



# Operator's Guide



- Disk contains:**
- Control Console Software
  - Software License
  - Operator's Guide



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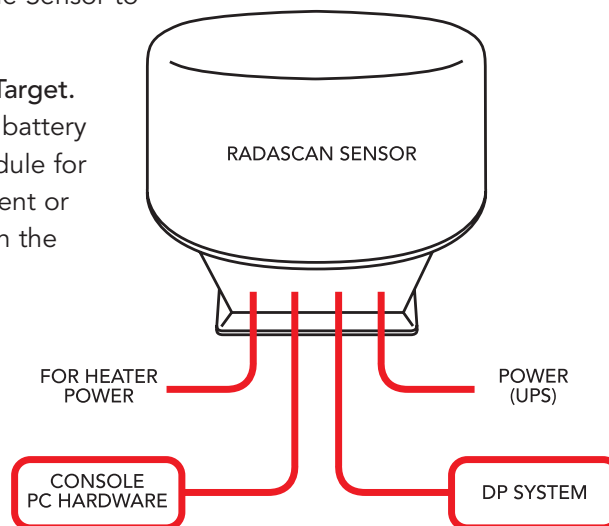
# Introduction

Welcome to the RadaScan position reference sensor for dynamic positioning and other vessel control applications. RadaScan is a high accuracy radar based sensor that provides positional information to allow automated approach and/or station keeping relative to a structure or vessel. The structure or vessel must be equipped with one or more retro-reflective RadaScan transponders/targets.

## Components:

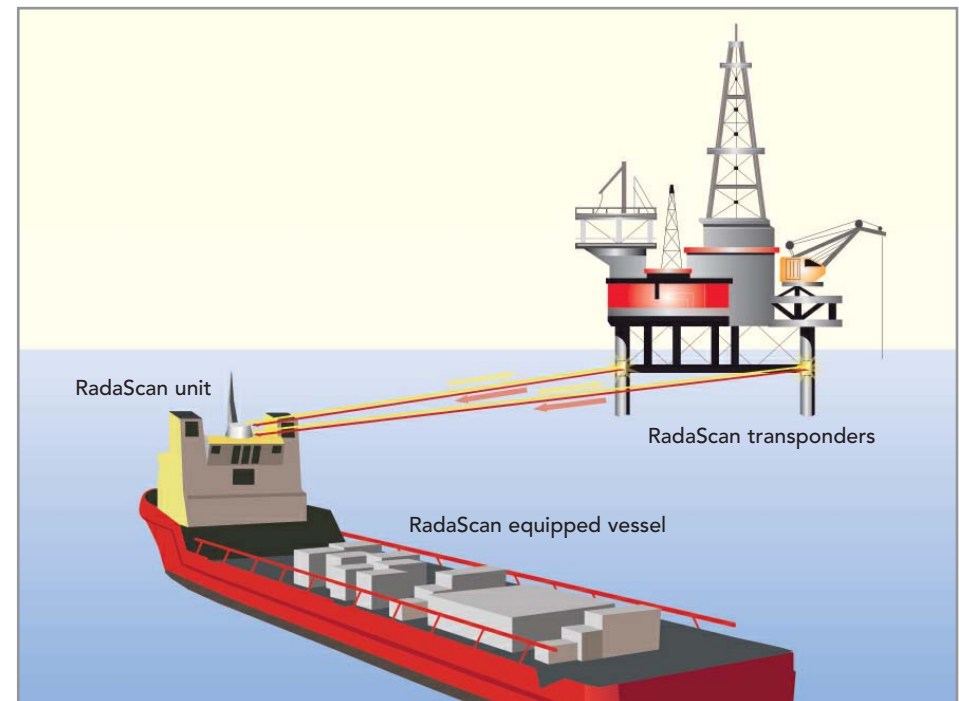
RadaScan has been designed for permanent installation and quick/easy operation. A RadaScan system comprises of 3 major components as follows:

- **The RadaScan Sensor.** A scanning transceiver unit with integral power supply and processing electronics for installation in a prominent external location in order to view available transponder. The Sensor is connected to the vessel DP system by a serial RS422 or Ethernet link.
- **The RadaScan Console.** A system control and display application running under Microsoft Windows XP on a standard PC. This allows full control of the system together with graphical and data display of system status. An Ethernet link connects the Sensor to the Console PC.
- **RadaScan Transponder/Target.** A passive self contained battery powered electronics module for temporary, semi-permanent or permanent installation on the target vessel. RadaScan transponders are ATEX certified as intrinsically safe.



