

B&G[®]

Vulcan[™] Series

INSTALLATION MANUAL

ENGLISH



Preface

Disclaimer

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

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

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

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.bandg.com

Compliance statements

Declarations

The relevant declarations of conformity are available at:

Europe


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

- CE under RED 2014/53/EU

United States of America

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

- 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

 **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.

- **Note:** 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 is connected
 - Consult the dealer or an experienced technician for help

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
- Radiocommunications (Short Range Devices) Standards 2021

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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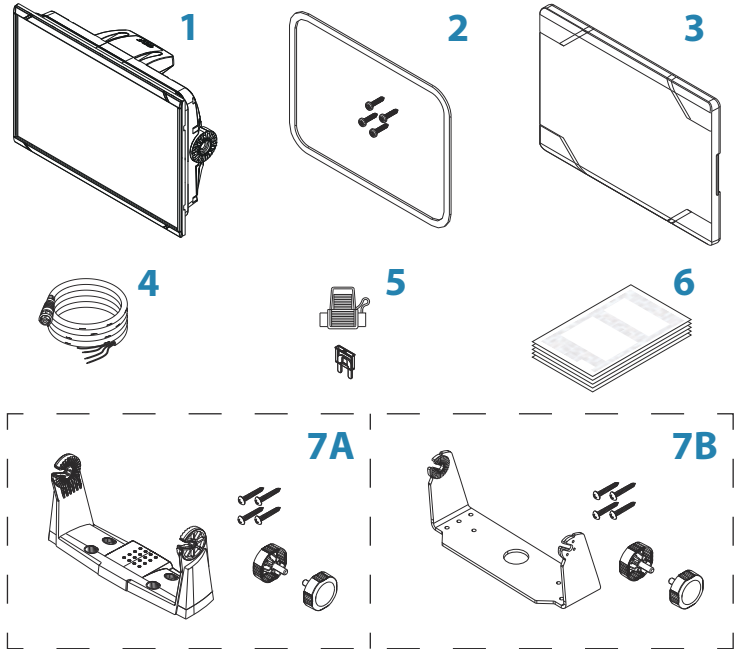
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Introduction

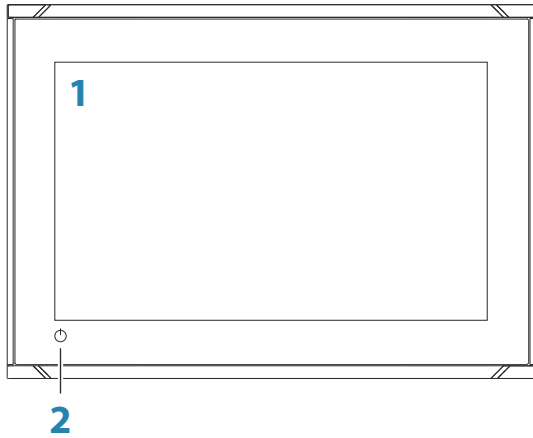
Parts included



- 1 Display unit**
- 2 Panel mounting kit**
 - Gasket
 - Mounting screws (4x #4 x 3/4" PN HD SS)
- 3 Sun cover**
- 4 Power cable**
- 5 Fuseholder and fuse**
3 A, ATC-blade
- 6 Documentation package**

- 7 A: Bracket mounting kit** - 7" and 9" units
- U bracket (plastic)
 - Mounting screws (4x #10 x 3/4" PN HD SS)
 - Bracket knobs (2x)
- B: Bracket mounting kit** - 12" unit
- U bracket (metal)
 - Mounting screws (4x #10 x 3/4" PN HD SS)
 - Bracket knobs (2x)

Front controls



1 Touch screen

2 Power key

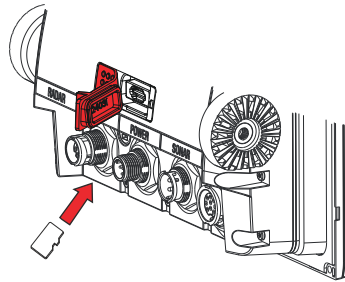
Press and hold to turn the unit ON/OFF.
Press once to display the System Controls dialog.

Card reader

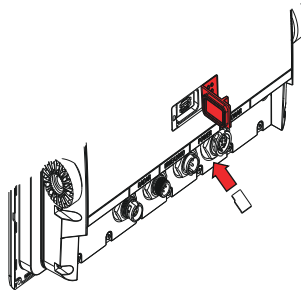
Used for inserting a microSD memory card. The memory card can be used for detailed chart data, software updates, transfer of user data, and system backup.

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

The card reader door is opened by pulling the rubber cover open. The card reader door should always be securely shut immediately after inserting or removing a card, in order to prevent possible water ingress.



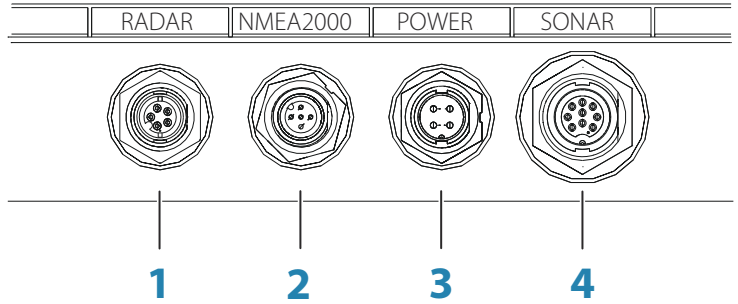
Card reader on the 7" and 9" units



Card reader on the 12" unit

Connectors

7", 9" and 12" units rear connections



- 1 **Radar** - radar (Ethernet) connection
- 2 **NMEA 2000** - data input / output
- 3 **Power** - 12 V DC supply input
- 4 **Sonar** - Sonar / CHIRP Sonar, ForwardScan

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.

