Zeus³S Glass Helm MPU
Installation Manual

ENGLISH



bandg.com

Preface

Disclaimer

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

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

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

Copyright © 2020 Navico Holding AS.

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.bandg.com

Compliance statements

Europe

Navico declare under our sole responsibility that the product conforms with the requirements of:

- CE under RED 2014/53/EU

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

- www.bandg.com

United States of America

⚠ 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.

ISED Canada

This device complies with ISED (Innovation, Science and Economic Development) Canada's license-exempt RSSs. 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.

La traduction française de ce document est disponible sur le site Web du produit.

Australia and New Zealand

Navico declare under our sole responsibility that the product conforms with the requirements of:

- level 2 devices of the Radiocommunications (Electromagnetic Compatibility) standard 2017

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.

Trademarks

Navico® is a registered trademark of Navico Holding AS.

B&G® is a registered trademark of Navico Holding AS.

HDMI® and HDMI™, the HDMI Logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC in the United States and other countries.

NMEA® and NMEA 2000® are registered trademarks of the National Marine Electronics Association.

SD™ and microSD™ are trademarks or registered trademarks of SD-3C, LLC in the United States, other countries or both.

Navico product references

This manual refers to the following Navico products:

- Broadband Radar™ (Broadband Radar)
- Broadband 3G™ (Broadband 3G Radar)
- Broadband 4G™ (Broadband 4G Radar)
- Halo™ Pulse Compression Radar (Halo Radar)

About this manual

Images used in this manual might not exactly match the screen on your unit.

Important text conventions

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

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

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

Intended audience

This manual is written for system installers.

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

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

Translated manuals

Available translated versions of this manual can be found on the following website:

- www.bandg.com

Contents

7 Introduction
7 System overview
7 Operating the system
8 Parts included
9 Connectors
9 Card reader

10 Installation
10 General mounting guidelines
11 Wall mounting

12 Wiring
12 Access to connectors
12 Wiring guidelines
12 Control devices
12 Monitors
13 Power
15 NMEA 2000
16 Serial port
18 Ethernet
19 USB port
19 Video in
20 HDMI out

21 System setup
21 First time startup
21 Software setup sequence
21 The settings dialog
21 System settings
24 Alarms
24 Radar installation
27 Echosounder settings
29 Autopilot settings
30 Fuel settings
31 Wireless settings
32 Network settings

35 3rd party support
35 CZone
36 Naviop
36 FLIR camera setup

37 Dimensional drawings
37 Zeus3S Glass Helm MPU

38 Technical specifications
38 Zeus3S Glass Helm MPU

39 Supported data
39 NMEA 2000 compliant PGN List
42 NMEA 0183 supported sentences

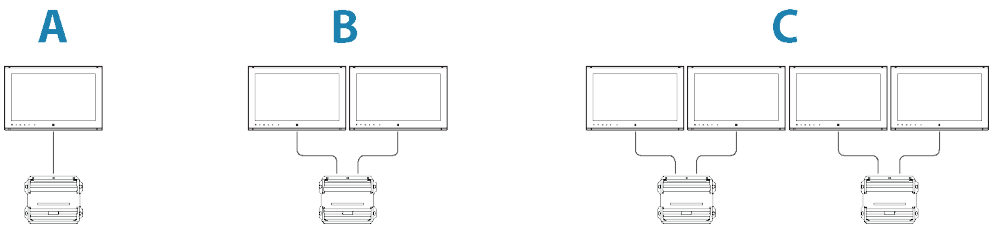
1 Introduction

System overview

The basic system consists of the processor and one or two monitors.

The system can be configured and installed in various configurations:

- One processor with one monitor (**A**)
- One processor with two independent monitors (**B**)
- A complex network where additional networked processors are connected to independent monitors throughout the boat (**C**)



Operating the system

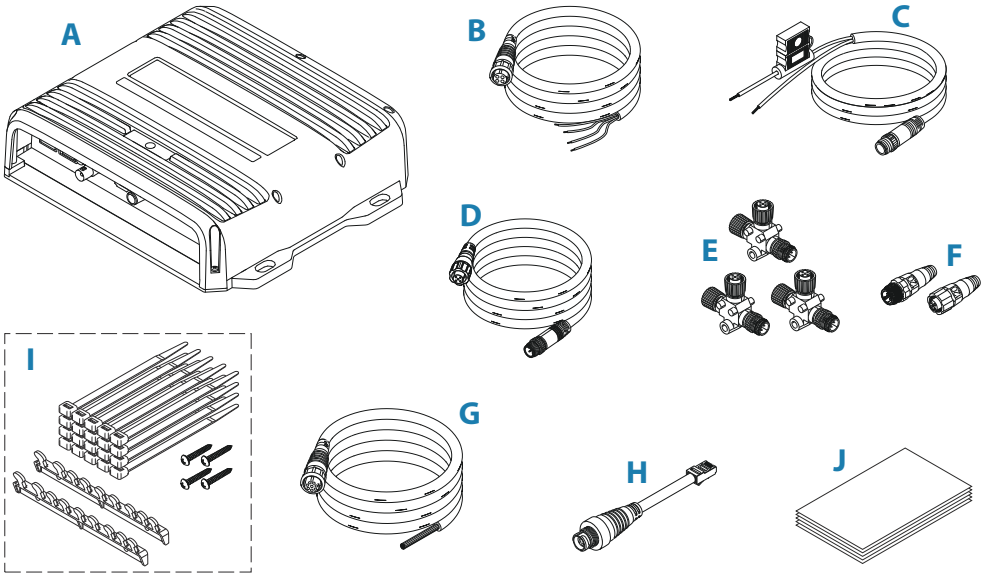
The system supports single and dual touch-screen operation when compatible touch monitors are connected.

If a compatible remote controller is available on the network, this can control multiple processors and monitors, including power control. A separate manual is delivered with the remote controller units.

You can also use a keyboard and mouse/trackball to control the system. Once these devices are connected to the USB ports on a processor, they can be used to control the monitors connected to the same processor.

The active controller is indicated with an icon in the status bar.

Parts included



A Zeus^{3}S Glass Helm Marine Processor Unit (MPU)

B MPU Power cable, 2 m (6.5')

C Micro-C power cable, 1.3 m (4.3')

D Micro-C drop cable, male-female plugs, 1.8 m (6')

E Micro-C T-connectors (x3)

F Micro-C terminators, 120 ohm, (male and female)

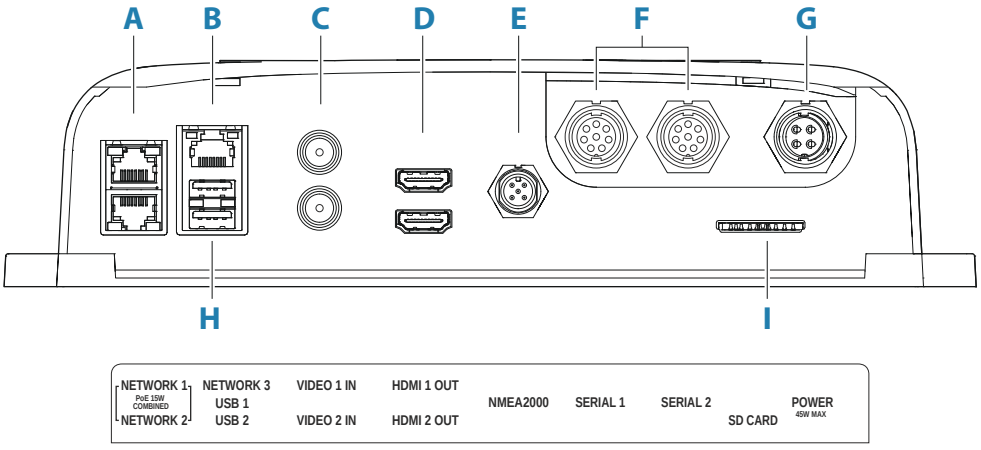
G NMEA 0183 serial cable, 8 wires, 2 m (6.5')

