



KONGSBERG

Operator manual

# Seapath<sup>®</sup> 385 series

GNSS aided Inertial Navigation System





Company shared



KONGSBERG

***Seapath 385***  
***GNSS aided Inertial Navigation System***  
***Operator Manual***

110-0060201/B

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## Document history

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Rev. B	May 2024	Updated accuracy values. Changes to TelegramOut parameter for post-processing.

## Document information

- Product: Seapath 385
- Document: Operator Manual
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- Revision: B

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## Warning

***The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.***

***Kongsberg Discovery disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.***

## Disclaimer

*Kongsberg Discovery AS endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omissions.*

## Support information

If you require maintenance or repair, contact Kongsberg Discovery's support organisation. You can contact us using the following address: [support.seatex@kd.kongsberg.com](mailto:support.seatex@kd.kongsberg.com). If you need information about our other products, visit <http://www.kongsberg.com/discovery>.

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# About this manual

## **Purpose of manual**

The purpose of this publication is to provide the descriptions and procedures required to operate, troubleshoot and maintain the Seapath 385 product.

## **Target audience**

This publication is intended as a reference manual for personnel operating the system.

## **License information**

An export license is required for the export of the Inertial Measurement Units MGC and MRU.

## **Registered trademarks**

Seapath® is a registered trademark of Kongsberg Discovery AS in Norway and the People's Republic of China. MGC® is a registered trademark in Norway and Europe. Windows® is a registered trademark of Microsoft Corporation in the United States and other countries.

## **Subscriptions**

If you want to use the Seastar™ high performance position services from Fugro Norway AS, this requires a subscription. For a subscription, contact Seastar™ GNSS support.

- <https://fsp.support/seastar/index.php?tab=contacts>

## **Maintenance purposes**

This publication is also intended as reference material for the maintenance personnel. Keep this publication for later use.

# Seapath 385

## Topics

[System description, page 8](#)

[System diagram, page 11](#)

[Product restrictions, page 12](#)

[Health and safety, page 13](#)

[Network security, page 13](#)

[Support information, page 14](#)

## System description

The Seapath 385 is developed specifically for hydrographic surveying where high precision heading, position, velocity, roll, pitch, heave and timing are critical measurements. The product combines state-of-the-art inertial technology and processing algorithms with multi-frequency GPS, GLONASS, Galileo and Beidou satellite signals.

The Seapath software includes Automatic Online Calibration (AOC) that significantly improves the roll and pitch accuracy. With the AOC functionality recalibration of the IMU is now longer required.

The Seapath 385 series is delivered in the following product range:

### **Seapath with MRU (Motion Reference Unit)**

- Seapath 385-3 with MRU 3 to 0.010° roll and pitch accuracy
- Seapath 385-5 with MRU 5 to 0.008° roll and pitch accuracy
- Seapath 385-5+ with MRU 5+ to 0.005° roll and pitch accuracy

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**Note**


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*The MRU 3 model part of Seapath 385-3 has to be mounted in a fixed direction relative to the vessel and that is with the connector pointing up or down. Else the performance of the Seapath 385-3 will be degraded.*

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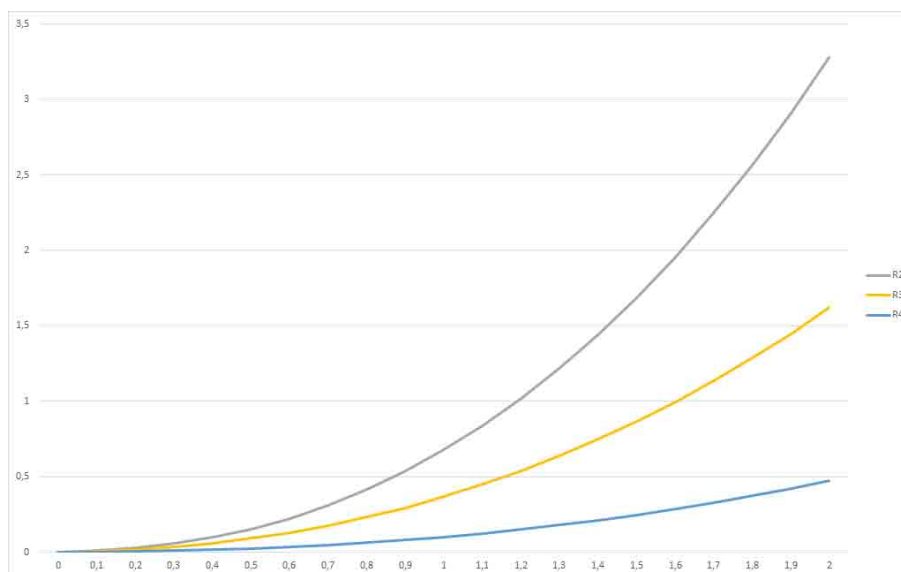
**Seapath with MGC (Motion Sensor and Gyro Compass)**

- Seapath 385-R2 with MGC R2 to 0.008° roll and pitch accuracy
- Seapath 385-R3 with MGC R3 to 0.007° roll and pitch accuracy
- Seapath 385-R4 with MGC R4 to 0.005° roll and pitch accuracy

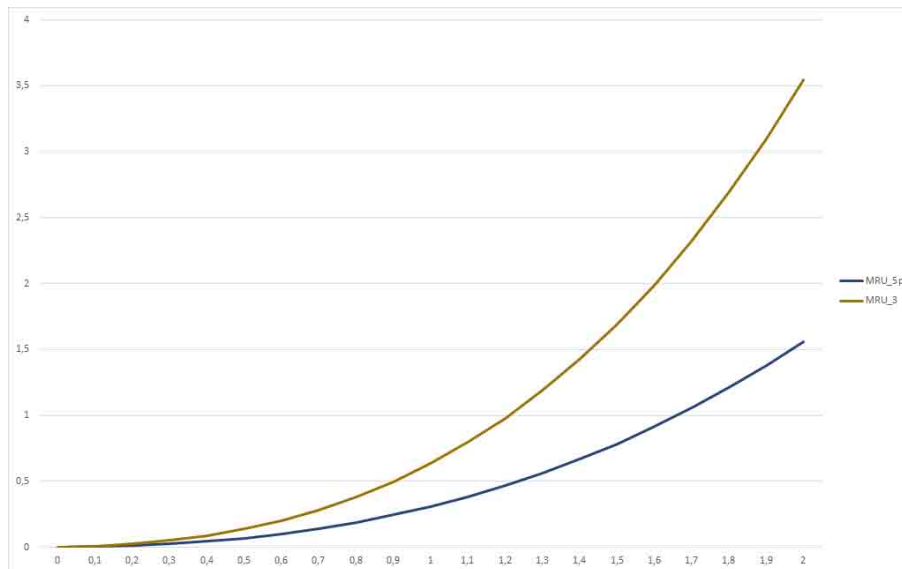
The advanced Seapath navigation algorithms integrate the RTK GNSS data with the inertial sensor data. This gives the Seapath 385 unique advantages compared to stand alone RTK products. The Seapath product's accurate roll, pitch and heading measurements allow the RTK antenna position to be referenced to any point on the vessel where accurate position and velocity are required. All the data from Seapath have the same time stamp and the output is in real-time. Subdecimetre position accuracy can be achieved through download of satellite orbit and clock data from internet and by post processing of satellite and IMU (Inertial Measurement Unit) data. The Seapath is robust against GNSS dropouts by using the inertial sensor for dead reckoning navigation in order to provide position, velocity and also heading measurements when GNSS is not available.

The Seapath 385 software has improved algorithms for position drift after GNSS dropout. The plots show typical position drifts.

*Figure 1 Typical position drift in meters after GNSS dropout in minutes for MGC R2, R3 and R4*



*Figure 2 Typical position drift in meters after GNSS dropout in minutes for MRU 3, 5 and 5+*



The product has a total of 16 configurable RS-232/422 serial lines and Ethernet ports for output of motion data and NMEA messages to the multibeam and survey computer. Input of DGNSS corrections of various quality and sources are input on a configurable RS-232/422 serial line or Ethernet.

For surveys where RTK position accuracy is not required in real-time, the Seapath has the possibility to log raw satellite data for post processing. Centimetre position accuracy can be achieved through download of satellite orbit and clock data from the internet and by post processing the satellite data.

By utilising standard DGNSS, Fugro Seastar® XP2/G2/G4/G4+, VERIPOS Ultra/Ultra<sup>2</sup>, C-NavC<sup>1</sup>, C-NavC<sup>2</sup> and RTK corrections, this system is a unique solution for hydrographic surveying and dredging work which demand the most comprehensive, most accurate surveying data available.

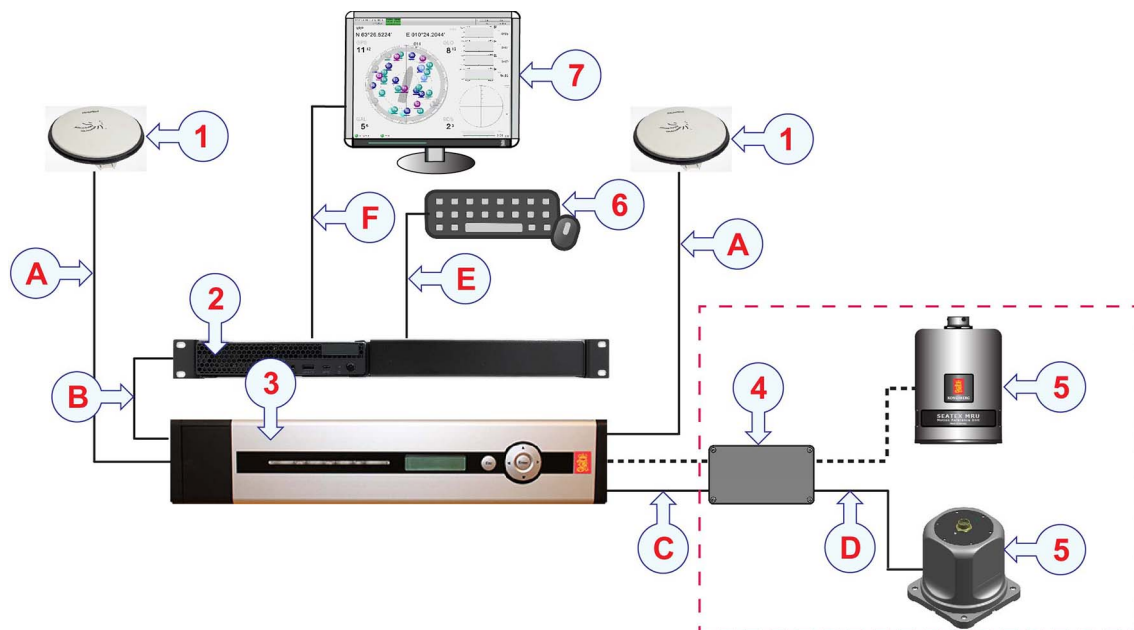
The combination of GNSS signals and inertial data enables much better performance than each of the signals alone, with high output data rate (up to 200 Hz), zero delay on output data, data available in up to eight different monitoring points and a total of eight configurable serial lines and five configurable Ethernet LANs.

This Seapath product is a two-module solution with a Processing Unit and an HMI Unit connected via Ethernet. The Processing Unit runs all critical computations independent of the user interface on the HMI Unit to ensure continuous and reliable operation. The HMI Unit present the vessel motion in a simple and easy-to-understand format to ensure that the decision making based on the available data is as efficient as possible.

## System diagram

The system diagram identifies the main components of a Seapath system.

The Inertial Measurement Unit connected to the Processing Unit can either be a Motion Sensor and Gyro Compass (MGC) or a Motion Reference Unit (MRU). The IMU components in the red square are not a part of a standard delivery.



### Units

- |   |                         |   |   |
|---|-------------------------|---|---|
| 1 | <i>GNSS antennas</i>    | 5 | <i>Inertial Measurement Unit (MGC or MRU) (Not part of standard delivery)</i> |
| 2 | <i>HMI Unit</i>         | 6 | <i>Keyboard and mouse (Not part of standard delivery)</i>                     |
| 3 | <i>Processing Unit</i>  | 7 | <i>Display (Not part of standard delivery)</i>                                |
| 4 | <i>IMU Junction Box</i> |   |   |

### Cables

- |   |  |   |  |
|---|--|---|--|
| A | <i>Antenna cables</i>                            | D | <i>IMU cable (Attached to IMU junction box)</i>                      |
| B | <i>Ethernet cable</i>                            | E | <i>Keyboard/mouse cable</i>  |
| C | <i>Processing Unit to IMU junction box cable</i> | F | <i>HDMI cable/Display Port cable (Not part of standard delivery)</i> |

## Product restrictions

### Topics

[Restrictions in guarantee, page 12](#)

[Restrictions in export, page 12](#)

[Restrictions in use, page 13](#)

### Restrictions in guarantee

Changes or modifications to the product not explicitly approved by Kongsberg Discovery AS will void the guarantee.

The liability of Kongsberg Discovery AS is limited to repair of this product only under the given terms and conditions stated in the sales documents. Consequential damages such as customer's loss of profit or damage to other systems traceable back to this product's malfunctions, are excluded.

The warranty does not cover malfunctions of the product resulting from the following conditions.

- The Processing Unit, HMI Unit or the Inertial Measurement Unit (IMU) housing has been opened by the customer in an attempt to carry out repair work.
- The IMU is not shipped in the original transportation box.
- The IMU has been exposed to extreme shock and vibrations.
- Incorrect power connection.
- Short-circuiting of antenna cables during operation of the system.

### Restrictions in export

Export of these Inertial Measurement Units (IMU) requires an export license.

- MGC R2/R3/R4
- MRU 5+/5

## Important

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Notice to customer/importer/end user.

The inertial sensor specified here is shipped from Norway in accordance with the Ministry of Foreign Affairs' Official Notification on Export Control and U.S. Export Administration Regulations (EAR).

The inertial sensor will be subject to restrictions from your national export control authorities if resold, transferred or otherwise disposed from your country.

Resale, transfer or otherwise disposal of the inertial sensor to countries, persons or entities under UN, US, EU or Norwegian embargo/sanctions, is prohibited.

Any valid and approved export license granted to Kongsberg Discovery AS from the Norwegian Ministry of Foreign Affairs or the U.S. Government, is not an authorization for you to resell, transfer or other disposal of the inertial sensor.

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## Restrictions in use

The system requires certain conditions in order to operate.

The Seapath function is based on GNSS signals and requires free sight to the sky. A minimum of four visible satellites. A position dilution of precision (PDOP) value less than six. Otherwise normal conditions.

It is designed for use on-board marine surface operated vehicles with a linear acceleration less than  $\pm 45 \text{ m/s}^2$  ( $\pm 4.5 \text{ g}$ ). And an angular rate range less than  $\pm 75^\circ/\text{s}$ .

Specifications are valid without multipath, without shadowing of antennas and for typical survey operations.

## Health and safety

Operation or troubleshooting of this equipment will not imply any risk for high voltages, explosions or exposure to gas. The equipment complies with IEC 61010-1/EN 61010-1 standards regarding product safety (low voltage).

## Network security

If the Seapath 385 product is connected to a local area network, data security is important.

Equipment manufactured by Kongsberg Discovery is often connected to a local area network (LAN). When you connect a computer to a local area network you will always expose the data on that computer. All the other computers connected to the same network may be able to access your data. Several threats are imminent:

- Remote computers can read your data.
- Remote computers can change your data.
- Remote computers can change the behavior of your computer, for example by installing unwanted software.

Usually, two parameters are used to define the threat level:

- 1 The likelihood that any remote computer will do any of the above.
- 2 The damage inflicted if a remote computer succeeds doing any of the above.

Kongsberg Discovery has no information about your complete system installation. Products provided by Kongsberg Discovery are always regarded as stand-alone offline systems. They are regarded as stand-alone even though they may be connected to a local area network for sensor interfaces or data distribution.

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**Note**

*No network safety applications are installed on Kongsberg Discovery computers. The computer is not protected against viruses, malware or unauthorized access by external users.*

---

Securing the Seapath 385 system has no meaning unless you have established a policy that secures all the computers on the network. This policy must include physical access by trained and trusted users. The customer or end user of the Seapath 385 system is responsible for defining and implementing a security policy and providing the relevant network security applications.

---

**Note**

*Kongsberg Discovery will not accept any responsibility for errors or damages caused by unauthorized use of or access to the Seapath 385 system.*

---

## Support information

If you need technical support for your product you must contact a Kongsberg Discovery office. A list of all our offices is available on our website.

- **Company name:** Kongsberg Discovery AS
- **Address:** Havnegata 9, N-7010 Trondheim, Norway
- **Telephone:** +47 33 03 41 00
- **Telephone, global 24h support:**
  - Europe, the Middle East and Africa: +47 33 03 24 07
  - Asia Pacific: +65 97 11 24 07
  - Americas: +15 04 303 5244



- **E-mail address:** support.seatex@kd.kongsberg.com
- **Website:** <http://www.kongsberg.com/discovery>

### **KM-Support App**

Kongsberg Discovery support is also available in the KM-Support App. Our support application is available for free in the App Store and Google Play.

# Getting started

## Topics

[Turning on/off procedures, page 16](#)

[Operating principles, page 18](#)

[User preference procedures, page 22](#)

## Turning on/off procedures

### Topics

[Turning on the Seapath system, page 16](#)

[Turning off the Seapath system, page 17](#)

[Restarting the Seapath system, page 18](#)

## Turning on the Seapath system

Turn on the Seapath system in order to start using the system for operational purposes.

### Prerequisites

The Seapath system is connected to the vessel's mains and set up for operation.

### Context

The power switch is located behind the lid to the left on the front of the unit. Press down on the left side of the lid to open it.



### Procedure

- 1 Turn on the Processing Unit by pressing the power switch located under the lid at the front of the unit.
- 2 Turn on the HMI Unit.
- 3 Turn on the display.  
The software is pre-installed and the system will start automatically after it has been turned on.

### Related topics

[LED indicators Processing Unit, page 70](#)

[LED indicators HMI Unit, page 71](#)

## Turning off the Seapath system

Shut down the system to stop all processing, calculation and output from the system.

### Context

The power switch is located behind the lid to the left on the front of the unit. Press down on the left side of the lid to open it.



### Note

---

*Do not turn off power during the Windows shutdown sequence.*

---

### Procedure

- 1 Select the **System** menu → **Shutdown** → **System**.  
The message `It is now safe to turn off your computer` appears.
- 2 Turn off the Processing Unit by pressing the power switch located under the lid at the front of the unit.
- 3 Turn off the HMI Unit.
- 4 Turn off the display.  
The system will stop in a controlled way.

### Related topics

[System menu, page 66](#)

[Investigating large error ellipse in Integrity view, page 79](#)

[Connecting the display to the Processing Unit, page 88](#)

[Replacing the antenna, page 99](#)

[Replacing the antenna cable, page 99](#)

[Replacing the Processing Unit, page 101](#)

[Replacing the HMI Unit, page 102](#)

## Restarting the Seapath system

Sometimes it is necessary to restart the system. For example to confirm changes to the configuration.

### Context

#### Note

---

*When you restart the whole system, all processing, calculation and output stops for about two minutes.*

---

### Procedure

- 1 Select the **System** menu → **Restart** → **System**.

The message `This will restart the system. Are you sure?` appears.

- 2 Select **Yes**.

The system restarts automatically and resumes operation within two minutes.

### Related topics

[System menu, page 66](#)

## Operating principles

### Topics

[General, page 19](#)

[Navigation, page 19](#)

[Operator software configuration description, page 19](#)

[Changing system modes, page 20](#)

[Browsing or switching display views, page 20](#)

## General

The system starts automatically after it has been turned on. It is operated through the operator software installed on the HMI Unit. The software is used for performance monitoring, configuration and system troubleshooting.