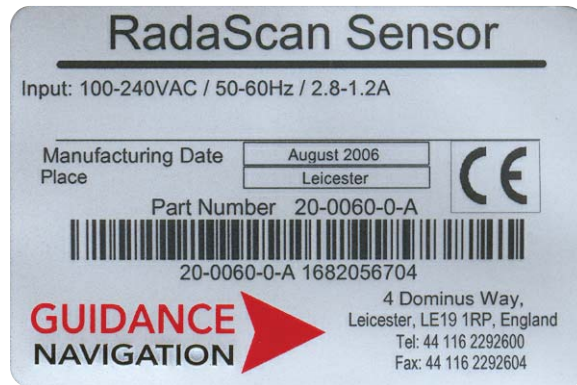
## Principles of Operation

The RadaScan sensor emits a low power radar beam. The beam is received by a RadaScan transponder and instantaneously reflected back to the sensor. The sensor uses the reflection to accurately calculate the distance (range) and direction (bearing) to the transponder. This positional data is automatically sent to the DP system. The transponder reflection is retro-reflective in character (ie it is sent in the same direction as received beam). The transponder is also able to encode the reflection with a transponder identity code. This code allows the sensor to recognise the reflection as genuine and so aid easy operation and improve tracking reliability.



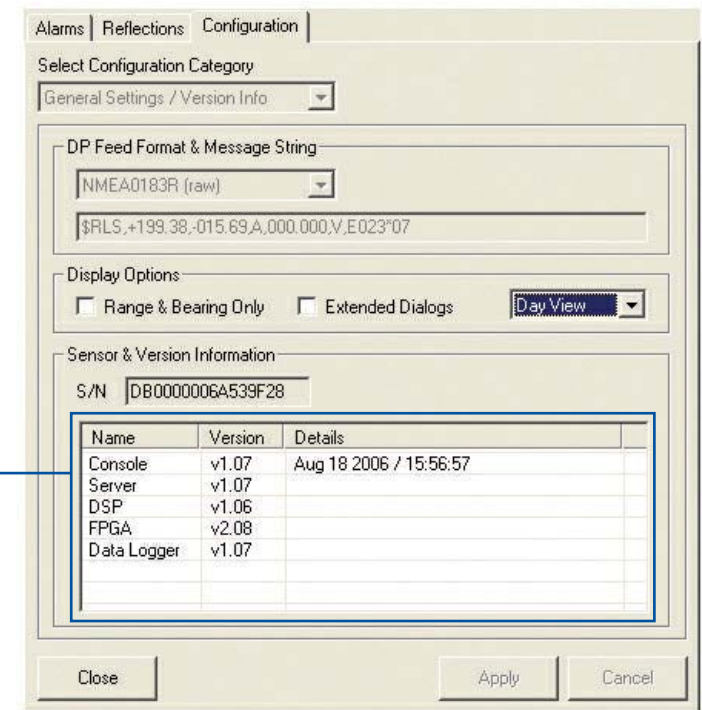
# Serial numbers and software versions

Component Part Numbers and individual Serial Number are assigned to each sensor, transponder and PC.



## Software version information

The Configuration page tab within the property sheet provides version information about every software component with the Console application and the RadaScan Sensor.



Software component version information

# Using the System

Radascan User Console provides an intuitive environment that allows you to quickly assess and control the functions of the system. This section provides information about the options and procedures within the program.

## Start up

### To enter RadaScan User Console

- 1 Ensure that the RadaScan sensor is powered on and running correctly.
- 2 Locate the RadaScan User Console icon and double click it.



(or run the RadaScan User Console application from Start > Programs > RadaScan > RadaScan User Console).

- 3 The Console display screen will appear. After a brief initialisation period indicated by a connecting dialog, the sensor will begin operation and its scanning results displayed on screen.

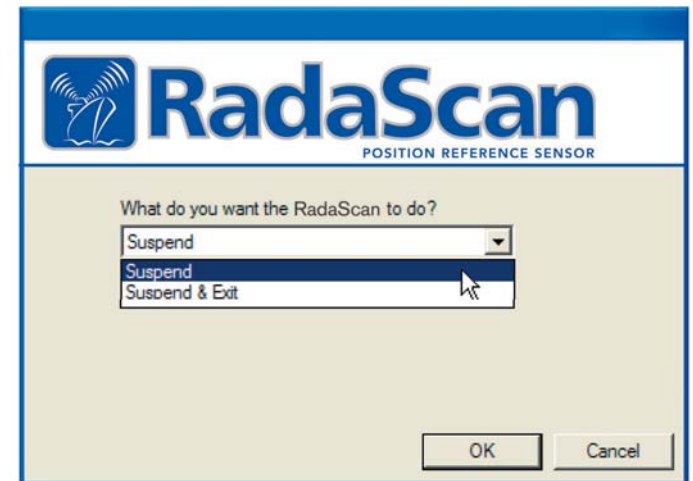
## Suspend, exit or reset communications

RadaScan User Console offers you two options for shutting down or suspending or resetting the sensor communication link. These options are accessed via the RadaScan button in the lower left-hand corner:

- **Suspend** - Places the sensor into a 'sleep mode' whereby the motor ceases spinning. However, upon command from the Console application, the unit will return to full operation. This mode is suitable for use when travelling between locations.
- **Suspend & Exit** - Places the sensor into the same 'sleep mode' as the suspend command (discussed above) and also closes the RadaScan Console program.