H Ethernet adaptor, 5 pin female to RJ45 male

I Installation kit:
- Cable retainers (x2)
- Cable ties (x20)
- Pan head screws, 3.5 x 19, A4 DIN7981B (x8)

J Documentation pack

Connectors



A Network 1 and Network 2 ports (Ethernet with PoE)

B Network 3 (Ethernet)

C Video 1 IN and Video 2 IN

D HDMI 1 OUT and HDMI 2 OUT

E NMEA 2000

F Serial 1 and Serial 2

G Power

H USB 1 and USB 2

I SD card reader

Card reader

A memory card can be used for:

- Chart data
- Software updates
- Transfer of user data
- Logging user data
- System backup

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

2

Installation

General mounting guidelines

⚠ Warning: Do not install the unit in a hazardous/flammable atmosphere.

➔ ***Note:*** Choose a mounting location that will not expose the unit to conditions that exceed the technical specifications.

Mounting location

This product generates heat which must be considered when choosing the mounting location.

It is recommended that the unit is installed in a location on the vessel with adequate airflow and away from areas heated by the environment or other equipment.

Ensure that the selected area allows for:

- Cable routing, cable connection and cable support.
- Connection and use of portable storage devices.
- Viewing any LED indicators.
- Easy access to serviceable parts.

Do also consider:

- The free space around the unit to avoid overheating.
- The mounting surface's structure and strength, with regard to the weight of the equipment.
- Any mounting surface vibration that might damage the equipment.
- Hidden electrical wires that might be damaged when drilling holes.

Ventilation

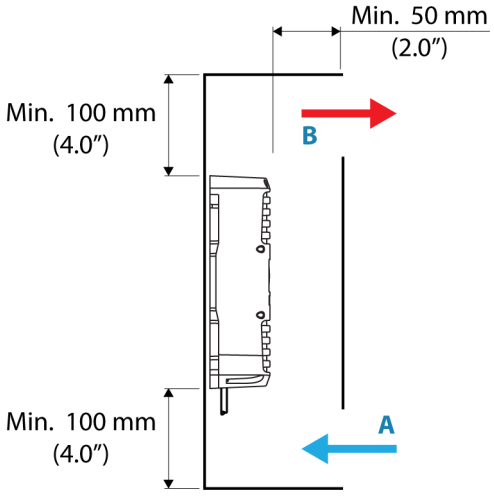
Inadequate ventilation and subsequent overheating of the unit may cause reduced performance and reduced service life.

Ensure that cables do not obstruct the airflow and that the ventilation holes are not blocked.

Examples of enclosure ventilation options, in order of preference, are:

- Positive pressure air from the vessel's air conditioning system.
- Positive pressure air from local cooling fans (fan required at input, fan optional at outlet).
- Passive airflow from air vents.

Enclosure recommendations



A Air inlet

B Air outlet

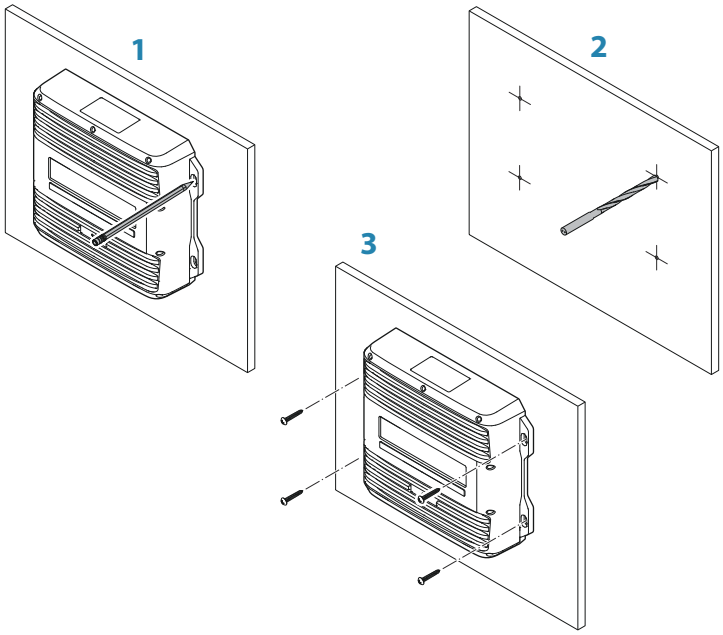
Electrical and radio frequency interference

This unit conforms to the appropriate Electromagnetic Compatibility (EMC) regulations. To ensure that the EMC performance is not compromised, the following guidelines apply:

- Separate battery used for the vessel engine.
- Minimum 1 m (3 ft) between the device, the device's cables and any transmitting equipment or cables with radio signals.
- Minimum 2 m (7 ft) between the device, the device's cables and the SSB radio.
- More than 2 m (7 ft) between the device, the device's cables and the radar beam.

Wall mounting

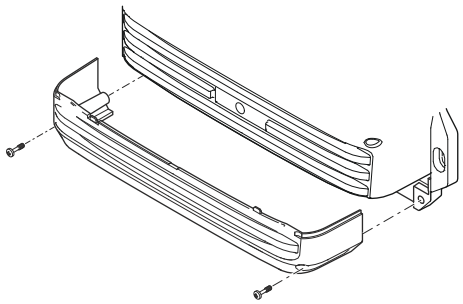
The unit should be installed vertically with the connectors facing down.



3 Wiring

Access to connectors

For easier access to connectors, remove the bottom front of the unit.



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:

- Make drip and service loops.
- Use cable-ties 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 a fuse or a circuit breaker (closest available to fuse rating).

Control devices

The system can be operated by:

- A supported remote controller connected via NMEA 2000.
- Touch monitors connected via serial interface (RS422) or USB.
- Keyboard and mouse/trackball connected via USB.

For wiring details, refer to the port description in the next pages.

Monitors

Up to two monitors may be connected via the HDMI ports.

Monitors with DVI inputs only should use an HDMI-DVI adaptor.

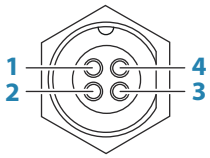
→ ***Note:*** Brightness control are not supported over DVI.

Monitors must conform to the supported resolutions and refresh rates as defined in the Technical specification.

Power

The power connector is used for power, power control and for external alarm output.

Power connector details



Unit socket (male)

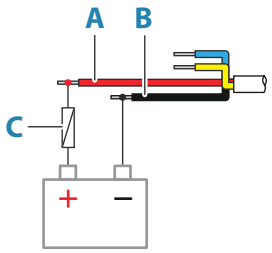
Pin	Purpose
1	DC negative
2	External alarm
3	Power control
4	+12/24 V DC

Power connection

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

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

A fuse or circuit breaker should be fitted to the positive supply. For recommended fuse rating refer to *"Technical specifications"* on page 38.