Normally, the system outputs signals on the serial lines, analog channels and Ethernet ports without any involvement from the user. After power on, it takes up to 30 minutes before full accuracy on all data is obtained. Since there normally is no reason to turn off the system, it should be left running continuously.

## Navigation

Use a mouse and keyboard to operate the system from the application menus and to navigate and select in the menus. Some commands may also be executed by use of key combinations.

The Processing Unit has a built-in display and navigation buttons for accessing the internal menu system. This is only used by customer support personnel for service purposes.

## Operator software configuration description

You can adjust the appearance of the display views through the **Operator software configuration** dialog box.

**Operator software configuration** contains tab pages for various presentation options and each page contains two confirmation buttons with different properties and a cancel button.

- **OK** button: Selecting the **OK** button will save the changes and close the **Operator software configuration**.
- **Apply** button: Selecting the **Apply** button will save the changes but the **Operator software configuration** dialog box will not close.
- **Cancel** button: Selecting the **Cancel** button will close the dialog box and changes will not be saved.

### Note

---

*The position properties selected in the **Operator software configuration** dialog box are only for display purposes.*

---

## Related topics

[Selecting default position of views in display, page 23](#)

## Changing system modes

The system has three modes: *Operation*, *Configuration* and *Engineering*. To be able to make changes to the setup you must be in *Configuration* or *Engineering* mode.

### Context

The *Configuration* or *Engineering* modes are password protected. The password is **STX**. The password is not case sensitive. It is not possible to change the password.

<input type="radio"/> Operation	
<input type="radio"/> Configuration	Ctrl+E
<input checked="" type="radio"/> Engineering	Ctrl+A

You can change the system mode via the **System** menu or using key commands directly from the display.

### Procedure

- 1 **Via System menu**
  - a Select the **System** menu → **Change system mode**.
  - b Select either **Configuration** or **Engineering**.
  - c Type the password: **stx**.
  - d Select **OK**.
- 2 **With keyboard commands**
  - a In the display:
    - Press **CTRL+E** to enter *Configuration* mode
    - Press **CTRL+A** to enter *Engineering* mode
  - b Type the password: **stx**.
  - c Select **OK**.

### Result

You are now able to carry out changes and/or set system parameters.

### Related topics

[System menu, page 66](#)

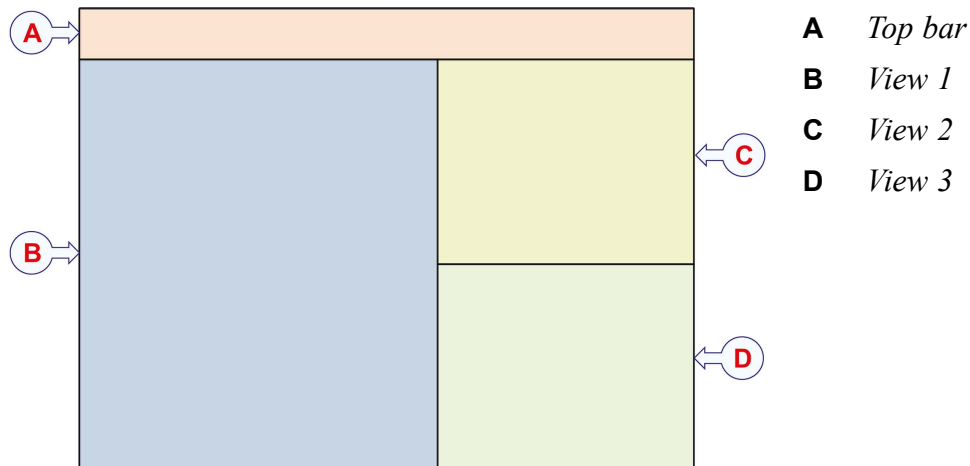
[System modes, page 42](#)

## Browsing or switching display views

The display is divided into three view sections: View 1, View 2 and View 3.

### Context

You can select which view you want to appear in these sections. You can switch views from the **View** menu or using keyboard commands directly in the display.



## Procedure

### 1 Selecting from View menu

#### a Select the View menu

View	
Browse top views	F2
Browse bottom views	Shift+F2
Toggle top view	F3
Toggle bottom view	Shift+F3

- b Select **Browse top views** to browse to the next available view in View 2.
- c Select **Browse bottom views** to browse to the next available view in View 3.
- d Select **Toggle top view** to switch the content of View 1 and View 2.
- e Select **Toggle bottom view** to switch the content of View 1 and View 3.

### 2 Using keyboard commands

- a Press **F2** key to browse to the next available view in View 2.
- b Press **F3** key to switch the content of View 1 and View 2.
- c Press **Shift+F2** keys to browse to the next available view in View 3.
- d Press **Shift+F3** keys to switch the contents of View 1 and View 3.

## Related topics

[View menu, page 59](#)

## User preference procedures

### Topics

[Selecting colour palette for display, page 22](#)

[Selecting presentation format for display, page 23](#)

[Selecting default position of views in display, page 23](#)

### Selecting colour palette for display

You can select a colour scheme for the display which suits your current light conditions.

#### Context

The **Palette** function provides colour schemes for the display presentation. Night, Dusk and Day.

You can select the colour palette from the **View** menu or using keyboard commands directly in the display.

- **Day white:** This is the recommended colour palette for daylight use.
- **Day black:** This palette has dark background and bright colours.
- **Night:** This is a special colour palette for night operations which will not weaken the night sight of the system operator.



#### Procedure

- 1 **Selecting from the View menu**
  - a Select the **View** menu.
  - b Select the wanted palette: **Day white**, **Day black** or **Night**.
- 2 **Using keyboard commands**
  - a Press the **F7** key to toggle between the day palettes.
  - b Press the **F8** key to switch to the night palette.

#### Related topics

[View menu, page 59](#)

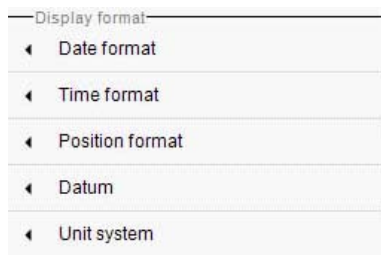


## Selecting presentation format for display

You can select which formats to use for the presentation of various data in the display.

### Context

The display formats you can modify are: Date, time, position, datum and unit system.



### Procedure

- 1 Select the **View** menu.
- 2 Select the display format you want to modify.
- 3 Select the wanted parameter from the shortcut menu.

### Related topics

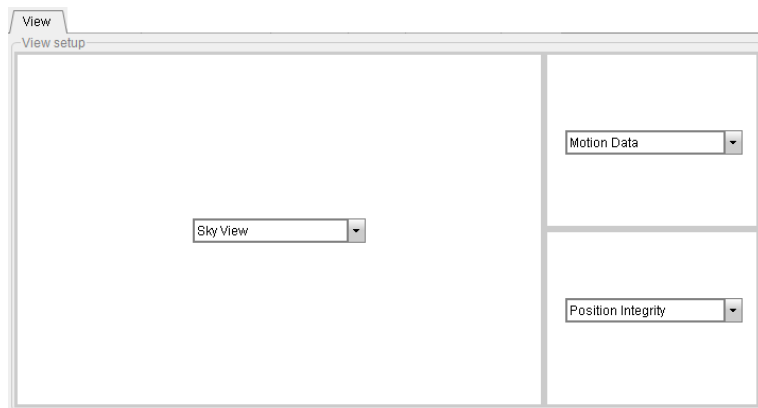
[View menu, page 59](#)

## Selecting default position of views in display

You can select a default appearance of the views in the display so they will appear in the same position each time you start the Seapath application.

### Context

The display is divided into three view sections: View 1, View 2 and View 3. You can select which view you want to appear in these sections.



### **Procedure**

- 1 Select the **System** menu → **Operator SW**.
- 2 Select **View**.
- 3 Select which view you want for View 1, View 2 and View 3 from the drop-down lists.
- 4 Select **Apply** to save the settings.

### **Related topics**

[Operator software configuration description, page 19](#)

[View menu, page 59](#)

[System menu, page 66](#)

# Operating procedures

## Topics

[Tuning heave measurement performance, page 25](#)

[Planning an operation, page 27](#)

[Acknowledging events, page 31](#)

[Exporting log data, page 32](#)

[Exporting system data with FTP, page 34](#)

[Post-processing of raw data, page 35](#)

## Tuning heave measurement performance

Before a survey and/or during operation, check the Seapath heave performance and tune the heave parameters until the best heave performance is achieved.

### Context

When using the Seapath for real-time heave measurements, it is important to tune the heave period to the vessel size and motion characteristics for the actual weather conditions. The configuration parameter **Heave filter mode** defines default values of the heave period. In order to achieve optimum heave performance, these values have to be tuned for the actual vessel and weather conditions.

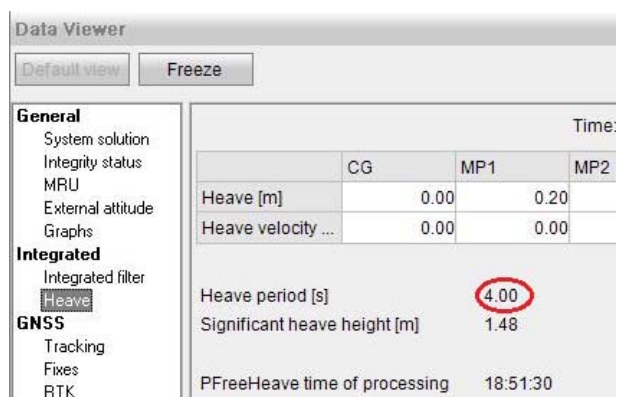
The simplest option is to select **Automatic** or **GNSS aided** heave filter mode in **NAV Engine configuration** and let the system estimate the heave filter parameters during operation.

Or you can manually tune the heave measurement performance by checking the heave period parameter in the **Data Viewer** and then enter this value in the **NAV Engine configuration**.

**Note**

*If you decide to let the system automatically estimate the heave filter parameters, by selecting **Automatic** or **GNSS aided**, you do not need to observe the heave period parameter in the **Data Viewer**.*

---

**Procedure**

- 1 Select the **Tools** menu → **Data Viewer**.
- 2 Under **Integrated**, select **Heave**.
- 3 Observe the **Heave period [s]** parameter and close the **Data Viewer**.
- 4 Select the **System** menu → **NAVEngine** → **Standard**.
- 5 Select **MRU** → **Heave config**.
- 6 Select **Hydrographic survey** or **General purpose** from the **Options** list.
- 7 Type the **Period** parameter which you observed in the **Data Viewer**.  
Allowed values are between 1 and 25 seconds. The default value is 10 seconds.



- 8 Or you can select **Automatic** or **GNSS aided** for the system to estimate the heave filter parameters.
- 9 Select the **Roll/Pitch dependent** box if you want the heave measurement dependent on the roll and pitch measurements.
- 10 Select **Apply** to save the settings.

**Related topics**

[Tools menu, page 63](#)

## Planning an operation

**Topics**

[Satellite Prediction tool, page 27](#)

[Verifying satellite constellation, page 29](#)

[Adding or removing shadow sectors in Sky view, page 30](#)

[Enabling and disabling satellites, page 31](#)

### Satellite Prediction tool

**Satellite Prediction** is a helpful tool to plan an operation where good accuracy throughout the operation is necessary. It will help you to plan when a safety operation could take place and to identify periods of poor satellite geometry.

**How to open**

Select **Satellite Prediction** on the **Tools** menu.

**Description**

During some periods the satellite coverage over some areas is rather poor. Operations close to large equipment will often result in shadowed satellites and decrease the number of satellites available. This is a major risk for safety operations.

The satellite prediction is based on the satellite's almanac data received from the GNSS receiver.

The **Satellite Prediction** tool supports only one antenna at a time.

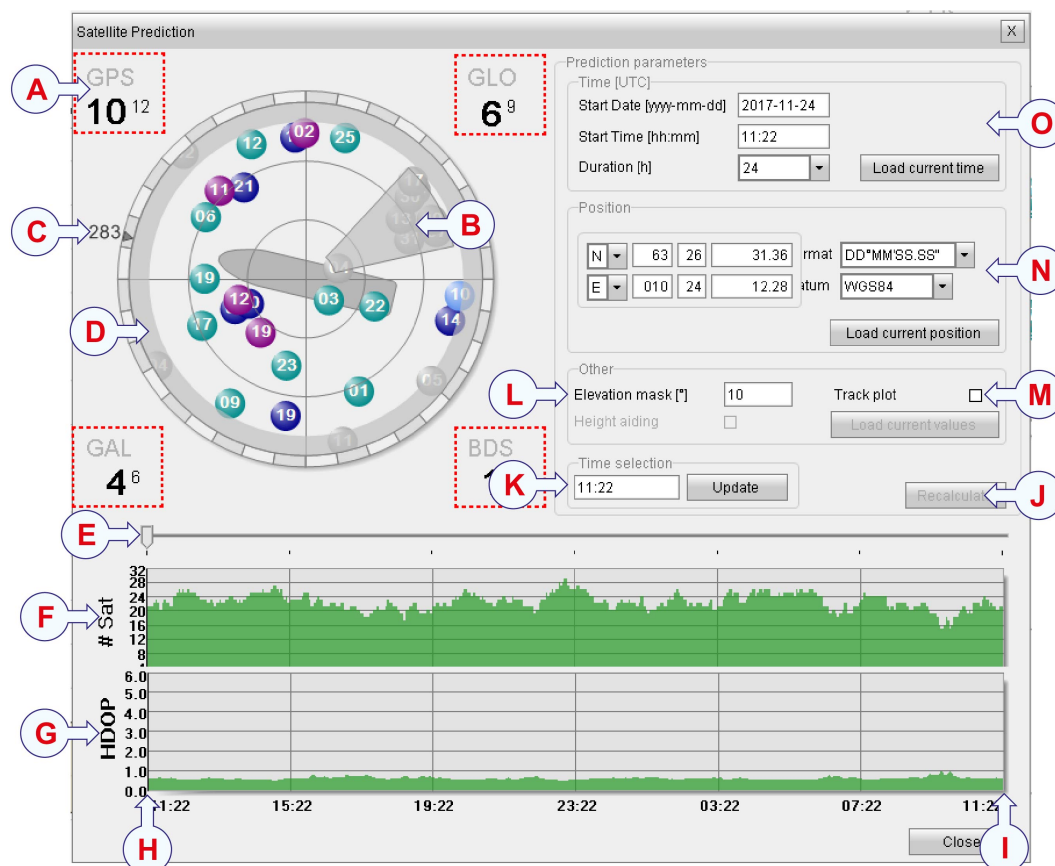
When you open the **Satellite Prediction** dialog box, some of the values are preset.

- The current date, time and position is set as start values.
- The shadow sectors are drawn as inserted in the **Operator software configuration** dialog box, **Sky view**.

The elevation mask is drawn as set in the **NAV Engine Configuration** dialog box → **Sensors** → **GNSS processing**.

- The default duration of the prediction is set to 24 hours. It can be changed to 1, 2, 4, 8 and 12 hours.

To change the start values, enter new values and select **Recalculate** to update the graphs and sky view.

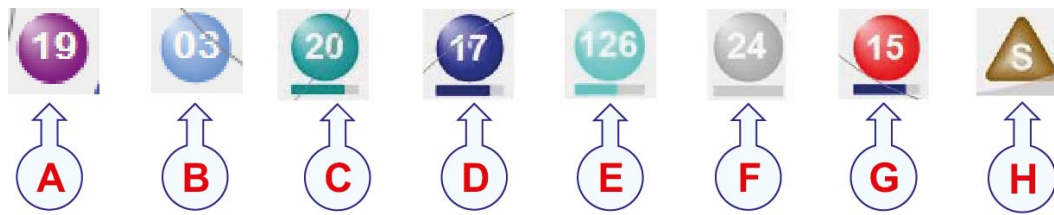


- |          |   |          |                                   |
|----------|---|----------|-----------------------------------|
| <b>A</b> | Number of GPS satellites used (large figure), tracked (small figure). This applies to GLONASS, Galileo and BeiDou satellites, in red squares. | <b>H</b> | Start of prediction               |
| <b>B</b> | Shadow sector   | <b>I</b> | End of prediction                 |
| <b>C</b> | Vessel heading indicator  | <b>J</b> | Recalculate Sky view and graphs   |
| <b>D</b> | Elevation mask  | <b>K</b> | Track plot                        |
| <b>E</b> | Time indicator  | <b>L</b> | Time selection for time indicator |
| <b>F</b> | Graph showing number of satellites used   | <b>M</b> | Elevation mask setting            |
| <b>G</b> | Graph showing HDOP  | <b>N</b> | Position setting                  |
|          |   | <b>O</b> | Start date and time setting       |

### Satellite symbols

#### Note

Which satellites are used depend on the type of Seapath system you are operating. Not all systems use all the satellites.



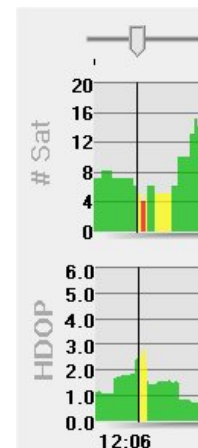
- |   |   |
|---|---|
| <b>A</b> Galileo satellite  | <b>G</b> Rejected satellite. The satellite is rejected by the position calculation algorithms or is reported unhealthy from the almanac. Red satellites are not included in the calculations. |
| <b>B</b> BeiDou satellite   |   |
| <b>C</b> GPS satellite  |   |
| <b>D</b> GLONASS satellite  |   |
| <b>E</b> SBAS satellite   | <b>H</b> Correction satellite   |
| <b>F</b> Not tracked or disabled satellite. The satellite is under the elevation mask or hidden by a shadow sector. |   |

The colours used in the **# Sat graph** (Number of satellites), indicate the status of the satellite constellation.

- **Green:**  $\geq 5$  satellites visible
- **Yellow:** 4 satellites visible
- **Red:**  $\leq 3$  satellites visible

The colours of the **HDOP graph** (horizontal dilution of precision) indicate the satellite geometry (default values).

- **Green:** HDOP < 2.5
- **Yellow:**  $2.5 < \text{HDOP} < 4$
- **Red:** HDOP > 4



## Related topics

[Tools menu, page 63](#)

[Adding or removing shadow sectors in Sky view, page 30](#)

## Verifying satellite constellation

You can estimate what the satellite constellation will be like for a certain period.

### Procedure

- 1 Select the **Tools** menu → **Satellite Prediction**.
- 2 Select start date, time and duration for the period for which you want to verify the satellite constellation.
- 3 Select the position for the location of the vessel.

- 4 Select elevation mask.
- 5 Select **Recalculate**.
- 6 Add shadow sector(s) in the sky view area.  
The graphs will be updated automatically.
- 7 Observe the information in the # **Sat** and **HDOP** graphs.

### Related topics

[Tools menu, page 63](#)

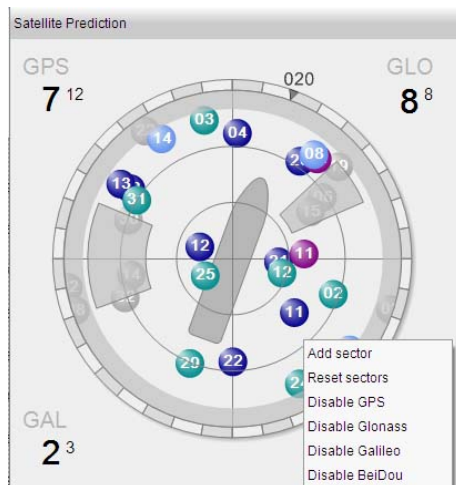
[Sky view, page 48](#)

## Adding or removing shadow sectors in Sky view

Operations close to large equipment will often result in shadowed satellites and decrease the number of satellites available. This is a major risk for safety operations. You can add shadow sectors to estimate what the conditions will be like.

