Operator Manual

KONGSBERG

SpotTrack

Relative positioning system

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Spot-D-Operator/7.0

Document history

Document number: Spot-D-Operator / Revision 7.0		
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Note

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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. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

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

Comments

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism.

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Table of contents

About this manual

Purpose of manual

This operator manual provides operators with sufficient information to perform basic SpotTrack sensor system operations. Please see the *SpotTrack Installation manual* for more detailed information about product installation and configuration.

SpotTrack

System description

SpotTrack is primarily used as a reference system for relative positioning in DP operations. The SpotTrack Sensor Unit is a robust motion stabilised rotating laser sensor which measures range and bearing to one or several reflectors installed on the target platform or vessel. Automatic wave motion stabilisation provides optimum target lock. The onboard Control Unit allows for easy configuration and monitoring of the SpotTrack system.

SpotTrack is a true multi-target sensor with advanced tracking algorithms for true target recognition preventing lock on false reflections.

SpotTrack is capable of reflector tracking in close-by operations by utilising roll and pitch stabilisation. SpotTrack has a wide vertical field of regard which keeps track of targets even at high elevation angles.

The SpotTrack system is easy to install and operate. All moving parts are enclosed within the sensor housing. The mechanical wear due to harsh weather conditions is thus kept at a minimum.

Product restrictions

Restrictions in guarantee

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

The liability of Kongsberg Seatex AS is limited to repair of this system 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 system's malfunctions, are excluded. The warranty does not cover malfunctions of the system resulting from the following conditions:

- Incorrect power connection.
- The Control Unit and the Sensor Unit housing have been opened by the customer.

Safety regulations

The laser radiation levels of the SpotTrack sensor have been classified in accordance with IEC 60825-1:2014.

The Sensor Unit is a class 1 laser device under normal operation and reasonably foreseeable single-fault conditions. This means that the sensor is eye safe under all conditions of normal use.

During service, stationary emission can be enabled by the use of specialized software. In this case the sensor is a Class 3R laser device, which is not unconditionally eye-safe.

Location of apertures: Window when cover is on, transmitter lens when cover is off.

Operation of this equipment will not imply any risk for high voltages, explosions or exposure to gas or any chemical and mechanical hazard.

WARNING

The Sensor Unit cover shall not under any circumstances be removed.

Caution

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

General safety guidelines must be followed when working in mast and on deck.

Support information

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- **Switchboard**: +47 73 54 55 00
- **Duty phone**: +47 33 03 24 07 (24 hours)
- **E-mail address**: km.support.seatex@km.kongsberg.com
- **Website**: http://www.kongsberg.com

Getting started

This chapter describes how to get started with the basic operation of the SpotTrack system.

Power on/off procedures

These procedures explain how to switch the system on and off.

Powering up the system

SpotTrack Sensor Unit

The Sensor Unit starts to operate when it is connected to a power source.

Control Unit

The Control Unit starts automatically when it is switched on. The power switch is found behind the lid to the left on the front panel of the Control Unit.

Confirming that the system is active

In the **System** menu, select the **Active** button to toggle the sensor between **Active** and **Standby** mode.

The LED is lit (green light) when in Active mode (normal operation).

In **Standby** mode (LED is grey), the Sensor Unit will not emit any laser pulses. It is recommended that the system is switched to **Standby** mode when **not in operation**.

Note

*When switching to **Standby** mode, the selection of reflectors to distribute to the DP, is cleared. The sensor search area will be reset to default.*

Restarting the Control Unit

Under **Tools**, select **Restart Application** for a soft restart of the SpotTrack HMI. The Sensor Unit is not restarted.

Note

Output to DP will cease for approximately 15 seconds during restart.

Powering off the system

SpotTrack Sensor Unit

Switch off the Sensor Unit by disconnecting it from the power source. No special precaution is needed.

Control Unit

A controlled shut down of the Control Unit is recommended before switching off its power.

1. Press the **Ctrl** +**Alt** + **Del** keys simultaneously. The **Windows Security** dialog box appears.
2. Select **Shut down**.
3. Switch the power off when the system claims it is safe to switch the power off.

User interaction principles

If you do not have a touch screen, the system is operated using a mouse and a keyboard. A mouse is the recommended interaction unit but keyboard support is also implemented. This document will focus on mouse operation. Keyboard operations are described in *Keyboard functions* on page 10.

Interaction with a single touch monitor is by touching objects with a finger. This is equivalent to a mouse click.

Note

The mouse cursor will disappear after some time of mouse inactivity. Simply move the mouse to make the cursor reappear.

Editing in text boxes

Select the **Pencil**  next to the box to modify the value. Select **OK** when the correct information is entered.

Confirming changes

You are not always prompted to confirm changes. The new values are saved when you close the dialog box.

Displaying the keypad

If you do not use a mouse and keyboard you can select to display a keypad on the screen for entering values.

1 Select the **System** menu →**Settings** →**Display**

2 Select **Display keypad** ON or OFF.

Keyboard functions

A subset of the keys on a standard PC keyboard is used for operation of the various functions.

The active button is indicated with a dashed line. Press the **Tab** key to change the active buttons.

Press **Enter** to open the function linked to the various buttons.

Press the **Space** bar to toggle the **System** menu directly. When the **System** menu is displayed, use **Tab** to highlight the desired button. Then select **Enter** to activate the desired function.

After a few seconds with no keyboard activity, the focus is removed. Focus is also removed by pressing **Esc**.