Key	Purpose	Color
A	+12/24 V DC	Red
B	DC negative	Black
C	Fuse	

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.

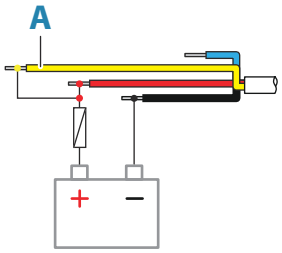
Leave the yellow power control wire disconnected and tape or heat-shrink the end to prevent shorting.

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).

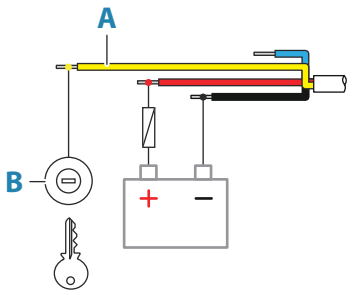


Key	Purpose	Color
A	Power control wire, connected to supply power	Yellow

Power controlled by ignition

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

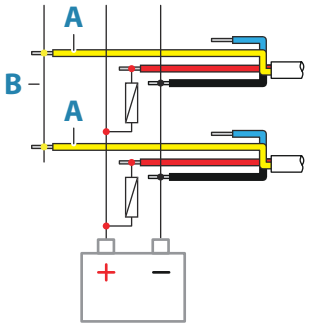
→ ***Note:*** Engine start batteries and house batteries should have a common ground connection.



Key	Purpose	Color
A	Power control wire	Yellow
B	Ignition switch	

Power controlled by power 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.

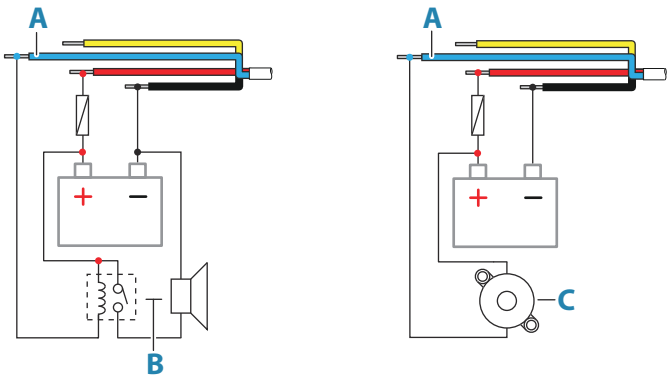


Key	Purpose	Color
A	Power control wire	Yellow
B	Power control bus	

If a unit is configured as power control master and turned on by the power key, it will output voltage on the power 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 and off using their own power key. However, this will not turn on any other units connected to the power bus.

External alarm



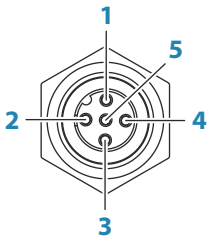
For sirens that draw more than 1 A, use a relay.

Key	Purpose	Color
A	External alarm output	Blue
B	Siren and relay	
C	Buzzer	

NMEA 2000

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

Connector details



Unit socket (male)

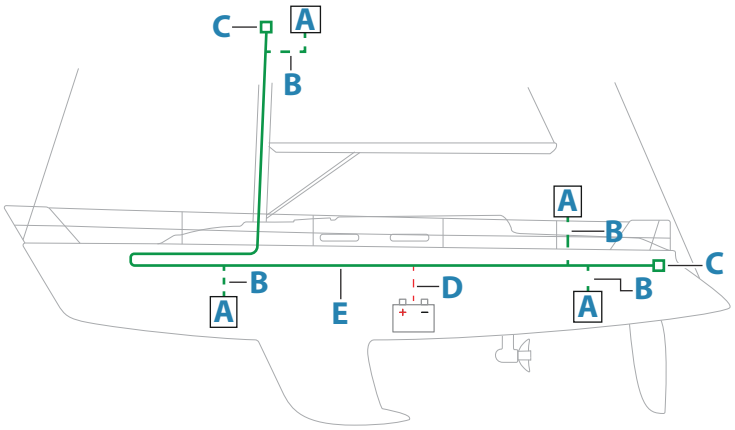
Pin	Purpose
1	Shield
2	NET-S (+12 V DC)
3	NET-C (DC negative)
4	NET-H
5	NET-L

Plan and install an NMEA 2000 network

An NMEA 2000 network consists of a powered backbone from which drop cables connect to NMEA 2000 devices. The backbone needs to run within 6 m (20 ft) 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).
- A terminator must be installed at each end of the backbone. The terminator can be a terminator plug or a unit with built-in terminator.



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

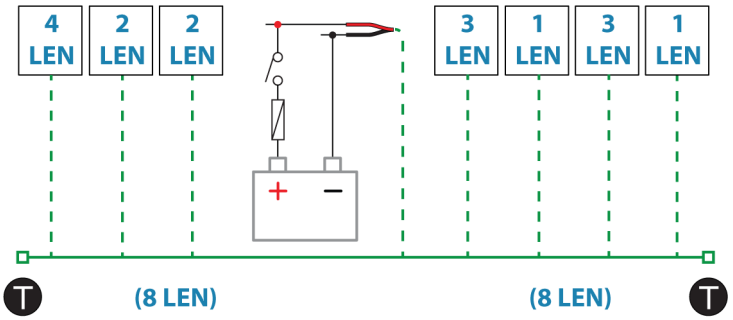
Powering the network

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.

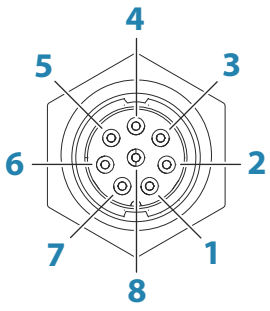


→ ***Note:*** Do not connect the NMEA 2000 power cable to the same terminals as the engine start batteries, autopilot computer, bow thruster or other high current devices.

Serial port

The serial port(s) is used for NMEA 0183 and touch screen control.

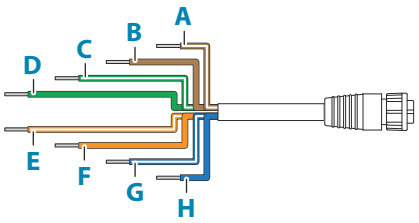
Connector details



Unit socket (male)

Pin	Purpose
1	NMEA 0183 Listener B (Rx_B)
2	NMEA 0183 Listener A (Rx_A)
3	NMEA 0183 Talker B (Tx_B)
4	NMEA 0183 Talker A (Tx_A)
5	Touch screen RS422 Talker + (Tx+)
6	Touch screen RS422 Talker - (Tx-)
7	Touch screen RS422 Listener - (Rx-)
8	Touch screen RS422 Listener + (Rx+)

NMEA 0183 and Touch screen control, cable details



Key	Description	Color
A	NMEA 0183 Listener B (Rx_B)	Brown/white
B	NMEA 0183 Listener A (Rx_A)	Brown
C	NMEA 0183 Talker B (Tx_B)	Green/white
D	NMEA 0183 Talker A (Tx_A)	Green
E	Touch screen RS422 Talker + (Tx+)	Orange/white
F	Touch screen RS422 Talker - (Tx-)	Orange
G	Touch screen RS422 Listener - (Rx-)	Blue/white
H	Touch screen RS422 Listener + (Rx+)	Blue

NMEA 0183

The units has two NMEA 0183 ports, which are connected via two discrete cables. Each cable is dedicated to one of the two internal processors.