### Context

You can also edit the preset sectors which have been set in the **Operator software configuration**.



### Procedure

- 1 Select the **Tools** menu → **Satellite Prediction**.
- 2 Right-click over the sky view area to show the shortcut menu.
- 3 Select **Add sector**.  
A new shadow sector is enabled.
- 4 Drag the size of the sector and move it to the wanted location.  
Continue until you have added and edited the wanted shadow sectors.



The **# Sat** and **HDOP** graphs will be updated automatically when shadow sectors are changed.

- 5 Right-click on a sector and select **Remove sector** to delete the added sectors.

Only the sectors set up in the **Operator software configuration** dialog box, **Sky view**, will remain.

### Related topics

[Satellite Prediction tool, page 27](#)

[Tools menu, page 63](#)

## Enabling and disabling satellites

You can create a scenario where one or several satellites are disabled, for example to simulate unhealthy satellites.

### Procedure

- 1 Select the **Tools** menu → **Satellite Prediction**.
- 2 In the sky view area, right-click the satellite symbol for the satellite you want to disable.

- 3 Select **Disable**.

The satellite will turn grey and the graphs will display the number of satellites and HDOP where this satellite is omitted.

- 4 To re-enable the satellite, right-click the satellite symbol for the disabled satellite and select **Enable**.

### Related topics

[Tools menu, page 63](#)

## Acknowledging events

The top bar will show if the system has one or more event situations.

### Context


These events can range from informational messages to warnings and alerts. If a situation has been handled, and there is no need for it to be displayed, it can be acknowledged and thus removed from the top bar.

### Procedure

- 1 Observe the alarm(s) in the top bar.
- 2 **Acknowledging events from the top bar:**

- a Select the Event severity symbol, letter **A**, **W** or **I**, for the event to acknowledge the event directly.

Observe that the event disappears from the top bar.

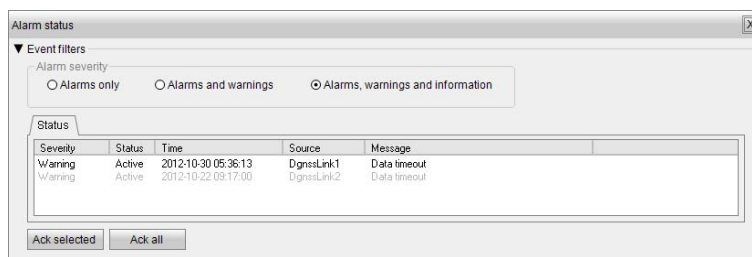
- b Or you can select the **Event list** button,  to open the **Event list** and view all events.
- c Select the Event severity symbol in the list to acknowledge an event.

### 3 Acknowledging events from the Alarm menu:

- a You can select the **Alarm menu** → **Ackn. all events** to acknowledge all events.

Observe that there are no events in the top bar.

- b You can select the **Alarm menu** → **Status** to acknowledge events from the **Alarm status** dialog box.



### Related topics

[Alarm menu, page 62](#)

[Event system description, page 43](#)

## Exporting log data

The **Data Export** tool is used to retrieve log data from the Seapath system.

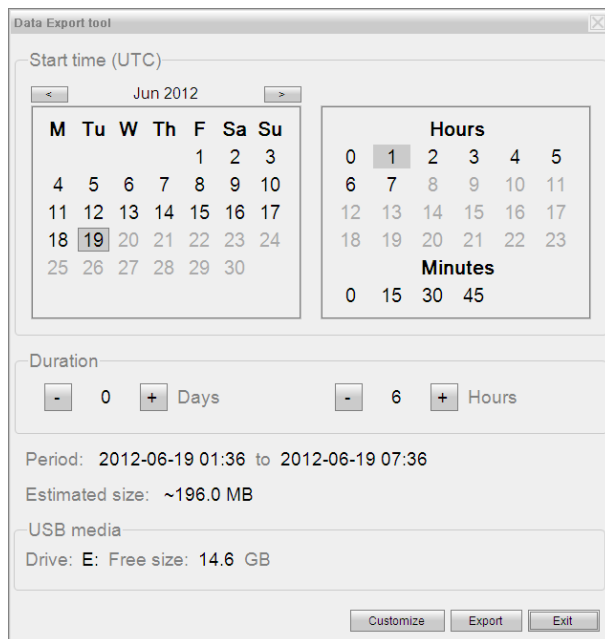
### Context

The log data can be used for documentation, post-processing or diagnostic purposes.

Available data categories for export are:

- Sensor data (for example IB log files)
- Telegram output (for example exported NMEA telegrams)
- Diagnostics (for example alarms, internal diagnostics)

Diagnostics data are not included by default.



## Procedure

- 1 Insert a USB flash drive into the USB port at the front of the HMI Unit.  
If you do not insert a USB flash drive, the files will be written to local disk.
- 2 Select the **Tools** menu → **Data Export**.
- 3 Select the start time for the data export from the calendar.
- 4 Select the duration of the exporting period.
- 5 Select **Customize** if you want to change which data files you want to export.  
Select which data you want to export and if you want to split the output file into smaller files.
- 6 Select **Export**.  
A progress bar will appear on the screen.
- 7 Close the dialog box when the logging session is finished.
- 8 Remove the USB flash drive.

## Result

The log files are now zipped and stored on the USB flash drive inside a folder named: DataExport.

## Related topics

[Tools menu, page 63](#)

## Exporting system data with FTP

The Seapath system contains an FTP (File Transfer Protocol) server which can be used to export files to your computer.

### Prerequisites

You must be familiar with the Processing Unit's internet protocol (IP) address to be able to connect to it. The default IP address for the Processing Unit is: 192.168.1.10.

FTP client software must be installed on your computer. For installation, see documentation for the chosen FTP client.

### Context

The directory structure on the FTP server:

#### **/data/user/loghost**

Data from telegram outputs where **Log to file** has been selected in the **NAV Engine Configuration** → **Communication interface** → **Input/Output**. The file name extensions are **.l<sub>nn</sub>** (lowercase L, not one), where **nn** is the two-digit output number.

#### **/data/user/other**

Other directories are used for diagnostic and maintenance purposes. Instructions are given from customer support if these types of files are needed.

### Procedure

- 1 Start the FTP client software on your computer and connect to the Processing Unit's IP address.
- 2 Log in by typing the user name and password
  - **User name:** navigator
  - **Password:** navigator

The user name and password are case sensitive.
- 3 Select Binary or Text transfer mode depending on how the data shall be used.  
Binary transfer mode is usually the correct choice for machine-readable data.
- 4 Transfer the wanted files.
- 5 Disconnect.

# Post-processing of raw data

## Topics

[About post-processing of raw data, page 35](#)

[Setting up Seapath for post-processing output, page 35](#)

[Post-processing of raw data in TerraPos, page 36](#)

## About post-processing of raw data

Seapath can output raw GNSS (Global Navigation Satellite Systems) and IMU (Inertial Measurement Unit) data for post-processing with Field Group's TerraPos.

It is recommended to log the data on the Kongsberg Discovery K-Controller system or on another connected logging system. Alternatively, the data can be logged internally in the Seapath system. If logged internally on Seapath, use FTP (File Transfer Protocol) to download files from the Seapath disk. Log in with user name "navigator", password "navigator" and binary transfer mode. The files are found on the user/loghost directory. Use an Ethernet port on the Processing Unit (192.168.1.4). The log files have the following extension:

- The **TelegramOut** interface number which is configured to log raw data to file will generate log files with the same interface number in the file extension (IXX where XX is the interface number). For instance, if the **TelegramOut1** interface is configured to log raw data the extension on the log file will be \*.101.

### Note

---

*Make sure to retrieve the data logged internally on the Processing Unit periodically if you need it. When the internal disk reaches 80 % of capacity, it will delete the oldest 120 minutes of logged data. The more logging you enable, the faster the disk will fill up.*

---

## Setting up Seapath for post-processing output

The outputs must be set up and connected to the optional external logging system before the data collection starts.

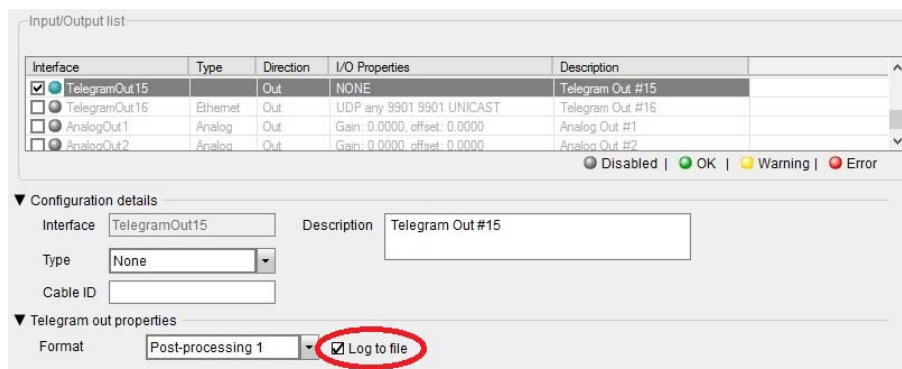
### Context

This procedure describes how to set the Telegram out interface and, under the **Telegram out properties**, how to set up one output with the following format:

- **Post-processing 1** (including both raw IMU and GNSS data).

Select **Log to file** on the outputs if the data shall be logged internally in the Seapath system.

A possible selection is indicated in the procedure.



## Procedure

- 1 Select the **System** menu → **NAVEngine** → **Standard**.
- 2 Select **Communication interface** → **Input/Output**.
- 3 Select the **TelegramOut15** interface in the **Input/Output** list.

Observe that the configuration details for **Telegram out properties** appear at the lower part of the page.

- 4 Select **Type** for output on data on **Serial line**, **Ethernet** or **None**.
- 5 As **Format**, select **Post-processing 1**.
- 6 Select **Log to file** if you want data logged internally.
- 7 Select **Apply** to save the settings.

## Related topics

[System menu, page 66](#)

## Post-processing of raw data in TerraPos

After you have logged the raw data you can process these data using the TerraPos position and attitude post-processing software.

## Prerequisites

Contact Kongsberg Discovery by email: [seatex.sales@kd.kongsberg.com](mailto:seatex.sales@kd.kongsberg.com) and request the TerraPos software and license.

## Context

The TerraPos software integrates satellite positioning and inertial sensors for a full six degrees of freedom solution. It uses Precise Point Positioning (PPP) technology to provide true autonomy: anywhere, anytime - without worrying about base stations or reference networks.

Post-Processed Kinematics (PPK) is also available through selection of a value for **Base station service** (CORS). Alternatively, the base station files can be added manually by adding a DGNSS setup file. The DGNSS setup is created by selecting the **Tools** menu → **Edit DGNSS setup**.

#### Note

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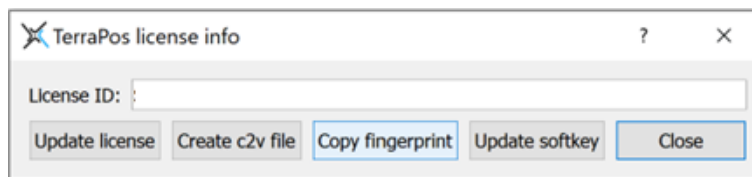
*In the procedure below, you only install the TerraPos software once. If TerraPos is already installed and the softkey updated, you go to Processing data.*

---

### Procedure

#### 1 Installing TerraPos software:

- a Request the TerraPos software.
- b Install the software using the standard options.
- c Open the TerraPos application and select **Tools** → **License Tool** → **Copy fingerprint**.

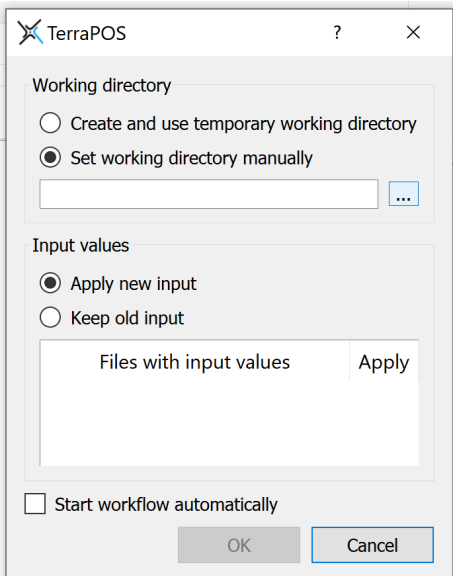


- d Send the fingerprint to the Kongsberg Discovery sales office. You will now receive a file by email.
- e Select **Tools** → **License Tool** → **Update softkey**.

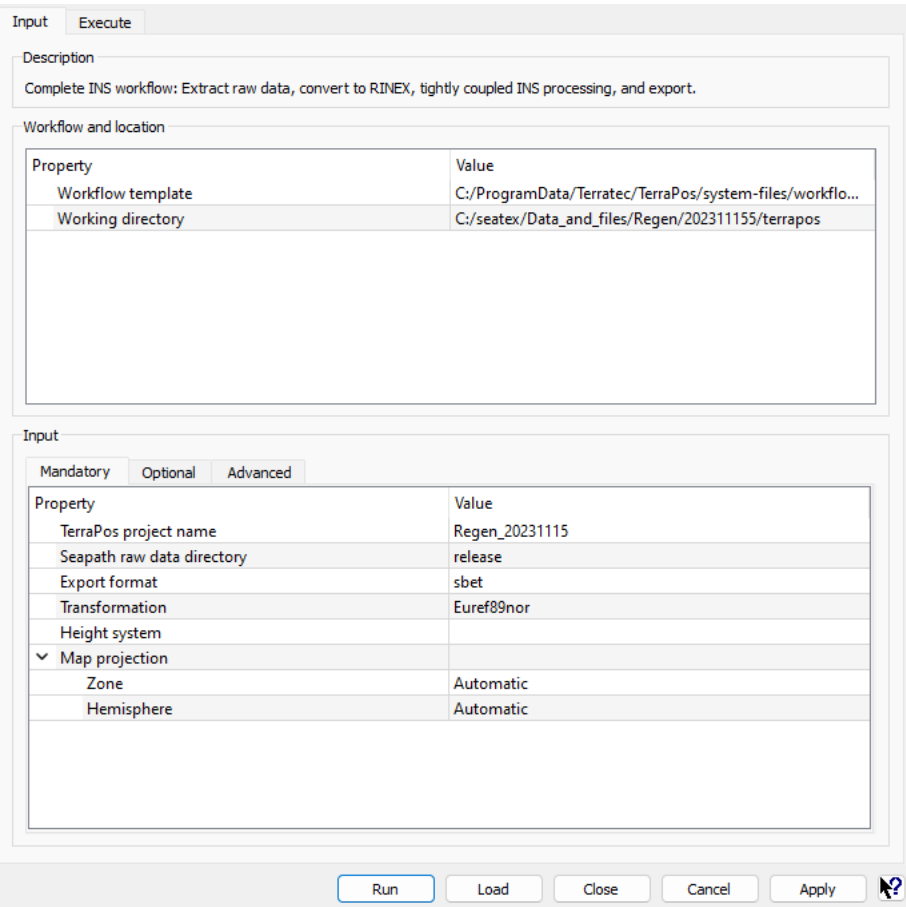
#### 2 Processing data:

- a Select **Workflows** → **Seapath** → **Seapath INS**.
- b Select a **Working directory** for where to store the files associated with the project.

You can let the system create a directory by selecting **Create and use temporary working directory** or you can select which directory you want to use by selecting **Set working directory manually**.

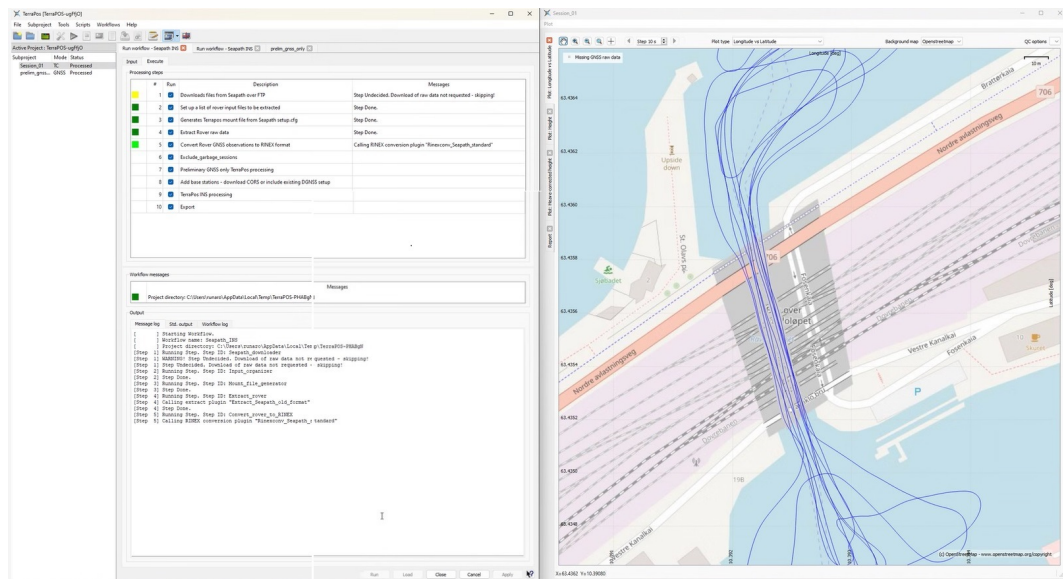


- c Select if you want to **Apply new input** or if you want to **Keep old input**.
- d Select **OK**.
- e Type a **TerraPos project name**.





- f In **Seapath raw data directory**, select the directory where you have stored the Seapath raw data on format **Post-Processing 1**.
- g Select data format, **Export format**.
- h Select datum, **Transformation**.  
If you do not select anything here, the default datum is ITRF.
- i Select **Run** to run the workflow.



# User interface

## Topics

[Display organisation, page 40](#)

[Top bar description, page 41](#)

[DGNSS link status bar, page 45](#)

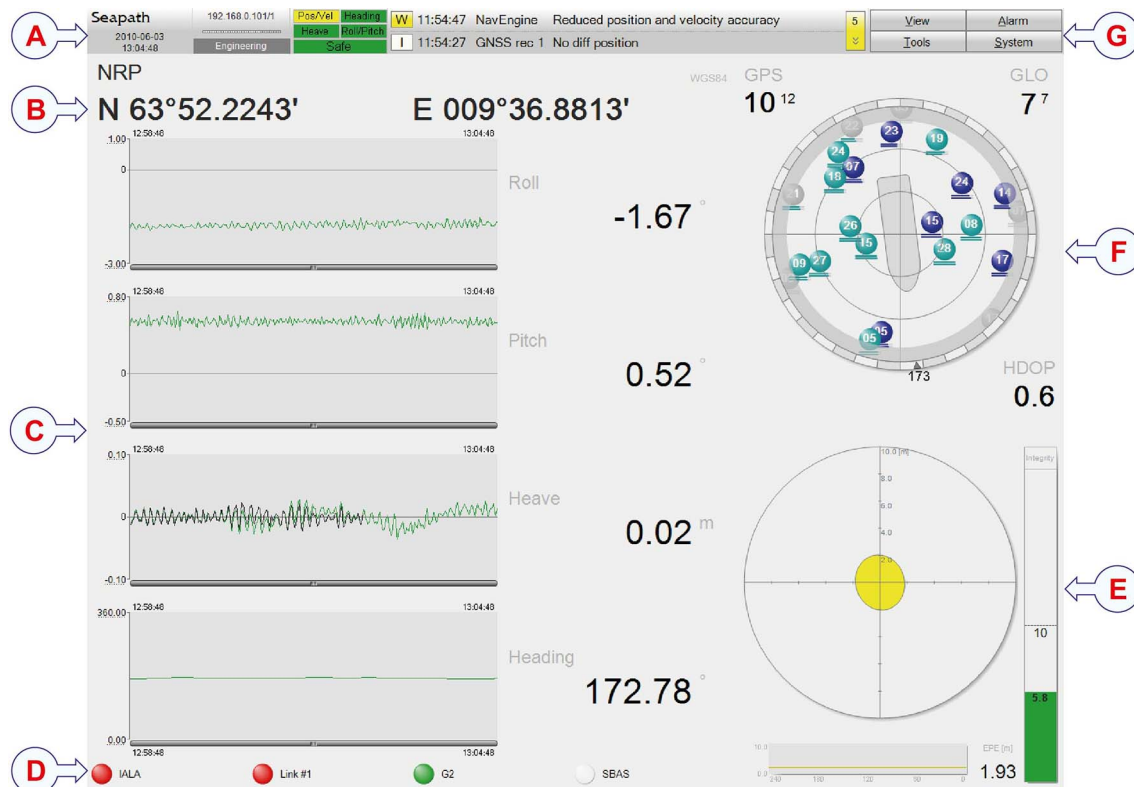
[Application menu \(Menu system\), page 46](#)

[Display views, page 48](#)

## Display organisation

The illustration shows the various parts of the display in this system. Various user preference settings can change the appearance of some parts of the display.