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.

Ventilation behind units is recommended for all units which are not bracket mounted.

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.

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.

WiFi

It is important to test the WiFi performance before the location of the unit is decided.

Construction material (steel, aluminum, or carbon) and heavy structure might affect WiFi performance.

The following guidelines apply:

- Select a location where there is a clear, direct line of sight between WiFi connected units.
- Keep the distance between WiFi units as short as possible.
- Mount the WiFi unit at least 1 m (3 ft) away from:
 - Other WiFi enabled products.
 - Products that send wireless signals in the same frequency range.
 - Equipment that might generate interference.

Compass safe distance

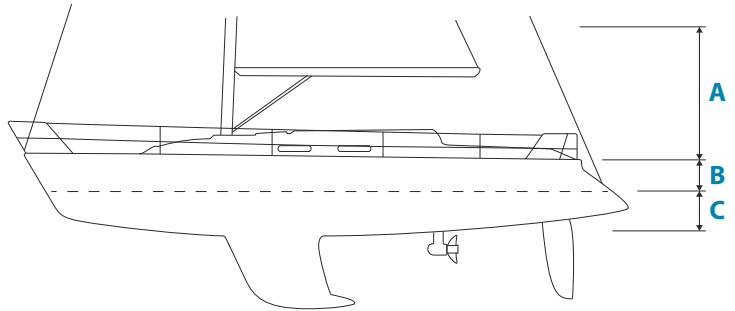
The unit outputs electromagnetic interference that can cause inaccurate readings on a nearby compass. To prevent compass inaccuracy the unit must be mounted far enough away so the interference does not affect compass readings. For minimum compass safe distance, refer to "*Technical specifications*" on page 55.

GPS

It is important to test the GPS performance before the location of the unit is decided.

Construction material (steel, aluminum, or carbon) and heavy structure might affect GPS performance. Avoid a mounting location where metal obstacles block the view of the sky.

A well placed external GPS module can be added to overcome poor performance.



- A** Optimal location (above deck)
- B** Less effective location
- C** Not recommended location

→ **Note:** Consider the lateral swinging if mounting the GPS sensor high above the sea level. Roll and pitch might give false positions and affect the true directional movement.

Touchscreen

Touchscreen performance can be affected by the location of the unit. Avoid locations where the screen is exposed to:

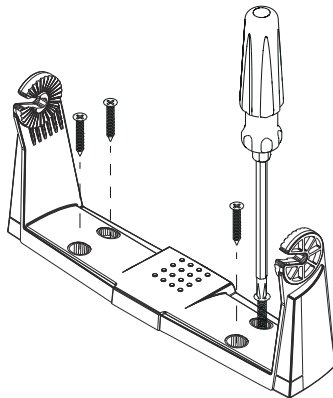
- Direct sunlight.
- Prolonged rainfall.

Bracket mounting

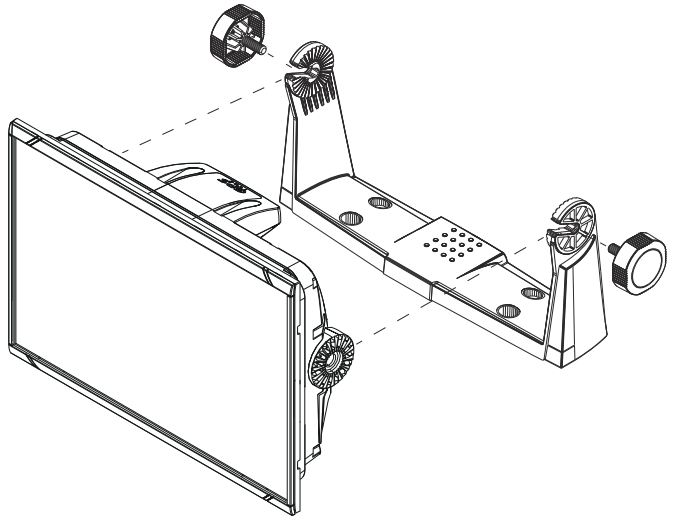
U-bracket mounting

The 7", 9" and 12" units can be mounted with the U-bracket.

1. Place the bracket in the desired mounting location. Ensure that the chosen location has enough height to accommodate the unit fitted in the bracket, and allows tilting of the unit. Also adequate space is required on both sides to allow tightening and loosening of the knobs.
2. Mark the screw locations using the bracket as a template, and drill pilot holes. Use fasteners suited to the mounting surface material. If the material is too thin for self-tappers, reinforce it, or mount the bracket with machine screws and large washers. Use only 304 or 316 stainless steel fasteners.
3. Screw down the bracket.



4. Mount the unit to the bracket using the knobs. Hand tighten only. The ratchet teeth in the bracket and unit ensure a positive grip and prevent the unit from changing from the desired angle.