→ ***Note:*** AIS data supplied via NMEA 0183 is not internally bridged, and must be connected to both NMEA 0183 ports if required on both screens. AIS data supplied via NMEA 2000 is available to both processors.

The port(s) uses the NMEA 0183 (serial balanced) standard, and can be configured in the software for different baud rates up to 38,400 baud.

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.

Touch screen control

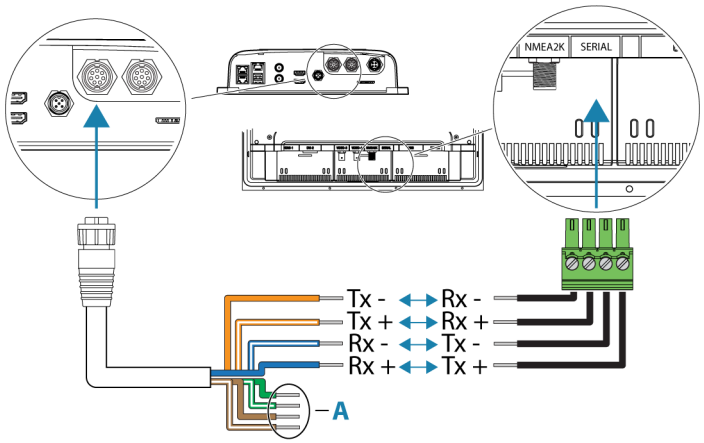
Touch monitors can be connected to the serial ports (RS422).

Serial 1 can be used for touch input for the monitor connected to HDMI 1 out, and Serial 2 can be used for touch input for the monitor connected to HDMI 2 out.

MO series touch monitors are supported. Other monitors may also work, but are not officially supported.

Wiring example

The NMEA 0183 wires (**A**) are not to be used for touch operation. For more details, refer to the documentation for your monitor.

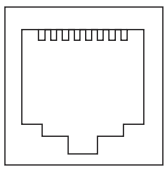


Ethernet

The Ethernet port(s) can be used for transfer of data and synchronization of user created data. It is recommended that each device in the system is connected to the Ethernet network.

No special setup is required for establishing an Ethernet network.

Ethernet connector details



Unit socket (female)

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

Ethernet adapter cables

Units with a 5-pin yellow Ethernet connector will require an adapter cable to connect to this unit.

For more details about the available adapter cables, refer to the brand website of your unit:

www.bandg.com

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.

USB port

The USB port can be used to:

- Connect a keyboard.
- Connect a mouse.
- Connect a storage device.
- Connect a card reader.
- Connect to a touch monitor for touch operation.

➔ ***Note:*** If you want to read chart cards using a USB card reader connected to the USB port, an MI10 USB card reader is required.

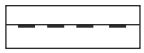
The USB devices should be standard PC compatible hardware.

➔ ***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.

Configuring the USB port

By default, USB port 1 is assigned to interact with the monitor connected to HDMI out 1 and USB port 2 is assigned to interact with the monitor connected to HDMI out 2. For USB configurations, refer to *"Configuring the USB port"* on page 19 in the system setup section.

USB connector details



Unit socket (female)

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

Video in

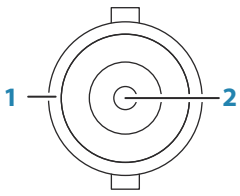
The unit can be connected to two composite video sources, and display video images on its display.

➔ ***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 connector details



Unit socket (female)

Pin	Purpose
1	Ground
2	Signal

Video input configuration

Configurations to video input are made in the video panel. Refer to the Operator Manual for more information.

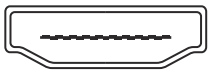
HDMI out

The HDMI port(s) is used for connecting monitor(s).

The connected monitor should support the resolution listed in the Technical specifications, 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 connector details



Unit socket (female)

The unit is equipped with standard HDMI (Type A) connector(s).

HDMI cable requirements

→ ***Note:*** The unit should be turned off prior to connecting or disconnecting an HDMI cable.

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 10 m it may be required to add an HDMI amplifier or use HDMI-CAT6 adaptors.

4 System setup

First time startup

When the unit is started for the first time, or after a reset, 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

This setup sequence focus on the settings done during installation and setup of the system. For other settings refer to the Operator manual.

1 **General settings** - refer to *"System settings"* on page 21.
- Make general settings as desired
- Configure the USB ports
- Configure the power control

2 **Advanced settings** - refer to *"Advanced"* on page 22.
- Enable or disable features
- Review the advanced setting options and make changes as desired

3 **Source selection** - refer to *"Network settings"* on page 32.
- Make sure that the proper external data sources have been selected

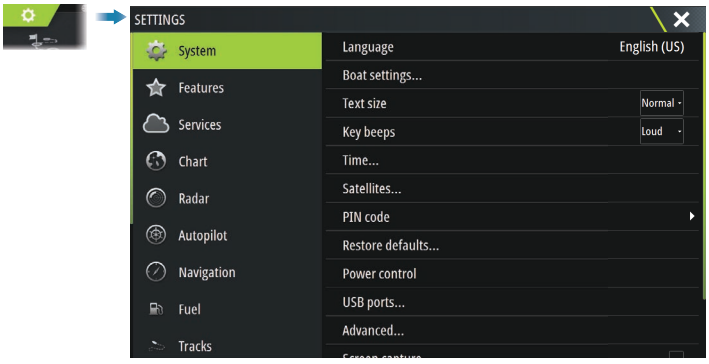
4 **Feature setup**
- Configure specific features as described later in this chapter

The settings dialog

The software setup is done from the settings dialog.



System settings



Boat settings

Used to specify the physical attributes of the boat.

Time

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

PIN code

Sets a PIN code to prevent unauthorized access to your system's settings.

➔ ***Note:*** Record the PIN code and store it in a safe place.

When you establish password protection, the PIN code must be entered when any of the following are selected. After the correct PIN code is entered, all of them can be accessed without re-entering the PIN code.

- Settings, activated from the home page or system controls dialog.
- Alarms, activated from the toolbar.
- Storage, activated from the toolbar.
- Store, activated from the toolbar.

Power control setup

Determines unit response to signals 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 power control wire is connected directly to power, the ignition switch, or to a stand-alone switch. The unit should also be set to slave if you want the unit to behave as a slave when connected to a power control bus.
- Set to master to make this unit turn other devices connected to the power control bus on and off.

When a master unit is turned on or off, all units connected to the same power control 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 and off individually.

USB ports

By default, USB port 1 is assigned to interact with the monitor connected to HDMI out 1 and USB port 2 is assigned to interact with the monitor connected to HDMI out 2.

If a mouse or a keyboard is used to only control one of the displays, set the USB port used to be permanently assigned to one display.

If a mouse or a keyboard is used to control both monitors, the USB port used need to be setup to be switchable between the monitors.

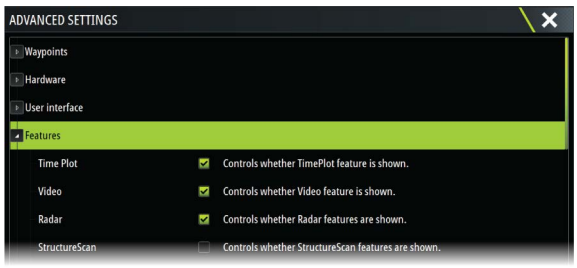
➔ ***Note:*** A USB port should be set to switchable only when used for a mouse or a keyboard.