### To suspend or exit

- 1 Click the 'RadaScan' button in the lower left corner of the screen (this button is not available while navigating). A dialog box will be displayed:
- 2 Click the down-arrow to reveal the three options. Select the required option and click the OK button.



# Screen layout

The RadaScan User Console screen has five key areas:

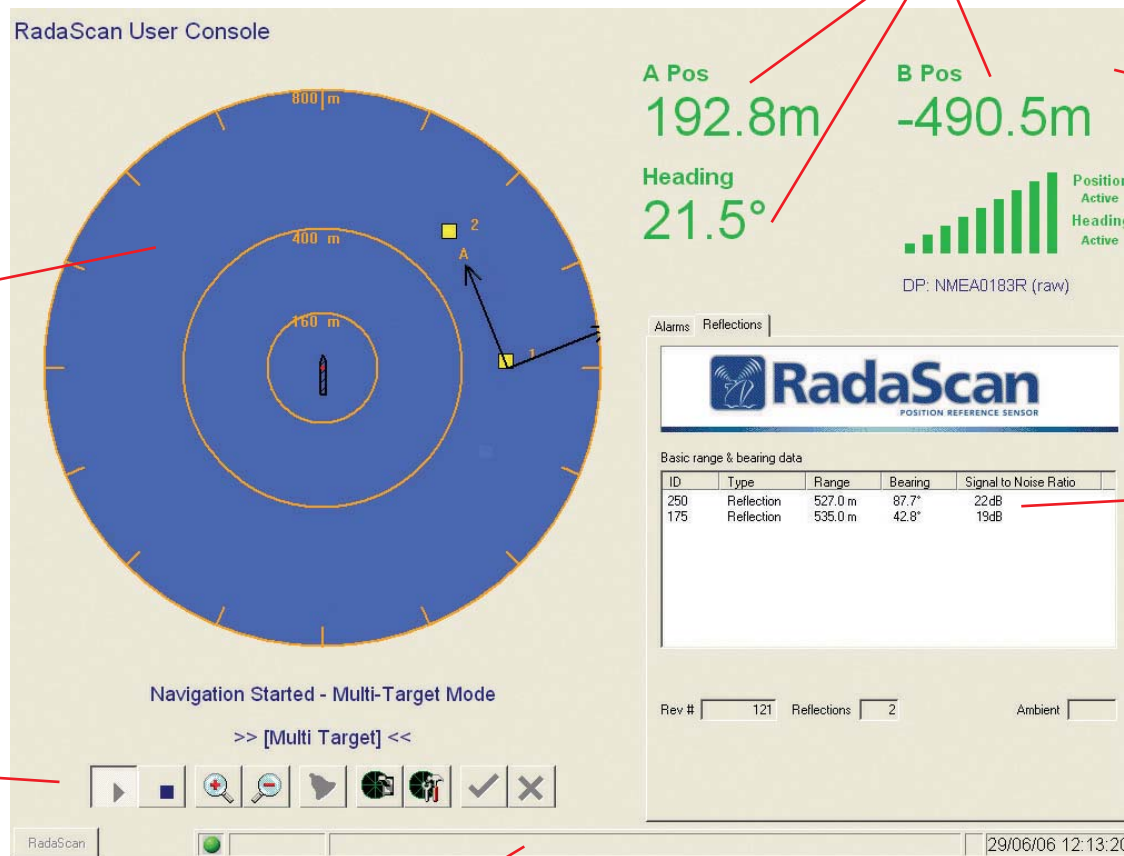
- [The Sensor display](#)
- [The Navigation section](#)
- [The Status bar](#)
- [The Property sheet](#)
- [The Button bar](#)

## Sensor display

A large circular area, rather like a radar sweep display, that shows the relationship between the RadaScan vessel and any targets that are in view.

## Button bar

A collection of nine buttons that provide, or control, a range of functions. The pages that follow provide explanations of each of the five key screen areas and the elements presented within them.



## Positional data display

## Navigation section

This section provides navigation information in a simple clear manner whenever the system is navigating.

## Property pages

Provides detailed information on a number of different topics and uses two tabbed pages to group information.