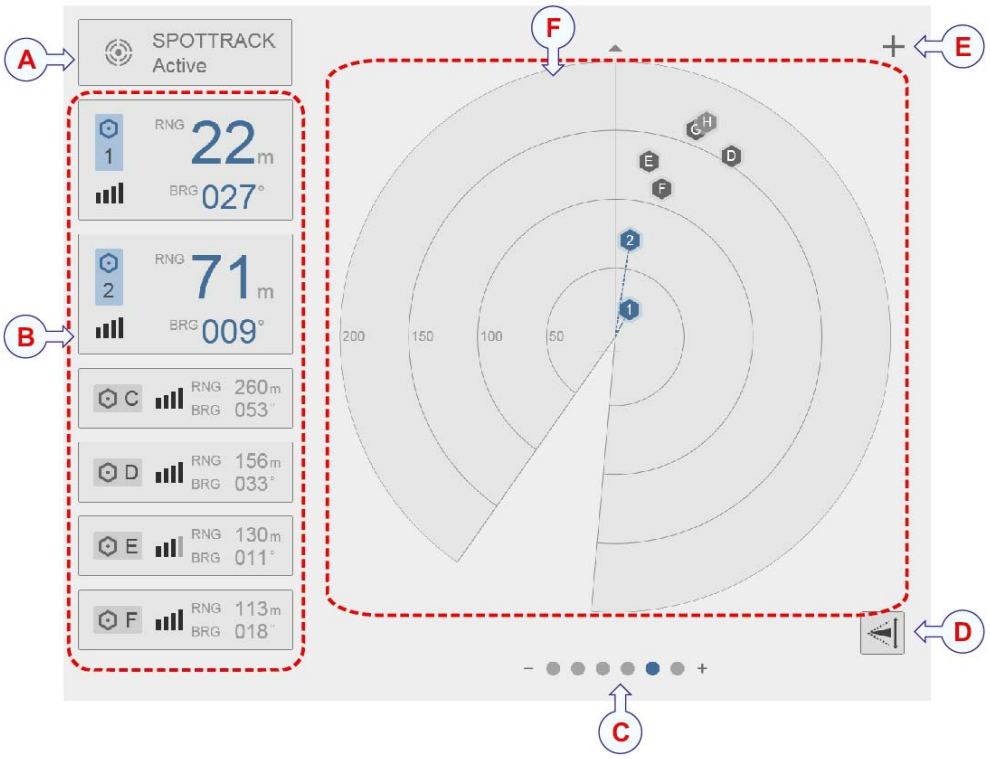
The **Esc** key may also be used to close the **History** view, the **System** menu and the **System status** view with detailed system status.

Press the **+** and **-** keys to zoom one step in our out, as if the corresponding **Zoom** buttons have been clicked.

Presentation overview

Display organisation

Typical SpotTrack display.



A **System status**

It shows the overall sensor system status.

B **Reflector list**

This is a list of reflectors observed and selected for distribution to DP and their detailed status.

C **Zoom** buttons

Use these buttons to zoom the **Radar** view in or out.

D **Sensor search area** button

Use this button to define the vertical sensor search area.

E **System menu** button

It provides various system settings and operational functions.

F **Radar** view

It shows the location of the reflectors relative to the Sensor Unit.

Measurement types

The SpotTrack system supports presentation of the distance to reflectors in both polar and cartesian coordinates. This is selected under **Settings →Display**.

The figures illustrate how the measurement types are presented in the **Reflector list**.

Note

*The **Radar** view is not affected by this setting.*

Figure 1 Measurement type RNG/BNG

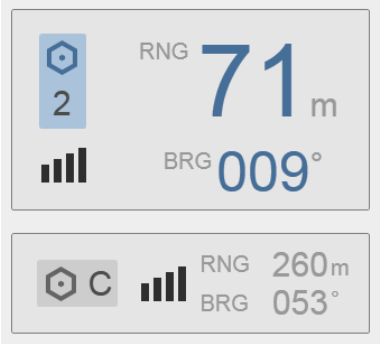
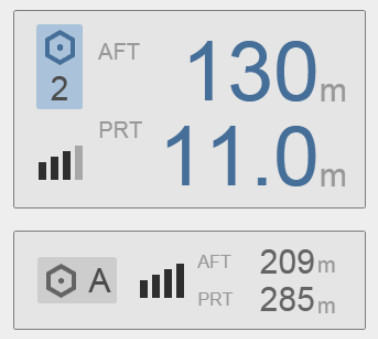


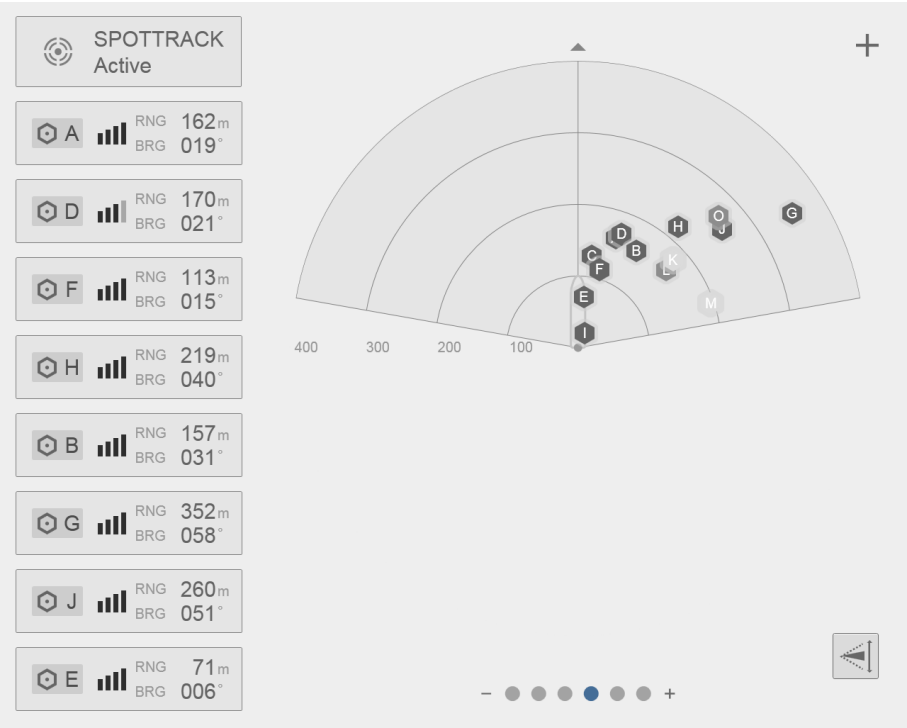
Figure 2 Measurement type X/Y



Starting normal operation

The SpotTrack system is ready for operation as soon as all units have been powered on.

In the **Radar** view the operator shall select the reflectors which shall be forwarded to the DP.



Scaling the Radar view

The **Radar** view supports scaling. Select a **Zoom** button to select the wanted scale directly, or press the **+** key or **-** key next to the circles to zoom the **Radar** view one step in or out, respectively.

Choosing colour palette

The **Palette** function provides colour schemes for the display presentation. Select the colour scheme which suits your light conditions.