Advanced

Used for configuration of advanced settings and how your system displays various user interface information.

Enabling or disabling features

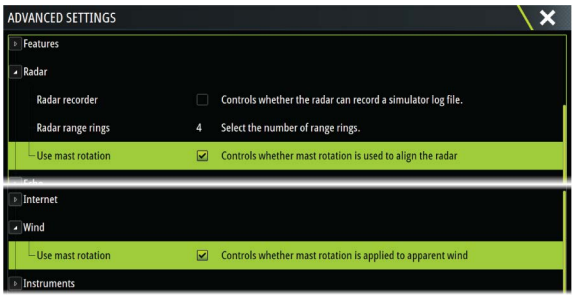
Use the feature option to enable or disable features that are not automatically enabled or disabled by the system.



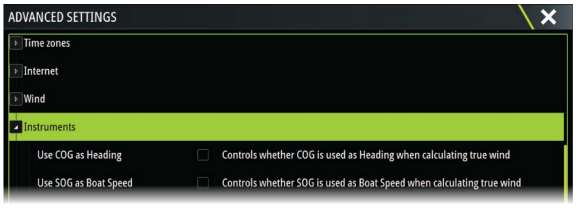
Rotating mast compensation

If the vessel is fitted with a rotating mast it will impact any sensors or radar mounted to it. Provided the mast is also fitted with a sensor to measure rotation, the effect can be compensated for.

➔ ***Note:*** If using H5000 with a rotating mast, use mast rotation for wind needs to be disabled as the H5000 CPU will automatically correct the wind information relative to the vessel.



SOG as boat speed and COG as heading



Use SOG as boat speed

If boat speed is not available from a paddle wheel sensor, it is possible to use speed over ground from a GPS. SOG will be displayed as boat speed and used in the true wind calculations and the speed log.

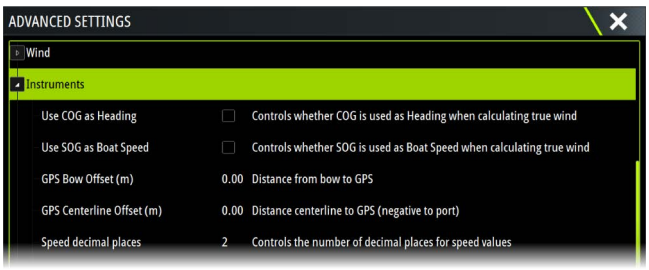
Use COG as heading

If heading data is not available from a compass sensor, it is possible to use COG from a GPS. COG will be used in the true wind calculations.

➔ ***Note:*** The autopilot cannot be operated using COG as the heading source. COG cannot be calculated when stationary.

GPS offset - start line configuration

In order for the start line feature to work at it's optimum, the exact position of the vessels bow must be known. This is achieved by entering position offsets for the GPS sensor. These offsets combined with heading data will allow the software to accurately determine the bows distance from the start line.



GPS Bow Offset

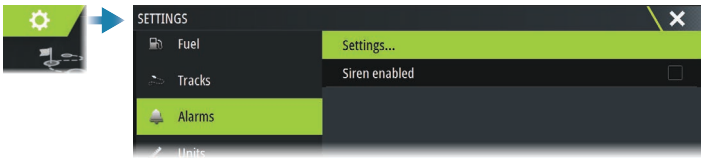
Enter the distance from bow to GPS (always a positive value)

➔ ***Note:*** Ensure the bow offset includes any projections forward of the hull, such as a bowsprit.

GPS Centerline offset

Enter the distance from vessel centerline to GPS (negative to port)

Alarms



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

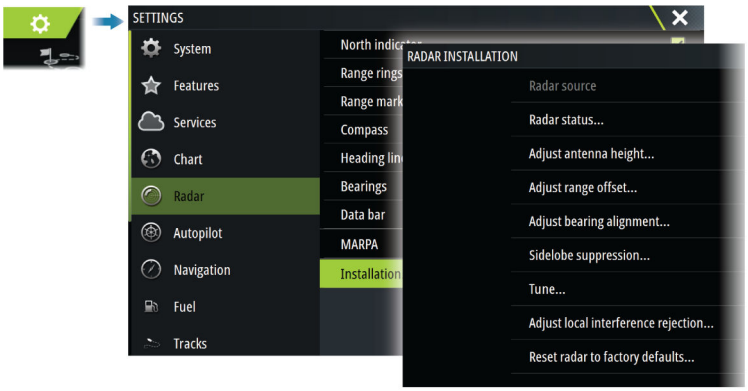
The Siren enabled option must be set in order for the unit to activate the buzzer when an alarm condition arises.

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

Radar installation

The radar system requires radar sensor specific settings in order to adjust for a number of variables found in different installations.

→ ***Note:*** The installation settings available depends on the radar sensor.



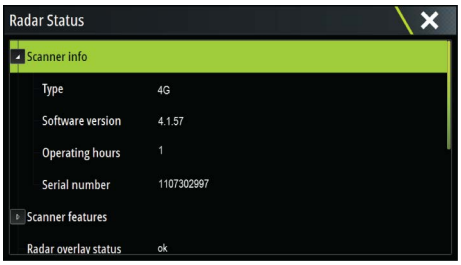
Radar source

In a system with more than one radar sensor, the device to configure is 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

Displays scanner information and scanner features, primarily used for information and to assist with fault finding.



Adjust antenna height

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

Select antenna length

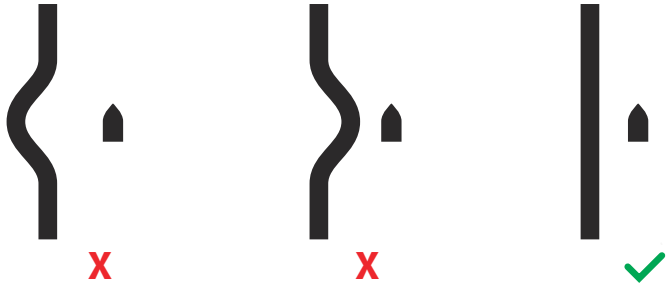
Select the proper antenna length.

Adjust range offset

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.

1. Position the vessel in relation to the jetty.
2. Adjust the range offset to make the jetty echo appear as a straight line on the display.



Adjust bearing alignment

This option is used 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.

Misalignment that is not corrected for will compromise target tracking and can result in dangerous misinterpretation of potential navigation hazards.

Any inaccuracy will be evident when using MARPA or chart overlay.

1. Point the vessel towards a stationary isolated object, or towards a far range AIS target where the AIS icon matches the radar echo.
2. Adjust the coarse and fine bearing alignment so that the heading line touches the end of the selected object, or the radar target matches the AIS target.

→ ***Note:*** Adjustments to bearing alignment has to be done before Use mast rotation is enabled.

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 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.

→ ***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.

To adjust the sidelobe suppression value:

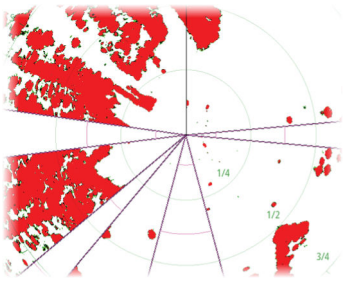
1. Set radar range to between 1/2 nm to 1 nm and the sidelobe suppression to auto
2. Take the vessel to a location where sidelobe returns are likely to be seen. Typically, this would be near a large ship, container port, or metal bridge.
3. Traverse the area until the strongest sidelobe returns are seen.
4. Change auto sidelobe suppression to OFF, then adjust the sidelobe suppression control just enough to eliminate the sidelobe returns. 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.