## Status bar

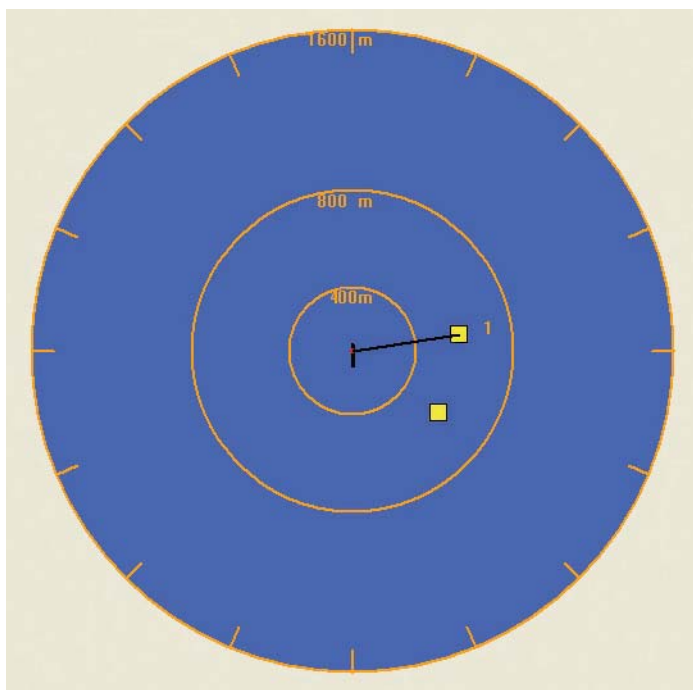
Provides important feedback information on various topics and displays the date and time that the situation was first reported.



# Sensor display

## Reflections and targets

Reflections from targets are shown as yellow squares on the seascape. The signal processing in RadaScan ensures that only reflections from genuine targets can be recognised and displayed. When navigating a coloured box is drawn around the reflection square to show the quality of the association with a known target.



This circular area is a seascape and shows the relationship between the RadaScan vessel and the targets. There are a number of key elements within the Sensor display:

### RadaScan vessel

The RadaScan vessel image is shown, as determined by the setting in the Display options, either as an outline or a solid filled shape, with a distinct bow and stern, or alternatively the vessel image may be switched off - see [Display options](#).

Depending upon the chosen display option, the centre of the Sensor display will either represent the RadaScan vessel, or the target origin of the current multi-target group - see [Display options](#).

### Range circles

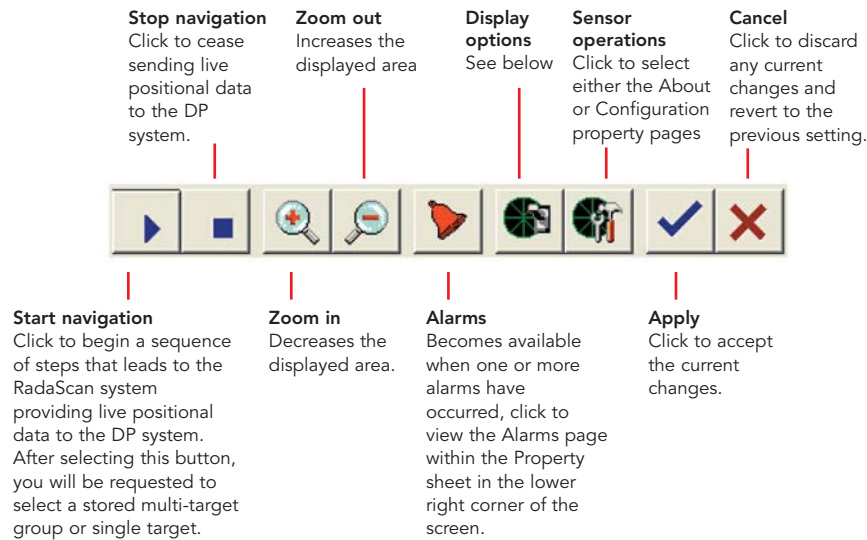
A series of radiating labelled concentric circles provide a visual indication of the location of the RadaScan vessel to the targets. Use the Zoom in and Zoom out buttons to change the scale of the display.

### Target reference frame

Indicates the A-B axis that the RadaScan system uses to define the positions of each target. This axis can be included/excluded from the display as required - see [Display options](#).