The DGNSS link bar is hidden by default but can be activated if corrections are enabled.



**A** Top bar (with Application menu)

**B** Position data

**C** View 1

**D** DGNS link status bar

**E** View 3

**F** View 2

**G** Application menu

## Top bar description

### Topics

[Top bar overview, page 42](#)

[System modes, page 42](#)

[Event system description, page 43](#)

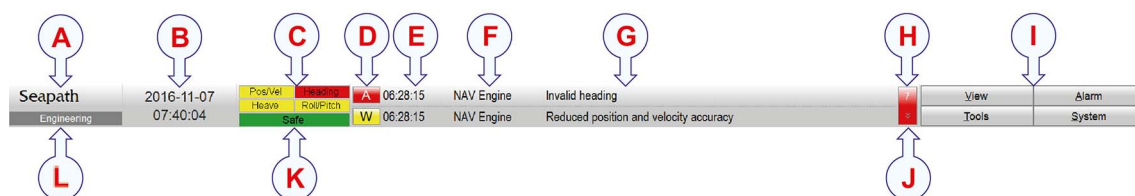
[System status, page 44](#)

[Data quality status, page 44](#)

[Application menu, page 45](#)

## Top bar overview

The top bar holds system and system status information as well as the Application menu with the various menus in the system.



- |                                |  |
|--------------------------------|--|
| <b>A</b> Type of system        | <b>H</b> Number of acknowledged events                                     |
| <b>B</b> Current date and time | <b>I</b> Application menu  |
| <b>C</b> Data quality status   | <b>J</b> Event list button   |
| <b>D</b> Event severity symbol | <b>K</b> System status   |
| <b>E</b> Event time tag        | <b>L</b> System mode (indicated only in Engineering or Configuration mode) |
| <b>F</b> Event source          |  |
| <b>G</b> Event message         |  |

## System modes

The system has three modes: *Operation*, *Configuration* and *Engineering* mode. The mode you are operating in, is indicated in the system mode area of the top bar.

A password is required to switch from *Operation* to *Engineering* or *Configuration* mode. The password is **STX**. It is not possible to change the password. The password is not case sensitive.

The system will return to *Operation* mode after 30 minutes of user inactivity.

### Operation

This is the default mode. In this mode it is not possible to start any external applications, diagnostic tools or re-configure the system. A password is not required to switch to this mode.

### Configuration

In this mode it is possible to change settings related to the connected sensors, applications and system-wide settings.

### Engineering

This mode is primarily intended for field engineers during initial installation, fault diagnostics and system-wide re-configuration.




## Related topics

[Changing system modes, page 20](#)

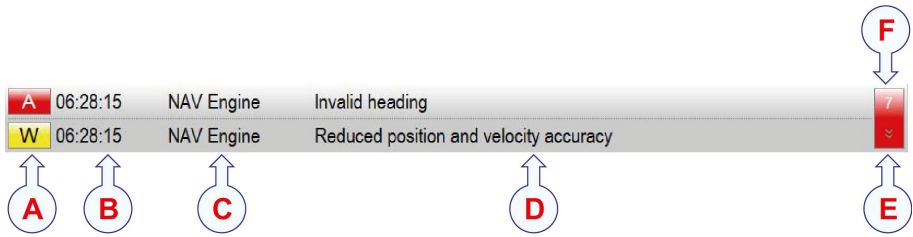
## Event system description




The event system handles events regarding the safety and operation of the system. An event is a notification to the operator of some condition in the system or the controlled process that may need attention.

Events which appear in the Seapath application can be set up with different alarm types. These alarm types have different severity levels. The Event severity symbol indicates:

-  **Alarm:** Alarms – **high** priority
-  **Warning:** Warnings – **medium** priority
-  **Information:** Information messages – **low** priority









An event message is acknowledged by selecting the Event severity symbol, letter **A**, **W** or **I**, in the top bar. When an event is acknowledged, it disappears from the **Event list**. However, the event can still be viewed in the alarm status under the **Alarm** menu.



	06:28:15	NAV Engine	Invalid heading	
	06:28:15	NAV Engine	Reduced position and velocity accuracy	

**A** *Event severity symbol*                      **D** *Event message*  
**B** *Event time tag*                              **E** *Event list button*  
**C** *Event source*                                  **F** *Number of unacknowledged events*

Select the **Event list** button to open the **Event list**. Here you can see all the unacknowledged events. Select the button again to close the list.

	06:28:15	NAV Engine	Invalid heading	
	06:28:15	NAV Engine	Reduced position and velocity accuracy	
	06:28:15	NAV Engine	Reduced heave accuracy	
	06:28:15	NAV Engine	Reduced roll and pitch accuracy	
	06:28:15	NAV Engine	Reduced heading accuracy	
	15:05:19	GnssRec2	No diff position	
	06:28:15	GnssRec1	No raw data	

### Related topics

[Acknowledging events, page 31](#)

[Alarm menu, page 62](#)

## System status

The system has three system states. The system status describes the position integrity level. It is indicated in the Status box of the top bar. The background colour of this box helps indicate the system status. The system states are:

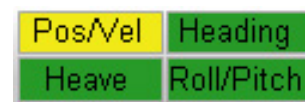


### Related topics

[Integrity view, page 51](#)

## Data quality status

The system's data quality status indicators indicate the status of the system measurements.



- Horizontal position and velocity
- Heave
- Roll and pitch
- Heading

The colour codes represent:

- **Green:** Normal operation. The input data has good quality.
- **Yellow:** Reduced performance. The input data has reduced quality.
- **Red:** The data are invalid or there is no input data.

### Related topics

[Investigating red Pos/Vel data quality indicator, page 74](#)

[Investigating yellow Pos/Vel data quality indicator, page 75](#)

[Investigating red Heading data quality indicator, page 76](#)

[Investigating yellow Heading data quality indicator, page 77](#)

[Investigating yellow Roll/Pitch data quality indicator, page 78](#)

[Investigating red Heave and Roll/Pitch data quality indicator, page 82](#)

[Investigating yellow Heave and Roll/Pitch data quality indicator, page 83](#)

## Application menu

The four menu buttons located to the far right on the top bar make up the Application menu.

Select a button to open the menu and reveal a drop-down list of sub-menus. You can also use the **ALT** key and the underlined letter to open the menu. For example **ALT+V** will open the **View** menu.

The Application menu offers various operational, visual and setup options.



### View

This menu allows you to select colour palette for the display presentation, switch between views, select format for the display presentation and to display the DGNSS link status bar and/or position data in the main view.

### Alarm

This menu allows you to acknowledge alarms and view the status of active alarms.

### Tools

This menu allows you to select operational tools and tools to use for various diagnostic purposes.

### System

This menu allows you to set up the system, change system mode, see system version, stop and log off the system.

## Related topics

[Menu system, page 58](#)

## DGNSS link status bar

The DGNSS link status bar holds status information regarding GNSS differential correction data links.

This bar is by default disabled in this system but it can be activated if corrections are enabled.



The colour of the circle indicates the status of the link.

- **Grey:** Link not enabled.
- **Yellow:** Data received but not used.

- **Green:** Data are available and OK.
- **Red:** No data available.

Select the link symbol to open the **DGNSS Monitor** tool for more detailed information about the link status.

### Related topics

[View menu, page 59](#)

[Tools menu, page 63](#)

[Investigating red indicators in DGNSS link status bar, page 80](#)

## Application menu (Menu system)

Access to the menu system is in the Application menu part of the top bar.

Select the menu buttons to reveal the menu items and select the menu items to reveal the sub-menus.



### View

This menu holds user preference selections for which colour palette to use for the current light conditions. Here you can maximize the main view and switch and toggle between the various display views. You can select which format to use for presentation of data in the display, such as date and time format, position format, unit measurement system. Position data can be displayed at the top of View 1. DGNSS link status and the status of the position sources used in the system can be displayed at the bottom of View 1.

### Alarm

This menu allows you to acknowledge alarms, or events, which have occurred in the system. You can also see status details for the alarms which are active. The NAV Engine debug option is for advanced users and shows output of status messages for NAV Engine and is used for troubleshooting purposes.

### Tools

This menu holds various tools used for planning and operation and tools used for diagnostic purposes. Which tools are available will differ according to type of product purchased.

### System

This menu allows you to select which object to use as monitoring point on your vessel. It also holds the NAV Engine configuration and the operator software configuration. This is where you change the system mode or performs a restart, stop or shutdown of the system. This is also where you find various information



about the system, such as contact details, software version and equipment information. This menu holds a quick help with shortcut keys for switching display views and changing the colour palette.

**Related topics**

[Menu system, page 58](#)

## Display views

### Topics

[Sky view, page 48](#)

[DGNSS view, page 50](#)

[Integrity view, page 51](#)

[Compass view, page 54](#)

[Motion data view, page 54](#)

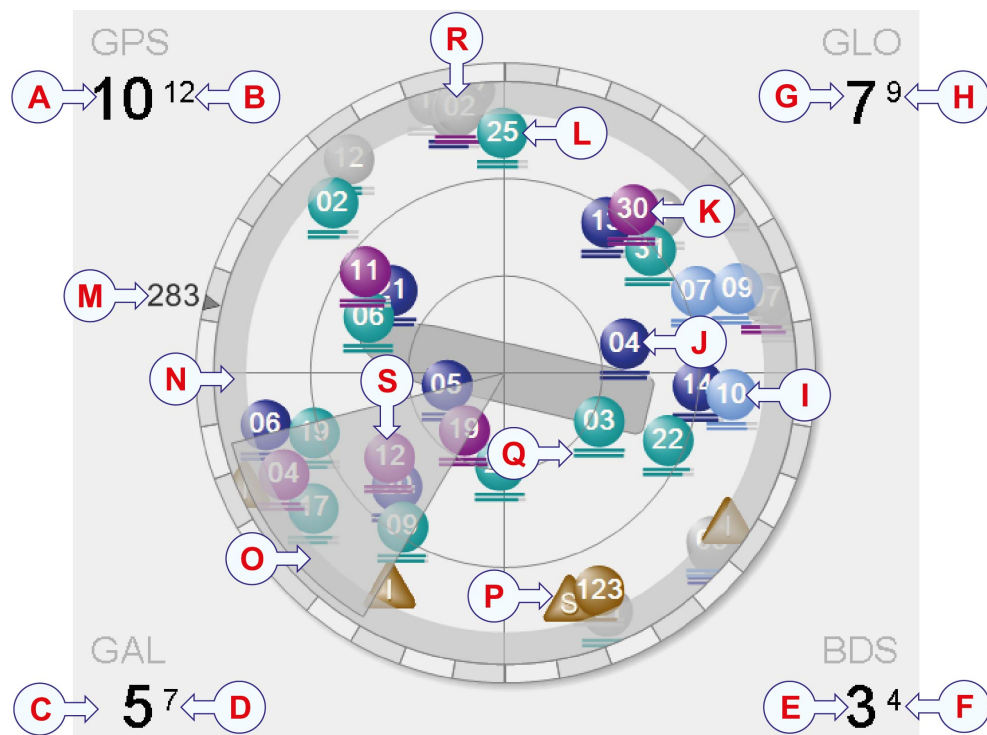
[Time series view, page 56](#)

### Sky view

The *Sky* view display shows which satellites the system is tracking and using in the position calculation.

#### How to open

You can select if you want this view to appear as View 1, View 2 or View 3. Press the **F3** key to switch between views in View 1 and View 2. Press the **SHIFT+F3** key to switch between View 1 and View 3.



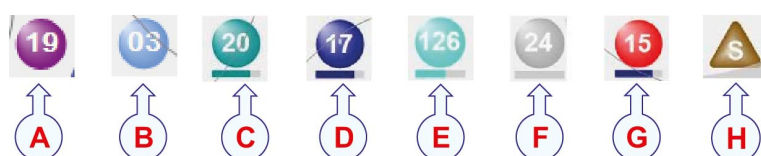
<b>A</b>	<i>Number of used GPS satellites</i>	<b>J</b>	<i>GLONASS satellite</i>
<b>B</b>	<i>Number of tracked GPS satellites</i>	<b>K</b>	<i>Galileo satellite</i>
<b>C</b>	<i>Number of used Galileo satellites</i>	<b>L</b>	<i>GPS satellite</i>
<b>D</b>	<i>Number of tracked Galileo satellites</i>	<b>M</b>	<i>Vessel heading</i>
<b>E</b>	<i>Number of used BeiDou satellites</i>	<b>N</b>	<i>Elevation mask</i>
<b>F</b>	<i>Number of tracked BeiDou satellites</i>	<b>O</b>	<i>Shadow sector</i>
<b>G</b>	<i>Number of used GLONASS satellites</i>	<b>P</b>	<i>Correction satellite</i>
<b>H</b>	<i>Number of tracked GLONASS satellites</i>	<b>Q</b>	<i>Signal-to-noise ratio indicator</i>
<b>I</b>	<i>BeiDou satellite</i>	<b>R</b>	<i>Satellite under elevation mask</i>
		<b>S</b>	<i>Satellite under shadow sector</i>

### Description

The satellites are presented according to satellite geometry. The grey outer circle represents the elevation mask. The satellite azimuth angle is according to the north-south axis.

The number of GPS and/or GLONASS, Galileo and BeiDou satellites tracked and used in the position solution, is presented in the corners of the display.

The satellite colours represent type of satellite and condition of satellite.



<b>A</b>	<i>Galileo satellite</i>	<b>E</b>	<i>SBAS satellite</i>
<b>B</b>	<i>BeiDou satellite</i>	<b>F</b>	<i>Not tracked or disabled satellite</i>
<b>C</b>	<i>GPS satellite</i>	<b>G</b>	<i>Rejected satellite</i>
<b>D</b>	<i>GLONASS satellite</i>	<b>H</b>	<i>Correction satellite</i>

The satellites with grey colour are disabled as they are not used directly in the position fix. Satellites with red colour are faulty and not used in the position fix.

The bar(s) at the bottom of each satellite represent(s) the signal-to-noise level for the satellite, and the longer the bar, the stronger the signal.

The upper bar indicates signal strength on L1 and the lower bar indicates signal strength on L2.



When you hover the cursor over a satellite symbol, an information box will appear with the status of the satellite including azimuth, elevation, L1/L2 signal-to-noise ratio and differential correction availability.

	19	04
	Glonass PRN 19	
Azimuth:	68°	
Elevation:	61° (Down)	
S/N ratio:	L1:60 L2:42	
Diff.Corr.:	L1, L2, G2	

If the vessel has a gyro interfaced, the display shows the vessel's true heading.

The shadow sector represents areas with obstructions. You can add shadow sectors. Adding shadow sectors will have no effect on calculations but will assist in explaining why some satellites are not used in the position fix.

You can select the appearance of the Sky view from the **System** menu → **Operator SW** → **Sky view**. Here you can enable or disable the correction satellites, the signal strength bars, the track plot length, shadow sectors and the elevation mask.

For more details on the *Sky* view, refer to the *Installation manual*.

## Related topics

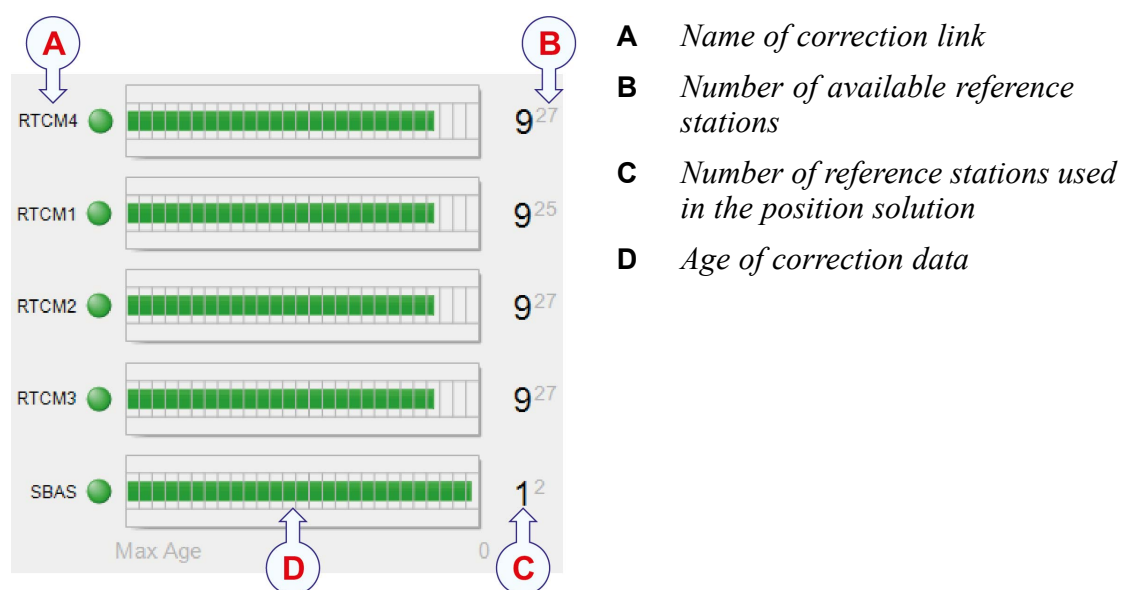
[Verifying satellite constellation, page 29](#)

## DGNSS view

This view indicates the status and age of the available correction links. The link status for all links is indicated with a colour.

### How to open

You can select if you want this view to appear as View 1, View 2 or View 3. Press the **F3** key to switch between views in View 1 and View 2. Press the **SHIFT+F3** key to switch between View 1 and View 3.



## Description

The link status for all links is indicated with a colour.

- **Green:** Correction data are received and used in the position solution.
- **Yellow:** Correction data are received but not used.
- **Red:** No correction data are received through that link.
- **Grey:** The link has been disabled for some reason.

Status of up to 9 correction links can be displayed. Each link is identified by a name. The name is defined in the **NAV Engine Configuration** dialog box, **Communication interface** → **Input/Output**. The number of reference stations used in the position calculation and the number of reference stations available, are indicated for each correction link.

Each correction link is presented as a circle and with a bar which indicates the quality as the age of the corrections received through that link.

If a bar is green, the correction signals are newer. The older the signals are, the shorter the bar is.

If the bar is grey, the age of the corrections has exceeded the maximum age and the corrections from the link are not in use. You can set the maximum age for using differential corrections in the NAVEngine Advanced configuration but this feature is for advanced users only.

If you select one of the link buttons, the **DGNSS Monitor** appears. This view lists details of all available reference stations from all correction links.