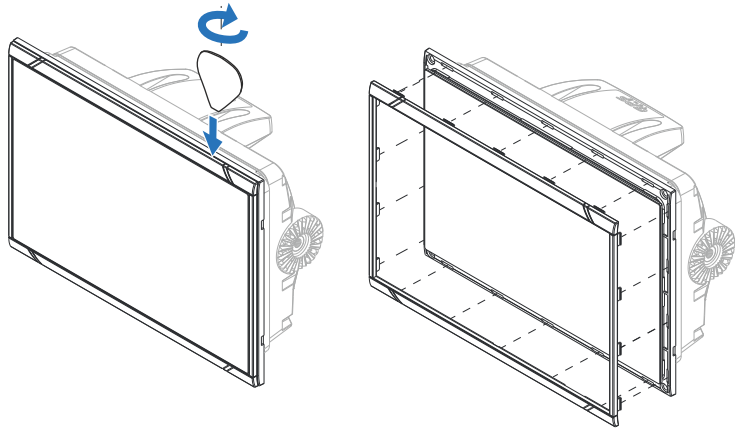


Panel mounting

Refer to the separate mounting template for panel mounting instructions.

Bezel fitment and removal

The bezel trim have been designed to be very low profile, and therefore fully conceal the locking tabs that keep it from being accidentally disengaged from the mounting flange. To release the locking tabs, gently insert a thin object between the bezel and the screen frame. When the first locking tab is released and an opening is visible, carefully release the remaining locking tabs and remove the bezel.



When fitting the bezel, ensure that the hook tabs on the back of the bezel recess in to opposing slots in the screen frame. Secure the bezel to the screen frame by gently pressing the bezel against the screen frame.

3

Wiring

Connectors

Different models have different connectors. For available connectors and connector layout refer to "*Connectors*" on page 13.

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).

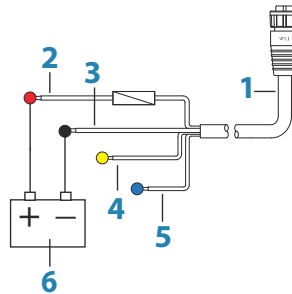
Power connections

7", 9" and 12" units power connection

The units are powered by 12 V DC. They are protected against reverse polarity, under voltage, and over voltage (for a limited duration).

The supplied power cable has four cores used for:

- Power into the system (Red and Black wires).
- Controlling power state of the unit (Yellow wire).
- Connecting to an external alarm (Blue wire).



- 1 Power cable
- 2 12 V positive wire (red) shown with fuse holder fitted
- 3 12 V negative wire (black)
- 4 Power control wire (yellow)
- 5 Alarm wire (blue)
- 6 Vessel's 12 V DC supply

Connect Red to (+) DC using a 3 amp fuse.

Connect Black to (-) DC.

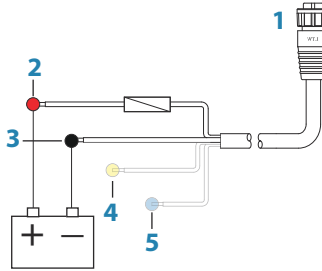
The units can be powered on and off using the power key on the front of the case.

Power control connection

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

Power Control unconnected

Device will turn on and off when the power key on the front of the unit is pressed. Leave the yellow Power Control wire disconnected and tape or heat-shrink the end to prevent shorting.

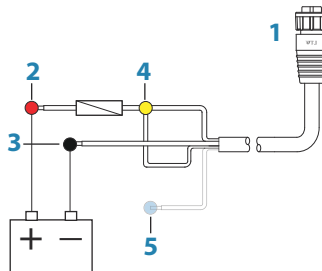


- 1 Power cable connector to unit
- 2 Positive wire (red)
- 3 Ground wire (black)
- 4 Power control wire (yellow)
- 5 Alarm wire (blue)

Power Control to supply positive (auto on)

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

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



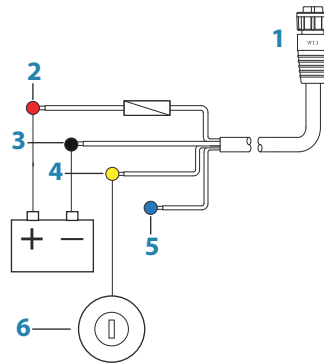
- 1 Power cable connector to unit

- 2 Positive wire (red)
- 3 Ground wire (black)
- 4 Power control wire (yellow)
- 5 Alarm wire (blue)

Power Control to ignition

Device will turn on once ignition is turned on to start engines.
Connect the yellow wire to the accessories output of the engine key switch.

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



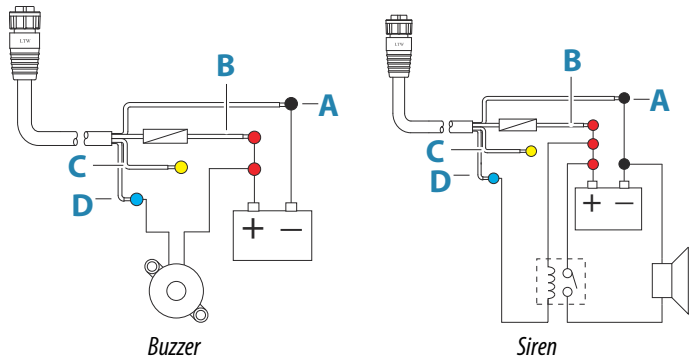
- 1 Power cable connector to unit
- 2 Positive wire (red)
- 3 Ground wire (black)
- 4 Power control wire (yellow)
- 5 Alarm wire (blue)
- 6 Ignition switch

External alarm

The external alarm can be a small piezo buzzer connected directly, or a horn siren connected through a relay.

Alarms are configured globally in the system. That is, they can be configured on any one networked multifunction device or instrument, and be seen, heard, and acknowledged from all devices. Individual devices can also be configured to not sound their internal buzzer, but still display the alarm information. For information about configuring alarms, refer to the Alarms section in the Operator Manual.