# Button bar

A collection of nine buttons that provide, or control, a range of functions. When a function is not available, the button image will fade and become unselectable:



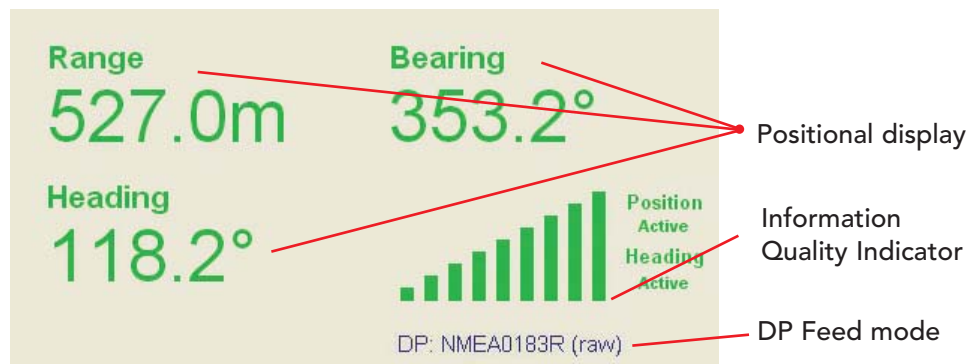
## Display options

Click to view a list of options that determine the elements within the sensor display:

- **Show Bearing Axis** - display/hide the tickmarks around the outer circle of the sensor display.
- **Show Range Circles** - display/hide the concentric distance circles of the sensor display.
- **Show Labels** - display/hide the range and target labels within the sensor display.
- **Show Reflections** - display/hide the markers representing the reflections received by the RadaScan sensor.
- **Show Targets** - display/hide the association boxes that are superimposed on the reflection squares.

# Navigation section

The upper right of the screen provides positional information whenever navigation mode is being used.



## Positional Display:

A number of different DP message types are available for configuration during installation and commissioning. The DP message type defines the positional display format.

In most formats the Range a Bearing to the primary target from the vessel is displayed numerically. Heading is only available when a NMEA message format is used and where 2 or more targets are available and multi-target navigation is selected.

When a NMEA format is used to navigate in Single target navigation the Range and Bearing values can be converted and displayed as Bow and Starboard distances from the target to the vessel. The option is selected by un-ticking the Range & Bearing box in the Configuration property page.

When a NMEA format is used to navigate with multiple targets the Range and Bearing values can be converted and displayed as the vessel position in relation to the A and B axis of a co-ordinate frame constructed around the target group. The option is selected by un-ticking the Range & Bearing box in the Configuration property page.

## Information Quality Indicator

A graphical 9 bar display gives a quick indication of the confidence that the sensor system has in the positional data being generated. The more bars that are displayed the better the data. The bars and numerical values are also coloured and change from red through orange to green as the date improves.

## Navigation: modes

You can choose from two main modes of navigation:

### Single target navigation

Single target is the simplest type of navigation as it only requires a single target and does not involve the creation of a target group. It is quick and easy to use however be aware that this method has certain limitations as follows:

- If the true target reflection is obscured by vessel operations there is a possibility that the sensor track will be lost and navigation will drop out.
- There is no provision for Heading data to be produced.

### Multi-target navigation


The use of multiple targets gives certain advantages over single target navigation and is worth considering whenever suitable targets are available.

The advantages are as follows:

- Improved tracking stability
- Redundancy allowing temporary loss of target reflection.
- Provision of Heading data in relation to target group.

## Navigation: single target

### To start single target navigation


- 1 Click the  button to reveal a pop-up list of navigation options.
- 2 Select [Single Target]
- 3 In the subsequent dialog, click 'OK' to confirm your selection.
- 4 Click the cursor on one of the target reflections shown on the sensor display.



After a short delay, the navigation data will be determined and displayed.

*Note that only 'Range and Bearing' or 'Bow and Starboard' values will be shown as single target/prism modes cannot provide heading information.*

### To end single target navigation


- 1 Click the  button.
- 2 In the subsequent dialog, click 'OK' to confirm your action.

The readouts in the navigation section will become inactive and turn grey. The viewed targets will remain shown on the sensor display.

## Navigation: multi-target


### To start multi-target navigation

The Multi-target navigation option only becomes available when Radascan identifies 2 or more authentic Radascan targets

- 1 Click the  button to reveal a pop-up list of navigation options.
- 2 Select [Multi-Target]
- 3 In the subsequent dialog, click 'OK' to confirm your selection.

RadaScan will automatically identify the available targets and after a short delay will start to navigate against them.

### To end multi-target navigation

- 1 Click the  button.
- 2 In the subsequent dialog, click 'OK' to confirm your action.

The readouts in the navigation section will become inactive and turn grey. The viewed targets will remain shown on the sensor display

### Information quality indicator

When beginning either single or multi-target navigation, the readouts in the navigation section of the screen (top right corner) will initially turn red (to indicate that the positional information received is not yet sufficient). The RadaScan system will improve upon its positional information and as quality increases, the readouts will change from red to amber and then to green. Additionally, the information quality indicator bar graph will show more similarly coloured bars.