## Related topics

[Tools menu, page 63](#)

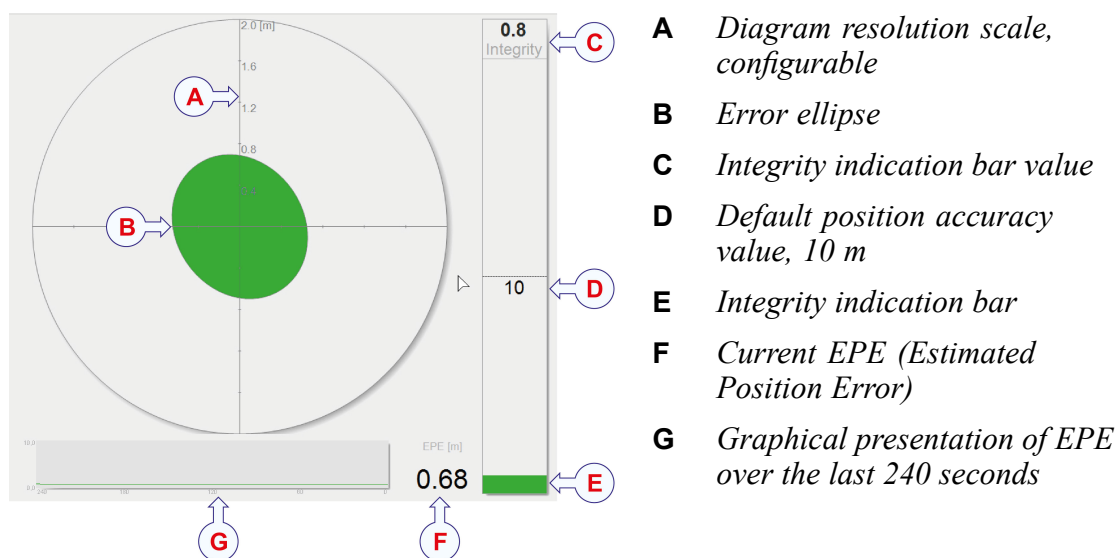
[Investigating red indicators in DGNSS link status bar, page 80](#)

## Integrity view

This view indicates the integrity of the system position.

### How to open

You can select if you want this view to appear as View 1, View 2 or View 3. Press the **F3** key to switch between views in View 1 and View 2. Press the **SHIFT+F3** key to switch between View 1 and View 3.



## Description

The error ellipse describes the position quality and the geometry of the position solution. The colour of the ellipse indicates the quality/integrity of the position. The colours used are the same as in the System status field of the top bar.

A RAIM exclusion and detection algorithm is implemented to detect satellite failure. The integrity indication for different position accuracy levels is expressed in three states that satisfy the requirements. The states are Safe, Unsafe and Caution. These states are indicated with different colours (green, yellow and red) on the error ellipse in the *Integrity* view.

The position accuracy level is configurable from the **NAV Engine Configuration** → **Advanced** (the value is displayed as the outer circle on the axis). Default value is 10 m.

The system integrity value is often referred to as the horizontal external reliability. It gives an indication of how large a horizontal position error might be, at the condition of an arbitrary undetected satellite failure.

The colour of the error ellipse indicates the integrated position solution status.

### Green - safe

The position solution is OK.

Green indicates that the system accuracy is below the selected accuracy level and that a single satellite failure cannot make the actual horizontal position error exceed the selected integrity limit (95 % confidence level).

### Yellow - caution

The position solution is reduced.

Yellow indicates that the system accuracy is below the selected position accuracy level but a single satellite failure might not be detected. If such a satellite failure is

detected, the actual horizontal position error might exceed the selected integrity limit (95 % confidence level). With only four satellites (three when height aiding is chosen), there is no way to detect a satellite failure, and the system will always be in the state Caution or Unsafe. The expected accuracy and HDOP might still be reasonably low.

**Red - unsafe**

There is no position solution available.

Red indicates that the system accuracy is above the selected accuracy level (95 % confidence level).

The position accuracy level is configurable (95 %) from the **NAV Engine Configuration** → **Advanced**. The value is displayed as the outer circle on the axis. The default value is 10 metres.

The **EPE** (Estimated Position Error) is a position quality parameter for the DGPS position. The figures are 95 % CEP (Circular Error Probability). The unit is metres. The time span in the graphical plot of the EPE is 240 seconds in the horizontal axis.

**Related topics**

[System status, page 44](#)

[Investigating large error ellipse in Integrity view, page 79](#)

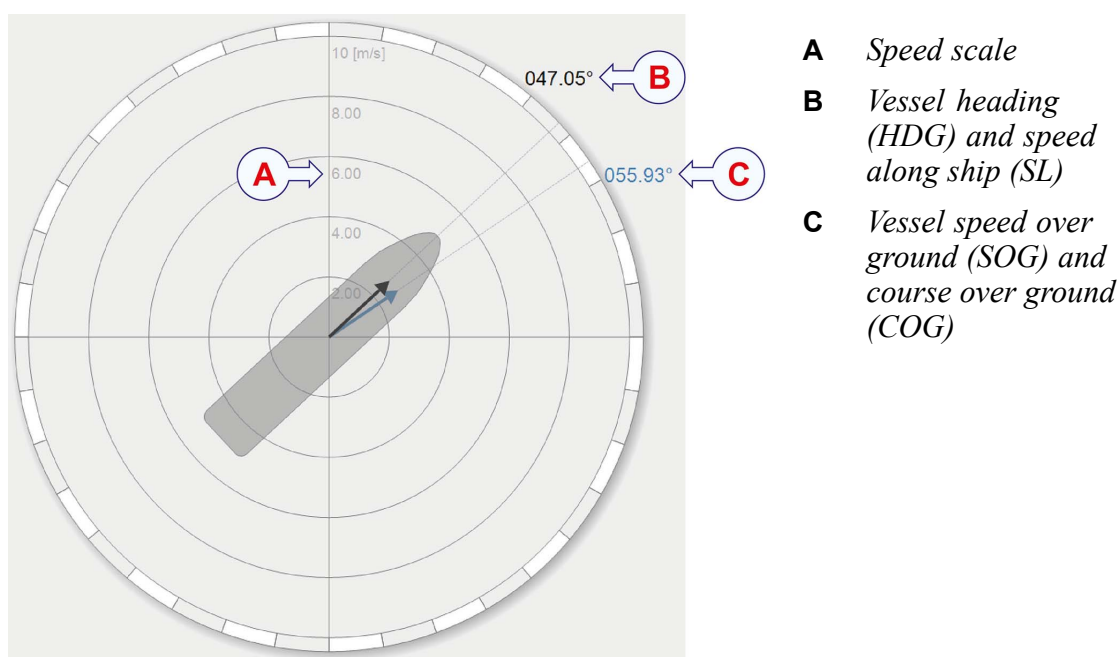
## Compass view

The Compass view shows the vessel heading, course over ground (COG) and speed over ground (SOG). The arrow heads indicate the speed according to the speed scale.

### How to open

You can select if you want this view to appear as View 1, View 2 or View 3. Press the **F3** key to switch between views in View 1 and View 2. Press the **SHIFT+F3** key to switch between View 1 and View 3.

### Example



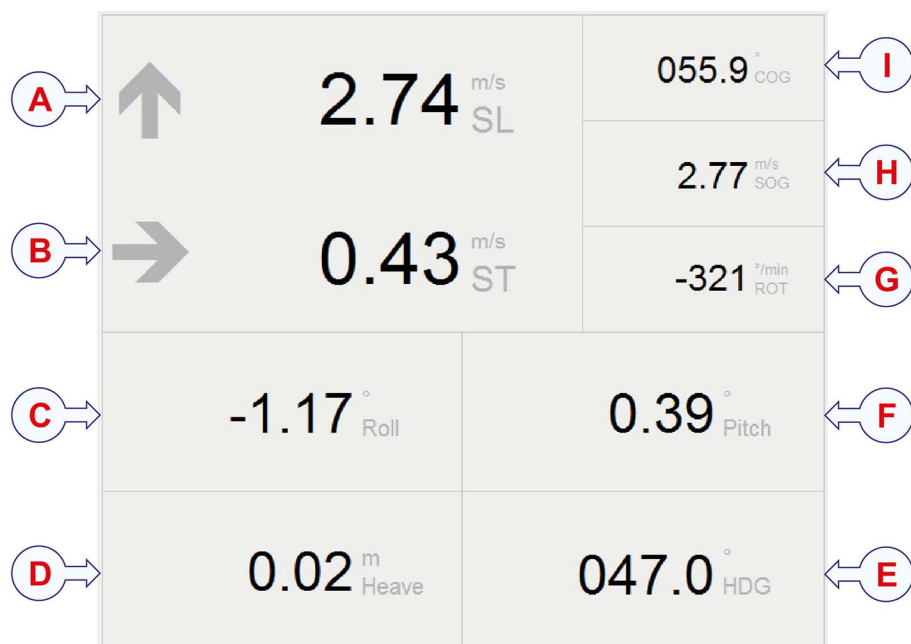
## Motion data view

The main function of the Motion data view is to give information about the speed and heading of the vessel.

### How to open

You can select if you want this view to appear as View 1, View 2 or View 3. Press the **F3** key to switch between views in View 1 and View 2. Press the **SHIFT+F3** key to switch between View 1 and View 3.



**Example****A** Vessel speed along ship (SL)**F** Vessel pitch**B** Vessel speed transverse ship (ST)**G** Vessel rate of turn (ROT)**C** Vessel roll**H** Vessel speed over ground (SOG)**D** Vessel heave**I** Vessel course over ground (COG)**E** Vessel heading (HDG)**Description**

Longitudinal and transversal speed (SL and ST) are presented together with arrows indicating forward/aft and port/starboard directions. The arrows and the vessel's course over ground (COG) are not displayed if the speed over ground (SOG) is less than 0.1 m/s.

Also the vessel roll, pitch, heave and rate of turn (ROT) are shown in this view.

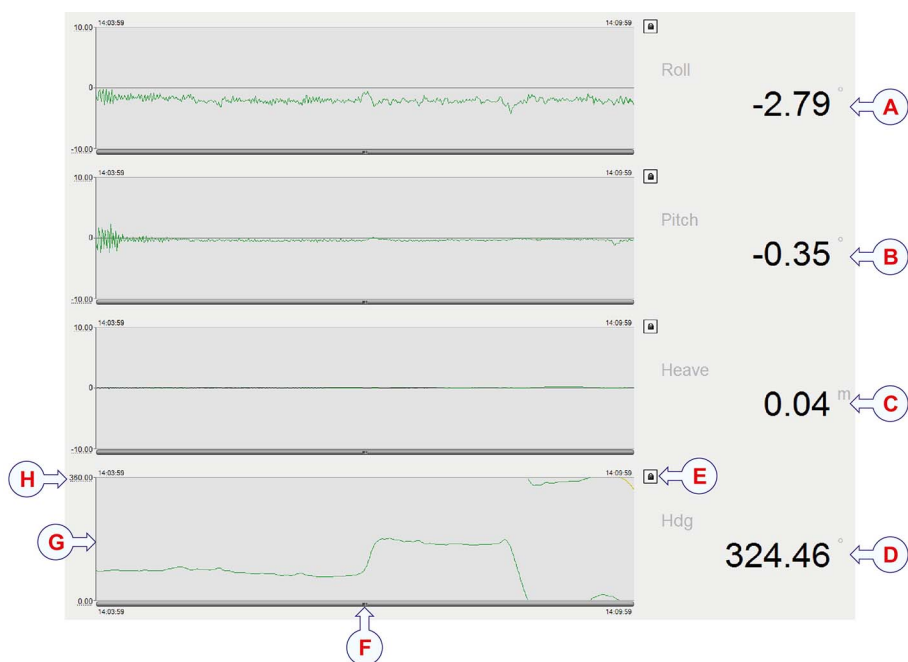
## Time series view

This view plots roll, pitch, heave and heading as time series.

### How to open

You can select if you want this view to appear as View 1, View 2 or View 3. Press the **F3** key to switch between views in View 1 and View 2. Press the **SHIFT+F3** key to switch between View 1 and View 3.

### Example



- |                             |                                |
|-----------------------------|--------------------------------|
| <b>A</b> Roll in degrees    | <b>E</b> Lock/unlock time axis |
| <b>B</b> Pitch in degrees   | <b>F</b> Time axis             |
| <b>C</b> Heave in metres    | <b>G</b> Y axis 0              |
| <b>D</b> Heading in degrees | <b>H</b> Y axis scale, max.    |

### Description

The colour of the time series graph indicates the data quality.

- **Green:** The system performance is normal.
- **Yellow:** The system has reduced accuracy.
- **Red:** The data are invalid.

In the time series for heave both real-time heave and delayed heave are presented in the same time series. Therefore, the heave time series is always 2 minutes delayed in time in order to be able to present both measurements in the same curve and for the same sample.

You can zoom in parts of each plot and pan the time series by dragging the active controls. You can lock the time axis for the time series you want to take a closer look at by selecting the padlock symbol.

# Menu system

## Topics

[View menu, page 59](#)

[Alarm menu, page 62](#)

[Tools menu, page 63](#)

[System menu, page 66](#)

# View menu

The **View** menu provide selections for colour palette, switching between views, display format presentation and display of DGNSS link status bar and/or position data in View 1.

## How to open

Select **View** in the Application menu on the top bar.

## Display mode

**Display mode** controls the selection of colours used by the HMI. Select the menu item which corresponds to the desired mode or colour palette.

You can press the **F7** key to toggle between the day palettes and the **F8** key to switch to the night palette.

### Day white

**Day white** is the recommended colour combination for daylight use.

### Day black

The **Day black** colour combination uses bright colours, but has a dark background.

### Night

**Night** is a special palette with very low contrast on black background, intended to be used during night without weakening the night sight of the operator.

## View

The display is divided into three view sections: View 1, View 2 and View 3. View allows you to decide which view you want to appear in these sections.

### Note

*Browsing or switching views using F2 and F3 is not stored. The only way to ensure that the selected contents is displayed every time the software starts, is to make the selection in the **View** tab in the **Operator software configuration** dialog box.*

View	Alarm
Tools	System
Display mode	
<input checked="" type="radio"/> Day white	
<input type="radio"/> Day black	F7
<input type="radio"/> Night	F8
View	
Maximize main view	F5
Browse top views	F2
Browse bottom views	Shift+F2
Toggle top view	F3
Toggle bottom view	Shift+F3
Display format	
◀ Date format	
◀ Time format	
◀ Position format	
◀ Datum	
◀ Unit system	
Bars	
<input checked="" type="checkbox"/> DGNSS links	
<input checked="" type="checkbox"/> Position data	

Figure 3 Browsing views with F2 key

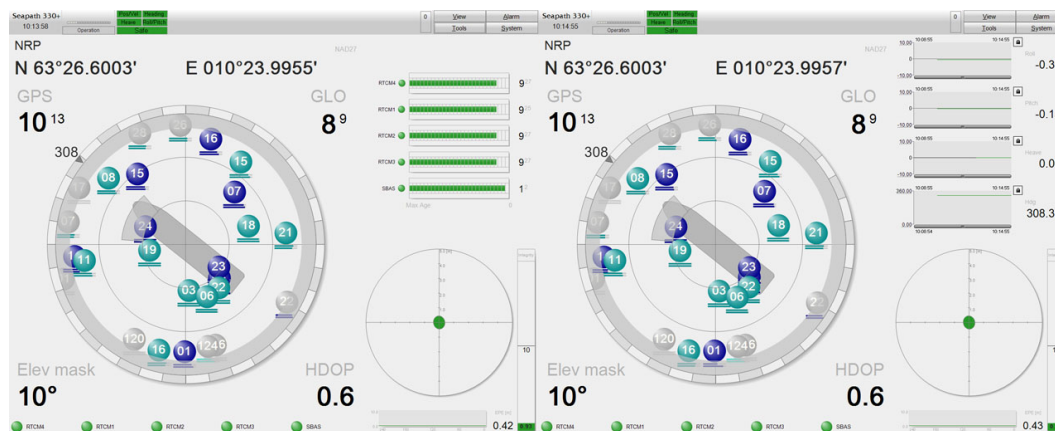
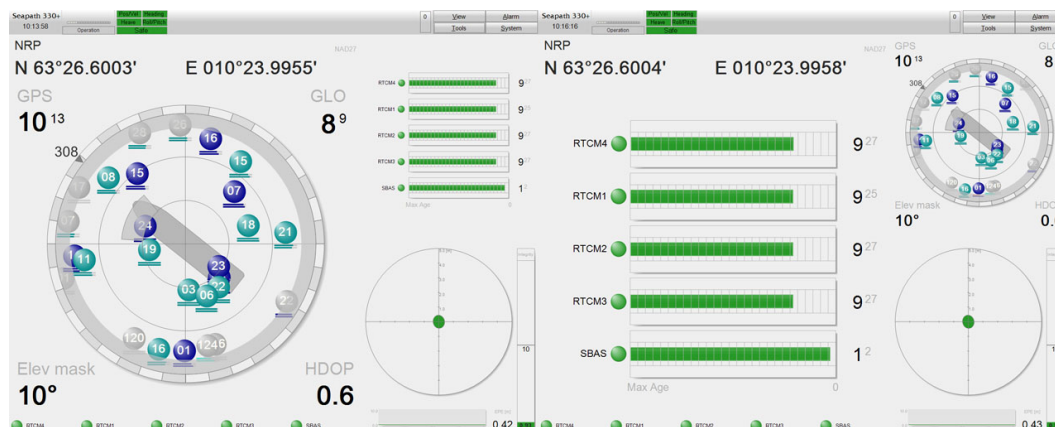


Figure 4 Switching views with F3 key



### Maximise main view

**Maximise main view** allows you to make View 1 cover the whole screen. This has the same effect as pressing the **F5** key.

### Browse top views

**Browse top views** allows you to browse to the next available view in View 2. This has the same effect as pressing the **F2** key.

### Browse bottom views

**Browse bottom views** allows you to browse to the next available view in View 3. This has the same effect as pressing the **SHIFT+F2** key.

### Toggle top view

**Toggle top view** allows you to switch the contents of View 1 and View 2. This has the same effect as pressing the **F3** key.

### Toggle bottom view

**Toggle bottom view** allows you to switch the contents of View 1 and View 3. This has the same effect as pressing the **SHIFT+F3** key.

## Display format

**Display format** provides alternatives to modify the presentation of various data types. When selecting a view menu item of this group, or hovering the mouse cursor over it, a sub-menu will appear to the left, containing option items for selecting the wanted format.

### Date format

**Date format** allows you to select between various date formats. The selected format is used in displayed fields presenting data information. For example the data part of the top bar.

### Time format

**Time format** allows you to select between AM/PM and 24-hour display of time values. This applies to all displayed fields presenting time information. For example current date and time and event information in the top bar.

### Position format

**Position format** allows you to select between decimal seconds (for example N63°26'31.92"), decimal minutes (for example N63°26.5320') and UTM (Universal Transverse Mercator).

### Datum

**Datum** allows you to select the datum in which positions are presented. Be aware that this selection is only valid if the datum on the corrections input to the product is in WGS84 or if no corrections are input. If the corrections input are in another datum than WGS84, you must select WGS84. See the Installation Manual for available selections.

### Unit system

**Unit system** allows you to select the length and speed units used in the various views. Two types of unit system selections are available: Fixed units and Auto-scaling units. Each alternative indicates the distance unit, then the speed unit. Auto-scaling units will change from short range unit to long range unit (indicated in parenthesis) when the number of digits in the displayed value exceeds a certain limit.

Available fixed units:

- NM: knots
- m: m/s
- ft: ft/s

Available auto-scaling units:

- M (km): km/h
- m (NM): knots
- ft (NM): knots

### Bars

**Bars** allows you to decide whether various status bars shall appear at the bottom or top of View 1 or not.

#### DGNSS links

The **DGNSS links** option allows you to display the DGNSS Link status bar at the bottom of View 1.