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



- A** Negative power wire (black)
- B** Positive power wire (red)
- C** Power control wire (yellow)
- D** Alarm wire (blue)

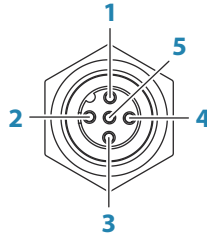
Connecting control devices

The unit can be controlled with an ZC1 or ZC2 Remote controller connected on the NMEA 2000 network.

NMEA 2000

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

Connector details



Unit socket (male)

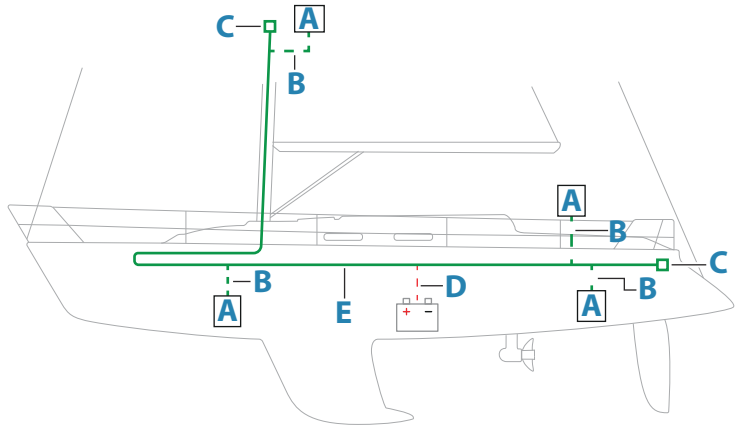
Pin	Purpose
1	Shield
2	NET-S (+12 V DC)
3	NET-C (DC negative)
4	NET-H
5	NET-L

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 a built-in terminator.



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

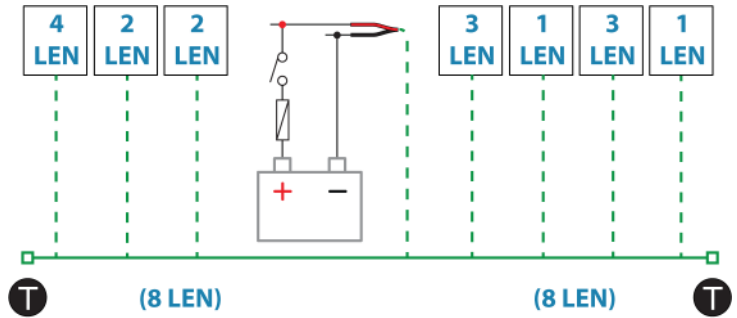
Powering the NMEA 2000 network

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

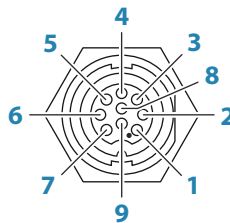
Echosounder

→ **Note:** A 7-pin transducer cable can be connected to a 9-pin port using a 7-pin to 9-pin adaptor cable. However, if the transducer has a paddle wheel speed sensor, the water-speed data will not be displayed on the unit.

Supports:

- Sonar / CHIRP Sonar
- ForwardScan

Connector details



Unit socket (female)

Pin	Purpose
1	Drain/Ground

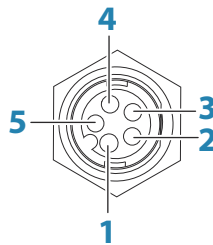
Pin	Purpose
2	Not used
3	Not used
4	Transducer -
5	Transducer +
6	Not used
7	Not used
8	Temp +
9	Transducer ID

Radar connector

The Radar port allows connecting the unit to your radar scanner using a 5 pin Ethernet connector.

The Radar port can also 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.

→ **Note:** Only the 12" unit can share echosounder data and charts over the Ethernet network.



Unit socket (female)

Key	Purpose	Color
1	Transmit positive TX+	Blue/White
2	Transmit negative TX-	Blue
3	Receive positive RX+	Orange/White

Key	Purpose	Color
4	Receive negative RX-	Orange
5	Shield	Bare

4

System setup

Turning the system on and off

The system is turned on by pressing the Power key.

Press and hold the Power key to turn the unit off.

If the key is released before the shut-down is completed, the power off process is cancelled.

You can also turn the unit off from the System Controls dialog.

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.

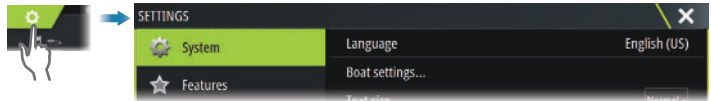
You can perform further setup and later change settings using the system settings dialogs.

System setup sequence

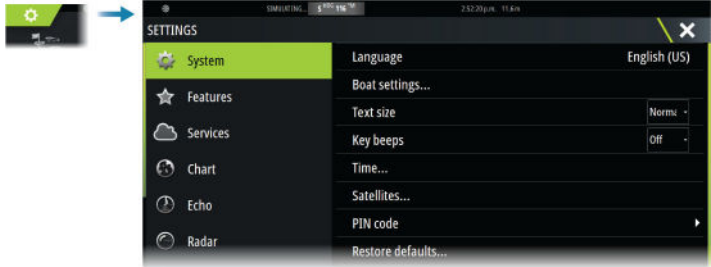
- 1 General settings** - refer to "*System settings*" on page 31.
 - Make general settings as desired.
- 2 Advanced settings** - refer to "*Advanced*" on page 32.
 - Enable or disable features.
 - Review the advanced setting options and make changes as desired.
- 3 Source selection** - refer to "*Network settings*" on page 48.
 - 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 system 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.