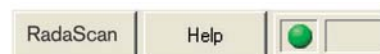
# Status bar

Provides important feedback information on various topics and displays the date and time that the situation was first reported. A green icon indicates that communication between the User Console and the RadaScan sensor is satisfactory. Double click on the Time and Date portion of the status bar to adjust the current system time and date settings.



## Status bar buttons

To the left of the status bar are two buttons:



## RadaScan

Click this button to view the Control dialog. From here you can

- **Suspend** - Places the sensor into a 'sleep mode' whereby the motor ceases spinning. However, upon the resume command, the unit will return to full operation.
- **Suspend & Exit** - Shuts the Console software application but maintains power to the sensor. Upon starting the application the unit will return to full operation. This mode is suitable for use when travelling between mooring locations.

## Help

Click this button to view the online RadaScan User Console operator's guide using Acrobat Reader.

# Property pages

This area of the User Console screen provides detailed operational and set-up information. The section is divided into 4 tabbed pages as follows:

**Alarms:** This page alerts the operator to any situation which may impact the performance of the system or the position output.

**Reflections:** This page gives details of the reflection(s) which are being received by the sensor.

**Configuration:** This page gives access to operational parameters including screen contrast, DP feed type and navigation display.




**About:** This page gives Service Access to the set-up parameter for the system. The software version of the User Console, a copyright statement and Guidance Navigation contact details are also shown.



For more information on these pages please refer to the detailed sections following:


# Alarms property page

During operation, the RadaScan system produces an event audit trail in the form of alarms from its various constituent components. These range in increasing order of severity from: Information, Warning, and Error to Fatal. As these alarms are received from the sensor, the console application lists them within the Alarms page tab of the property sheet.

To assist with quick recognition of the various alarm types, a colour coding scheme is employed. The triangular and square symbols used to represent the start and stop points of each alarm condition are represented in three colours to indicate their severity:

- Information Grey 
- Warning Orange 
- Fatal and Error Red 


As an alarm condition occurs, its entry is appended by a Start  symbol in the relevant severity colour. When the condition is resolved, the entry is appended with a Stop  symbol.

The Pause symbol  is displayed in the event of a single non-persistent incident


The Alarms page offers two key features to assist in the display of applicable alarms. These are the Alarm filter and the Alarm History.

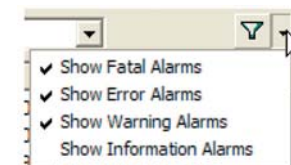
## Using the alarm filter

This allows you to choose which types of alarms (of the four categories) to display within the Alarms page. As standard the filter is activated with only the 'Information' alarms un-ticked to conceal them. To use the alarms filter:





- 1 View the Alarms page within the Property sheet (in the lower right corner).
- 2 Click the right side of the two-part filter  button. A drop down list will be displayed showing the four types of reports/alarms.

- 3 Click on each type of alarm to check/uncheck them as necessary
  - Note: Alarm types that are ticked are shown in the alarms list, un-ticked items are hidden.

- 4 To enable/disable the filter, click the left side of the two-part filter  button. The filter is active whenever the right side of the filter button is 'pressed in'.



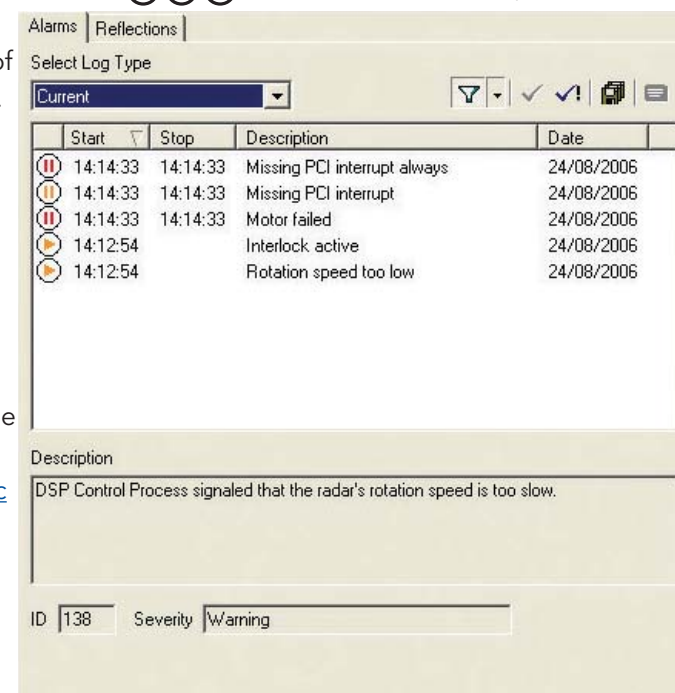
**Alarms page** - Lists any messages received from the various component units of the RadaScan sensor. These are classified into four types of alarm which are, in increasing order of severity:

- **Information** - grey symbols 
- **Warning** - orange symbols 
- **Error** - red symbols 
- **Fatal** - red symbols 

The arrow symbol indicates the Start of an entry that persists, while the square symbol indicates the end of an entry. The pause symbol indicates an entry that does not persist.

