



# NSO evo3

# Installation Manual

ENGLISH





# Preface

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## Disclaimer

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

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

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

This manual represents the product as at the time of printing. Navico Holding AS and its subsidiaries, branches and affiliates reserve the right to make changes to specifications without notice.

## Governing language

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

## Copyright

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## Warranty

The warranty card is supplied as a separate document. In case of any queries, refer to the brand website of your unit or system: [www.simrad-yachting.com](http://www.simrad-yachting.com).

## Compliance Statement

This equipment complies with:

- CE under 2014/53/EU Directive
- The requirements of level 2 devices of the Radio communications (Electromagnetic Compatibility) standard 2008
- Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The relevant Declaration of conformity is available in the product's section at the following website: [www.simrad-yachting.com](http://www.simrad-yachting.com).

## Industry Canada

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

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

## 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 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

## Countries of intended use in the EU

AT - Austria  
BE - Belgium  
BG - Bulgaria  
CY - Cyprus  
CZ - Czech Republic  
DK - Denmark  
EE - Estonia  
FI - Finland  
FR - France  
DE - Germany  
GR - Greece  
HU - Hungary  
IS - Iceland  
IE - Ireland  
IT - Italy  
LV - Latvia  
LI - Liechtenstein  
LT - Lithuania  
LU - Luxembourg  
MT - Malta  
NL - Netherlands  
NO - Norway  
PL - Poland  
PT - Portugal  
RO - Romania  
SK - Slovak Republic  
SI - Slovenia  
ES - Spain  
SE - Sweden  
CH - Switzerland  
TR - Turkey  
UK - United Kingdom

## Internet usage

Some features in this product use an internet connection to perform data downloads and uploads. Internet usage via a connected mobile/cell phone internet connection or a pay-per-MB type internet connection may require large data usage. Your service provider may charge you based on the amount of data you transfer. If you are unsure, contact your service provider to confirm rates and restrictions.

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## Navico product references

This manual refers to the following Navico products:

- Broadband Radar™ (Broadband Radar)
- Broadband Sounder™ (Broadband Sounder)
- DownScan Overlay™ (Overlay)
- GoFree™ (GoFree)
- Halo™ Pulse Compression Radar (Halo Radar)
- StructureScan® (StructureScan)

## About this manual

This manual is a reference guide for installing units.

Some features may not be activated or available for screenshots in the manual. As a result, screenshots of menus and dialogs may not match the look of your unit.

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.

# Contents

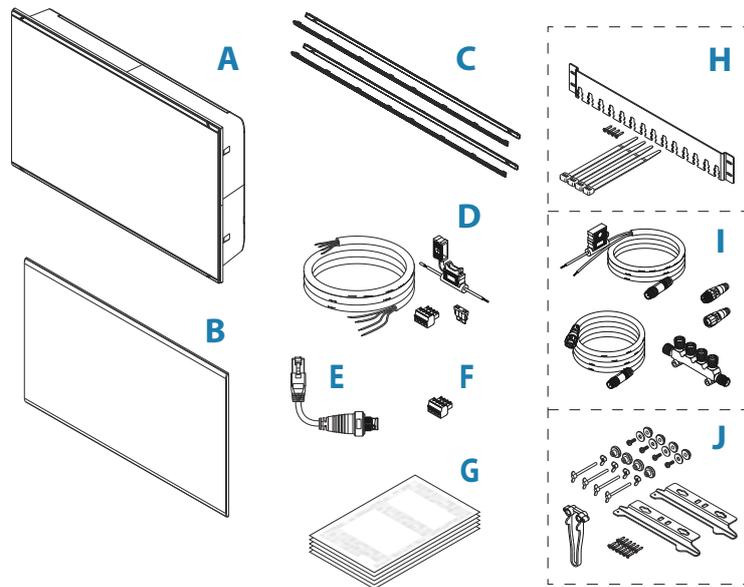
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<b>7</b>	<b>Introduction</b>
7	Parts included
8	Front controls
8	Connectors
9	Card reader
<b>10</b>	<b>Installation</b>
10	Installation guidelines
10	Bezel fitment and removal
11	Cable retainer installation
11	Panel mounting
11	Bracket mounting
<b>12</b>	<b>Wiring</b>
12	Wiring guidelines
12	Power connector details
15	USB connector details
15	NMEA 0183 connector details
16	NMEA 2000 connector details
17	J1939 connector details
18	Ethernet connector details
18	Video in connector details
19	HDMI connector details
<b>20</b>	<b>Software setup</b>
20	First time startup
20	Software setup sequence
20	Accessing the settings dialog
20	System settings
21	Alarms settings
21	Radar settings
24	Echosounder settings
27	Autopilot settings
27	Fuel settings
29	Wireless settings
31	Network settings
<b>36</b>	<b>3rd party support</b>
36	C-Zone
37	Mercury
37	Suzuki Marine
37	Yamaha engine integration
<b>38</b>	<b>Appendix</b>
38	Accessories
39	Supported data
43	Technical specifications
45	Dimensional drawings

# 1

## Introduction

### Parts included



**A Display unit**

**B Suncover**

**C Bezels**

- 1 set black bezels
- 1 set silver bezels

**D Power cable, fuse, fuse holder and connector block**

**E RJ45 to 5-pin Ethernet adapter cable**

**F NMEA 0183 connector block**

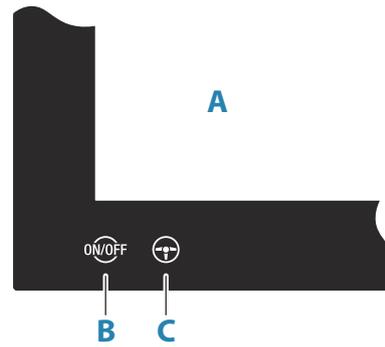
**G Documentation pack**

**H Cable retainer kit**

**I NMEA 2000 starter kit**

**J Panel mounting kit**

## Front controls



### A Touch screen

### B Power key

- Press and hold: turns the unit ON/OFF
- Short press once: displays the System Controls dialog
- Repeat short presses: toggles through preset dimming levels

### C WheelKey - user configurable key, refer to "*Configure WheelKey*" on page 20.

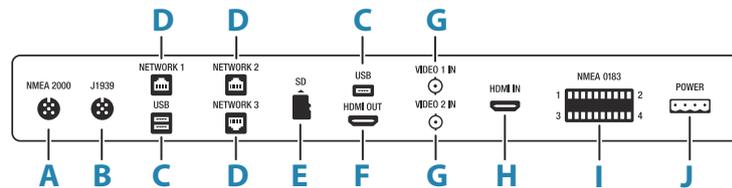
Default without an autopilot connected to the system

- Short press: toggles between panels on split screen
- Long press: maximizes active panel on split screen

Default with an autopilot connected to the system

- Short press: opens the autopilot controller and puts the autopilot in standby mode
- Long press: toggles between panels on split screen

## Connectors



**A NMEA 2000** - NMEA 2000 data

**B J1939** - J1939 engine data

**C USB** - mouse, keyboard or mass storage

**D NETWORK 1-3** - Ethernet network

**E SD** - microSD card reader

**F HDMI OUT** - HDMI video output

**G VIDEO IN** - composite video input

**H HDMI IN** - HDMI video input

**I NMEA 0183** - NMEA 0183 data

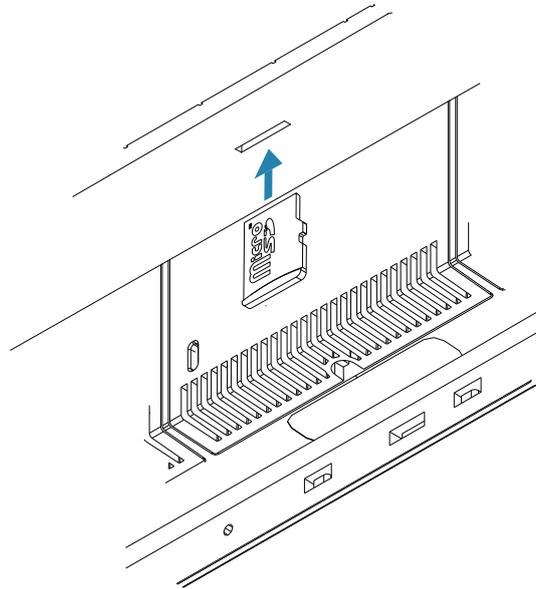
**J POWER** - 12 - 24 V DC input, external alarm and power control

## Card reader

A memory card can be used for detailed chart data, software updates, transfer of user data, and system backup.

→ **Note:** Do not download, transfer or copy files to a chart card. Doing so can damage chart information on the chart card.

If the card reader has a protective door it should always be securely shut immediately after inserting or removing a card, in order to prevent possible water ingress.



# 2

## Installation

### Installation guidelines

Choose the mounting location carefully, make sure that there are no hidden electrical wires or other parts behind the panel before you drill or cut. 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, or marine electronics installer.