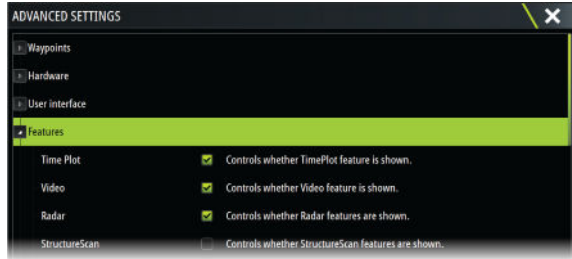
- Settings, activated from the home page or system controls dialog.
- Alarms, activated from the toolbar.
- Storage, activated from the toolbar.
- Store, activated from the toolbar.

Advanced

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

Enabling or disabling features

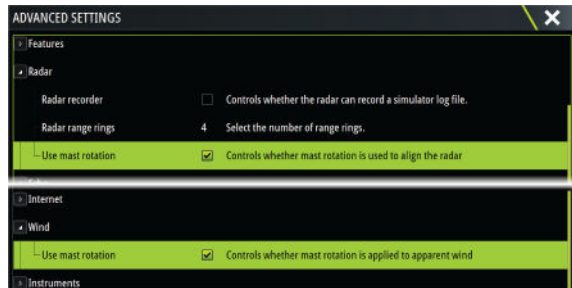
Use the feature option to enable or disable features that are not automatically enabled or disabled by the system.



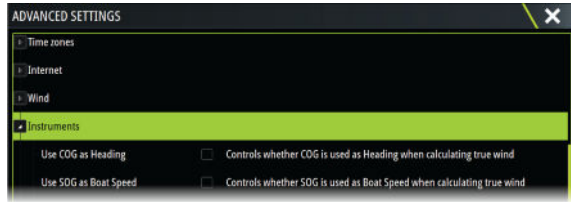
Rotating mast compensation

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.

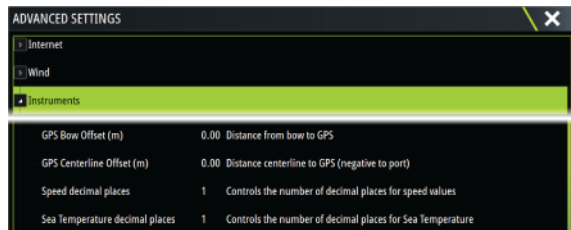
Use COG as heading

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 its 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.

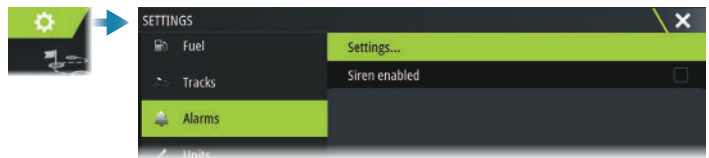
GPS Centerline offset

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

Feature option

Use the features option in the settings dialog to activate/deactivate features and unlock features.

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.

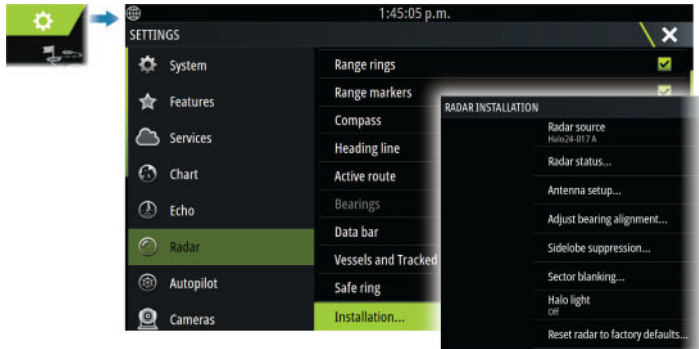
Siren enable

Enables or disables the internal and external audio alarms when an alarm condition arises.

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 type and model.



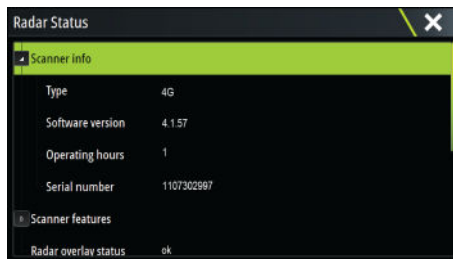
Radar source

In a system with more than one radar sensor, the device to connect 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.

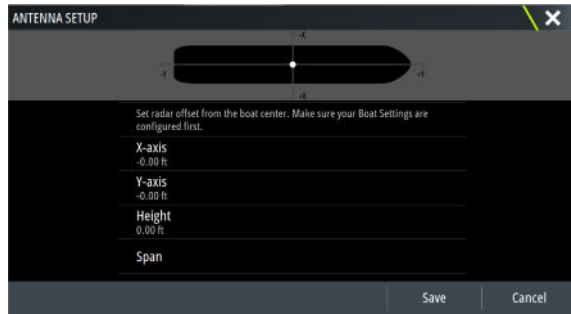
Radar status

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



Antenna setup

Used for setting the position, height and span of the antenna.



The approximate position of the antenna on the vessel must be set in order to correctly position the vessel outline when viewing close range settings. The PPI will be centered on the icon representing the position of the antenna.

The antenna height is the height of the antenna above the water line, when vessel is carrying a typical load. It is very important to set the antenna height correctly as this will affect the sea clutter function.

The antenna span is the total length of the antenna.

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.