A [filter](#) is available to suppress the display of particular alarm types. As standard, the filter is activated and the Information messages are hidden from the list.

Deleting alarms from the current list will move the alarms to the Historic list. Deleting them from the [Historic](#) list will discard them permanently.

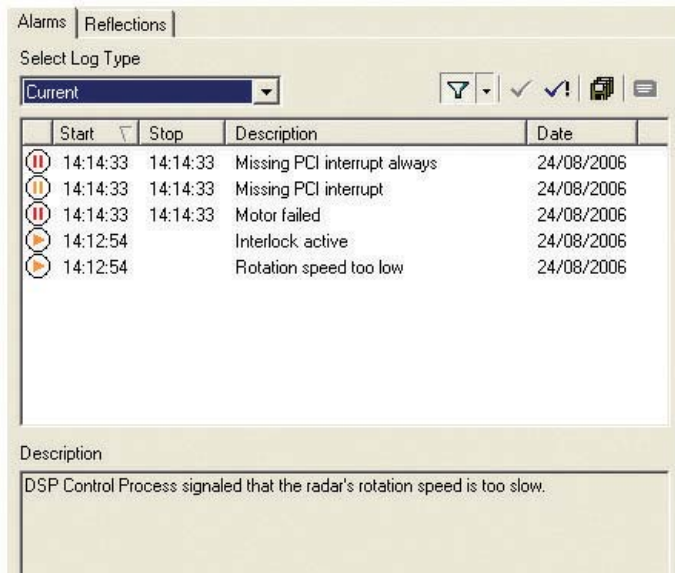


# Using the historic alarm list

The Alarms page has two alarms lists. The 'Current' list is where new alarm reports (since the last start of the console software) are automatically stored as they occur. In addition, a 'Historic' list allows you to clear the Current list and transfer its alarms so that you do not lose potentially important diagnostic feedback. On shutdown, current alarms are automatically transferred to the Historic list.

## To accept alarms in the current list

- 1 View the Alarms page tab within the Property sheet and check that the 'Select Log Type' entry shows 'Current'.
- 2 Select the alarms that you wish to move into the Historic list:



- To accept one alarm - click the alarm entry and click the button.
- To accept two or more - hold down the CTRL key, click the required alarm entries and click the button.
- To accept all alarms - click the button.

*Note: If you attempt to transfer any alarms that are still unresolved, a warning dialog will be displayed.*

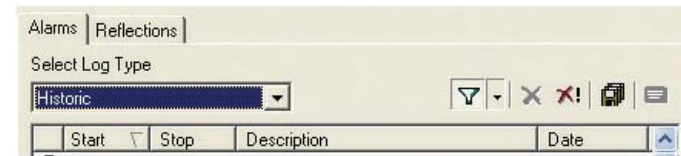
## To clear the historic list

Items in the Current list cannot be deleted, they may only be moved to the Historic list. Once there, however, they may be erased.

- 1 View the Alarms page tab within the Property sheet and check that the 'Select Log Type' entry shows 'Historic'.

- 2 Select the alarms to delete:

- To delete one alarm - click the alarm entry and click .
- To delete two or more - hold down the CTRL key, click the required alarm entries and click .
- To delete all alarms - click the button.



- 3 A dialog will be displayed and will require confirmation for each deletion. You can confirm each deletion individually, or click the 'Yes to All' button.

## To export an alarms list

- 1 Click the Export alarms button to export all alarms to a text file.



# Reflection Property page

This area of the RadaScan User Console screen provides detailed information on a number of different topics. The property sheet uses tabbed pages to group information and has four tabs:

**Reflections page** - Provides a numeric list of the reflections received during the last complete revolution of the sensor rotor. This page can be used to verify the graphical representation of reflections shown within the Sensor display.

As a new revolution is started, the list is cleared and starts again. For each verified reflection the list provides: Target ID code, Range, Bearing and Signal to Noise Ratio. The latter relates to the quality of the reflection. For changes up to 200m this value will ideally be between 13 and 21.

The screenshot shows the 'Reflections' tab in the RadaScan user console. At the top, there is a header with the RadaScan logo and the text 'POSITION REFERENCE SENSOR'. Below this, the section is titled 'Basic range & bearing data'. It contains a table with the following data:

| ID  | Type       | Range   | Bearing | Signal to Noise Ratio |
|-----|------------|---------|---------|-----------------------|
| 250 | Reflection | 200.0 m | 326.2°  | 22 dB                 |
| 175 | Reflection | 200.0 m | 281.3°  | 18 dB                 |

At the bottom of the interface, there are three input fields: 'Rev #' with the value '1135', 'Reflections' with the value '2', and 'Ambient' with the value '28 °C'.