Don't:

- Mount any part where it can be used as a hand hold
- Mount any part where it might be submerged
- Mount any part where it will interfere with the operation, launching, or retrieving of the boat

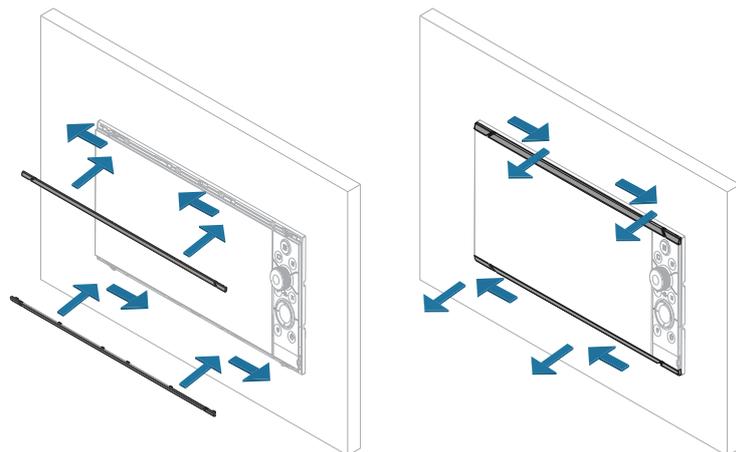
Do this:

- Test the unit in its intended location to ensure satisfactory wireless performance. Metal and carbon materials are known to impact the performance in a negative way. A well placed external wireless module can be added to overcome poor performance
- Consider the optimum viewing angles
- Consider the overall width and height requirements
- Consider access to the card reader
- Leave sufficient clearance to connect all relevant cables
- Check that it is possible to route cables to the intended mounting location

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

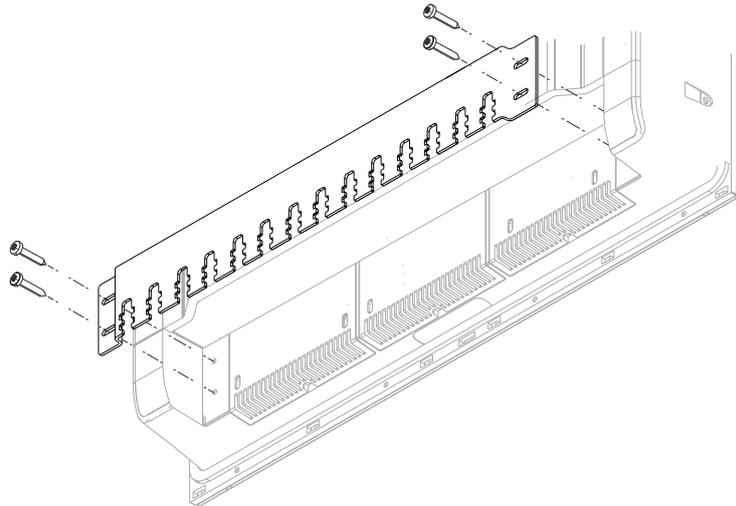
**⚠ Warning:** Inadequate ventilation and subsequent overheating of the unit may cause unreliable operation and reduced service life. Exposing the unit to conditions that exceeds the specifications could invalidate your warranty. Refer to the technical specifications in the "Appendix" on page 38.

### Bezel fitment and removal



→ **Note:** The unit in the illustration is an example only.

## Cable retainer installation



With the cable and plug fitted in place, secure the cable to the retention bracket using a cable tie. Do not secure in such a way that it applies strain to the cable, or causes the plug or socket to be bent out of alignment.

## Panel mounting

Refer to the separate mounting template for panel mounting instructions.

## Bracket mounting

For bracket mounting refer to separate documentation supplied with the bracket kit (sold separately).

# 3

## Wiring

### Wiring guidelines

Don't:

- Make sharp bends in the cables
- Run cables in a way that allows water to flow down into the connectors
- Run the data cables adjacent to radar, transmitter, or large/high current carrying cables or high frequency signal cables.
- Run cables so they interfere with mechanical systems
- Run cables over sharp edges or burrs

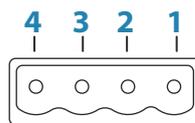
Do this:

- Make drip and service loops
- Use cable-tie on all cables to keep them secure
- Solder/crimp and insulate all wiring connections if extending or shortening the cables. Extending cables should be done with suitable crimp connectors or solder and heat shrink. Keep joins as high as possible to minimize possibility of water immersion.
- Leave room adjacent to connectors to ease plugging and unplugging of cables

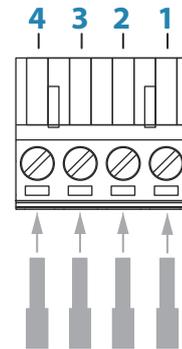
**⚠ Warning:** Before starting the installation, be sure to turn electrical power off. If power is left on or turned on during the installation, fire, electrical shock, or other serious injury may occur. Be sure that the voltage of the power supply is compatible with the unit.

**⚠ Warning:** The positive supply wire (red) should always be connected to (+) DC with the supplied fuse or a circuit breaker (closest available to fuse rating).

### Power connector details



Unit socket (male)



Cable plug (female)

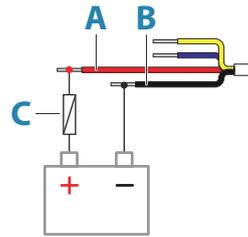
Pin	Purpose	Color
1	DC negative	Black
2	+12/24 V DC	Red
3	External alarm	Blue
4	Power control	Yellow

### Power connection

The unit is designed to be powered by a 12 or 24 V DC system.

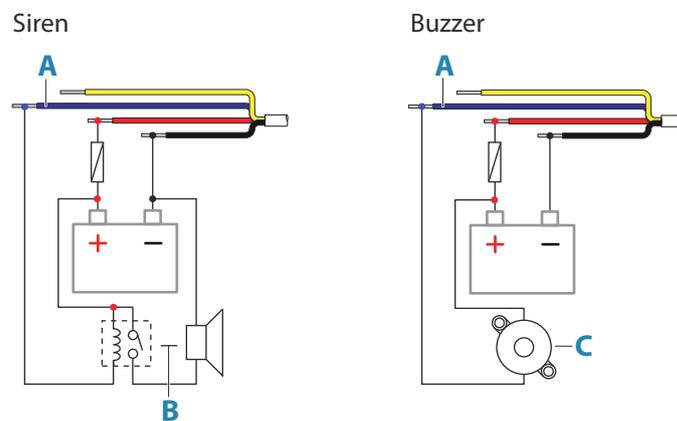
It is protected against reverse polarity, under voltage, and over voltage (for a limited duration).

A fuse should be fitted to the positive supply, for recommended fuse rating refer to the technical specification in the "Appendix" on page 38.



Key	Purpose	Color
<b>A</b>	+12/24 V DC	Red
<b>B</b>	DC negative	Black
<b>C</b>	Fuse, for recommended fuse rating refer to the technical specification in the "Appendix" on page 38.	

### External alarm



For sirens that draw more than 1 A, use a relay.

Key	Purpose	Color
<b>A</b>	External alarm output	Blue
<b>B</b>	Siren and relay	
<b>C</b>	Buzzer	

### Power control connection

The yellow wire in the power cable can be used to control how the unit is turned on and off.

#### Power controlled by power key

The unit will turn on/off when the power key on the unit is pressed.

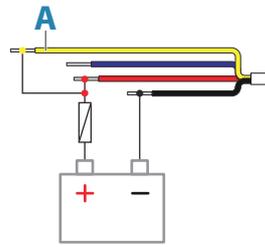
Leave the yellow power control wire disconnected and tape or heat-shrink the end to prevent shorting.

#### Power control by supply power

The unit will turn on/off without using the power key when power is applied/removed.

Connect the yellow wire to the red wire after the fuse.

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

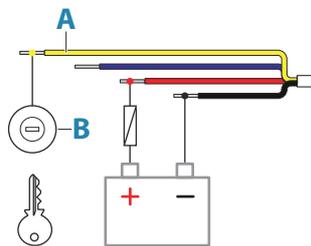


Key	Purpose	Color
<b>A</b>	Power control wire, connected to supply power	Yellow

#### Power controlled by ignition

The unit will turn on once ignition is turned on to start engines.

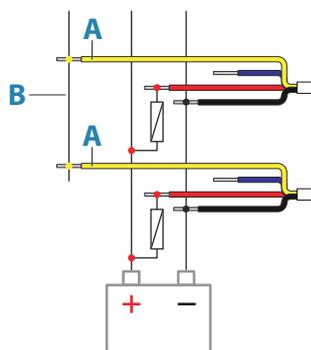
→ **Note:** Engine start batteries and house batteries should have a common ground connection.



Key	Purpose	Color
<b>A</b>	Power control wire	Yellow
<b>B</b>	Ignition switch	

#### Power controlled by master slave bus

The yellow power control wire can either be an input that will turn on the unit when power is applied, or an output that turns on other devices when the unit 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, the unit can be set to be a power control slave or power control master.



Key	Purpose	Color
<b>A</b>	Power control wire	Yellow
<b>B</b>	Master slave bus	

If a unit is configured as power control master and turned on by the power key, it will output voltage on the power control bus. This will power on both other power master units and power slave units. If a unit is set to power control slave, it cannot be powered down using its

own power key while a power control master unit is turned on. Pressing the power key will set the unit to standby. If all power control masters are off, power control slaves can be turned on using their own power key. This however will not turn on any other units connected to the power bus.