Procedure

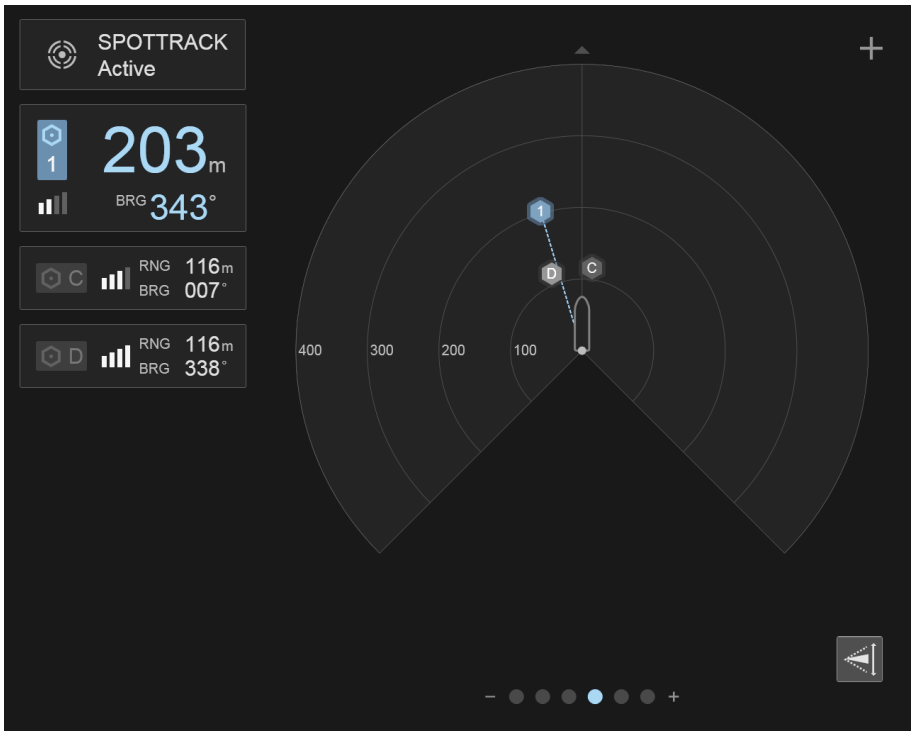
1 Select **System menu**,  , →**Palette**

2 Select the button for the palette you want to use.

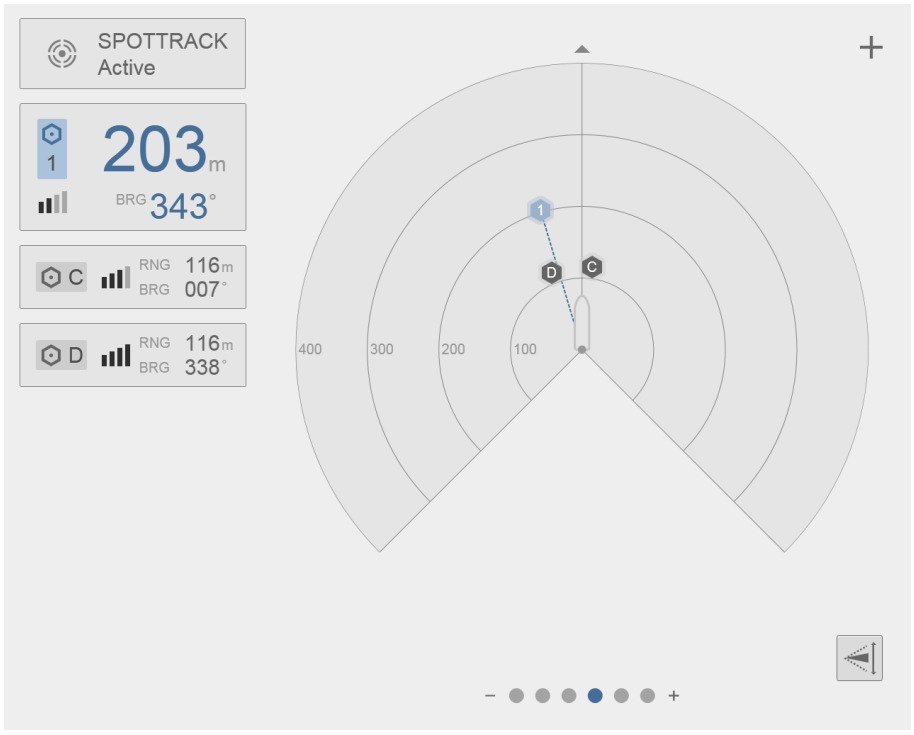
Three palettes are available as indicated under **Palette** on the **System** menu: night, day black and day white. The various palettes are illustrated.

Main view, night

Main view, day black



Main view, day white

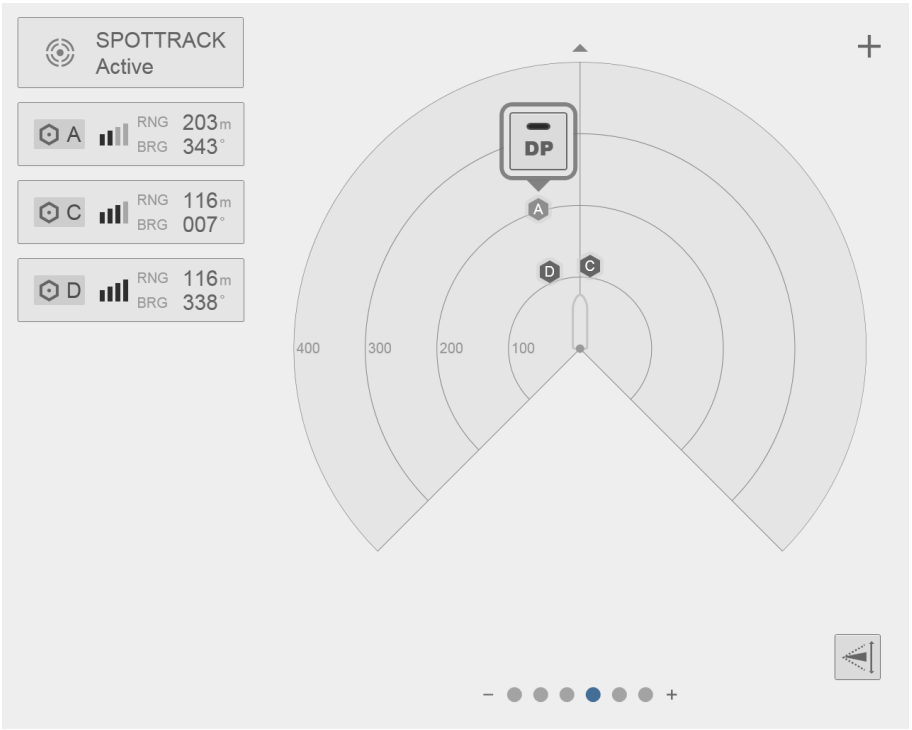


Operational procedures

This chapter contains various tools which you can use to perform diagnostic tasks.