Sector blanking

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.

→ ***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

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.

Halo light

Controls the levels of the Halo Radar 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.

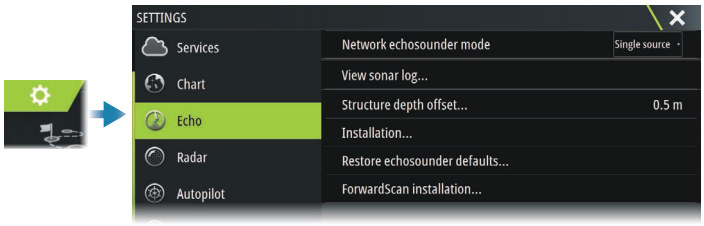
Reset radar to factory defaults

Clears all user and installer settings applied to the selected radar source, and restores factory settings.

→ ***Note:*** Use this option with caution. Take note of current settings first, especially those set by the operator if radar has already been in active service.

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:*** Single source is automatically selected if there are older legacy echosounders on the network. You cannot change this setting if older legacy echosounders are on the network. Multi-source mode should be selected if no legacy echosounder is connected to the network.
- ***Note:*** When changing the mode to multi-source you must wait 30 seconds and then power down all sources for. Wait 1 minute, then restart all connected sources.

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.

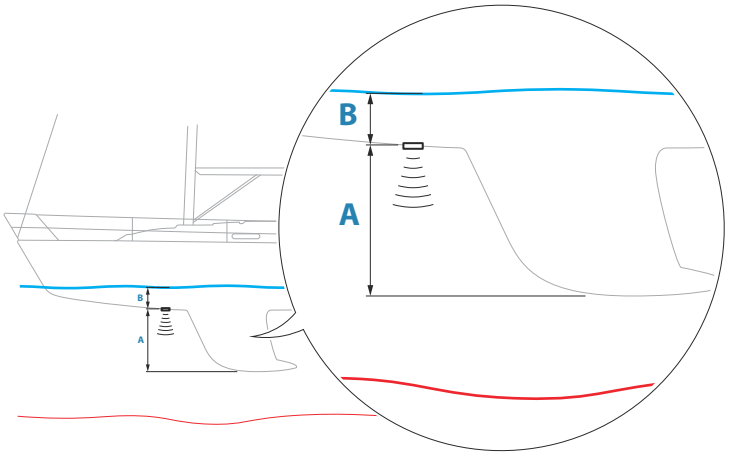
View sonar log

Used to view recordings. The log file is displayed as a paused image, and you control the scrolling and display from the menu.

You can use the cursor on the image, measure distance, and set view options as on a live image. If more than one channel was recorded in the selected log file, you can select which channel to display.

Structure depth offset

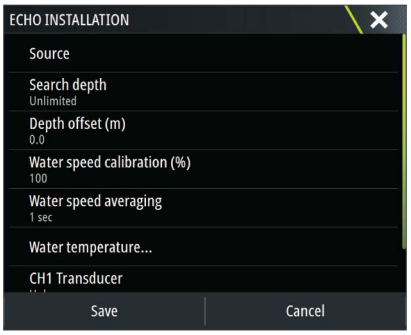
All transducers measure water depth from the transducer to the bottom. As a result, water depth readings do not account for the distance from the transducer to the lowest point of the boat in the water or from the transducer to the water surface.



- 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.

Installation

Use this dialog to setup and configure available sources.



Source

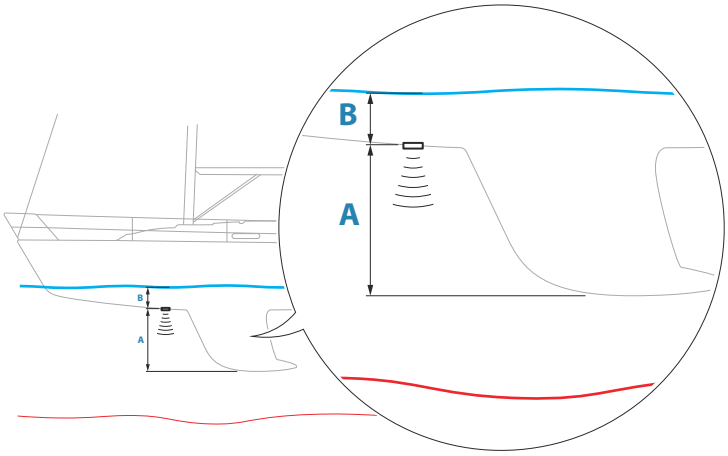
Select this option to display a list of sources available for setup. The settings you make in the rest of the dialog pertain to the source selected.

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

→ ***Note:*** The transducer type is automatically set for transducers that support Transducer ID (XID) and is not user selectable.

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.

Restore echosounder defaults

Restore echosounder settings to the factory supplied defaults.

Use depth and temp data from

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

ForwardScan installation

Available when the ForwardScan feature is connected.

For setup information, refer to the Operator Manual.

Autopilot settings

The Autopilot settings dialog depends on which autopilot computer that is connected to the system. If more than one autopilot is connected, the Autopilot settings dialog shows option for the active autopilot.

The autopilot settings can be split between settings done by the user, and settings done during installation and commissioning of the autopilot system.

- User settings can be changed for various operational conditions or user preferences.
- Installation settings are defined during commissioning of the autopilot system. No changes should later be done to these settings.

The following sections describe the installation settings per autopilot computer. For user settings, refer to the Operator manual.

NAC-2/NAC-3 specific installation settings

For setup and commissioning of the NAC-2 or NAC-3, refer to the commissioning manual included with the autopilot computer.

H5000 specific installation settings

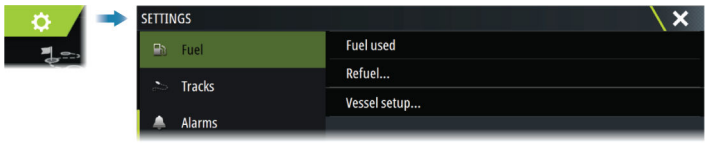
For setup and commissioning of the H5000, refer to the documentation included with the H5000 system.

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.

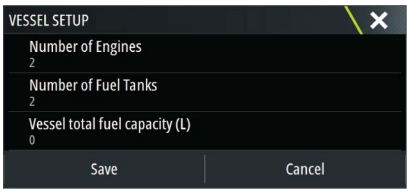
To use the utility, a Navico Fuel Flow sensor, or a NMEA 2000 engine adaptor cable/gateway with Navico Fuel Data Storage device must be fitted to the vessel. The Navico Fuel Flow sensor, does not require the use of a separate Fuel Storage device. Refer to the engine manufacturer or dealer for information 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 32.



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.