## USB connector details



Unit socket (female)



Cable plug/Device plug (male)

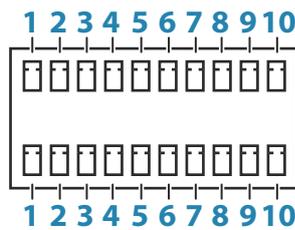
The unit is equipped with standard USB type-A connector(s).

### USB devices

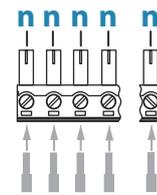
The USB ports can be used to connect a keyboard, mouse or storage device for software updates, transfer of user data, and system backup. The USB devices should be standard PC compatible hardware.

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

## NMEA 0183 connector details



Unit socket (male)



Cable plug (female)

Pin	Top row	Bottom row	Purpose
<b>1</b>	Port 1	Port 3	TX_B (-)
<b>2</b>	Port 1	Port 3	TX_A (+)
<b>3</b>	Port 1	Port 3	RX_B (-)
<b>4</b>	Port 1	Port 3	RX_A (+)
<b>5</b>	Port 2	Port 4	TX_B (-)
<b>6</b>	Port 2	Port 4	TX_A (+)
<b>7</b>	Port 2	Port 4	RX_B (-)
<b>8</b>	Port 2	Port 4	RX_A (+)
<b>9</b>	Port 2	Port 4	Common
<b>10</b>	Port 2	Port 4	Shield
<b>n</b>	4 to 10 pin connector(s) can be used. The pin number (n) depends on the connectors location in the unit socket.		

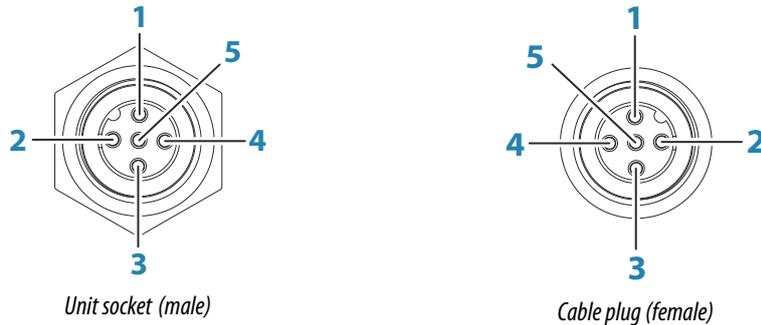
→ **Note:** Ports 1 and 3 conform to the NMEA 0183 standard, while ports 2 and 4 adds Common and Shield connections to conform to NMEA 0183-HS. These additional connections can be used if the connecting high-speed device supports it.

### Talkers and listeners

Only one talker (output device) can be connected to a serial input (RX) on the unit, in accordance with the NMEA0183 protocol. However, an output port (TX) on the unit may be

connected to up to three listener (receiver) devices, dependent on the hardware capabilities of the receiver.

## NMEA 2000 connector details



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

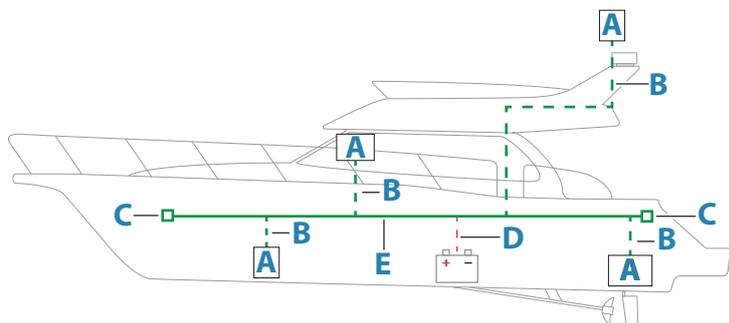
### Plan and install an NMEA 2000 network

The NMEA 2000 data port allows the receiving and sharing of a multitude of data from various sources.

An NMEA 2000 network consists of a powered backbone from which drop cables connect to NMEA 2000 devices. The backbone needs to run within 6m (20ft) of the locations of all products to be connected, typically in a bow to stern layout.

The following guidelines apply:

- The total length of the backbone should not exceed 100 meters (328 ft)
- A single drop cable has a maximum length of 6 meters (20 ft). The total length of all drop cables combined should not exceed 78 meters (256 ft)
- The backbone needs to have a terminator at each end of the backbone. The terminator can be a terminator plug or a unit with built-in terminator



The following drawing demonstrates a typical network.

- A** NMEA 2000 device
- B** Drop-cable
- C** Terminator
- D** Power supply
- E** Backbone

- **Note:** Most SimNet devices can be connected to a NMEA 2000 backbone by using adapter cables.
- **Note:** Units with two NMEA 2000 sockets 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.

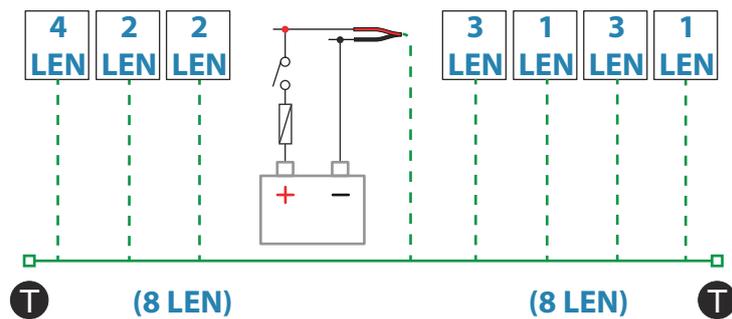
### Powering the network

The network requires its own 12 V DC power supply, protected by a 3 amp fuse.

For smaller systems: connect power at any location in the backbone.

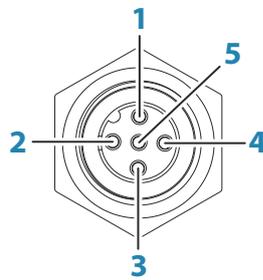
For larger systems: connect power at a central point in the backbone to balance the voltage drop of the network. Make the installation such that the load/current draw on each side of the power node is equal.

- **Note:** 1 LEN (Load Equivalency Number) equals 50 mA current draw.

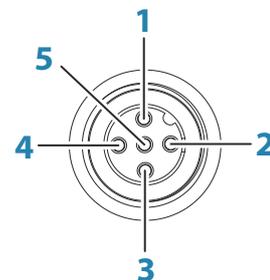


- **Note:** Do not connect the NMEA 2000 power cable to the same terminals as the engine start batteries, autopilot computer, bow thruster or other high current devices.

### J1939 connector details



Unit socket (male)



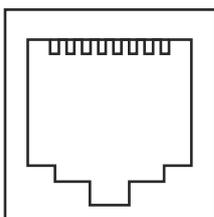
Cable plug (female)

Pin	Purpose
1	Shield
2	Not used
3	CAN GND
4	NET-H
5	NET-L

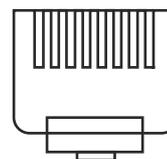
### Engine connection

For information about connecting an engine to the J1939 interface refer to the documentation supplied by the engine manufacturer.

## Ethernet connector details



Unit socket (female)



Cable plug (male)

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

### Ethernet devices

The Ethernet ports can be used for transfer of data and synchronization of user created data. It is recommended that each MFD in the system is connected to the Ethernet network.

No special setup is required for establishing an Ethernet network, it is all plug-and-play.

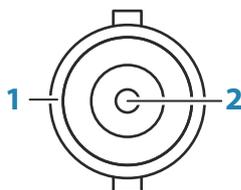
### Ethernet expansion device

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

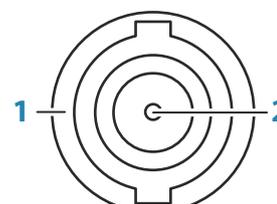
### FLIR camera setup

Compatible FLIR cameras are plug and play when used in conjunction with a device acting as a DHCP host. For setup on networks not utilizing a DHCP host, refer to the website [www.simrad-yachting.com](http://www.simrad-yachting.com), or contact technical support.

## Video in connector details



Unit socket (female)



Cable plug (male)

Pin	Purpose
1	Ground
2	Signal

### Video in

The unit can be connected to two composite video sources, and display video images on its display.

- **Note:** Camera cables are not supplied, and will need to be selected to suit termination - BNC at the unit, and typically BNC or RCA plug at the camera end.
- **Note:** The video images will not be shared with another unit via the network. It is only possible to view video on the unit connected to the video source.
- **Note:** Both NTSC and PAL formats are supported.

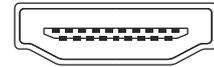
## Video in configuration

Configurations to video in are made in the video panel, refer to the Operator Manual for more information.

## HDMI connector details



*Unit socket (female)*



*Cable plug (male)*

The unit is equipped with standard HDMI (Type A) connector(s). The unit should be turned off prior to connecting or disconnecting an HDMI cable.