Selecting and deselecting reflectors

The **Radar** view shows the available reflectors and their position relative to the Sensor Unit.



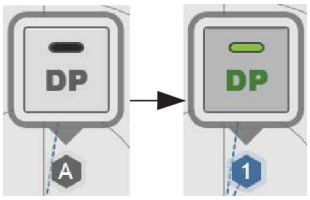
Click on a reflector in the **Radar** view to show the button for enabling or disabling the distribution of its range and bearing data to the DP system (the **DP** button).

Selected reflectors are displayed with blue background and have numerical IDs.

Deselected reflectors are displayed with grey background and have letter IDs.

Selecting reflectors

Procedure



1 Select a grey reflector icon in the **Radar** view.

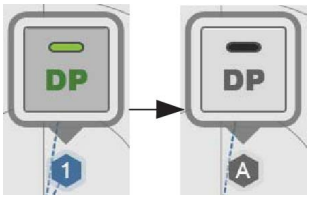
2 The **DP** button appears. It has a grey colour.

3 Selct the **DP** button to select the reflector. This reflector will now distribute range and bearing data to the DP system.

4 Now the reflector icon has a blue colour, and its ID changed to numerical. The **DP** button is green.

Deselecting reflectors

Procedure

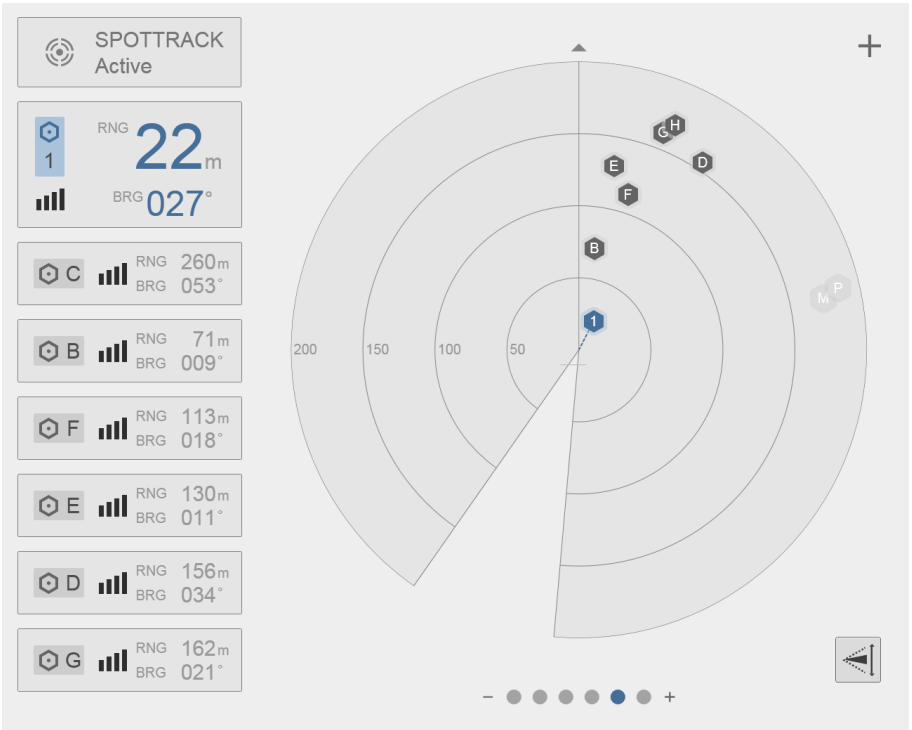


1 Select a blue reflector icon in the **Radar** view.

2 The **DP** button appears. It has a green colour.

3 Select the **DP** button to deselect the reflector. This reflector will now stop distributing range and bearing data to the DP system.

4 Now the reflector icon has a grey colour, and its ID changed to a letter. The **DP** button is grey.



A reflector selected for output to DP is shown as indicated above, with large numbers in blue colour to distinguish from reflectors only observed. DP reflector have numerical IDs, whereas observed reflectors have alphabetical IDs.

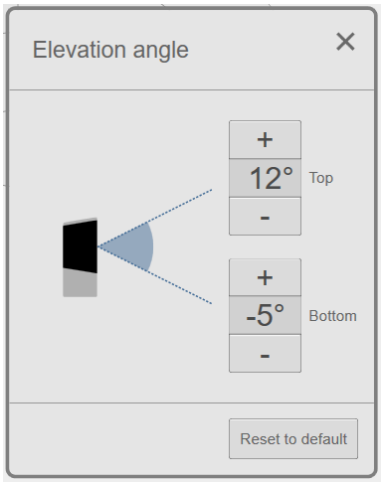
Note

You cannot select more reflectors than the maximum number of reflectors configured. Selecting another reflector is not possible for a configurable grace period after a reflector has been deselected. Refer to the SpotTrack installation manual in References on page 33 for configuration.

Changing the sensor search area

Allows you to define the sensor vertical search area. No reflector will be found or tracked outside this sector. The **Sensor search area** button turns green when changes have been made.

Select **Reset to default** to reset the values to their original settings.



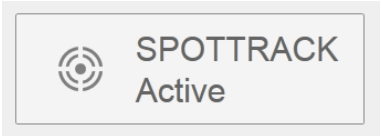
Procedure

1. Select the **Sensor search area** button in the **Radar** view.
2. Select **Plus** or **Minus** to change the **Top** of the sector area.
3. Select **Plus** or **Minus** to change the **Bottom** of the sector area.
4. Close the dialog box when finished.
5. Observe that the **Sensor search area** button turns green.

Checking the system status

The **System status** box is located at the top left of the **Main** view. This shows the overall system status.

