Suzuki Engine and Storage Device Config
130835	SetEngineAndTankConfiguration
130836	Fluid Level Insect Configuration
130837	Fuel Flow Turbine Configuration
130839	Pressure Insect Configuration
130845	Weather and Fish Prediction and Barometric Pressure History
130850	Evinrude Engine Warnings

## NMEA 0183 supported sentences

TX / RX		GPS							
Receive	GGA	GLL	GSA	GSV	VTG	ZDA			
Transmit	GGA	GLL	GSA	GSV	VTG	ZDA			
		Navigation							
Receive	RMC								
Transmit	AAM	APB	BOD	BWC	BWR	RMC	RMB	XTE	XDR
		Echo							
Receive	DBT	DPT	MTW	VLW	VHW				
Transmit	DBT	DPT	MTW	VLW	VHW				
		Compass							
Receive	HDG	HDT	HDM						
Transmit	HDG								
		Wind							
Receive	MWV	MWD							
Transmit	MWV	MWD							
		AIS / DSC							
Receive	DSC	DSE	VDM	AIS sentences are not bridged to or from NMEA 2000.					
		MARPA							
Transmit	TLL	TTM	These are only output sentences						

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## Specifications

Multi Function Display	NSS7	NSS8	NSS12
<b>Display</b>			
Display resolution	480 x 640 (H x W)	800 x 600 (H x W)	1024 x 768 (H x W)
Display type	6.4 inch VGA color TFT LCD	8 inch SVGA color TFT LCD	12.1 inch XGA TFT LCD
Display brightness	1200 nits	1200 nits	1200 nits
Touch screen		Yes	
<b>Power</b>			
Power supply	12 - 24 V DC (9-32.0 V DC min - max)	12 - 24 V DC (9-32.0 V DC min - max)	12 - 24 V DC (9-32.0 V DC min - max)
Power consumption	10.4 W (0.8 A @ 13 V DC)	15.6 W (1.2 A @ 13 V DC)	26 W (2.0 A @ 13 V DC)
<b>Technical / Environmental</b>			
Housing	Plastic housing; Die cast rear heatsink		
Temperature	-15° C to + 55° C (+5° F to +131° F)		
Waterproof standard	IPx7		
Certificate of conformity	CE(EN60945: 2002) / C-tick / CSS		
<b>Interface</b>			
Ethernet	1 Port	1 Port	3 Ports
NMEA 2000	Micro-C (1)		
Video input	Composite video (2) (multiplexed)		
Data card slot	Micro SD (1)		
<b>Other</b>			
Weight (display only)	1.6 kg (3.5 lb)	2.1 kg (4.6 lb)	3.78 kg (8.3 lb)
Pack dimensions (L x W x H)	30.5 x 27.9 x 27.9 cm (12" x 11" x 11")	40.6 x 27.9 x 25.4 cm (16" x 11" x 10")	
Pack weight	2.54 kg (5.6 lb)	2.9 kg (6.5 lb)	
<b>Echo sounder</b>			
Sonar frequency	50/200 or 83/200 kHz		
Sonar output power	Max 250 W peak to peak (31 W RMS) actual	Max 250 W peak to peak (31 W RMS) actual	Not applicable Not applicable







**SIMRAD**