→ **Note:** While the HDMI standard does not state maximum cable length, signal may be compromised on long runs. Only use Navico or other high quality HDMI certified cables. 3rd party cables should be tested before installation. On runs over 10m it may be required to add an HDMI amplifier or use HDMI-CAT6 adaptors.

### HDMI out

If the unit has a HDMI output it can be connected to an external monitor to replicate video at a remote location. The image is shown on the external monitor at the units own native resolution, so the external monitor should support the same resolution or be able to scale.

→ **Note:** Some HDMI TV displays may apply over-scan, which will in effect crop the image possibly causing loss of important content. Check the display manual for an option to disable over-scan or adjust scaling

### HDMI in

If the unit has a HDMI input it can be connected to an external video source and display video images on its display.

Configurations to video in are made in the video panel, refer to the Operator Manual for more information.

# 4

## Software setup

### First time startup

When the unit is started for the first time, or after a factory default, the unit displays a series of dialogs. Respond to the dialog prompts to make fundamental settings.

You can perform further setup and later change settings using the system settings dialogs.

### Software setup sequence

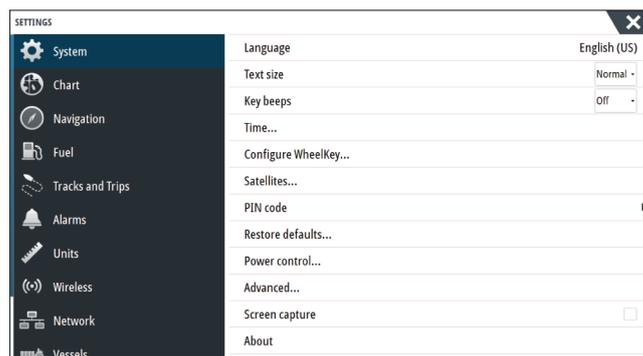
- 1 General settings** - refer to "*System settings*" on page 20.
  - Make general settings as desired
  - Configure the power control
- 2 Advanced settings** - refer to "*Advanced*" on page 21.
  - Enable or disable features
  - Review the advanced setting options and make changes as desired
- 3 Source selection** - refer to "*Network settings*" on page 31.
  - Make sure that the proper external data sources have been selected
- 4 Feature setup**
  - Configure specific features as described later in this chapter

### Accessing the settings dialog

The following sections focus on settings that typically do not require change once configured. The software setup is done from the Settings dialog which can be accessed from the home page.



### System settings



#### Time and date

Configure time settings to suit vessel location, along with time and date formats.

#### Configure WheelKey

Configures the action of the WheelKey on the front of the unit.

#### Power control setup

Determines unit response to signal applied to the power control wire. Refer to "*Power control connection*" on page 13.

This setting is only applicable if the yellow wire is used for power control.

- Set to slave if the yellow wire is connected to ignition or to a stand-alone switch that applies 12 V/24 V
- Set to master to make this device turn other devices connected to the master slave bus on and off

When a master unit is turned on or off, all units connected to the same master slave bus turns on or off.

While a master unit is on, a slave unit cannot be turned off.

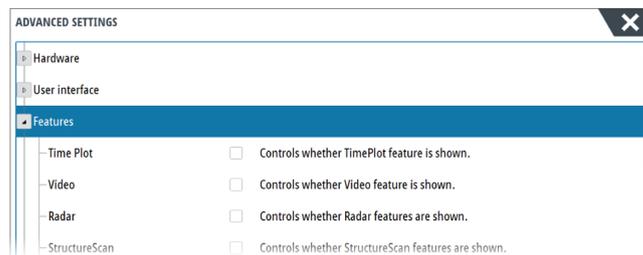
If no master unit is turned on, slave units can be turned on or off individually.

## Advanced

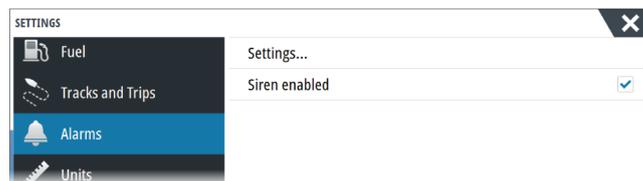
Is a dialog for advanced setting and how your system displays various user interface information.

### Enable and disable features

It is possible to enable or disable features that are not automatically enabled or disabled by the system.



## Alarms settings



## Settings

List of all available alarm options in the system, with current settings. From this list you can activate, deactivate and change alarm limits.

### Siren enable

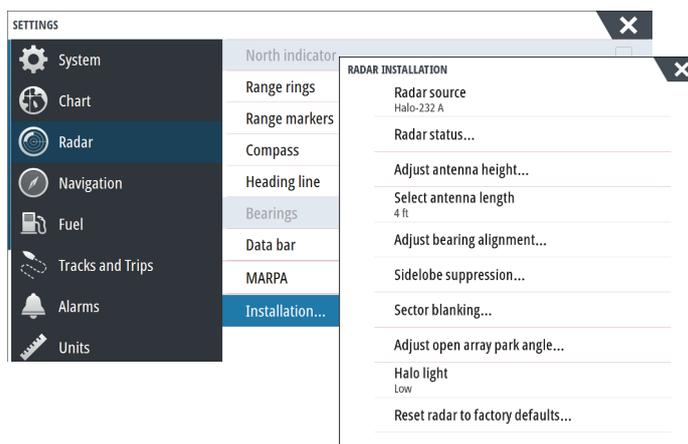
The Siren enabled option must be set in order for the unit to activate the buzzer when an alarm condition arises.

Its setting also determines the operation of the external alarm output.

## Radar settings

→ **Note:** The installation can vary depending on the radar. Follow the installation and setup instructions supplied with the radar.

Use the Radar Installation dialog to setup the radar.

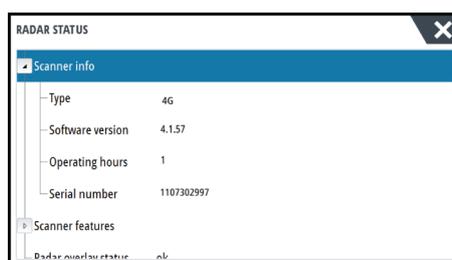


## Radar source

In a system with more than one radar, the correct device to configure can be selected from this menu.

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

## 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 the latest software version available at: [www.simrad-yachting.com](http://www.simrad-yachting.com).

### 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

Should a radar be connected to the network that has been connected to a dual radar network in the past, it might not be detected by the system because it might have an invalid Device ID. With the radar connected and powered up, select the Reset Device ID button to resolve this problem.

→ **Note:** This procedure must be performed with only one radar on the network, and only applies where a network combines an older MFD with other MFDs.

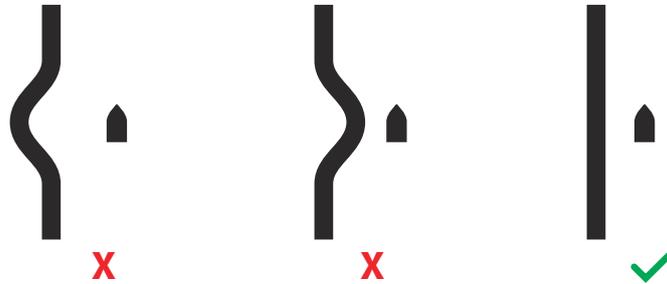
## Adjust range offset

(Pulse Radar only)

The radar sweep should commence at your vessel (a radar range of zero). You may need to adjust the radar range offset to achieve this. If this is set incorrectly, a large dark circle in the center of the sweep might occur. You might notice straight objects such as straight sea walls or piers having curves or an indentation. Objects close to your vessel may appear pulled in or pushed out.

Adjust the range offset as below when the vessel is about 45 to 90 m (50 to 100 yards) from a straight-walled jetty or similar feature that produces a straight line echo on the display.

- Point the boat towards the jetty
- Adjust the gain setting until a reasonably good image of the jetty echo is displayed



### Adjust antenna height

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

### Adjust bearing alignment

This is to align 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.

### Sidelobe suppression

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 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.

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

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.

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:

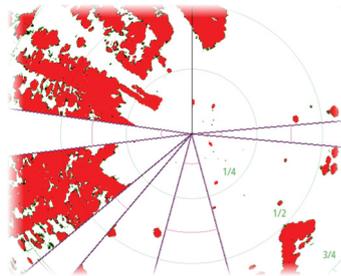
1. Set Radar range to between 1/2 nm to 1 nm and Sidelobe Suppression to Auto
2. Take the vessel to a location where sidelobe returns are likely to be seen. Typically, this would be near a large ship, container port, or metal bridge.
3. Traverse the area until the strongest sidelobe returns are seen.
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 dialog.

### Radar sector blanking

(Halo radar only)

Radar installed in close proximity to a mast or structure could cause unwanted reflections or interference to appear on the radar image. Use the sector blanking feature to stop the radar from transmitting on up to four sectors in the image. The blanking occurs on the main radar PPI and on the radar overlay on a chart.

- **Note:** Sectors are setup relative to the heading line of the radar. The bearing of the sector is measured from the center line of the sector.
- **Note:** Sector blanking should be applied very carefully to avoid reducing the radar's usefulness in identifying valid and potentially dangerous targets.