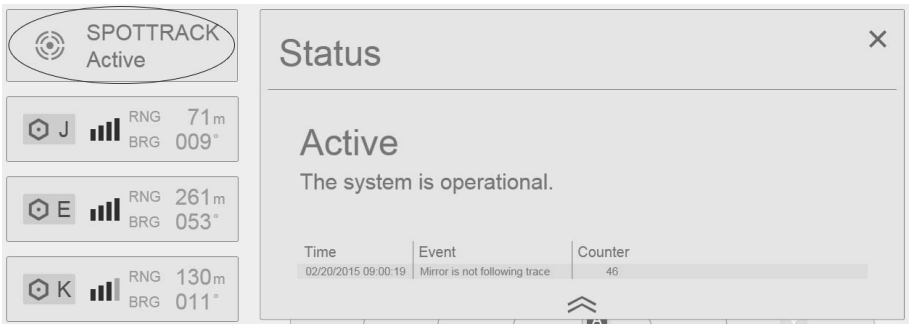
During normal operation, the status is indicated as **Active**. If the system is in Standby mode, the status changes to **Standby**.



The text and colour of the **System status** will change if anomalies occur. The text will indicate the main cause of the anomaly, and the severity is indicated by the colour;

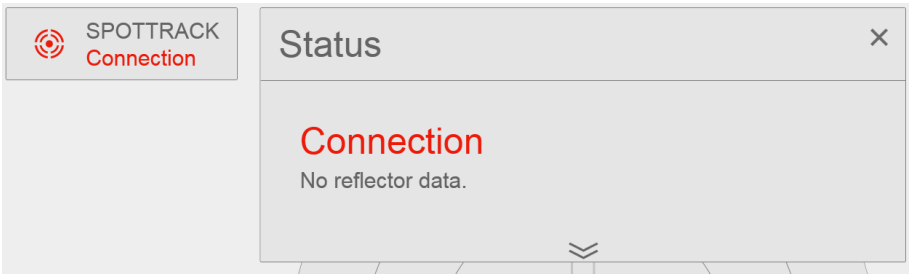
- **yellow:** warnings and/or reduced operability
- **red:** sensor critical situations where reflector detection is impossible and/or no data are sent to the DP.

Select the **System status** box to view more details about the system status. Select or to hide or show the Event list, respectively.



Select to close the **Status** view.

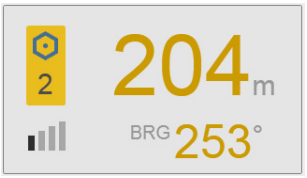
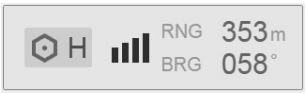
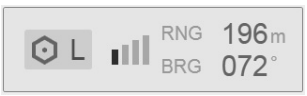
An alarm situation can look like this.



Checking the reflector status

The **Reflector list** is located to the left of the **Main** view.

The reflectors selected for distribution of range and bearing data to the DP are always displayed first, and with numerical IDs. The signal strength is indicated in two ways, by signal bars and by reflector symbol fill rate. Samples are described in the table.

Reflector status	Reflector list	Radar view
Enabled for DP: Strong signal / good reflection		
Enabled for DP: Weak signal / low reflection		
Enabled for DP: Yellow colour indicates reduced reliability for a reflector. (May cause red fields in **History** view)		
Enabled for DP: No signal, lost reflector (Will cause red field in **History** view)		
Observed only: Strong signal / good reflection		
Observed only: Poor signal / low reflection		
Observed only: No signal, relocating	(automatically removed from view)	(automatically removed from view)
Observed only: No signal / lost reflection	(automatically removed from view)	(automatically removed from view)

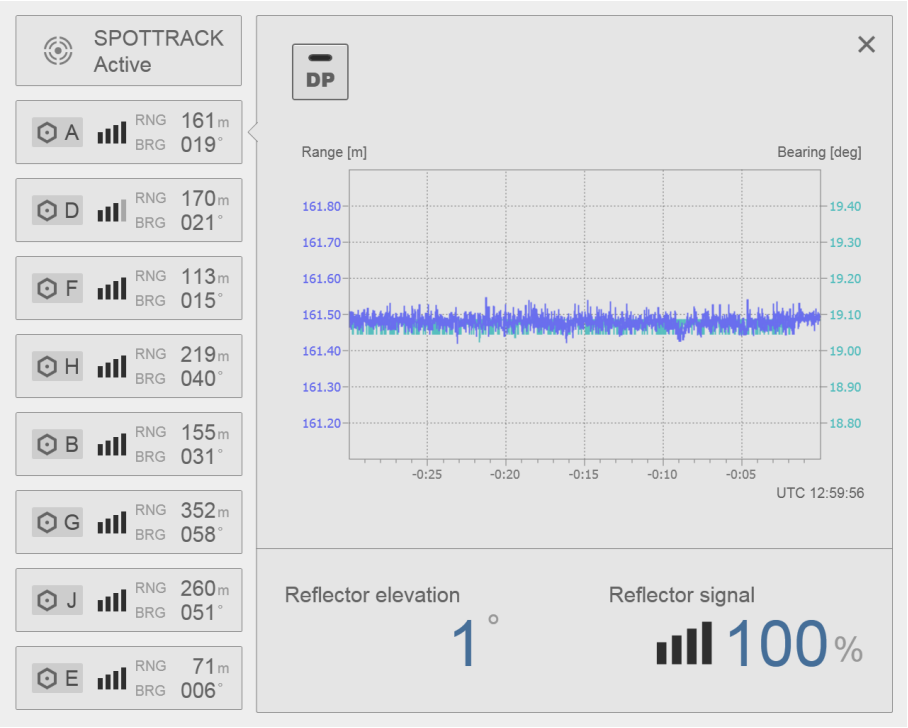
Note

A reflector enabled for distribution to DP will not disappear automatically if it is lost. The operator has to deselect the reflector in order to allow for new DP enabled reflectors.