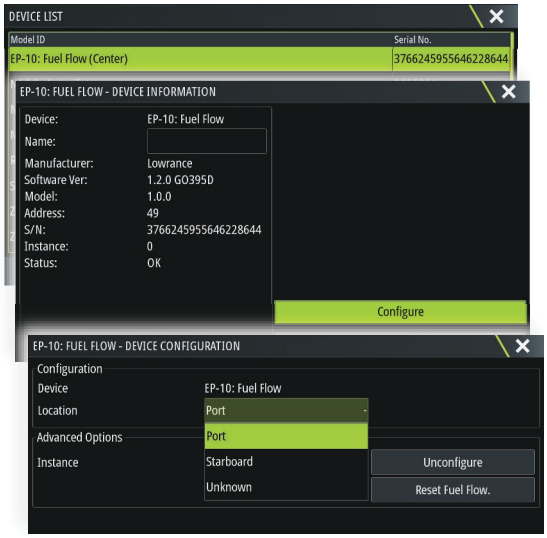
→ ***Note:*** Nominal fuel consumption setting should be determined taking into account typical vessel loads. That is, filled fuel and water tanks, stowed tender, supplies, etc.

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.

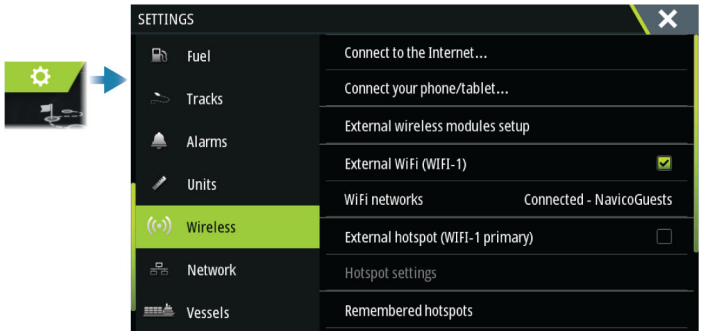
→ ***Note:*** A maximum of 5 tanks is supported using Fluid Level devices.

→ ***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

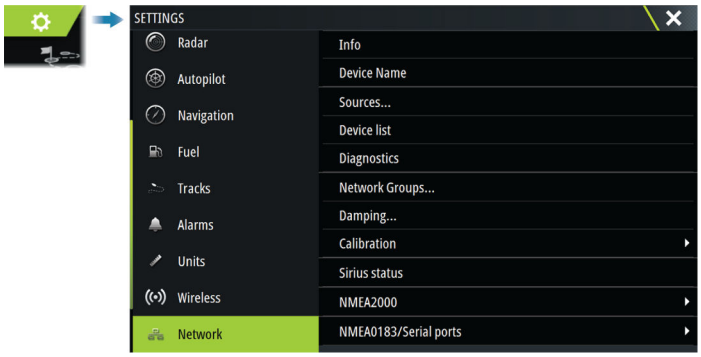
Provides configuration and setup options for the wireless functionality.

This unit does not have built-in WiFi. To connect to the internet or to use the Link app you must have a compatible external WiFi module connected to the same Ethernet network as this unit. The following image shows options available when the unit is connected to a compatible external WiFi module.



For further details about wireless setup and connectivity, refer to the Operator Manual.

Network settings



Device name

Assigning a name is useful in systems using more than one device of the same type and size.

Sources

Data sources provide live data to the system.

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 networks 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

The unit can use the same data sources that all other products on the network use, or alternatively use a data source independently from other units.

If the unit is part of a source group, all source selection changes will affect all units belonging to the same group.

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

Devices with no selected group can use different sources than the rest of the network devices.

Advanced source selection

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

Occasionally auto select might not assign the desired source, which can be corrected using the advanced source selection.

Device list

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 the unit to distinguish between them. The data option shows all data being output by the device.

→ ***Note:*** In most cases, setting the instance number on a 3rd party product is not possible.

Display assignment

Display assignment must be performed to enable the Home button on MO series monitors. It also ensures that when pressed, the home page is opened on the correct monitor.

This option must be set separately on both monitors connected.

→ ***Note:*** This feature is dependant on both the MPU and the MO series monitor being connected to the NMEA 2000 network.

Diagnostics

Provides information useful for identifying an issue with the network.

NMEA 2000

Provides information on NMEA 2000-bus activity.

→ ***Note:*** The following information might 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 can be resolved by correcting termination, reducing backbone or drop lengths, or reducing the number of network nodes (devices).

UDB

Provides information on Ethernet activity.

Network 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 via a 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. The offset is set on the NMEA 2000 device.

→ ***Note:*** Select the advanced option to adjust local offsets for this display only.

→ ***Note:*** It is typically not possible to calibrate 3rd party sensors. However, a local offset can be 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 that are 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.

Ethernet/WiFi
The NMEA 0183 data stream is output and made available to tablet devices and PCs, via WiFi or Ethernet connection. 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

CZone

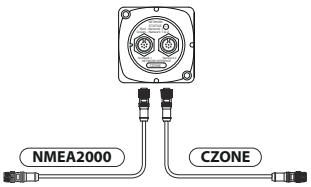
CZone connection to NMEA 2000

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

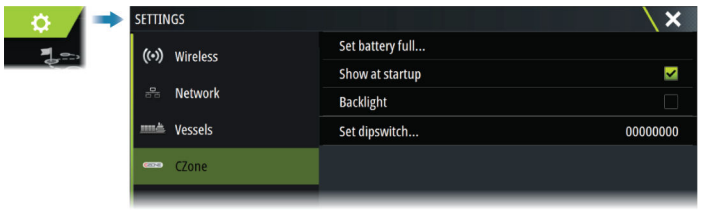
The CZone / NMEA 2000 Network interface bridge isolates the power of the two networks, but allows data to be freely shared between both sides.

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.



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 Zeus^{3}S Glass Helm MPU. 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 Zeus^{3}S Glass Helm MPU 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 Zeus^{3}S Glass Helm MPU is powered up.

Backlight

Enabling this causes the Zeus^{3}S Glass Helm MPU 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 Zeus^{3}S Glass Helm MPU set as a controller.

Naviop

If this device is on the same NMEA 2000 network as a Naviop Loop system, this device can be used to operate the Naviop Loop system.

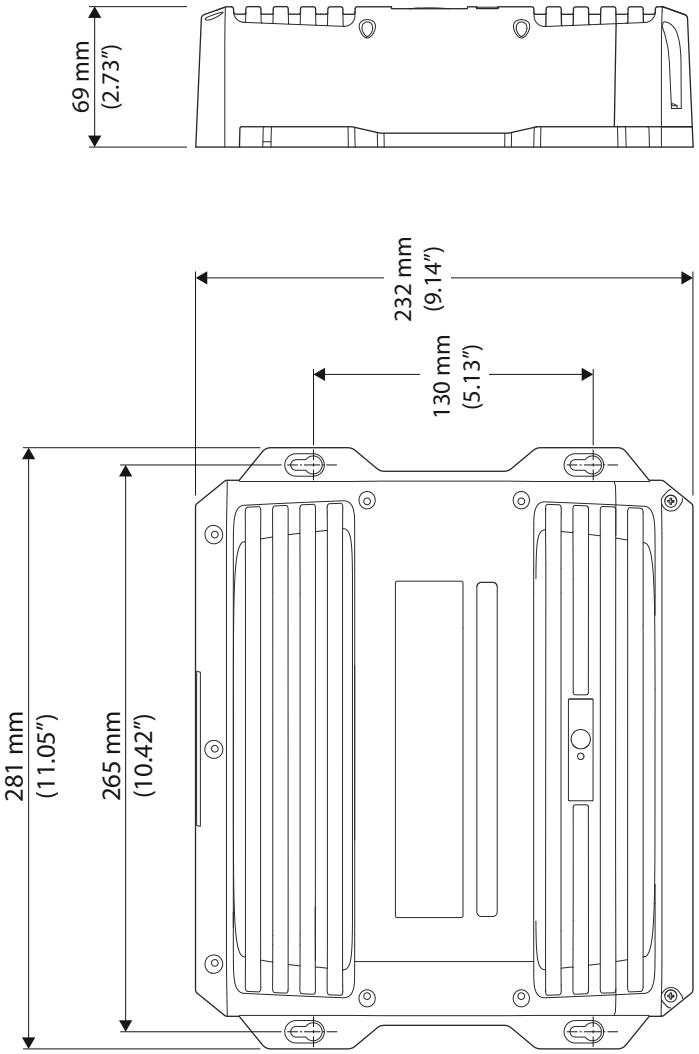
For details, refer to the documentation following the Naviop system.