Main radar PPI



Radar overlay on a chart

## Adjust open array park angle

(Halo Radar only)

The park angle is the final resting position of the antenna relative to the heading line of the radar when the radar is set to standby. The antenna will stop rotating at the desired offset.

## 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.

## Halo light

(Halo radar only)

Controls the levels of the Halo Radar pedestal blue accent lighting. The accent lighting can only be adjusted when the radar is in standby mode.

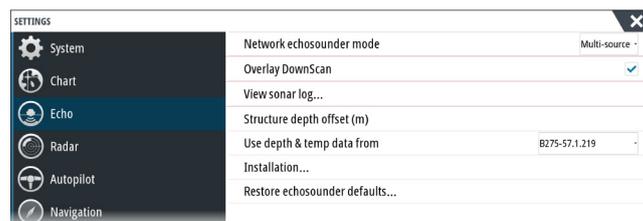
- **Note:** The blue accent pedestal lighting might not be approved for use in your boating location. Check your local boating regulations before turning the blue accent lights ON.

## Restore radar to factory defaults

This option can be used to revert all user adjustments.

## Echosounder settings

A compatible echosounder module (or another unit which has built-in sonar) shared over the Ethernet network is required to view echosounder images on the unit.



## Network echosounder mode

The network echosounder mode setting selects whether only one or multiple echosounder sources can be selected at the same time.

→ **Note:** Changing the mode requires that all connected sources are restarted.

## Overlay DownScan

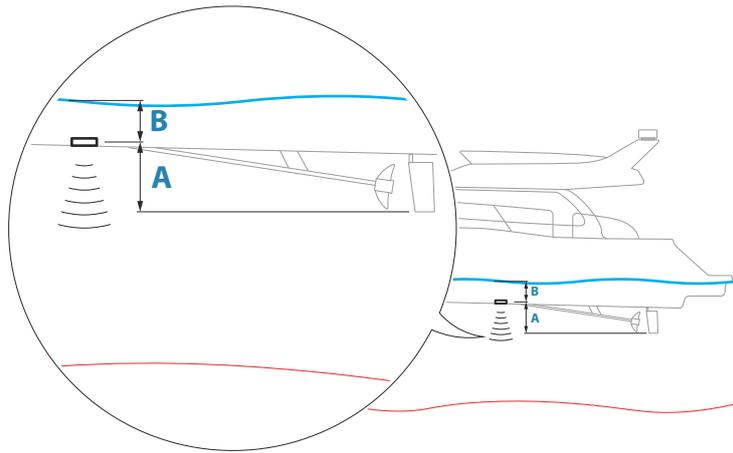
When a DownScan capable transducer is connected to your system, you can overlay DownScan images on the regular Echosounder image.

When overlay DownScan is activated, the Echosounder panel menu expands to include basic DownScan options.

## Structure depth offset

Setting for Structure transducers.

All transducers measure water depth from the transducer to the bottom. As a result, water depth readings do not account for the distance from the transducer to the lowest point of the boat in the water or from the transducer to the water surface.



- To show the depth from the lowest point of the vessel to the bottom, set the offset equal to the vertical distance between the transducer and the lowest part of the vessel, **A** (negative value).
- To show the depth from the water surface to the bottom, set the offset equal to the vertical distance between the transducer and the water surface, **B** (positive value)
- For depth below transducer, set the offset to 0.

## Use depth and temp data from

Selects from which source the depth and temperature data is shared on the NMEA 2000 network.

## Installation

Use this dialog to setup and configure available Echosounder sources.

Field	Value
Source	
Search depth	Unlimited
Depth offset (m)	0.0
Water speed calibration (%)	100
Water speed averaging	1 sec
Water temperature...	
Transducer type	

### Source

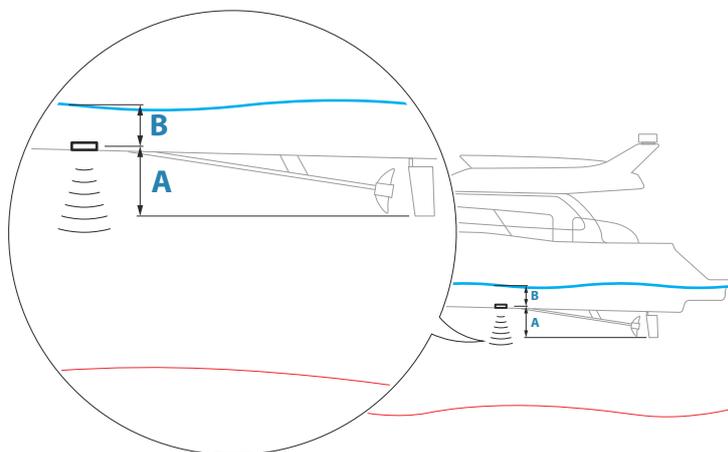
Select this option to display a list of Echosounder sources available for setup. The settings you make in the rest of the dialog pertain to the source selected.

### Search depth

Noise may cause the echosounder to search for unrealistic depths. By setting the search depth manually the system displays echoes received from objects within the set depth range.

### Depth offset

All transducers measure water depth from the transducer to the bottom. As a result, water depth readings do not account for the distance from the transducer to the lowest point of the boat in the water or from the transducer to the water surface.



- To show the depth from the lowest point of the vessel to the bottom, set the offset equal to the vertical distance between the transducer and the lowest part of the vessel, **A** (negative value).
- To show the depth from the water surface to the bottom, set the offset equal to the vertical distance between the transducer and the water surface, **B** (positive value)
- For depth below transducer, set the offset to 0.

### Water speed calibration

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.

Increase this value above 100 % if the paddle wheel is under reading, and decrease this value if it is over reading. For example, if the average water speed reads 8.5 knots (9.8 MPH) and SOG records 10 knots (11.5 MPH) the calibration value needs to be increased to 117 %. To calculate the adjustment, divide the SOG by the paddlewheel speed, and multiply the product by 100.

Calibration range: 50-200 %. Default is 100 %.

### Water speed averaging

Averages water speed by measuring your speed at a selected interval of time. Water speed intervals range from one to thirty seconds. For example 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

Temperature calibration is used to adjust the water temperature value from the sonar transducer. It may be required to correct for localized 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.

### Transducer type

Transducer type is used for selecting the transducer model connected to the sonar module. The transducer selected will determine what frequencies the user can select during sonar operation. In some transducers with built-in temperature sensors, the temperature reading may be inaccurate or not available at all if the wrong transducer is selected. Transducer temperature sensors are one of two impedances - 5k or 10k. Where both options are given for the same model transducer, refer to paperwork supplied with transducer to determine impedance.

### ForwardScan setup

Available when the ForwardScan feature is turned on. For setup information, refer to the Operator Manual.

## Autopilot settings

For setup and commissioning of autopilot computers, refer to the documentation included with your autopilot system or autopilot computer.

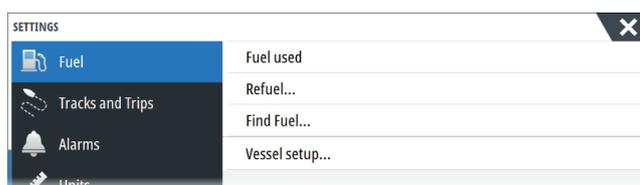
→ **Note:** The WheelKey can be used as a standby key when configured for autopilot control. To configure the WheelKey, refer to *"Configure WheelKey"* on page 20.

## Fuel settings

The fuel utility monitors a vessel's fuel consumption. This information is totaled to indicate trip and seasonal fuel usage, and is used to calculate fuel economy for display on instrument pages and the data bar.

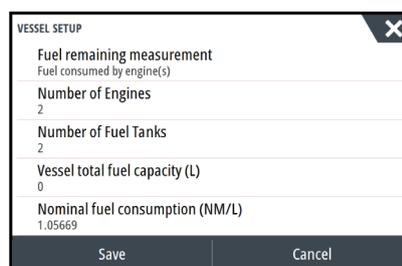
To use the utility, a Navico Fuel Flow sensor, or a NMEA 2000 engine adaptor cable/gateway with Navico Fuel Data Storage device must be fitted to the vessel. The Navico Fuel Flow sensor, does not require the use of a separate Fuel Storage device. Refer to the engine manufacturer or dealer for information on whether or not your engine provides a data output, and what adaptor is available to connect to NMEA 2000.

Once the physical connection is made, ensure source selection is completed. Multiple engine installations using Fuel Flow sensors, or Fuel Data Storage devices, require setup of related engine location in the Device list. For general source selection information, refer to *"Network settings"* on page 31.



### Vessel setup

The Vessel setup dialog must be used to select the number of engines, the number of tanks and vessel's total fuel capacity across all tanks.



### Fuel remaining measurement

The Fuel remaining measurement can be determined from fuel used by engine(s), or fuel level from tank sensors. Nominal fuel consumption is required to set the scale on the fuel

economy gauge. This value should be determined from experience, over time. Alternatively the boat builder or designer may be able to give an approximate value to use.

→ **Note:** Fuel remaining measurement taken from level sensors while underway can get inaccurate readings due to vessel movement.