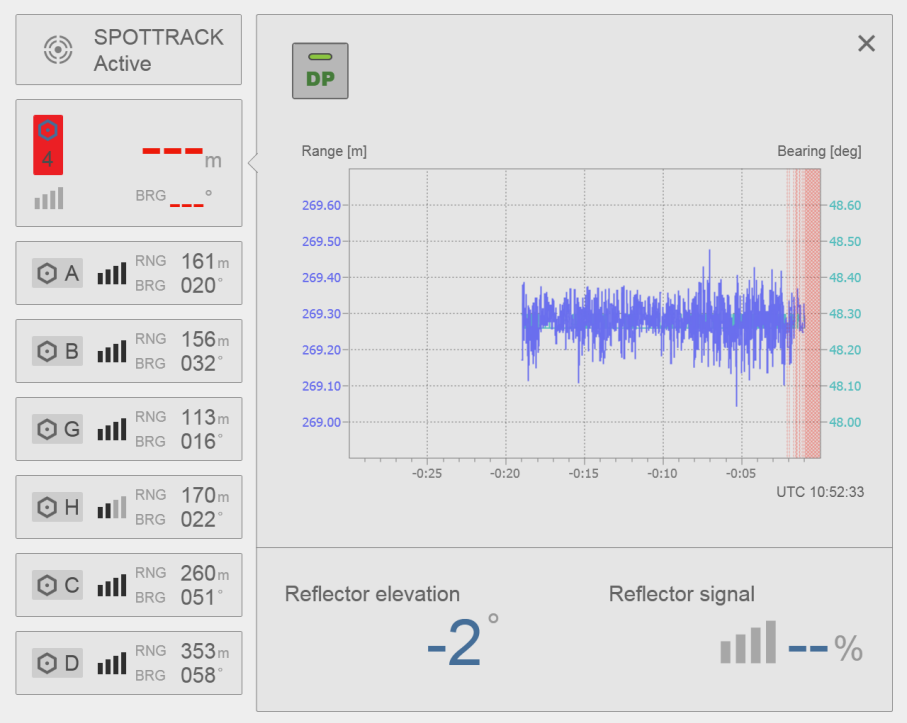
Checking the reflector history

Select a **Reflector** in the **Reflector list**. The **History** view appears. This view displays a range and bearing graph for the reflector for the last 30 minutes.

Reflector elevation is the vertical angle from the horizon to the reflector.



In case the reflector signal is unstable, periods with no signal are indicated in red. The illustration shows a situation where the signal from the reflector is gradually weakening and eventually lost.



Select another **Reflector** box to view the reflector's history, or select ✕ to close the **History** view.

Note

*History values are always displayed as range/bearing even if the selected **Measurement type** is X/Y.*

Related topics

- *Presentation overview* on page 10
- *Setting up the display* section in the *SpotTrack installation manual*.

Verifying data communication

Tools holds the diagnostic tools. Under **Diagnostics** you will find the **Port Monitor** tool. This is an advanced tool used to diagnose how data are transported in the SpotTrack system.

Displaying sensor raw data

Procedure

1 Select the **System menu** button in the upper right corner of the **Main** view.

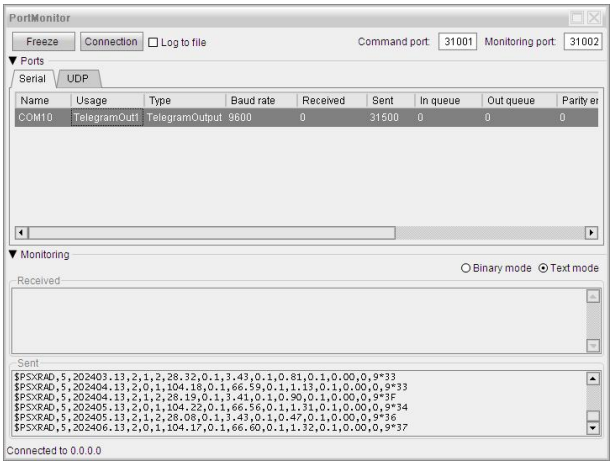
2 Select **Tools →Diagnostics →Port Monitor**.

3 Serial interfaces are displayed in the **Serial** tab and IP interfaces in the **UDP** tab.

4 Select the desired interface, then observe that received and sent information through that interface is displayed in the lower windows.

5 To avoid displaying non-ASCII characters, select **Text mode**. **Binary mode** is the default.

6 Select **Freeze** to stop updating the data. Then, select **Unfreeze** to continue updates.



Exporting data from the system

Tools holds the diagnostic tools. Under **Utilities & Log** you will find the **Data Export** tool. This is a tool used to export data from the system.

Data Export tool

The **Data Export** tool provides an easy way of exporting data from the system, either for documentation, post-processing or diagnostics. Accept the default reporting period (last 6 hours of data) or selecting wanted duration, insert a USB flash drive and select the **Export** button.

The size of the inserted USB media will be automatically detected and compared with the estimated compressed size of the data from the selected period. The operator may need to reduce the duration in order to meet space limitations on the target media.

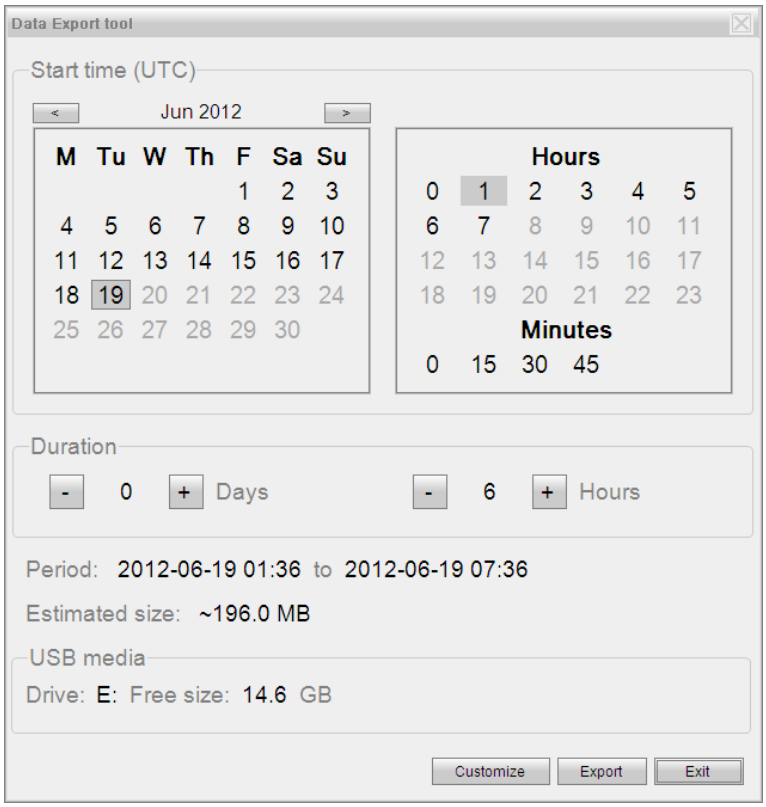
If more than one USB media is inserted, the tool will provide a media selection button.