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.bandg.com, or contact technical support.

6 Dimensional drawings

Zeus³S Glass Helm MPU



7 Technical specifications

Zeus³S Glass Helm MPU

Electrical	
Supply voltage	9 - 31.2 V DC
Power consumption - Max	45 W
Power consumption - OFF	1 W
Recommended fuse rating	3 Amp
Low power standby mode	Yes
Protection	Reverse polarity and temporary over-voltage to 36 V
Alarm output current	1 Amp
Processors	iMX8 Quad Max (x2)
Environmental	
Operating temperature range	-15°C to +55°C (5°F to 131°F)
Storage temperature	-20°C to +60°C (4°F to 140°F)
Waterproof rating	IPX2
Interface/Connectivity	
Ethernet	3 ports (1 & 2 are PoE (RJ45 socket))
USB	2 ports (USB-A)
NMEA 2000	1 port (Micro-C male, 1 LEN)
NMEA 0183	2 ports. Baud rate: 4800, 9600, 19200, & 38400 (via proprietary cable)
RS422	2 ports. Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Video input	2 ports (BNC female. NTCS or PAL format)
HDMI output	2 ports (type A, 60 Hz nominal) • 800x600 (SVGA 4:3) • 1024x768 (XGA 4:3) • 1280x720 (HD 16:9) • 1366x768 (WXGA) • 1920x1080 (Full HD 16:9) • 1920x1200 (WUXGA 16:10) • 1280x800 (16:10) • 1280x1024 (SXGA 5:4)
Data card reader	1 card slot (32 GB, SD card socket)
Physical	
Material	ABS plastic
Dimensions	Refer to *"Dimensional drawings"* on page 37
Weight	1.0 kg (2.2 lbs)
Compass Safe Distance - Metric, imperial	50 cm (20")

8 Supported data

NMEA 2000 compliant PGN List

NMEA 2000 PGN (receive)

59392	ISO Acknowledgement
59904	ISO Request
60160	ISO Transport Protocol, Data Transfer
60416	ISO Transport Protocol, Connection M.
65240	ISO Commanded Address
60928	ISO Address Claim
126208	ISO Command Group Function
126992	System Time
126996	Product Info
126998	Configuration Information
127233	Man Overboard Notification (MOB)
127237	Heading/Track Control
127245	Rudder
127250	Vessel Heading
127251	Rate of Turn
127252	Heave
127257	Attitude
127258	Magnetic Variation
127488	Engine Parameters, Rapid Update
127489	Engine Parameters, Dynamic
127493	Transmission Parameters, Dynamic
127500	Load Controller Connection State / Control
127501	Binary Status Report
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
129545	GNSS RAIM Output
129549	DGNSS Corrections
129551	GNSS Differential Correction Receiver Signal
129793	AIS UTC and Date Report
129794	AIS aids to Navigation
129798	AIS SAR Aircraft Position Report
129801	Cross Track Error
129802	AIS Safety Related Broadcast Message
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
130060	Label
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
130316	Temperature, Extended Range
130569	Entertainment - Current File and Status
130570	Entertainment - Library Data File
130571	Entertainment - Library Data Group
130572	Entertainment - Library Data Search
130573	Entertainment - Supported Source Data
130574	Entertainment - Supported Zone Data
130576	Small Craft Status
130577	Direction Data
130578	Vessel Speed Components
130579	Entertainment - System Configuration Status
130580	Entertainment - System Configuration Status
130581	Entertainment - Zone Configuration Status
130582	Entertainment - Zone Volume Status
130583	Entertainment - Available Audio EQ Presets

130584	Entertainment - Bluetooth Devices
130585	Entertainment - Bluetooth Source Status

NMEA 2000 PGN (transmit)

60160	ISO Transport Protocol, Data Transfer
60416	ISO Transport Protocol, Connection M.
126208	ISO Command Group Function
126992	System Time
126993	Heartbeat
126996	Product Info
127237	Heading/Track Control
127250	Vessel Heading
127258	Magnetic Variation
127502	Switch Bank Control
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
129285	Navigation - Route/WP Information
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
130578	Vessel Speed Components

NMEA 0183 supported sentences

TX / RX - GPS

Name	Description	RX	TX
DTM	Datum reference	x	
GGA	Global positioning system (GPS) fix data	x	x
GLC	Geographic position - Loran-C		
GLL	Geograpic position - Latitude/longitude	x	x
GSA	GNSS DOP and active satellites	x	x
GNS	GNSS fix data	x	
GSV	GNSS satellites in view	x	x
VTG	Course over ground and ground speed	x	x
ZDA	Time and date	x	x

TX / RX - Navigation

Name	Description	RX	TX
AAM	Waypoint arrival alarm		x
APB	Heading/track controller (autopilot) sentence B		x
BOD	Bearing origin to destination		x
BWC	Bearing and distance to waypoint - Great circle		x
BWR	Bearing and distance to waypoint - Rhumb line		x
RMB	Recommended minimum navigation information		x
XTE	Cross-track error - measured		x
RTE	Routes	x	
WPL	Waypoint location	x	

TX/RX - Echosounder

Name	Description	RX	TX
DBT	Depth below transducer	x	x
DPT	Depth	x	x
MTW	Water temperature	x	x
VLW	Dual ground/water distance	x	x
VHW	Water speed and heading	x	x

TX / RX - Compass

Name	Description	RX	TX
HDG	Heading, deviation and variation	x	x
HDT	Heading true	x	
THS	True heading and status	x	x
ROT	Rate of turn	x	

TX / RX - Wind

Name	Description	RX	TX
MWD	Wind direction and speed	x	x
MWV	Wind speed and angle	x	x

TX / RX - AIS / DSC

Name	Description	RX	TX
DSC	Digital selective calling information	x	
DSE	Expanded digital selective calling	x	
VDM	AIS VHF data-link message	x	
VDO	AIS VHF data-link own-vessel report	x	

→ ***Note:*** AIS sentences are not bridged to or from NMEA 2000.

TX / RX - MARPA

Name	Description	RX	TX
TLL	Target latitude and longitude		x
TTM	Tracked target message		x

→ ***Note:*** These are only output sentences.

TX/RX - Radar

Name	Description	RX	TX
RSD	Radar system data		*x
OSD	Own ship data		*x

→ ***Note:*** *x - only transmitting when the radar panel is displayed.

TX/RX - MISC

Name	Description	RX	TX
MOB	Man over board notification	x	
VBW	Dual ground/water speed	x	
XDR	Transducer measurement	x	x

988-12550-002

B&G