#### Position data

The **Position data** option allows you to display the vessel position and datum at the top of View 1.

### Related topics

[Browsing or switching display views, page 20](#)

[Selecting colour palette for display, page 22](#)

[Selecting presentation format for display, page 23](#)

[Selecting default position of views in display, page 23](#)

[DGNSS link status bar, page 45](#)

## Alarm menu

The **Alarm** menu allows you to acknowledge alarms, or events, which have occurred in the system. You can also see status details for the alarms which are active.

### How to open

Select **Alarm** in the Application menu on the top bar.

#### Acknowledge alarm

Select the **Acknowledge alarm** option to acknowledge the topmost event viewed in the top bar. You can also press **F10** or select the **Event severity** symbol in the top bar.

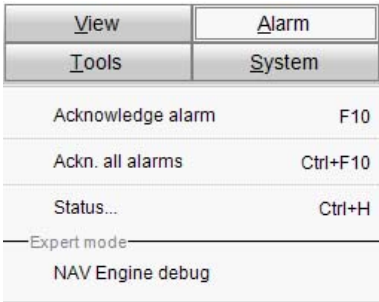
The **Acknowledge alarm** option is disabled if no alarms are available in the **Event list** in the Top bar. Acknowledged alarms are still available in the alarm log, but removed from the Top bar view.

#### Ackn. all alarms

Select the **Ackn. all alarms** option to acknowledge all the events viewed in the **Event list** in the top bar at once. You can also press **Ctrl+F10**. The **Ackn.all alarms** option is disabled if no alarms are available in the top bar.

#### Status

Select **Status** to open the **Alarm status** dialog box. You can also press **Ctrl+H**. This dialog box allows you to see all the active alarms. Use the radio buttons to filter

A screenshot of the 'Alarm' menu in the software. The menu is divided into two columns: 'View' and 'Alarm'. The 'View' column contains 'Tools' and 'System'. The 'Alarm' column contains 'Acknowledge alarm' (F10), 'Ackn. all alarms' (Ctrl+F10), and 'Status...' (Ctrl+H). Below these options is a separator line, followed by 'Expert mode' and 'NAV Engine debug'.

View	Alarm
Tools	System
Acknowledge alarm	F10
Ackn. all alarms	Ctrl+F10
Status...	Ctrl+H
Expert mode	
NAV Engine debug	



the alarms according to alarm severity. You can also acknowledge the selected alarm or all alarms. When an alarm message is acknowledged, but still active, the alarm message text will be grey. The alarm message will only be removed from the list when it becomes inactive.

Expert mode

**Expert mode** contains parameters which can be used for troubleshooting. They are for advanced users only.

NAV Engine debug

**NAV Engine debug** is output of status messages for NAV Engine. This option is for advanced users and troubleshooting purposes.

Related topics

- [Acknowledging events, page 31](#)
- [Event system description, page 43](#)

Tools menu

The **Tools** menu provides applications for planning an operation, configuration tasks and various diagnostic and logging purposes.

How to open

Select **Tools** in the Application menu on the top bar.

Utilities

**Utilities** holds applications for prediction of satellite geometry, export of system data, copying and restoring the system configuration.

Satellite Prediction

The **Satellite Prediction** tool allows you to display the number of satellites and the satellite geometry for a defined position and period.

Data Export

The **Data Export** tool allows you to copy log data to a USB flash drive, either for documentation, post-processing or diagnostics purposes. You can select the start time and the duration of the data export.

Copy Configuration

The **Copy Configuration** tool allows you to copy the complete system configuration to a disk based archive file or to a USB flash drive. You can use the USB flash

<div><div>View</div><div>Tools</div></div>	<div><div>Alarm</div><div>System</div></div>
<div>Utilities</div> <div>Satellite Prediction</div> <div>Data Export</div> <div>Copy Configuration</div> <div>Restore Configuration</div>	
<div>Diagnostics</div> <div>DGNSS Monitor</div> <div>Data Viewer</div> <div>Port Monitor</div> <div>PU access</div> <div>Explorer</div> <div>Windows shell</div> <div>Remote Support</div>	
<div>Log</div> <div>Screen dump</div> <div>NAV Engine Log</div>	

drive with the copied configuration to restore the system configuration at a later date. The use of this application is described in detail in the *Installation Manual*.

### **Restore Configuration**

The **Restore Configuration** tool restores all relevant configurations from a disk based archive file or from a USB flash drive. The use of this application is described in detail in the *Installation Manual*.

#### **Note**

---

*A configuration archive can only be restored from the same type of unit (Remote HMI or Processing Unit) on which it was created.*

---

## **Diagnostics**

**Diagnostics** holds applications for advanced users for diagnostic purposes only.

### **DGNSS Monitor**

The **DGNSS Monitor** tool shows information about available reference stations.

### **Data Viewer**

The **Data Viewer** tool shows raw data information about the satellites which are tracked by the receiver, position fix information, correction data and Processing Unit status. You can use this tool for system verification and diagnostics.

### **Port Monitor**

The **Port Monitor** tool shows the data traffic on all serial and net ports.

### **PU Access**

The **PU Access** tool opens a terminal window for Processing Unit system access.

### **Explorer**

The **Explorer** tool opens Windows Explorer where you can view the file system of the HMI Unit.

### **Windows Shell**

The **Windows Shell** tool opens a Windows command shell.

### **Remote support**

If the **Remote support** tool is installed on the vessel and on the Seapath, a remote support operation can be initiated.

## **Log**

**Log** is for advanced users for diagnostic purposes only.

### **Screen dump**

The **Screen dump** tool creates screen dumps of the operator software. You can store the screen dump image on the local disk or on a USB flash drive.

## NAV Engine Log

The **NAV Engine Log** tool opens the Windows Explorer in the root folder for the NAV Engine log data. If the NAV Engine software is not running on the same unit as the operator software, an FTP (File Transfer Protocol) session is opened on the Processing Unit to which the operator software is connected, rather than a session on the local file system.

### Note

---

*It is recommended to use the **Data Export** tool rather than **NAV Engine Log**.*

---

## Related topics

[Tuning heave measurement performance, page 25](#)

[Satellite Prediction tool, page 27](#)

[Verifying satellite constellation, page 29](#)

[Adding or removing shadow sectors in Sky view, page 30](#)

[Enabling and disabling satellites, page 31](#)

[Exporting log data, page 32](#)

[DGNSS link status bar, page 45](#)

[DGNSS view, page 50](#)

[Investigating red Heading data quality indicator, page 76](#)

[Investigating yellow Heading data quality indicator, page 77](#)

[Investigating red Heave and Roll/Pitch data quality indicator, page 82](#)

[Investigating yellow Heave and Roll/Pitch data quality indicator, page 83](#)

[Updating the system software, page 90](#)

[Creating a backup of the configuration and software installation, page 95](#)

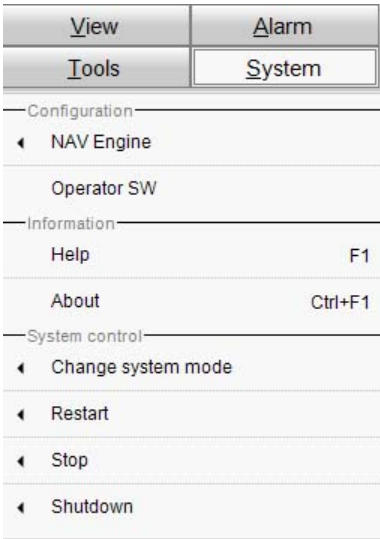
# System menu

The **System** menu allows you to select monitoring point, configure the system, specify the contents of the views, change the system modes, stop and log off the system in a controlled way.

## How to open

Select **System** in the Application menu on the top bar.

Some menu items may be disabled depending on the system mode selection. Disabled menu items appear with light grey text. Change system mode to *Configuration* or *Engineering* to activate the disabled menu items.



## Configuration

**Configuration** allows you to enter the system setup parameters and to enter the display setup settings.

### NAV Engine

The **Standard** option opens the **NAV Engine Configuration** dialog box from which you can set up your system to be ready for operation.

The **Advanced** option is for advanced users only. It is used for diagnostic and troubleshooting purposes.

### Operator SW

The **Operator SW** option opens the **Operator software configuration** dialog box with the tab pages where you can set up visual parameters for the display views.

## Information

**Information** contains quick help and product version information.

### Help

The **Help** option displays the **Quick Help** information sheet with basic information regarding navigation and selection.

### About

**About** displays the **About** dialog box which contains various information about the system, such as contact details and software version. Select **Details** to see more equipment information.

## System control

**System control** allows you to change the mode in which the system shall operate, to stop and restart the operator software, to shutdown and restart the units and to log off the system in a controlled way.

### Change system mode

**Change system mode** allows you to change the system's operating mode. Switching to *Configuration* or *Engineering* mode requires a password. This password is always "stx" and is not possible to change. The password is not case sensitive.

The system will return to *Operation* mode after 3 minutes of user inactivity.

You can also access *Engineering* or *Configuration* mode by key commands directly from the display.

- Press the **Ctrl+E** keys to enter *Configuration* mode
- Press the **Ctrl+A** keys to enter *Engineering* mode.

This opens the password dialogue directly.

### Restart

From the **Restart** option you can stop and immediately start:

- The NAV Engine
- The Operator software
- The Processing Unit
- The HMI Unit
- The GNSS receiver(s)
- The whole system

When restarting the NAV Engine, the Processing Unit or the whole system, the system will stop all processing, calculation and output from the system for about 2 minutes.

When restarting the Processing Unit and/or the HMI Unit, the system will restart automatically and resume operation withing 2 minutes. Restarting the HMI Unit will not affect system calculation and output of data.

When restarting the operator software, the application will stop and then automatically restart. The system will still continue to calculate and output data.

Restarting the GNSS receiver(s) will cause position drop-out for a few minutes.

### Stop

From the **Stop** option you can stop:

- The NAV Engine
- The Operator SW

Stopping the **NAV Engine** will stop data processing. Stopping the **Operator SW** will close the Seapath application but the system will still calculate and output data.

### Shutdown

From the **Shutdown** option you can shut down:

- The Processing Unit

- The HMI Unit
- The whole system

If you use this command to shut down the units or the whole system the units will shut down in a controlled way.

When shutting down the Processing Unit or the whole system, the system will stop all processing, calculation and output from the system for about 2 minutes.

When shutting down the HMI Unit, the system will still calculate and output data.

**Note**

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*Do not turn off the power during the shutdown sequence.*

---

**Related topics**

[Turning off the Seapath system, page 17](#)

[Restarting the Seapath system, page 18](#)

[Changing system modes, page 20](#)

[Selecting default position of views in display, page 23](#)

[Setting up Seapath for post-processing output, page 35](#)

[Investigating yellow Pos/Vel data quality indicator, page 75](#)

[Investigating red Heading data quality indicator, page 76](#)

[Investigating yellow Heading data quality indicator, page 77](#)

[Investigating red indicators in DGNS link status bar, page 80](#)

[Investigating problems with output to external equipment, page 81](#)

[Investigating red Heave and Roll/Pitch data quality indicator, page 82](#)

[Investigating echo sounder depth error, page 84](#)

[Investigating reduced heave in echo sounder, page 85](#)

[Enhancing performance by using GLONASS in RTK solution, page 85](#)

[Improving position availability when satellite geometry is weak, page 86](#)

[Enhancing performance by setting the ionospheric activity, page 87](#)

[Checking the product version, page 94](#)

# Troubleshooting

## Topics

[Investigating why LED indicators are not lit, page 70](#)  
[LED indicators Processing Unit, page 70](#)  
[LED indicators HMI Unit, page 71](#)  
[Investigating missing cursor, page 71](#)  
[Investigating why all data quality status indicators are black, page 72](#)  
[Investigating why all data quality status indicators are red, page 73](#)  
[Checking the Processing Unit IP address, page 73](#)  
[Investigating red Pos/Vel data quality indicator, page 74](#)  
[Investigating yellow Pos/Vel data quality indicator, page 75](#)  
[Investigating red Heading data quality indicator, page 76](#)  
[Investigating yellow Heading data quality indicator, page 77](#)  
[Investigating yellow Roll/Pitch data quality indicator, page 78](#)  
[Investigating large error ellipse in Integrity view, page 79](#)  
[Investigating red indicators in DGNSS link status bar, page 80](#)  
[Investigating problems with output to external equipment, page 81](#)  
[Investigating red Heave and Roll/Pitch data quality indicator, page 82](#)  
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[Investigating echo sounder depth error, page 84](#)  
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[Enhancing performance by using GLONASS in RTK solution, page 85](#)  
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[Connecting the display to the Processing Unit, page 88](#)

[System recovery, page 89](#)

## Investigating why LED indicators are not lit

When you turn on the system, the LED indicators will show normal operation after approximately 30 - 60 seconds.

### Context

The LED indicators are not lit. This may occur if the Processing Unit experiences a power failure.

### Procedure

- 1 Make sure that the system units receive power.
- 2 Try to turn the power switch off and on again.
- 3 Make sure that the fuse within the power connector is not blown.

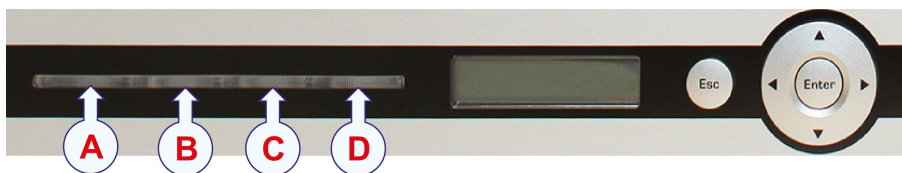
### Related topics

[Changing fuse in Processing Unit power inlet, page 97](#)

[Investigating problems with output to external equipment, page 81](#)

## LED indicators Processing Unit

At the front of the Processing Unit there are four LED indicators (Light Emitting Diode). These LEDs show the Processing Unit status at any time.



- A** *Power/SW LED*
- B** *Inertial Measurement Unit (IMU) LED*
- C** *System health LED*
- D** *Network card LED*

### Power/SW LED

This LED indicates power and software status.

- During start-up the LED is red.
- When the software is up and running, it turns green.



### Inertial Measurement Unit (IMU) LED

The LED indicates the status of the Inertial Measurement Unit (MGC or MRU).

- The LED is green when there is contact with the Inertial Measurement Unit (MGC or MRU) and PPS and data are OK.
- The LED is yellow when there is contact with the MGC or MRU but PPS or data are missing.
- The LED is red when there is no contact with the Inertial Measurement Unit (MGC or MRU).

### System health LED

- The LED is normally off. Other states indicate internal error.

### Network card LED

This LED indicates the status of the four network cards.

- The LED is green when all four network cards are OK.
- The LED is red if there is an error on one or more of the network cards.

### Related topics

[Turning on the Seapath system, page 16](#)

## LED indicators HMI Unit

The HMI Unit does not have any LEDs which show the status of the unit. The LED on the on/off button turns white when the unit is turned on.



### Related topics

[Turning on the Seapath system, page 16](#)

## Investigating missing cursor

The cursor may hide important information. For maximum visibility the cursor is hidden after about one minute of no user activity.

### Procedure

- Move the mouse to show the cursor again.

## Investigating why all data quality status indicators are black

During normal operation it takes a minute from the Processing Unit receives power until the four data quality status indicators in the top bar turn red.

### Context

If the data quality status indicators are still black after three minutes, this must be investigated.

If the data quality indicators are still not turning red, contact your nearest Kongsberg Discovery office.

Pos/Vel	Heading
Heave	Roll/Pitch

### Procedure

- 1 Power failure
  - a Make sure that the Processing Unit receives power.
  - b Try to turn the power switch off and on again.
  - c Make sure that the fuse within the power connector is not blown.
- 2 Broken connection between units
  - a Make sure that the Ethernet cable between the Processing Unit and the HMI Unit is not damaged.
  - b Make sure that the Ethernet cable between the Processing Unit and the HMI Unit is properly inserted into the LAN ports.
  - c Make sure that you have the correct IP addresses for the Processing Unit and the HMI Unit.

The default IP address of the Processing Unit and the HMI Unit is given in the *Seapath Installation Manual, Changing the Processing Unit IP address and Changing the HMI Unit IP address*.
  - d Inspect the connection parameters in the **Operator software configuration** dialog box, **Data source** page.

### Related topics

[Changing fuse in Processing Unit power inlet, page 97](#)

[Checking the Processing Unit IP address, page 73](#)

## Investigating why all data quality status indicators are red

During normal operation it takes up to 30 minutes from the Processing Unit receives power until full accuracy on all data is obtained and the four data quality status indicators in the top bar change colour from red.

### Context

If the data quality status indicators are still red after 30 minutes, this must be investigated.

If the data quality indicators are still red, contact your nearest Kongsberg Discovery office.

Pos/Vel	Heading
Heave	Roll/Pitch

### Procedure

- 1 Make sure that the antenna cables and the IMU (Inertial Measurement Unit) cable are properly connected to the Processing Unit.
- 2 If they are not properly connected, turn off the power, reconnect the cables and turn the power back on.
- 3 Make sure that the cable from the Processing Unit to the IMU junction box is correctly terminated.
- 4 Make sure that the cable from the junction box to the IMU is properly connected.
- 5 Make sure that the fuse in the junction box is not blown. Replace it if it is.

## Checking the Processing Unit IP address

If you have no connection with the Processing Unit, it can be due to an incorrect IP address.

### Prerequisites

An external display and a keyboard is needed.

### Procedure

- 1 Connect an external display and a keyboard to the corresponding ports at the rear of the Processing Unit.
- 2 Log in with these log in credentials:
  - User name: **root**
  - Password: **baf**

The user name and password are case sensitive.

- 3 Type `mdedit opt/seatex/bin/ipconfig.cfg`

- 4 Press **Enter**.
- 5 Type the correct network settings.
- 6 Exit the editor by pressing the **F10** key.  
The message `File was modified, save with exit?` appears.
- 7 Select **Yes**. Press **Enter**.
- 8 Restart the Processing Unit by typing `reboot`. Press **Enter**.  
The Processing Unit will start after a few minutes.
- 9 Disconnect the external display and keyboard.

#### Related topics

[Investigating why all data quality status indicators are black, page 72](#)

## Investigating red Pos/Vel data quality indicator

During operation situations may occur where the system does not receive any data from the GNSS receivers.

#### Context

Should such a situation occur, the **Pos/Vel** data quality status indicator in the top bar will turn red.

#### Procedure

- 1 Make sure that the GNSS antennas are not damaged.
- 2 Make sure that the GNSS antenna cables are not damaged.
- 3 Make sure that there is no water penetration on the GNSS antenna connectors.
- 4 Make sure that the GNSS antenna cables are properly and correctly connected to the Processing Unit.
  - a Select the **Tools** menu → **Port Monitor**. Make sure that data from GNSS antenna #1 appear on GNSSA1 and data from antenna #2 appear on GNSSB1.
- 5 If the **Pos/Vel** indicator is still red, the GNSS receiver boards within the Processing Unit may be damaged. Then the Processing Unit must be shipped back to Kongsberg Discovery AS for repair.

#### Related topics

[Data quality status, page 44](#)

## Investigating yellow Pos/Vel data quality indicator

During operation situations may occur where the system experiences reduced position/velocity.

### Context

Should such a situation occur, the **Pos/Vel** data quality status indicator in the top bar will turn yellow.

A reduced position/velocity function may be due to lack of differential corrections or an incorrect antenna or IMU offset setup.