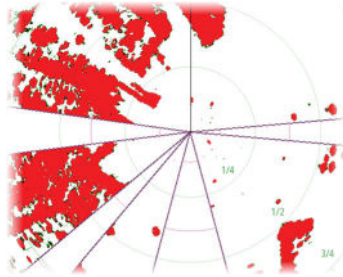
To adjust the sidelobe suppression value:

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.

Tune

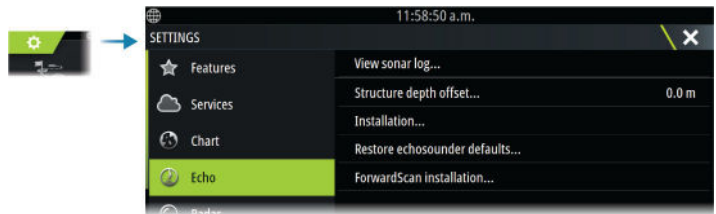
The automatic tuning will work well in most installations. The manual tuning is used if it is required to adjust the result from an automatic tuning.

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



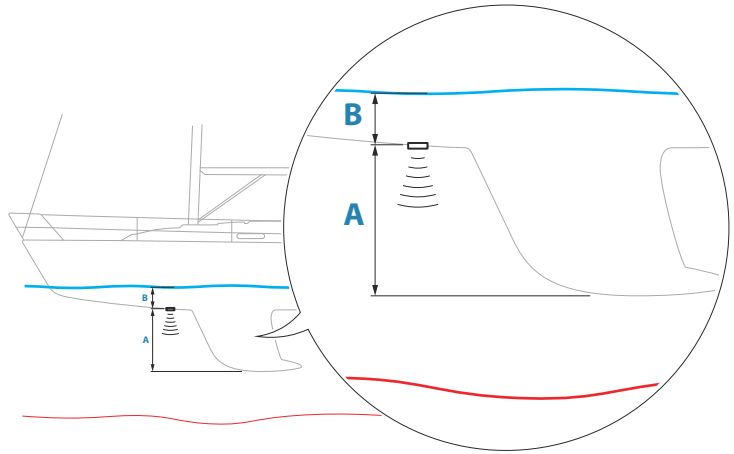
View sonar log

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

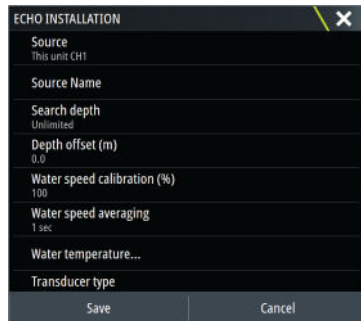
All transducers measure water depth from the transducer to the bottom. As a result, water depth readings do not account for the distance from the transducer to the lowest point of the boat in the water or from the transducer to the water surface.



- 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.

Source name

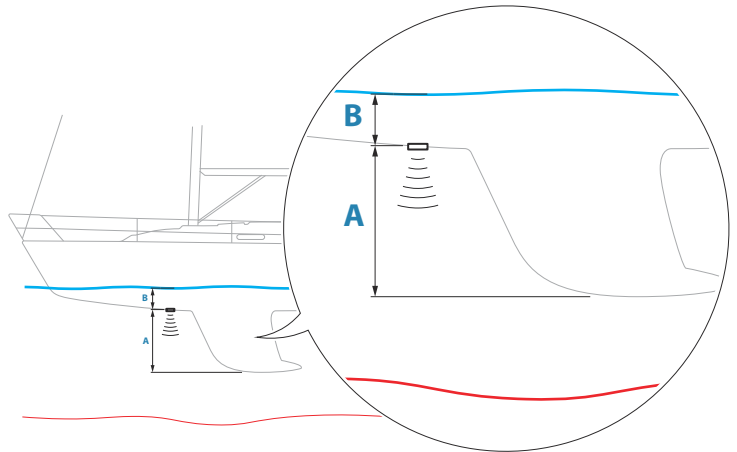
Select this option to set a descriptive name for the selected transducer.

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 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.

ForwardScan installation

Available when a ForwardScan transducer is connected.

For setup information, refer to the Operator Manual.

Settings for the 12" units

The 12" Vulcan units can share echosounder data over the Ethernet network with other 12" Vulcan units, other capable sonar modules and display units.

The following echosounder settings are available for setting up the sharing of the data.

Internal Echosounder

When selected, the internal echosounder is available for selection in the echosounder panel menu.

When unselected, this option disables the internal echosounder in the unit. It will not be listed as an echosounder source for any unit on the network. Unselect this option on units which do not have a transducer connected.

Network Echosounder

Select to share transducers from this unit with other units connected on the Ethernet network. In addition, the setting must be selected in order to see other enabled sonar devices on the network.

When unselected, transducers connected to this unit cannot be shared with other units connected on the network, nor can it see other sources on the network that have this feature enabled.

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.

Use network depth and temp data

The unit can share depth and temperature data from an Ethernet networked echosounder source over the NMEA 2000 network.

Use this option to select from which Ethernet network source the data is shared.

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 settings are made during commissioning of the autopilot. Be careful of changing settings after commissioning is completed.

H5000 specific installation settings

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

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.

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

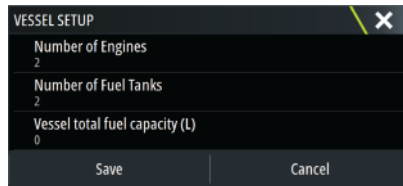
engine provides a data output, and what adaptor is available to connect to NMEA 2000.

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 48.



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.