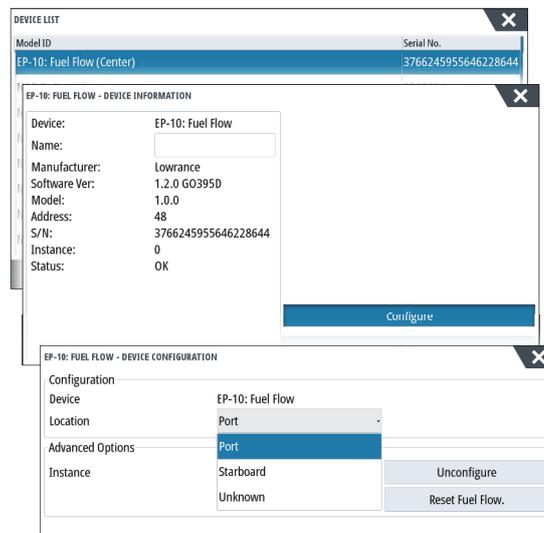
→ **Note:** Nominal fuel consumption setting should be determined taking into account typical vessel loads. That is, filled fuel and water tanks, stowed tender, supplies, etc.

## Fuel flow configuration

After the number of engines is set, it is required to set which fuel flow sensor is connected to which engine. Under Device list on the Network page, view the Device Configuration dialog for each sensor, and set the Location to match the engine the device is connected to.

**Unconfigure** - defaults the device which clears all user settings.

**Reset Fuel Flow** - restores only the Fuel K-Value setting, if set in Calibrate. Only Navico devices can be reset.



## Calibrate

Calibration may be required to accurately match measured flow with actual fuel flow. Access calibration from the Refuel dialog. Calibration is only possible on Navico's Fuel Flow sensor.

1. Start with a full tank and run the engine as it would normally be operated.
2. After at least several liters (a few gallons) have been used, the tank should be fully refilled, and the Set to full option selected.
3. Select the Calibrate option.
4. Set the actual amount used based on amount of fuel added to the tank.
5. Select OK to save settings. The Fuel K-Value should now show a new value.

→ **Note:** To calibrate multiple engines repeat the steps above, one engine at a time.

Alternatively, run all engines simultaneously, and divide the Actual amount used by the number of engines. This assumes reasonably even fuel consumption on all engines.

→ **Note:** The Calibrate option is only available when Set to full is selected, and a Fuel Flow is connected and set up as a source.

→ **Note:** A maximum of 8 engines is supported using Fuel Flow sensors.

## Fuel Level

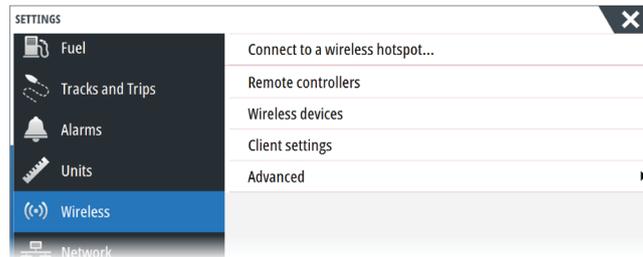
With the use of a Navico Fluid Level device connected to a suitable tank level sensor, it is possible to measure the amount of fuel remaining in any equipped tank. The number of tanks must be set in Vessel Setup dialog, initiated from the Fuel setting options page, to allow discrete tank assignment of the Fluid Level devices.

Select Device list on the Network page, and view the Device Configuration dialog for each sensor, and set the Tank location, Fluid type, and Tank size.

For setting up the Instrument bar or a gauge on the Instrument page with Fluid Level device data, refer to the Operator Manual.

- **Note:** A maximum of 5 tanks is supported using Fluid Level devices.
- **Note:** Tank data that is output by a compatible engine gateway can also be displayed, however tank configuration for such a data source is not possible from this unit.

## Wireless settings



### Wireless settings

Provides configuration and setup options for the wireless functionality.

### Remote controllers

When a wireless device is connected, it should appear in the Remote controllers list.

Selecting Always allow means the device can automatically connect without needing a password each time. This menu also allows disconnection of devices that no longer require access.

Refer to the User Manual for information about how to connect controllers.

### Wireless devices

This dialog shows the available wireless devices, as well as their IP and channel number. Selecting a device provides additional detail.

To view and change internal wireless detail values (Network Name (SSID), Network Key, or Channel) the internal wireless must be in Access Point (Internal Wifi) mode.

To select a network (hotspot) to connect to, the internal wireless must be in Client Mode. Use the Mode option to change modes.

### Mode

Displays if the internal wireless is set to Access Point (Internal WiFi) mode or Client Mode. Select it to change the wireless between Access Point mode and Client Mode. If the internal wireless is set to Access Point (Internal Wifi) mode, smartphones and tablets can access the unit to view and control (tablet only) it. Also when set to Access Point (Internal Wifi) mode you can view and change the internal wireless details. Client Mode allows the unit internet access via a wireless hotspot.

When viewing this menu for a WIFI-1 set to Access Point mode, it's also possible to switch between Primary and Secondary access point modes so two WIFI-1 devices can exist on the network at the same time.

Only one WIFI-1 may operate as Primary, which determines that the device is acting as DHCP server. Only one DHCP server may exist on a network at a time.

To use two WIFI-1s as access points simultaneously the unit must initially be connected to only one unit. Once this unit is set to secondary, a second module may be turned on/connected, and will automatically default to primary.

- **Note:** In a network with only one WIFI-1 and one or more internal wireless modules, the WIFI-1 should be left in Primary mode. The internal modules do not act as a DHCP server.

### Hardware

Provides hardware related details.

### Networks

Only visible if the internal wireless is in Client Mode when the device is selected. Shows a list of all networks (hotspots) available for connection. Select the name of the desired network to enter its network key and connect to it.

### Network Name (SSID)

Displays the name of the internal wireless network.

Only visible if the internal wireless is set to Access Point (Internal Wifi) mode when the device is selected. You can select it and change the internal wireless network to any name you want for easy identification.

### Network Key

Required by the smartphone or tablet to connect to the internal wireless network.

Only visible if the internal wireless is set to Access Point (Internal Wifi) mode when the device is selected. You can select it and change it to increase network security. The key must be at least 8 characters.

### Channel

Only visible if the internal wireless is set to Access Point (Internal Wifi) mode when the device is selected. Select it to change the Channel setting to overcome potential interference to the internal wireless by another RF device transmitting in the same frequency band.

### Restore defaults

Deletes all user made changes, and restores the wireless to factory settings.

## Client settings

Opens the Wireless Client Settings dialogue, which shows networks previously connected to, regardless of whether they are currently visible or not. Allows deletion of a network from the list, and toggling of Automatic connection setting.

## Advanced

Tools are available within the software to assist in fault-finding and setting up the wireless network.

### Iperf

Iperf is a commonly used network performance tool. It is provided for testing wireless network performance around the vessel so weak spots or problem areas can be identified. The application must be installed on and run from a tablet device.

The unit must be running Iperf server before initiating the test from the tablet. On exiting the page, Iperf automatically stops running.

### DHCP Probe

The wireless module contains a DHCP server that allocates IP addresses for all the MFDs, and Echosounder in a network. If integrating with other devices, such as a 3G modem or satellite phone, other devices in the network may also be acting as DHCP servers. To make it easy to find all DHCP servers on a network, dhcp\_probe may be run from the NSO evo3. Only one DHCP device may be operational on the same network at a time. If a second device is found, turn off its DHCP feature if possible. Refer to the device's own instructions for further assistance.

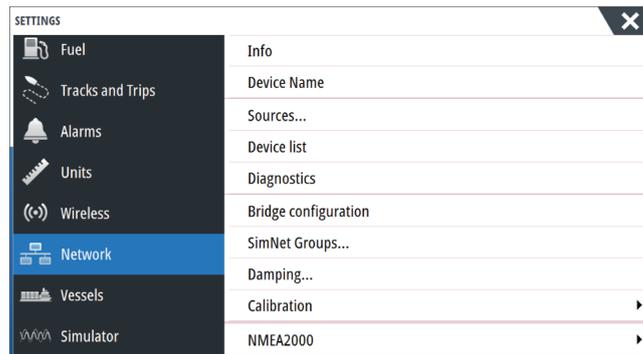
→ **Note:** Iperf and DHCP Probe are tools provided for diagnostic purposes by users familiar with network terminology and configuration. Navico is not the original developer of these tools, and cannot provide support related to their use.

## Simultaneous Client and Access Point operation

If it is desirable to have the MFD accessible to a tablet while also having internet access, it is necessary to use two wireless units - one must be in Client mode, the other in Access Point mode. This can be a combination of internal wireless and an external WIFI-1, or two external

WIF-1 units. Two external WIFI-1 units will offer the advantage of providing both features to all MFDs on the network (where applicable).