### Procedure

- 1 Make sure that the DGNSS link is properly set up in the **NAV Engine Configuration**.  
Select the **System** menu → **NAV Engine** → **Standard** → **Communication interface** → **Input/Output** → **DGNSSLink**.
- 2 Make sure that the vessel is in range of a radio reference station.  
If the reference station is too far away or it is in the shadow of geographical obstructions or other equipment on board, reception may be unreliable or missing. The location of the reference stations connected to system is shown in the **DGNSS Monitor** under the **Tools** menu.
- 3 Make sure that the reference station is functioning.  
Confirm the status of the reference station with the responsible authorities or contact your nearest Kongsberg Discovery AS office.
- 4 Make sure that the antenna or the IMU (Inertial Measurement Unit) offset setup is correct.  
Make sure that the lever arms from NRP to antenna #1 and to the IMU are correct.  
Select the **System** menu → **NAV Engine** → **Standard** → **Sensors** → **MRU/MGC** → **Geometry**. Make sure that the sign for each of the vector components is correct.

### Related topics

[Data quality status, page 44](#)

[System menu, page 66](#)

## Investigating red Heading data quality indicator

During operation situations may occur when the system does not receive any GNSS data from the two antennas.

### Context

Should such a situation occur, the **Heading** data quality status indicator in the top bar turns red.

You may or you may not have a gyro compass connected to your system.

### Procedure

A gyro compass is not connected to the system:

- 1 Make sure that the antenna baseline parameters in the antenna configuration are set up correctly.  
Select the **System** menu → **NAV Engine** → **Standard** → **Sensors** → **GNSS** → **Geometry**.  
If needed, re-measure and perform a new calibration of the antenna baseline.
- 2 Make sure that the system receives data from the GNSS receivers.
  - a Use the **Port Monitor** tool to see if data are coming in to the system.  
Select the **Tools** menu → **Port Monitor**. Select **GNSSA1** for antenna #1 and **GNSSB1** for antenna #2.
  - b If no data appear on the **Port Monitor**, make sure that the cables from the GNSS antennas are not damaged.
  - c Make sure that the cables from the GNSS antennas are properly and correctly connected to the **GNSS1** and **GNSS2** connectors on the Processing Unit.
  - d Make sure that the GNSS antennas are not damaged.
- 3 If the **Heading** indicator is still red, the GNSS receiver boards within the Processing Unit may be damaged. Then the Processing Unit must be shipped back to Kongsberg Discovery AS for repair.

A gyro compass is connected to the system:

- 4 Investigate the steps above.
- 5 Make sure that a gyro compass signal is connected to the Processing Unit.
- 6 Make sure that data are coming in from the gyro compass.  
Use the **Port Monitor** tool to see if data are coming in to the system.  
Select the **Tools** menu → **Port Monitor**. Select the **Serial** tab.

- 7 Make sure that the communication line on which the data from the gyro compass is received, is working properly.

Data from the gyro compass is normally input on COM 9.

#### Related topics

[Data quality status, page 44](#)

[System menu, page 66](#)

[Tools menu, page 63](#)

## Investigating yellow Heading data quality indicator

During operation situations may occur when the system experiences reduced heading performance.

#### Context

If the system experiences reduced heading, the **Heading** data quality status indicator in the top bar turns yellow.

#### Procedure

- 1 Make sure that the IMU (Inertial Measurement Unit) is working as intended.
- 2 Make sure that the antenna baseline parameters in the antenna configuration are set up correctly.  
 Select the **System** menu → **NAV Engine** → **Standard** → **Sensors** → **GNSS** → **Geometry**.  
 If needed, re-measure and perform a new calibration of the antenna baseline.
- 3 Make sure that the system receives data from the GNSS receivers.
  - a Use the **Port Monitor** tool to see if data are coming in to the system.  
 Select the **Tools** menu → **Port Monitor**. Select **GNSSA1** for antenna #1 and **GNSSB1** for antenna #2.
  - b If no data appear on the **Port Monitor**, make sure that the cables from the GNSS antennas are not damaged.
  - c Make sure that the cables from the GNSS antennas are properly and correctly connected to the **GNSS1** and **GNSS2** connectors on the Processing Unit.
- 4 Make sure that the GNSS antennas are of the same type and that they are mounted in the same orientation.  
 If not, the heading could get unstable and it switches from normal to reduced heading performance frequently.
- 5 Make sure that the GNSS antennas are not damaged.

- 6 If the **Heading** indicator is still yellow, the GNSS receiver boards within the Processing Unit may be damaged. Then the Processing Unit must be shipped back to Kongsberg Discovery AS for repair.

#### **Related topics**

[Data quality status, page 44](#)

[System menu, page 66](#)

[Tools menu, page 63](#)

## Investigating yellow Roll/Pitch data quality indicator

Sometimes the system may experience reduced roll or pitch performance.

### **Context**

If the system experiences reduced roll or pitch performance, the **Roll/Pitch** data quality status indicator in the top bar will turn yellow.

### **Procedure**

- 1 Make sure that the x-arrow on the IMU (Inertial Measurement Unit) is properly aligned with the ship's longitudinal axis.  
  
A misalignment of only one degree will reduce the performance when exposed to heavy motions due to cross-coupled roll and pitch measurements. If not already done, make sure that the IMU's yaw offset according to the ship's longitudinal axis is accurately measured and entered into the configuration software.
- 2 Make sure that the IMU is within the recommended calibration period.  
  
If there has been several years since the IMU was last calibrated, you must contact Kongsberg Discovery AS to see if the unit needs recalibration.

#### **Related topics**

[Data quality status, page 44](#)

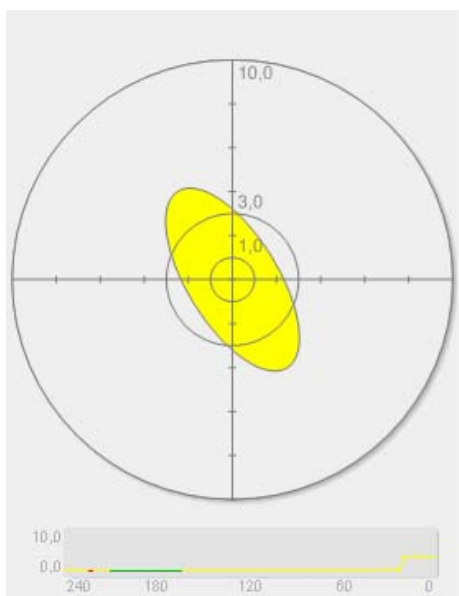


## Investigating large error ellipse in Integrity view

During operation situations may occur where few satellites are tracked by the receiver. This is indicated with a large error ellipse in the **Integrity** view.

### Context

This situation is often experienced on vessels working close to offshore platforms or other shadowing objects. A problem with few satellites is very often due to shadowing of the GNSS antenna, poor antenna connectors or poor antenna cable. The error ellipse in the *Integrity* view will indicate a situation with few satellites.



### Procedure

- 1 Shut down the Processing Unit using the shutdown procedure and turn it on again after a couple of minutes.

It will usually take up to five minutes before the position is stable after a restart. In the restart sequence the GNSS receiver will be reset and this may solve the problem.

- 2 Make sure that the GNSS antenna is not damaged.
- 3 Make sure that the GNSS antenna cable is not damaged.
- 4 Make sure that there is no water penetration in the GNSS antenna connectors.
- 5 Make sure that nearby equipment is not creating interference signals.  
This can be tested by turning off active equipment near the GNSS antenna.

### Related topics

[Integrity view, page 51](#)

[Turning off the Seapath system, page 17](#)

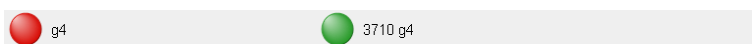
## Investigating red indicators in DGNSS link status bar

During operation situations may occur where the system does not receive corrections from all the differential correction sources or no differential corrections at all.

### Context

Loss of differential corrections can be seen in the **DGNSS link status** bar at the bottom of the display. If there are several differential correction links interfaced to the Processing Unit, a problem with one of the links may not degrade the position solution. If all the links are missing, the position will be severely degraded due to the non-differential position solution.

If one or more of the links are missing, the **DGNSS link status** bar will show the missing correction link as a red circle.



The DGNSS view will also show the missing correction link(s) with a red colour.

The top bar will show a DGNSS link warning when correction data are missing.

### Satellite differential correction systems

Differential corrections are usually received from a DGNSS receiver which receives data from either a Spotbeam satellite or an Inmarsat satellite.

See the user manual for the DGNSS receiver used in your system for operation and troubleshooting.

### Procedure

- 1 Make sure that the DGNSS antenna cable is properly connected.
- 2 Make sure that the DGNSS antenna is not damaged.
- 3 Make sure that the DGNSS antenna cable is not damaged.
- 4 Make sure that there is no water penetration in the antenna connectors.
- 5 Make sure that the cabling between the Processing Unit and external DGNSS receivers is correct.
- 6 Make sure that nearby equipment is not creating interference signals.  
This can be tested by turning off active equipment near the DGNSS antenna.
- 7 If a Fugro high precision service is used, make sure the subscription from Fugro Satellite Positioning is valid.
- 8 Inspect the DGNSS link settings in the **NAV Engine Configuration** dialog box → **Communication Interface** → **Input/Output**.

**Related topics**[DGNSS link status bar, page 45](#)[DGNSS view, page 50](#)[System menu, page 66](#)

## Investigating problems with output to external equipment

During operation situations may occur where the external equipment receives no data from the Processing Unit.

**Context**

The system is connected to external equipment either through Ethernet or serial interface.

See a description of the layout of the rear panel of the Processing Unit in the *Seapath Installation Manual*.

You can find the IP addresses for the Processing Unit in the *Seapath Installation Manual*.

**Procedure**

- 1 Make sure that the Processing Unit has power.
- 2 If Ethernet connection is used, make sure that you have the correct IP address for the Processing Unit.
- 3 Make sure that the serial lines, the network cables and the cable connectors are not damaged.
- 4 Make sure that the connectors are connected to the correct output ports both on the Kongsberg Discovery equipment and on the external equipment.
- 5 Make sure that the external output configuration of the Processing Unit is set up correctly in the **Nav Engine Configuration** dialog box → **Communication Interface** → **Input/Output**.

**Related topics**[Investigating why LED indicators are not lit, page 70](#)[System menu, page 66](#)

## Investigating red Heave and Roll/Pitch data quality indicator

If the **Heave** and **Roll/Pitch** data quality indicators in the top bar are red, a possible cause can be that the Processing Unit does not receive any data from the IMU (Inertial Measurement Unit (Motion Sensor and Gyro Compass (MGC) or Motion Reference Unit (MRU)).

### Context

Use the **Port Monitor** tool to check for no data reception from the Inertial Measurement Unit.

Refer to the user manuals for the Motion Sensor and Gyro Compass (MGC) or Motion Reference Unit (MRU) for troubleshooting of these units.

Pos/Vel	Heading
Heave	Roll/Pitch

### Procedure

- 1 Make sure that the cable from the MGC/MRU is properly connected to the MRU terminal at the rear of the Processing Unit.
- 2 Make sure that the MGC/MRU cable is properly terminated in the junction box.
- 3 Make sure that the MGC/MRU has power.
- 4 Make sure that the fuse in the junction box is not blown. Replace it if it is.
- 5 Make sure that you have selected the correct type of Inertial Measurement Unit for your system in the **NAV Engine Configuration** dialog box → **Sensors** → **MGC/MRU Geometry**.
- 6 Make sure that data are received on the MRU terminal on the Processing Unit by selecting the **Tools** menu → **Port Monitor** → **MGC** or **MRU**.

### Related topics

[Tools menu, page 63](#)

[Data quality status, page 44](#)

[System menu, page 66](#)

## Investigating yellow Heave and Roll/Pitch data quality indicator

If the **Heave** and **Roll/Pitch** data quality indicators in the status indicators on the top bar are yellow, a possible cause can be that the data received from the Inertial Measurement Unit (IMU) are unstable.

### Context

Use the **Data Viewer** tool to check for unstable data reception from the Inertial Measurement Unit.

If the system still does not receive signals from the Inertial Measurement Unit after you have carried out the checks below, then the IMU has most likely failed and it has to be shipped to Kongsberg Discovery AS for repair.

Pos/Vel	Heading
Heave	Roll/Pitch

### Procedure

- 1 Select the **Tools** menu → **Data Viewer** → **PPS and time**. Check if the **Status** parameter under **PPS information** indicates **Sync**.

If this is the case, the Processing Unit and the MGC/MRU are probably synchronized with GPS.

- 2 In order to be sure that the Processing Unit receives MRU data on time, select the **Tools** menu → **Data Viewer** → **Time delay**.

The time delay for the Raw MRU parameter should be 0.020 seconds or less. If the time delay is greater than 0.020, the MGC/MRU cable carrying the PPS signal from the Processing Unit is not properly connected.

- 3 Make sure that the connections in the Junction Box are correctly installed.

### Related topics

[Tools menu, page 63](#)

[Data quality status, page 44](#)

## Investigating echo sounder depth error

Sometimes the system may experience depth errors in the outer beams on a multi-beam echo sounder.

### Procedure

- 1 Make sure that the mounting angle around the z-axis is correct.  

The oscillations in the depth of the outer beams are correlated with the pitch angle of the vessel. The sensor unit x-axis has to be parallel with the ship's longitudinal axis as long as the echo sounder transducer head is aligned with the ship axes.
- 2 Make sure that the distance vector from origin to the IMU and the GNSS antenna is correct, both with regard to length and sign.  

The oscillations in the depth of the outer beams are correlated with the roll angle of the vessel. Make sure that the distance vector from the ship's origin to the IMU (Inertial Measurement Unit) is input correctly both when it comes to the length and the sign. Also make sure that the vector from origin to GNSS antenna no. 1 is input correctly both when it comes to the length and sign. Make sure that the sign in the vertical direction has a negative sign. This sign shall always be negative. Look at the background vessel in the **NAV Engine Configuration** to make sure that the arms and vector signs look correct.
- 3 Make sure that the measurements from the data sources are handled correctly.  

There is incorrect synchronisation of the Seapath and the multi-beam data (timing error). Make sure that the measurements from the two data sources are handled correctly and that a timing error has not occurred. Post-processing of the Seapath and the multi-beam data can be used to analyse whether incorrect synchronisation is the reason for the depth errors.

### Related topics

[System menu, page 66](#)

## Investigating reduced heave in echo sounder

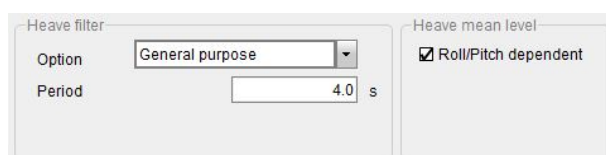
The IMU (Inertial Measurement Unit) may be connected to an echo sounder. Sometimes the echo sounder may experience reduced performance in heave or depth errors in the centre beam.

### Context

#### Note

*Be aware that the Seapath outputs heave measurements in the Navigation Reference Point (NRP), and not in the transducer location, unless the vector from the NRP to the transducer head (Monitoring Point, MP) is entered into the **NAV Engine Configuration** and defined on the output data string.*

*Note that the horizontal vector components from the NRP to MP are defined positive forward, to starboard and down.*



### Procedure

- There are oscillations in heave or in the depth of the centre beams.  
Select the **System** menu → **NAV Engine** → **Standard** → **Sensors** → **MRU/MGC** → **Heave config**. Make sure that the correct **Heave filter** mode and **Period** are selected.

### Related topics

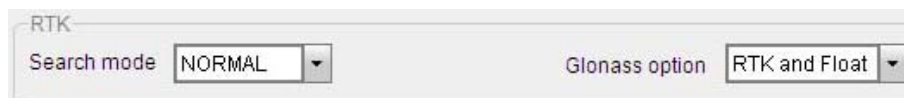
[System menu, page 66](#)

## Enhancing performance by using GLONASS in RTK solution

The RTK (Real Time Kinematic) parameters allow you to enhance the precision of position data which are derived from satellite-based positioning systems, such as GPS and GLONASS.

### Context

These settings can be changed to optimise the performance in RTK mode.



### Search mode

The default search mode is **Normal**. **Safe** mode is recommended used under difficult conditions with much multipath or ionospheric activity and for long baselines. **Fast** mode is recommended used when a fast RTK solution is required.

#### Note

*In **Fast** mode the probability for an incorrect solution from the system will increase.*

---

### Glionass option

The default setting is **RTK and Float**. The **RTK and Float** option is recommended used under conditions where the RTK correction source is known (own local reference station). The **Float only** option is used when the system has problems with getting an RTK solution. The **Off** option is used when the RTK corrections include only dual frequency GPS corrections.

### Procedure

- 1 Select the **System** menu → **NAVEngine** → **Standard**.
- 2 Select **Sensors** → **DGNSS** → **RTK**.
- 3 In the **Search mode** drop-down list, select the wanted search mode if you do not want the default mode **Normal**.
- 4 In the **Glionass option** drop-down list, select the wanted parameter if you do not want the default parameter **RTK and Float**.
- 5 Select **Apply** to save the settings.

### Related topics

[System menu, page 66](#)

## Improving position availability when satellite geometry is weak

For operations with weak satellite geometry, the use of height aiding and/or a lower elevation mask, may improve the position availability.

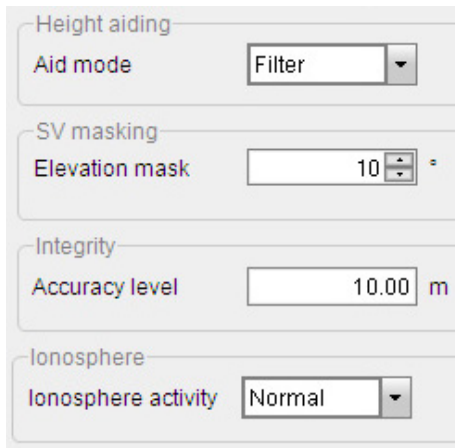
### Context

Available **Height aiding** mode values are **Filter** and **Off**. The **Height aiding** mode is normally set to **Filter**. In the **Filter** mode, the processing software will use the averaged antenna height measurement as a contribution to the position solution. For operations with varying height, **Height aiding** mode should be set to **Off**.

The elevation mask has a default value of 10 degrees, which is the recommended setting for most scenarios. Under special conditions the **Elevation mask** can be changed in



order to improve the satellite geometry or reduce multipath. The recommended value range is from 7 to 15 degrees.



The screenshot shows a settings panel with four sections:

- Height aiding:** Contains a dropdown menu labeled 'Aid mode' with 'Filter' selected.
- SV masking:** Contains a numeric input field labeled 'Elevation mask' with the value '10' and a degree symbol.
- Integrity:** Contains a numeric input field labeled 'Accuracy level' with the value '10.00' and a unit 'm'.
- Ionosphere:** Contains a dropdown menu labeled 'Ionosphere activity' with 'Normal' selected.

### Procedure

- 1 Select the **System** menu → **NAVEngine** → **Standard**.
- 2 Select **Sensors** → **GNSS** → **Processing**.
- 3 Select the wanted height aiding value from the **Aid mode** drop-down list.  
Available values are **Filter** or **Off**.
- 4 Select the wanted elevation mask from the **Elevation mask** drop-down list.  
The default value is 10. Recommended value range is 7 – 15 degrees.
- 5 Select **Apply** to save the settings.

### Related topics

[System menu, page 66](#)

## Enhancing performance by setting the ionospheric activity

The ionospheric activity will influence system performance and the ionosphere activity level can be set to help the system optimise the way it behaves under various conditions.

### Context

#### Note

*During periods with increased ionospheric activity, this value should be set to **High** for optimised system performance. Distant single frequency reference stations will then have less influence on the position calculations.*

The screenshot shows a settings panel with four sections, each with a title and a control element:

- Height aiding**: Contains a label 'Aid mode' and a dropdown menu currently showing 'Filter'.
- SV masking**: Contains a label 'Elevation mask' and a numeric input field with the value '10' and a unit '°'.
- Integrity**: Contains a label 'Accuracy level' and a numeric input field with the value '10.00' and a unit 'm'.
- Ionosphere**: Contains a label 'Ionosphere activity' and a dropdown menu currently showing 'Normal'.