If the operator wants to specify which data file types are wanted for the export, or if the size of a zip file is too large for the e-mail system limits, selecting the **Customzie** button provides check boxes for selecting categories of data, and an option to split the generated archive into several parts with a configurable maximum size.

Available data categories are:

- Sensor data (e.g. IB log files)
- Telegram output (e.g. NMEA telegrams exported to DP)
- Diagnostics (e.g. alarms, internal diagnostics)

Diagnostics data are not included by default.

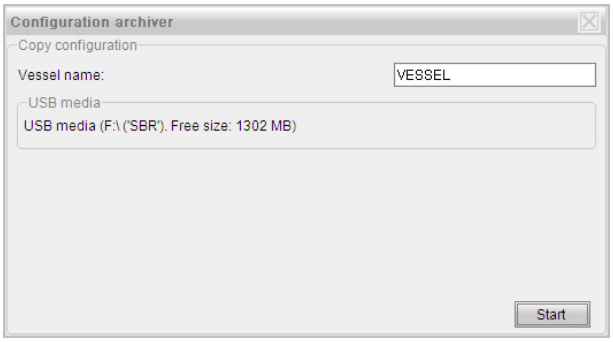


Sensor data, telegram output and diagnostics are automatically logged. Data are older than a configurable limit are automatically deleted. Likewise, the oldest data are deleted if disk space becomes critically low.

Copying the configuration files

It is possible to copy the configuration files to a USB flash drive.

Procedure



1. Select the **System menu** button →**Tools** →**Copy Configuration**.
2. Insert a USB flash drive into the Control Unit.
3. Optionally, modify the **Vessel name** box.
4. Select **Start**.
5. Remove the USB flash drive when finished.

Menus and functions

About the menu system

Select the **System menu** button,  , in the top right corner of the **Main** view to open the **System** menu. When the **System** menu is displayed, this button changes to a **Close** button,  . Select the **Close** button to close the **System** menu.

The **System** menu provides access to:

- SpotTrack operation mode
- colour schemes (Palette)
- system configuration (Settings)
- system tools (Tools)

Active

In the **System** menu, select the **Active** button to toggle the sensor between **Active** and **Standby** mode.

The LED is lit (green light) when in Active mode (normal operation).

In **Standby** mode (LED is grey), the Sensor Unit will not emit any laser pulses. It is recommended that the system is switched to **Standby** mode when **not in operation**.

Note

*When switching to **Standby** mode, the selection of reflectors to distribute to the DP, is cleared. The sensor search area will be reset to default.*

Palette

The **Palette** function provides colour schemes for the display presentation. Select the colour scheme which suits your light conditions.

Settings

Settings provides functions and parameters for configuration of the SpotTrack system.

Display

This page allows you to select the orientation of the vessel in the **Radar** view, measurement type and which measurement units to use.

Network

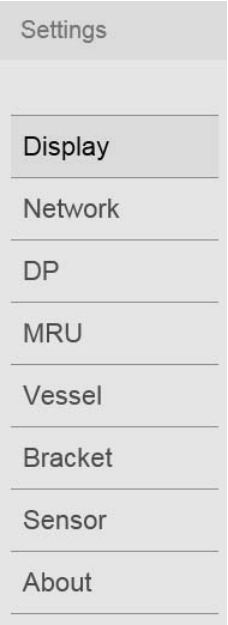
This page allows you to set the sensor IP address.

DP

This page allows you to select output telegrams from the SpotTrack system to the DP and to select which communication interface to use.

MRU

This page allows you to enable or disable reading of MRU data.



Vessel

This page allows you to enter a name for the vessel and an MMSI as well as entering dimensions for correct scaling of the vessel image in the **Radar** view.

Bracket

This page allows you to set up the sensor bracket location and the bracket orientation.

Sensor

This page allows you to set up the sensor blind zone and default sensor search area.

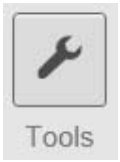
About

Select **About** in the **Settings** menu to see the SpotTrack serial number, the product version and the software version installed on the system.

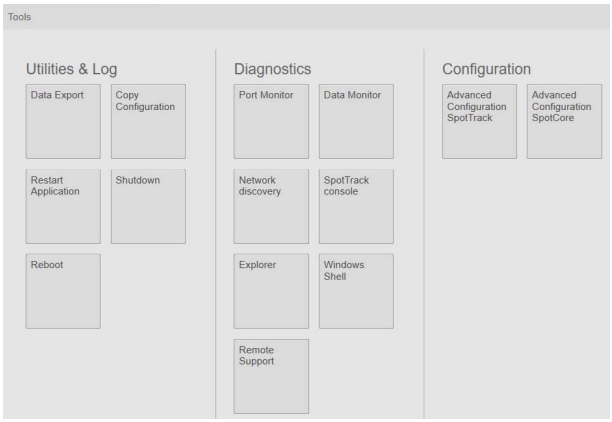
All of these settings are described in more detail in the *SpotTrack Installation manual*.

Tools

Tools provides a set of tools to assist in various configuration and diagnostic tasks and is divided into three groups:



- Utilities & Log
- Diagnostics
- Configuration



Utilities & Log

Data Export

The **Data Export** tool allows you to export data from the system, either for documentation purposes, post-processing or diagnostics.

Copy Configuration

The **Copy Configuration** tool allows you to copy the configuration files to a USB flash drive.

Restart Application

Under **Tools**, select **Restart Application** for a soft restart of the SpotTrack HMI. The Sensor Unit is not restarted.

Note

Output to DP will cease for approximately 15 seconds during restart.

Shutdown

Shutdown allows you to shut down the system in a controlled way.

Reboot

Reboot allows you to restart the system if an unexpected event has occurred.

Diagnostics

Port Monitor

The **Port Monitor** tool allows you to diagnose how data are transported in the SpotTrack system and how to display sensor raw data.

Data Monitor

The **Data Monitor** tool allows you to monitor the data on the network.

Network discovery

Network discovery allows you to change the sensor IP address.