## Network settings



### Device name

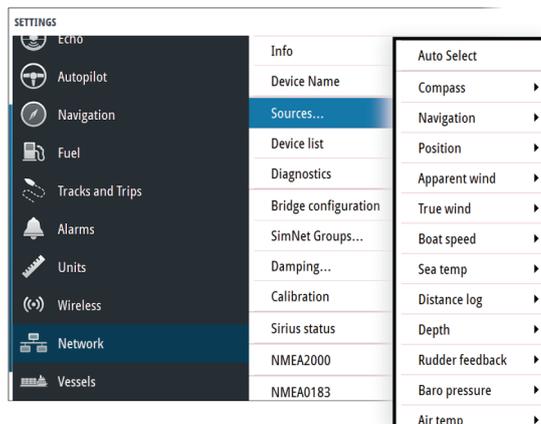
Assigning a name is useful in systems using more than one device of the same type and size. When viewing data sources or the device list, the assigned name will append the default product name + virtual device function for easy identification.

### Sources

Data sources provide live data to the system.

The data may originate from modules internal to the unit, or external modules connected through NMEA 2000 or via NMEA 0183 if available on the unit.

When a device is connected to more than one source providing the same data, the user can choose the preferred source. Before commencing with source selection make sure all external devices and the NMEA 2000 backbone are connected and turned on.

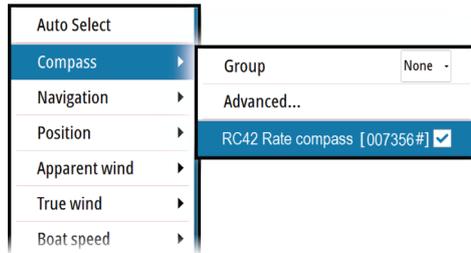


### Auto Select

The Auto Select option looks for all sources connected to the device. If more than one source is available for each data type, selection is made from an internal priority list. This option is suitable for the majority of installations.

### 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.



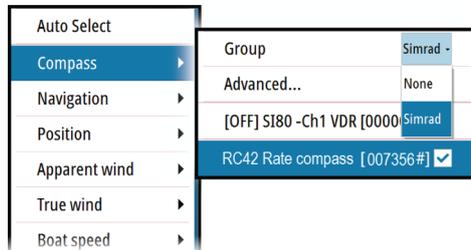
### Group source selection

Multifunction displays, autopilot controllers, and instruments have the ability to:

- Use data sources (for example position, wind direction, and so on) 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 only includes products set to Group mode.)

→ **Note:** In order to enable group selection, the display must be set to Simrad group.

Devices with the Group set to None can be set to use different sources to those of the rest of the network devices.



### Advanced source selection

This allows the most flexible and precise manual control over which devices provide data. Some data sources, such as those for fuel level, or engine RPM, can only be changed from the Advanced menu. Occasionally Auto Select may not assign the desired source, 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 cannot determine which engine is fitted on the port and which is fitted on the starboard side.

→ **Note:** The Advanced option is visible in multiple places - the bottom of the Sources list, and under each source category (for example, Compass). The latter shows a filtered list that only relates to devices that output data relevant to the category.

### Device list

The Device list shows the devices that provide data. This may include a module inside the unit, or any external NMEA 2000 device.

Selecting a device in this list will bring up additional details and options for the device.

All devices allow allocation of an instance number in the Configure option. Set unique instance numbers on any identical devices on the network to allow for the unit to distinguish between them. The Data option shows all data being output by the device. Some devices will show additional options specific to the device.

→ **Note:** Setting the instance number on a 3rd party product is typically not possible.

### Diagnostics

Provides information useful for identifying an issue with the network.

#### NMEA 2000

Provides information useful for identifying an issue with the network.

→ **Note:** The following information may not always indicate an issue that can be simply resolved with minor adjustment to network layout or connected devices and their activity on the network. However, Rx and Tx errors are most likely indicating issues with the physical network, which may be resolved by correcting termination, reducing backbone or drop lengths, or reducing the number of network nodes (devices).



### Bus State

Simply indicates whether the bus is powered, but not necessarily connected to any data sources. However, if bus shows as off, but power is present along with an increasing error count, it is possible that termination or cable topology is incorrect.

### Rx Overflows

The unit received too many messages for its buffer before the application could read them.

### Rx Overruns

The unit contained too many messages for its buffer before the driver could read them.

### Rx/Tx Errors

These two numbers increase when there are error messages, and decrease when messages are received successfully. These (unlike the other values) are not a cumulative count. Under normal operation these should be at 0. Values around 96 upwards indicate a heavily error prone network. If these numbers go too high for a given device, it will automatically drop off the bus.

### Fast Packet Errors

Cumulative counter of any fast packet error. This could be a missed frame, or a frame out of sequence etc. NMEA 2000 PGNs are made of up to 32 frames. The entire message will be discarded when a frame is missed.

→ **Note:** Rx and Tx Errors often indicate an issue with the physical network, which may be resolved by correcting termination, reducing backbone or drop lengths, or reducing the number of network nodes (devices).

### UDB

The UDB (User Data Base) tab on the diagnostics page, provides information on Ethernet activity.



### J1939

The J1939 tab on the diagnostics page, provides information on J1939-bus activity.



## SimNet groups

This function is used to control parameter settings, either globally or in groups of units. The function is used on larger vessels where several units are connected to the NMEA 2000 network. By assigning several units to the same group, a parameter update on one unit will have the same effect on the rest of the group members.

If any of the settings require discrete control, set the group to None.

## Damping

If data appears erratic or too sensitive, damping may be applied to make the information appear more stable. With damping set to off, the data is presented in raw form with no damping applied.

## Calibration

An offset (positive or negative) can be applied to correct data inaccuracies from NMEA 2000 sources.

→ **Note:** Any calibrations made here will only be applied locally to this unit. Other devices on the network will not have these offsets applied.

## NMEA 2000 setup

### Receive waypoint

Select this option to allow another device capable of creating and exporting waypoints via NMEA 2000 to transfer directly to this unit.

### Send waypoint

Select this option to allow this unit to send waypoints to another device via NMEA 2000.

→ **Note:** The system can only transmit or receive one waypoint at a time on creation of that waypoint. For bulk import or export of waypoints see the operator manual.

## NMEA 0183 setup

The NMEA 0183 port(s) must be set to suit the speed of connected devices, and can be configured to output only the sentences required by listening devices.

### Receive waypoint

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

### Baud rate

This should be set to correspond with devices connected to the NMEA 0183 input and output. The input and output (Tx, Rx) use the same baud rate setting.

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

### Serial Output

Selection determines whether the data is output via Tx lines, and will enable editing of the output sentences list.

### Serial output sentences

This list allows control over which sentences need to be transmitted to other devices from the NMEA 0183 port. Due to the limited bandwidth of NMEA 0183 it is desirable to only enable the data that is required. The less sentences that are selected, the higher the output rate of the enabled sentences.

Commonly used sentences are enabled by default.

### Ethernet/Wireless

The NMEA 0183 data stream is output and made available to tablet devices and PCs, via the internal wireless or Ethernet. The dialogue provides IP and port data typically required for configuring the application on the third party device.

→ **Note:** Other MFDs cannot decode this information back to NMEA 0183, to use the data as a source. To share data a physical NMEA 2000 or NMEA 0183 connection is still required.

# 5

## 3rd party support

### C-Zone

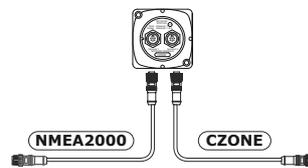
#### CZone connection to NMEA 2000

When interfacing to CZone network it is recommended to use a BEP Network interface bridge to join the two network backbones together.

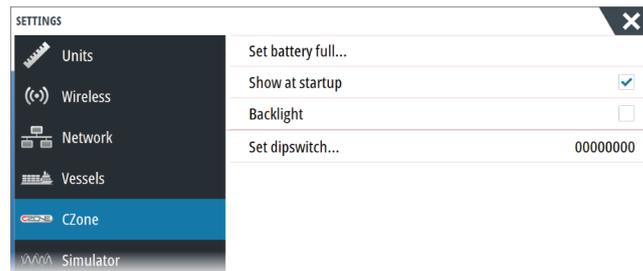
The CZone / NMEA 2000 Network interface bridge isolates the power of the two networks, but allows data to be freely shared between both sides.

The 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 150 m 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).



#### CZone setup



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

The functionality of the CZone system is determined by the CZone Config File which is stored on all CZone modules and the NSO evo3. The file is created using the CZone Configuration Tool, a specialized PC application available from BEP Marine Ltd, and associated CZone distributors.

For more information, refer to the documentation provided with your CZone system.

#### Assigning the dipswitch setting

Every 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 configuration 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 configuration is already available on the network, it will immediately commence uploading to the NSO evo3 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 is shown first, every time the NSO evo3 is powered up.

#### Backlight

Enabling this causes the NSO evo3 to synchronize its backlight setting with that of any CZone Display Interfaces set up to share backlight settings.

→ **Note:** CZone Config also needs to have the NSO evo3 set as a controller.

## Mercury

If the unit is on the same NMEA 2000 network as a compatible Mercury Marine VesselView product or VesselView Link, specific features are automatically unlocked on the unit. When the features are enabled, the display may prompt the user for some basic configuration information. Refer to the VesselView® manual or engine supplier for further information.

## Suzuki Marine

If the unit is on the same NMEA 2000 network as a Suzuki C10 color gauge, a dedicated Suzuki instrument panel is unlocked and automatically enabled. Data source selection is done the same way as for any regular NMEA 2000 sources.