### Procedure

- 1 Select the **System** menu → **NAVEngine** → **Standard**.
- 2 Select **Sensors** → **GNSS** → **Processing**.
- 3 Select the ionospheric activity from the **Ionospheric activity** drop-down list.  
Available values are **Normal**, **Medium** and **High**. The default value is **Normal**.
- 4 Select **Apply** to save the settings.

### Related topics

[System menu, page 66](#)

## Connecting the display to the Processing Unit

If a situation occurs where the display is connected to the HMI Unit with a HDMI cable, and you want to connect the display to the Processing Unit, you must install an adapter.

### Prerequisites

A Display Port cable adapter must be available.

### Context

The display is usually connected to the HMI Unit from a Display Port at the rear of the HMI Unit. If you have connected the display to the HDMI Unit with a HDMI cable, you must install an adapter as the Processing Unit has a Display Port connector at the rear, and not a HDMI connector.

You must shut down the Processing Unit while performing this procedure, and then turn it on again afterwards. If you do not shut down the Processing Unit, the display will be black.

**Procedure**

- 1 Turn off the Processing Unit using the shut down procedure.
- 2 Remove the Display Port cable or the HDMI cable from the HMI Unit.
- 3 Install a Display Port cable adapter if you are using an HDMI cable.
- 4 Connect the Display Port connector to the Display Port at the rear of the Processing Unit.
- 5 Turn on the Processing Unit.

**Related topics**

[Turning off the Seapath system, page 17](#)

## System recovery

In case of a disk crash or other system malfunction, the system may have to be reinstalled. In these cases, consult Kongsberg Discovery AS customer service for guidance on how to reinstall the system.

The system is delivered with a system recovery image stored on the internal disk and on a bootable USB flash drive (Backup stick). This image contains support software ensuring quick and easy system recovery. The system will be fully operative within less than an hour from the installation process is initiated.

See the Seapath *Installation manual* for a description on how to restore from or update the system backup.

# Maintenance

## Topics

[Software updates, page 90](#)

[Checking the product version, page 94](#)

[Creating a backup of the configuration and software installation, page 95](#)

[Periodic maintenance, page 96](#)

[Repairs and parts replacement, page 98](#)

## Software updates

### Topics

[Updating the system software, page 90](#)

[Updating the remote HMI Unit software only, page 92](#)

[Investigating the "NavEngine upgrade failed" message, page 93](#)

[Investigating the "Software upgrade failed" message, page 94](#)

## Updating the system software

We recommend that you keep your product updated with the latest software version.

### Prerequisites

You have received a USB flash drive with the latest software from Kongsberg Discovery AS.

Or you have received a zip file with the latest software via email from Kongsberg Discovery AS. Then you must copy the new software to a USB flash drive. You must

extract the contents of the zip file to the root folder of a USB flash drive. Make sure that the flash drive contains a folder named **Seapath** in the root directory after extraction.

### Context

It is recommended to copy the current system configuration both to a USB flash drive and to a folder on the system hard drive before you start the software update procedure. Use the **Copy Configuration** tool on the **Tools** menu to copy the current system configuration.

The operator software and the NAV Engine will stop during the software installation process. This will also stop all output to external systems. For example dynamic positioning (DP).

Progress information will be updated throughout the installation process. The operator software is updated first. Upon successful update of the operator software, the NAV Engine update starts.

During the NAV Engine update, the four LEDs at the front of the Processing Unit start to flash.

If the GNSS receiver firmware is upgraded, the waiting time for NAV Engine update might be up to 25 minutes. Do not under any circumstance interrupt the update. This may damage the GNSS receiver.

All relevant configuration from the old system is maintained. There should be no need to re-enter configuration parameters after update.

### Caution

---

*If the USB flash drive is removed before prompted by the system, the update will fail and leave the system in an indeterminate state!*

---

### Procedure

- 1 Insert the USB flash drive with the software update into the USB port at the front of the HMI Unit.

The message Upgrade disk inserted in USB port. Do you want to run upgrade software? appears.

- 2 Select **Yes**.

The message IMPORTANT! Do not remove memory stick during upgrade appears.

A message informing you of the software versions involved in the update and the text Do you want to upgrade?, appears.

- 3 Select **Install**.

The software update process will start.

- 4 Wait for the software update process to finish.

The operator software is updated first. Then the NAV Engine update will start.

The message `Waiting for NavEngine upgrade script to finish` appears.

**Caution**

---

*If the GNSS receiver firmware is updated, the waiting time for NAV Engine update might be up to 25 minutes. Do not under any circumstance interrupt the update. This may damage the GNSS receiver.*

---

When the software update has been successfully installed, the message `Software upgrade SUCCESS`. Click OK and remove memory stick, appears.

- 5 Select **OK**.
- 6 Remove the USB flash drive.

**Result**

The system software starts automatically when the software update process is finished. Data output to external systems will start up again.

**Related topics**

[Tools menu, page 63](#)

## Updating the remote HMI Unit software only

More than one HMI Unit can be connected to the Processing Unit.

**Prerequisites**

You have received a USB flash drive with the latest software from Kongsberg Discovery AS.

Or you have received a zip file with the latest software via email from Kongsberg Discovery AS. Then you must copy the new software to a USB flash drive. You must extract the contents of the zip file to the root folder of a USB flash drive. Make sure that the flash drive contains a folder named **Seapath** in the root directory after extraction.

**Context**

This procedure is intended for updating all but the first HMI Unit.

In order to avoid updating the NAV Engine software on the Processing Unit each time a remote HMI Unit is updated, we recommend that the file `NavEngineUpgrade.zip` in the `Seapath` folder on the USB flash drive is temporarily renamed to `_NavEngineUpgrade.zip` after you have updated the first HMI Unit. In this way, only the operator software on the other HMI Units will be updated.

### Caution

---

*If the USB flash drive is removed before prompted by the system, the update will fail and leave the system in an indeterminate state!*

---

### Procedure

- 1 Insert the USB flash drive with the software update into the USB port at the front of the HMI Unit.

The message Upgrade disk inserted in USB port. Do you want to run upgrade software? appears.

- 2 Select **Yes**.

The message IMPORTANT! Do not remove memory stick during upgrade appears.

A message informing you of the software versions involved in the update and the text Do you want to upgrade?, appears.

- 3 Select **Install**.

The software update process will start.

The operator software will stop during installation.

- 4 Wait for the software update process to finish.

When the software update has been successfully installed, the message Software upgrade SUCCESS. Click OK and remove memory stick, appears.

- 5 Select **OK**.

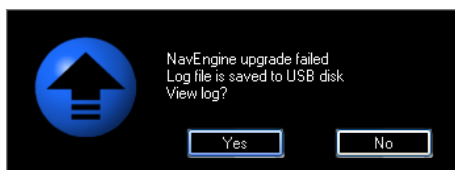
- 6 Remove the USB flash drive.

The system software starts automatically when the software update process is finished

## Investigating the "NavEngine upgrade failed" message

If, for some reason, the update of the NavEngine software failed, you can determine the cause of the failure by looking in the log file created during the software update process.

### Context



### Procedure

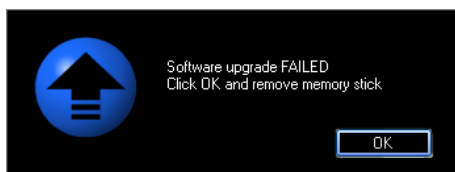
- 1 If the NavEngine software update fails, this message NavEngine upgrade failed. Log file is saved to USB disk. View log?, appears.
- 2 Select **Yes** to view the installation log.
- 3 Send the log file to Kongsberg Discovery AS customer support.  
They will use the log file as a tool for further assistance.

## Investigating the "Software upgrade failed" message

If, for some reason, the update of the operator software failed, you must contact Kongsberg Discovery AS customer support for further assistance.

### Context

In case an upgrade step in the software update process should fail, a message will appear. This may apply to the operator software, the NavEngine or receiver firmware update.



### Procedure

- 1 If the operator software update fails, this message Software upgrade FAILED. Click OK and remove memory stick, appears.
- 2 Select **Yes**.
- 3 Contact Kongsberg Discovery AS customer support for further assistance.

## Checking the product version

For software updates, or contact with customer support, it is useful to know the product version of this product.

### Procedure

- 1 Select the **System** menu → **About**.
- 2 Observe the current Seapath system product version.
- 3 Select **Details** to view more detailed information about the system. Such as serial numbers, software version, firmware version etc.
- 4 Select **Close** to close the dialog box.



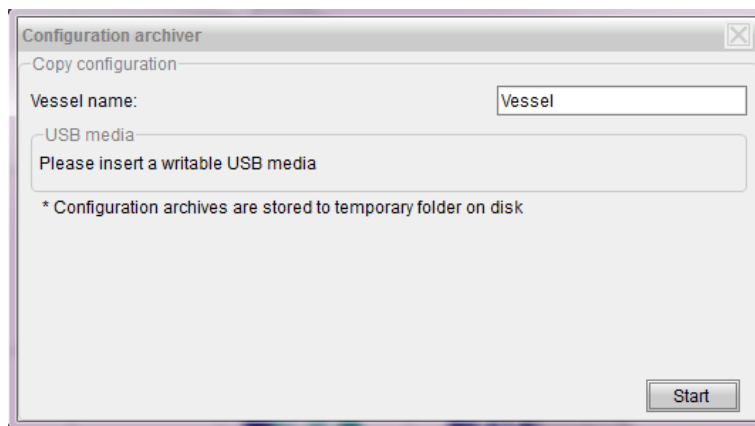
**Related topics**[System menu, page 66](#)

## Creating a backup of the configuration and software installation

If you have a complex configuration setup in your system, it can be useful to make a copy of this configuration in case you should need it later. The **Copy Configuration** tool will copy the system configuration to a disk based archive file or to a USB flash drive.

**Context****Note**

*This procedure will only copy the configuration setup and not a full image of the installed system.*

**Note**

*If a USB flash drive is not inserted, the archive will be stored in a temporary location on the local disk. In this case, the archive will only be available for restore until the next reboot.*

**Procedure**

- 1 Insert a USB flash drive into the USB port at the front of the HMI Unit.
- 2 Select the **Tools** menu → **Copy Configuration**.
- 3 The configured vessel name is automatically entered into the **Vessel name** box but you can change this if you want.
- 4 Select **Start** to copy the configuration files to the USB flash drive.  
The copied configuration will be stored as a compressed archive (ZIP file) under the **ConfigBackup** folder in the root of the USB flash drive.

## Result

You can use the USB flash drive with the copied configuration to restore the system configuration at a later date.

## Related topics

[Tools menu, page 63](#)

# Periodic maintenance

## Topics

[Cleaning of Processing Unit air inlet, page 96](#)

[Changing fuse in Processing Unit power inlet, page 97](#)

[Cleaning the GNSS antenna, page 97](#)

## Cleaning of Processing Unit air inlet

The air inlet at the rear of the Processing Unit needs to be cleaned regularly to avoid overheating of the unit.

## Context

The period between each cleaning is dependent on the air quality at the location. We recommend that the filter is cleaned at least every six months.

## Procedure

- 1 Remove the plastic cover with a screw driver or similar.
- 2 Remove the filter and clean it by washing it with a mild detergent or use a vacuum cleaner.  
If the filter is very dirty, replace it with a new one.
- 3 Replace the plastic cover with the clean filter.



## Changing fuse in Processing Unit power inlet

If the unit does not receive power, it could be because of a blown fuse in the power inlet.

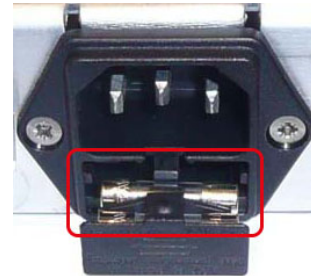
### Context

The power inlet has a 5 x 20 mm replaceable glass tube fuse. 2 A, L250. If you have replaced the fuse it is recommended to buy a new spare fuse. The fuse must be compliant to the safety standard for fuses.

### **WARNING**

***If the fuse is blown, the cause for the fuse failure must be investigated.***

---



### Procedure

- 1 Disconnect the power connector.
- 2 Open the fuse holder below the power inlet gently with a screw driver.  
Within the holder there are two fuses. One which is in use and one spare.
- 3 Remove the innermost fuse and replace it with the spare fuse.
- 4 Close the fuse holder.
- 5 Reconnect the power connector. Turn on the power switch.

### Related topics

[Investigating why LED indicators are not lit, page 70](#)

[Investigating why all data quality status indicators are black, page 72](#)

## Cleaning the GNSS antenna

The antenna surface should be cleaned on a regular basis for optimum performance.

### Context

#### Note

---

*Do not use abrasive cleaners or chemicals.*

---

### Procedure

- 1 Brush off any ice or snow.
- 2 Wipe the antenna with a damp cloth and a mild detergent.
- 3 Make sure that the connector is clean and dry.
- 4 Replace the connector dust cap when the antenna cable is not connected.

# Repairs and parts replacement

## Topics

[Returning equipment to manufacturer, page 98](#)

[Replacing the antenna, page 99](#)

[Replacing the antenna cable, page 99](#)

[Repairing the Processing and HMI Units, page 100](#)

[Replacing the Processing Unit, page 101](#)

[Replacing the HMI Unit, page 102](#)

## Returning equipment to manufacturer

Malfunctioning equipment should be returned to the manufacturer for repair.

### Context

When you contact the customer support department, you will receive an RMA number (Return Material Authorisation) which will identify your service request. Use this number for all correspondence regarding your service request.

### Procedure

- 1 Contact the manufacturer's customer support department
  - by phone: +47-33032407
  - by e-mail: [support.seatex@kd.kongsberg.com](mailto:support.seatex@kd.kongsberg.com)
- 2 Provide information about the equipment to the customer support department
  - what type of equipment you want to return
  - the serial number for this equipment
  - why you want to return the equipment
  - your company name and address
- 3 In return you will receive an RMA number (Return Material Authorization) for reference purposes.
- 4 Include this RMA number as a reference with the equipment when you send it back to the manufacturer.

## Replacing the antenna

If the system performance is reduced, or the system does not work properly, one of the reasons may be a defect antenna. Try to replace the antenna to obtain normal system performance.

### Context

The antenna cable must be as straight as possible. Do not crush or crimp the cable with tie-downs, as this will affect the electrical properties of the cable.

### Caution

---

*If the antenna cable is attached to the Processing Unit, do not attach the antenna cable to the antenna with the unit powered on. If the antenna cable is short-circuited with power on, the receiver within the unit can be damaged.*

---

### Procedure

- 1 Follow the shutdown procedure to turn off the Processing Unit.
- 2 Dismount the failed antenna.
- 3 Mount the new antenna with the existing mounting equipment.
- 4 Connect the antenna cable to the new antenna.
- 5 Seal the connection between the antenna and the antenna cable against water penetration by applying waterproof self-vulcanizing tape.
- 6 Connect the antenna cable to the unit.
- 7 Turn the power to the equipment back on.

### Related topics

[Turning off the Seapath system, page 17](#)

## Replacing the antenna cable

If the system performance is reduced, or the system does not work properly, one of the reasons may be a defect antenna cable. Try to replace the antenna cable to obtain normal system performance.

### Context

The antenna cable must be as straight as possible. Do not crush or crimp the cable with tie-downs, as this will affect the electrical properties of the cable.

### Caution

---

*If the antenna cable is attached to the Processing Unit, do not attach the antenna cable to the antenna with the unit powered on. If the antenna cable is short-circuited with power on, the receiver within the unit can be damaged.*

---

### Procedure

- 1 Follow the shutdown procedure to turn off the Processing Unit.
- 2 Remove the damaged antenna cable.  
The new antenna cable must be as straight as possible. Do not crush or crimp the cable as this will affect the electrical properties of the cable.
- 3 Connect the new antenna cable to the antenna.
- 4 Seal the connection between the antenna and the antenna cable against water penetration by applying waterproof self-vulcanizing tape.
- 5 Connect the antenna cable to the unit.
- 6 Turn the power to the equipment back on.

### Related topics

[Turning off the Seapath system, page 17](#)

## Repairing the Processing and HMI Units

The Processing Unit and HMI Unit are not designed for customer maintenance. All repairs and modifications of these units, except for changing fuse in power inlet of the Processing Unit, installation of new software versions and setup of the system, should be carried out by qualified personnel. A failed unit should be shipped back to Kongsberg Discovery AS or other agreed service point for repair.

As a part of the commissioning procedure, two USB flash drives are produced and stored with the product manual.

- A USB flash drive intended for a backup of the HMI Unit.
- A USB flash drive (Processing Unit IBR flash drive) with a backup of the Processing Unit.

These flash drives are needed for a proper installation or repair of replacement units.

## Replacing the Processing Unit

If the unit fails, it can be replaced by a spare unit. Local repair is not possible.

### Prerequisites

The Processing Unit IBR flash drive which contains a full image of the installed Processing Unit must be available.

This procedure is performed on the Processing Unit. A keyboard and a mouse must be connected to the Processing Unit in order to perform this procedure.

### Context

Refer to the Seapath *Installation Manual* for the System backup and restore procedures.

### Note

---

*All settings and configurations on the unit on which the restore is performed, will be cleared and replaced by the contents of the USB flash drive with the system image backup.*

---

### Procedure

- 1 Disconnect the Processing Unit to be repaired from its cables and the rack, and replace it with the spare unit.
- 2 Connect all cables to the spare unit as they were on the original unit.
- 3 Turn on the unit.
- 4 Insert the USB flash drive.
- 5 Turn on the Processing Unit.
- 6 Select **ISP Backup and Restore (IBR)** or wait 30 seconds for the program to open.
- 7 Select **System restore**.
- 8 Select **Yes**.  
Wait for the restore process to finish.
- 9 Select **OK**.
- 10 Remove the USB flash drive.
- 11 Turn on the Processing Unit.

### Related topics

[Turning off the Seapath system, page 17](#)

## Replacing the HMI Unit

If the unit fails, it can be replaced by a spare unit. Local repair is not possible.

### Prerequisites

The USB recovery flash drive with the HMI Unit backup is available.

### Context

The USB recovery flash drive contains a full image of the installed HMI Unit. You can install the new HMI Unit from this flash drive.

Refer to the Seapath *Installation Manual* for the System backup and restore procedures.

### Procedure

- 1 Turn off the HMI Unit.
- 2 Disconnect the unit to be replaced from its cables and the rack, and replace it with the spare unit.
- 3 Connect all cables to the spare unit as they were on the original unit.
- 4 Insert the USB recovery flash drive into a USB port on the HMI Unit.
- 5 Turn on the unit.
- 6 Press and hold the **F12** key during start-up until the **Startup Device Menu** appears.
- 7 Select the USB HDD from the list. Press **Enter**.
- 8 Wait for the Paragon tool to load.

This may take some time due to network auto-configuration in WinPE. Disconnect all Ethernet cables if you want to minimize boot time.
- 9 On the **Tools** menu, select **Restore backup**. Select **Next**.
- 10 Select **External devices**.
- 11 Locate the name of the backup you want to restore in the root of the USB flash drive. Select **Next**.
- 12 The **Check backup before restore** dialog box appears. To skip checking, select the **Skip backup integrity verification** box. Select **Skip**.
- 13 Under **Objects to restore**, select **Files and folders**. Select all available boxes. Select **Next**.
- 14 Under **What method should be used to restore the files?**, select **Restore files to the original location while overwriting files with identical names**. Select **Next**.
- 15 Select **Finish**.

The restore process will start. Wait for the process to complete to 100 %.
- 16 Select **Close**.
- 17 Remove the USB recovery flash drive. Store the flash drive in a safe place.



- 18 Select **Restart** from the **Shutdown/Restart** button in the upper right corner.

**Related topics**

[Turning off the Seapath system, page 17](#)

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