SpotTrack Console

Select **SpotTrack Console** to open a Linux terminal window towards the Sensor Unit.

Caution

This is an expert feature and should be used with extreme care. Do not alter or delete information without consulting with Kongsberg Seatex AS customer support.

Explorer

Select **Explorer** to open a file system explorer.

Caution

This is an expert feature and should be used with extreme care. Do not alter or delete information without consulting with Kongsberg Seatex AS customer support.

Windows Shell

Select **Windows Shell** to open a windows shell (command window).

Caution

This is an expert feature and should be used with extreme care. Do not alter or delete information without consulting with Kongsberg Seatex AS customer support.

Remote support

Remote support gives Kongsberg customer support access to your system so that they can carry out support tasks.

Related topics

- *Using the Remote Support function* on page 29

Configuration

Advanced Configuration SpotTrack

The **Advanced Configuration SpotTrack** tool is covered in the *SpotTrack installation manual*, see *References* on page 33, and is not intended for use under normal conditions.

Caution

This is an expert feature and should be used with extreme care. Do not alter or delete information without consulting with Kongsberg Seatex AS customer support.

Advanced Configuration SpotCore

The **Advanced Configuration SpotCore** tool is covered in the *SpotTrack installation manual*, see *References* on page 33, and is not intended for use under normal conditions.

Caution

This is an expert feature and should be used with extreme care. Do not alter or delete information without consulting with Kongsberg Seatex AS customer support.

Maintenance

Troubleshooting

No reflector tracking

The SpotTrack system is able to track multiple reflectors simultaneously. If a reflector is expected to appear in the reflector list, but somehow it does not, check the following to find the probable cause.

- The reflector is inside the blind zone.
- The yaw mounting angle is incorrect, and the reflector then happens to be in the effective blind zone.
- The reflector is outside the vertical search area.
- The reflector is too close to the sensor, see specification for range limits.
- The reflector is too far away, see specification for range limits.
- The reflector has approximately the same bearing as another reflector which has a different elevation.
- The reflector has the same bearing as another reflector which has a stronger signal.
- The reflector is too close to another reflector or reflective surface. The distance between a reflector and another reflector, or reflective surface, should be minimum 5 metres to maintain stable tracking.
- The size of the reflector, or the combination of the reflector and a nearby reflective surface, is too large. The horizontal size of a reflector or reflective surface should be maximum 1 metre to maintain high accuracy.
- Fog, snow and heavy rain will reduce the visibility range of the reflector.

Related topics

- Technical specifications in *SpotTrack installation manual*.

Using the Remote Support function

The **Remote support** function will give Kongsberg customer support access to your system so that they can carry out support tasks.

Pre-requisite

Contact Kongsberg customer support if you are in need of assistance. They will guide you through the necessary steps regarding the Remote Support function.

Procedure

1 Contact Kongsberg Customer Support.

2 Select the **System menu** button in the upper right corner of the **Main** view.

3 Select **Tools →Diagnostics →Remote Support**.

4 Select **I understand and wish to continue**.

5 Select **Connect**.

Related topics

- *Support information* on page 7

Updating the software

Kongsberg Seatex AS will regularly offer software upgrades for the system with improvements and new functionality. It is up to the user to decide whether he will upgrade his unit to the latest version.

Upgrades are distributed on USB flash drives or as zip archives to be copied to a USB flash drive.

Note

Some product specific text in the illustrations below may differ from what is actually shown on your system.

Procedure

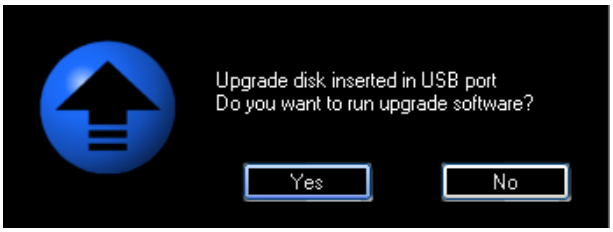
1 Perform a system configuration backup by selecting **Copy configuration** from the **System** menu. It is recommended to run this program twice; once with a flash drive as the target and once with a folder on the system hard disk as the target.

2 If you have received a system upgrade flash drive from Kongsberg Seatex AS, please continue from step 4.

3 Extract the contents of the zip file received from Kongsberg Seatex AS to the root folder of a USB flash drive. Verify that the flash drive contains a folder named `SpotTrack` in the root directory after extraction.

4 Insert the upgrade USB flash drive to the USB port at the front of the Control Unit.

5 The following message will appear in the upper left corner of the screen:



6 Select **Yes** to run the software upgrade.

7 The following message is displayed:

Caution

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

8 The upgrade system will now inform about the versions involved.

9 Select **Install** to start the upgrade.

10 The SpotTrack Control Unit will stop when selecting **Install**. This will also stop all output to the DP system.

11 SpotTrack software installation will now start, and progress information will be updated in the dialogue throughout the process. The SpotTrack HMI, SpotCore processing service and the Sensor Unit firmware are all updated from the USBflash drive.

12 When the software upgrade has been successfully installed, the indicated message is presented. Select **OK** and remove the flash drive.

13 The Control Unit will automatically reboot if required.

14 The system software is automatically started and output to external systems will resume.

Cleaning the Sensor Unit

The SpotTrack window has a dirt repellent coating but for optimum performance the Sensor Unit window should be cleaned regularly. Use a mild, non-abrasive, detergent and a soft cloth for this purpose.

Cleaning agent and cloth are provided in the Sensor Unit transportation container.

It is also recommended to check the window for dirt and, if necessary, clean it before you place the protection cover over the Sensor Unit as dirt may scratch the window when placing the cover on the unit or when taking it off.

A Sensor Unit window

Sensor Unit maintenance interval

To maintain system performance and the safety of the equipment it is recommended to send the Sensor Unit back to Kongsberg Seatex AS for maintenance.

We recommend to send the unit for maintenance before it reaches 20 million rotations. How long it will take for the unit to reach 20 million rotations, depends on how often the Sensor Unit is used. The Sensor Unit does not rotate when in **Standby** mode.

Please contact Kongsberg Seatex AS customer support for information on recommended maintenance interval based on your type of operation.

Any maintenance of the Sensor Unit must be carried out by Kongsberg Seatex AS.

Related topics

- *Support information* on page 7

References

Reference documents

1 *SpotTrack Installation Manual*, Kongsberg Seatex AS

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