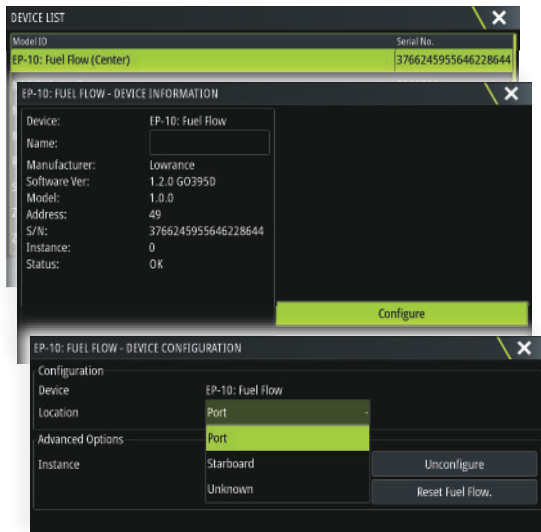
- **Note:** Fuel remaining measurement taken from level sensors while underway can get inaccurate readings due to vessel movement.
- **Note:** Nominal fuel consumption setting should be determined taking into account typical vessel loads. That is, filled fuel and water tanks, stowed tender, supplies, 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 a Navico 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.

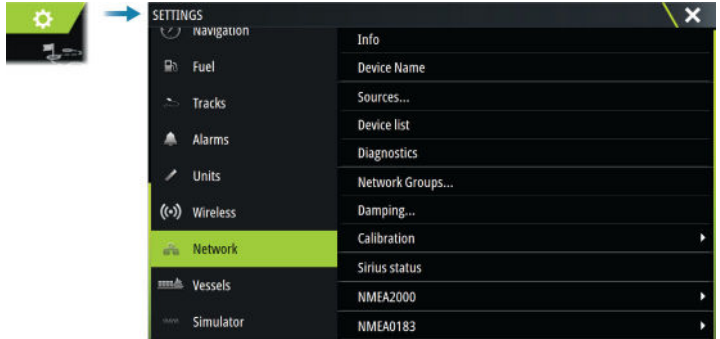
- **Note:** A maximum of 5 tanks is supported using Fluid Level devices.
- **Note:** Tank data that is output by a compatible engine gateway can also be displayed, however tank configuration for such a data source is not possible from this unit.

Wireless settings

Provides configuration and setup options for the wireless functionality.

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

Network settings



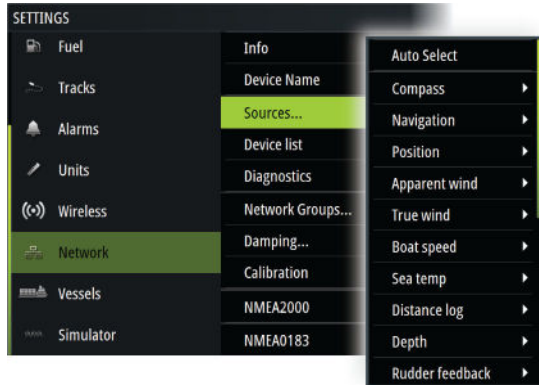
Device name

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.

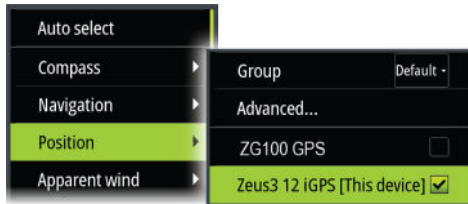


Auto Select

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.

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

Allows waypoints to be received from devices that transmit a waypoint over the NMEA 2000.

A waypoint will be received when the waypoint is created on the other device, if the following settings are in place:

- The receiving device - the receive waypoint option must be set to ON before the waypoint is created in the sending device.
- The sending device - the send waypoint option must be set to ON before the waypoint is created.

Send waypoint

Allows this unit to send a waypoint to other devices over the NMEA 2000 network.

A waypoint will be transmitted when the waypoint is created, if the following settings are in place:

- The sending device - the send waypoint option must be set to ON before the waypoint is created.
 - The receiving device - the receive waypoint option must be set to ON before the waypoint is created in the sending device.
- **Note:** The system can only transmit or receive one waypoint at a time over the NMEA 2000 network. For bulk import or export of waypoints see the operator manual.

5

3rd party support

FUSION-Link integration

Compatible FUSION-Link devices connected to the system can be controlled from the system.

The FUSION-Link devices appear as additional sources when using the audio function. No additional icons are available.

CZone

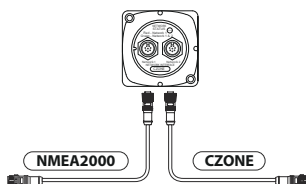
CZone connection to NMEA 2000

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

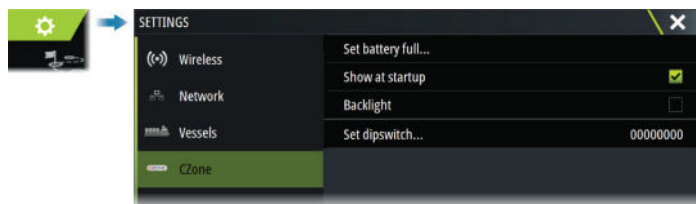
The CZone / NMEA 2000 Network interface bridge isolates the power of the two networks, but allows data to be freely shared between both sides.

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 Vulcan Series. 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 Vulcan Series 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 Vulcan Series is powered up.

Backlight

Enabling this causes the Vulcan Series 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 Vulcan Series 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.