## Yamaha engine integration

If a compatible Yamaha gateway is connected to the NMEA 2000 network, a Yamaha engine icon is added to the Home page.

For more information about configuration information, the Yamaha panel and the data displayed, and Troll control, refer to the Yamaha manual or the engine supplier.

# 6

## Appendix

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### Accessories

The most up-to-date accessories list is available at: [www.simrad-yachting.com](http://www.simrad-yachting.com)

## Supported data

→ **Note:** NMEA 0183 and NMEA 2000 data output requires the connection of relevant sensors.

### NMEA 2000 compliant PGN List

#### NMEA 2000 PGN (receive)

59392	ISO Acknowledgement
59904	ISO Request
60928	ISO Address Claim
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	Distance Log
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
129041	AIS aids to Navigation
129283	Cross Track Error
129284	Navigation Data
129539	GNSS DOPs
129540	AIS Class B Extended Position Report
129794	AIS aids to Navigation

129801	Cross Track Error
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

#### NMEA 2000 PGN (transmit)

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	Distance Log
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

## NMEA 0183 supported sentences

### TX / RX - GPS

<b>Receive</b>	GGA	GLL	GSA	GSV	VTG	ZDA	
<b>Transmit</b>	GGA	GLL	GSA	GSV	VTG	ZDA	GLC

### TX / RX - Navigation

<b>Receive</b>	RMC				
<b>Transmit</b>	AAM	APB	BOD	BWC	BWR

<b>Receive</b>					
<b>Transmit</b>	RMC	RMB	XTE	XDR	

### TX / RX - Sonar

<b>Receive</b>	DBT	DPT	MTW	VLW	VHW
<b>Transmit</b>	DBT	DPT	MTW	VLW	VHW

### TX / RX - Compass

<b>Receive</b>	HDG	HDT	HDM
<b>Transmit</b>	HDG		

### TX / RX - Wind

<b>Receive</b>	MWV	MWD
<b>Transmit</b>	MWV	MWD

### TX / RX - AIS / DSC

<b>Receive</b>	DSC	DSE	VDM
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→ **Note:** AIS sentences are not bridged to or from NMEA 2000.

### TX / RX - MARPA

<b>Transmit</b>	TLL	TTM
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→ **Note:** These are only output sentences.

## J1939 PGN/SPN list

J1939 SPN/PGN	Description	NMEA2000 PGN
190 / 61444	Engine Speed	127488
102 / 65270	Engine Turbocharger Boost Pressure	127488
100 / 65263	Engine Oil Pressure	127489
175 / 65262	Engine Oil Temperature 1	127489
110 / 65262	Engine Coolant Temperature	127489
167 / 65271	Alternator Potential (Voltage)	127489
183 / 65266	Engine Fuel Rate	127489
247 / 65253	Engine Total Hours of Operation	127489
109 / 65263	Engine Coolant Pressure	127489
94 / 65263	Engine Fuel Delivery Pressure	127489
92 / 61443	Engine Percent Load at Current Speed	127489
513 / 61444	Actual Engine - Percent Torque	127489
189 / 65214	Engine Rated Speed	127498
237 / 65260	Vehicle Identification Number	127498
234 / 65242	Software Identification	127498
523 / 61445	Transmission Current Gear	127493
127 / 65272	Transmission Oil Pressure	127493
177 / 65272	Transmission Oil Temperature	127493

→ **Note:** The unit will act as a gateway and resend received J1939 PGN/SPN over NMEA 2000.

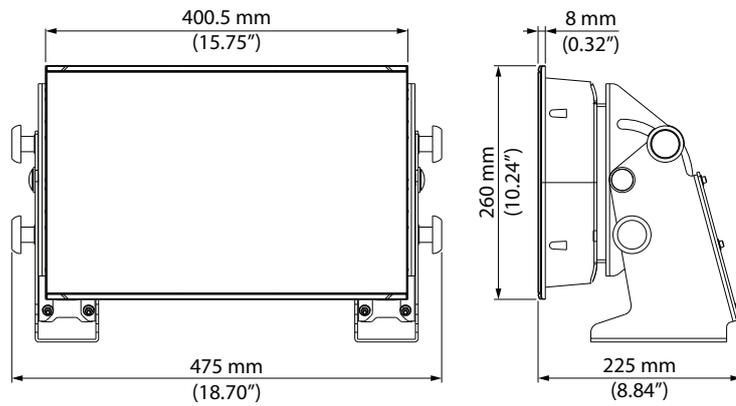
## Technical specifications

<b>Display</b>	
<b>Resolution</b>	1920 x 1080
<b>Brightness</b>	1000 nits
<b>Touch screen</b>	Full touch screen (multi-touch)
<b>Viewing angles in degrees</b> (typical value at contrast ratio = 10)	80° top/bottom, 80° left/right
<b>Electrical</b>	
<b>Supply voltage</b>	12/24 V DC (10 - 31.2 V DC min - max)
<b>Power consumption - Max</b>	
16" unit	40 W +- 4 W
19" unit	50 W +- 4 W
24" unit	80 W +- 5 W
<b>Recommended fuse rating</b>	
16" unit	6 A at 12 V DC / 3 A at 24 V DC
19" unit	7 A at 12 V DC / 4 A at 24 V DC
24" unit	10 A at 12 V DC / 5 A at 24 V DC
<b>Environmental</b>	
<b>Operating temperature range</b>	-15°C to +55°C (5°F to 131°F)
<b>Storage temperature</b>	-20°C to +60°C (4°F to 140°F)
<b>Waterproof rating</b>	IPX6 (when panel mounted correctly with only the front exposed)
<b>Humidity</b>	IEC 60945 Damp heat 66°C (150°F) at 95% relative (48 hr)
<b>Shock and vibration</b>	100 000 cycles of 20 G
<b>Interface/Connectivity</b>	
<b>Ethernet</b>	3x (RJ45)
<b>USB</b>	3x (USB-A)
<b>J1393</b>	1x (Micro-C)
<b>NMEA 2000</b>	1x (Micro-C)
<b>NMEA 0183</b>	4 ports
<b>Video output</b>	1x high definition video output (1080p, no HDCP, HDMI-A)
<b>Video input</b>	2x composite video (BNC) 1x high definition video (1080p, HDCP 1.4, HDMI-A)
<b>Data card reader</b>	1x slot (microSD)
<b>Wireless</b>	Internal 802.11b/g/n
<b>Physical</b>	
<b>Dimensions (W x H x D)</b>	Refer to "Dimensional drawings" on page 45
<b>Weight (display only)</b>	
16" unit	3.9 kg (8.6 lbs.)
19" unit	4.8 kg (10.5 lbs.)
24" unit	7.8 kg (17.2lbs.)
<b>Compass Safe Distance - Metric, imperial</b>	50 cm

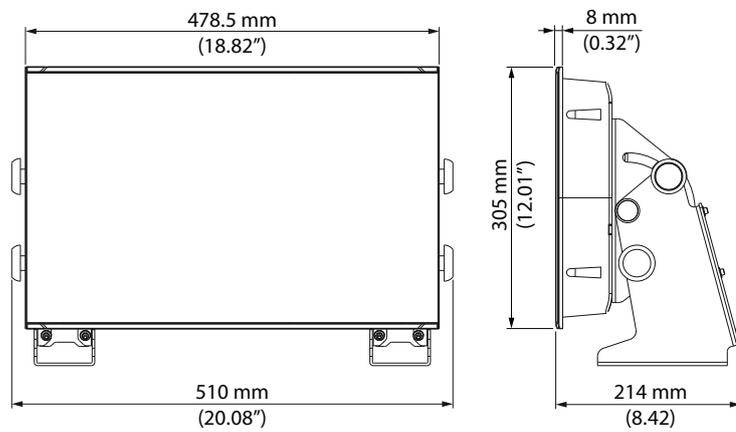
<b>Mounting type</b>	Panel mount or bracket (optional accessory)
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## Dimensional drawings

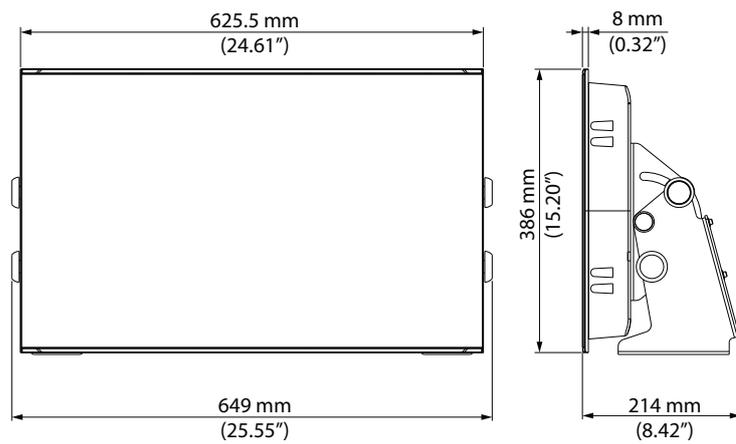
### 16"



### 19"



### 24"









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