6

Appendix

Technical specifications

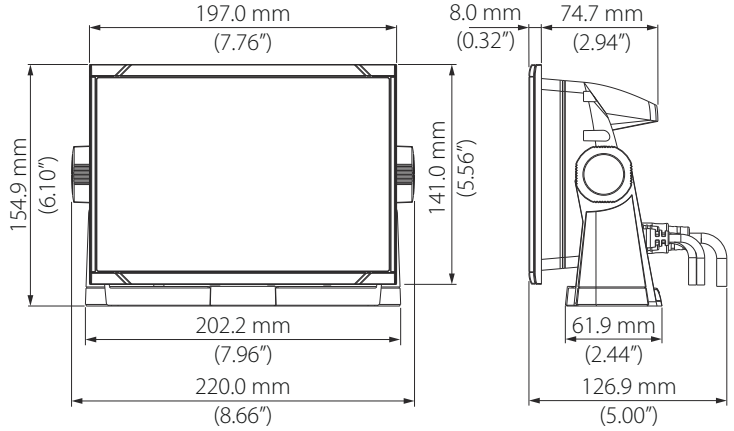
All units

Display	
Resolution	
7" unit	800 x 480
9" unit	800 x 480
12" unit	1280 x 800
Type	TFT Widescreen
Brightness	>1200 nits
Touch screen	Full touch screen (multi-touch)
Viewing angles in degrees (typical value at contrast ratio = 10)	Left/right: 70, top: 50, bottom: 60
Electrical	
Supply voltage	12 V DC (10 - 17 V DC min - max)
Recommended fuse rating	3 A
Protection	Protection reverse polarity and temporary over-voltage to 18 V
Power consumption	
7" unit	12 W (900 mA at 13.5 V)
9" unit	12 W (900 mA at 13.5 V)
12" unit	20 W (1500 mA at 13.5 V)
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	IPx7 and IPx6
Humidity	IEC 60945 Damp heat 66°C (150°F) at 95% relative (18 hr)
Shock and vibration	100 000 cycles of 20 G

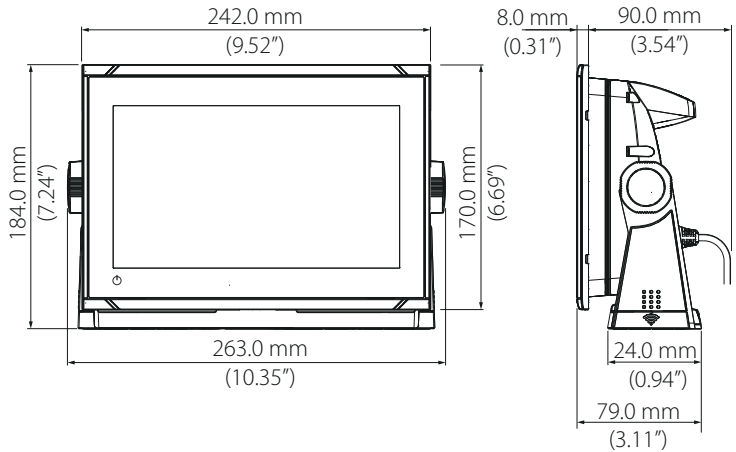
GPS	10 Hz high speed update (internal) WASS, MSAS, EGNOS, GLONASS
Interface	
<i>Ethernet/Radar</i>	1 port (5 pin connector)
<i>NMEA 2000</i>	1 port (Micro-C)
<i>Sonar</i>	1 port (9 pin connector)
<i>Data card slot</i>	
7" unit	1 slot (microSD)
9" unit	2 slot (microSD)
12" unit	2 slot (microSD)
<i>Wireless</i>	Internal 802.11b/g/n
Physical	
<i>Weight (display only)</i>	
7" unit	0.91 kg (2 lbs)
9" unit	1.32 kg (2.9 lbs)
12" unit	2.22 kg (4.90 lbs)
<i>Mounting type</i>	Bracket (supplied) or panel mount

Dimensional drawings

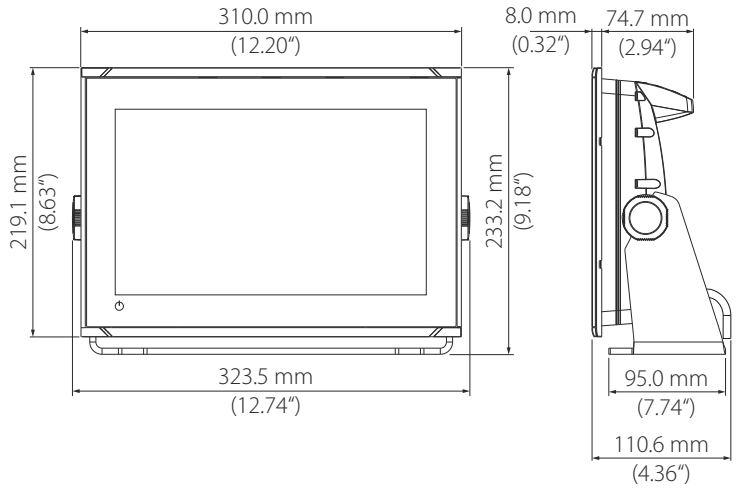
7" unit



9" unit



12" unit



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

Na me	Description	RX	TX
DTM	Datum reference	x	
GGA	Global positioning system (GPS) fix data	x	x
GLC	Geographic position - Loran-C		
GLL	Geographic 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

Na me	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 - Sonar

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	

Name	Description	RX	TX
VBW	Dual ground/water speed	x	
XDR	Transducer measurement	x	x



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