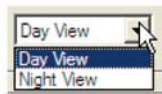
# Configuration property page

The Configuration page provides a mixture of RadaScan sensor data for troubleshooting purposes and also offers three selectable options:


- **Day View/Night View** - This option is essential in maintaining optimum usability between day and night operations.
- **DP Feed Format & Message String** - This is key to correct operation but which does not usually require alteration during day-to-day operations.
- **Range & Bearing Only** - In Single Target navigation with NMEA feed types, the default is to display position in a Bow Starboard axis frame. This option switches the display to one of Range and Bearing to the selected target. To implement, tick the box and click the apply button. The DP message string is unaffected.

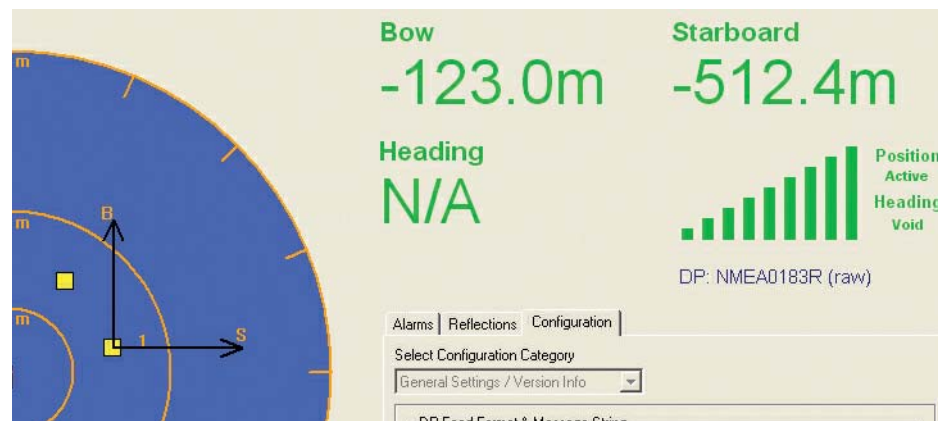
## Day View/Night View

To provide maximum visibility during daytime operation and minimal glare during night shifts, RadaScan User Console offers two display modes: 'Day View' and 'Night View'.

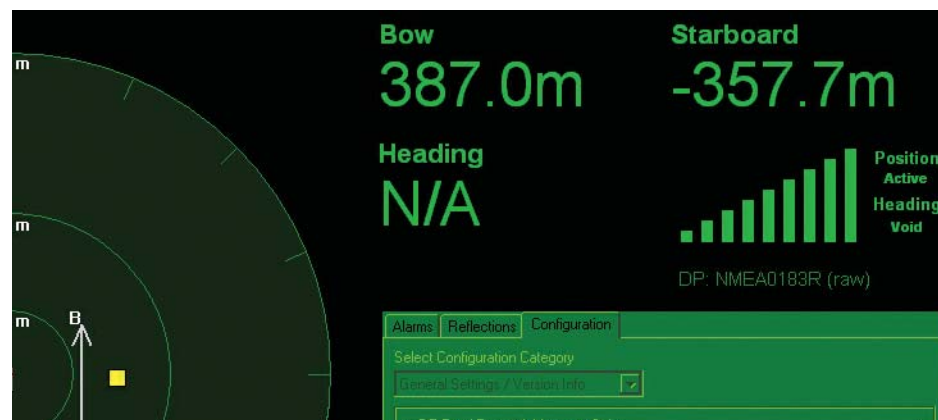


### To change the view mode:

- 1 View the Configuration page within the Property sheet.
- 2 Click the down arrow of the view box to reveal a drop-down list with two options.
- 3 Select the appropriate display format and then click the  button.



'Day' colour contrast setting



'Night' colour contrast setting

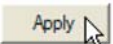
## DP feed format & message string

This option controls the format in which the positional information is packaged and sent to the vessel's DP system. The DP Feed Format may only be changed when RadaScan is not navigating. Any changes to this setting MUST be carried out in conjunction with a similar change on the DP system - both systems must use exactly the same format and variant thereof. The choice of DP Feed Format can have an effect on the information displayed in the Navigation section (top right corner) of the Console screen.

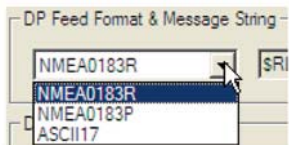
The DP Message string field displays the current text being sent to the DP system based on the current selection of the DP Feed Format type.

### To change the DP feed format:

Note: Changes in formats, other than between NMEA and ASCII, can only be carried out in [service access mode](#).

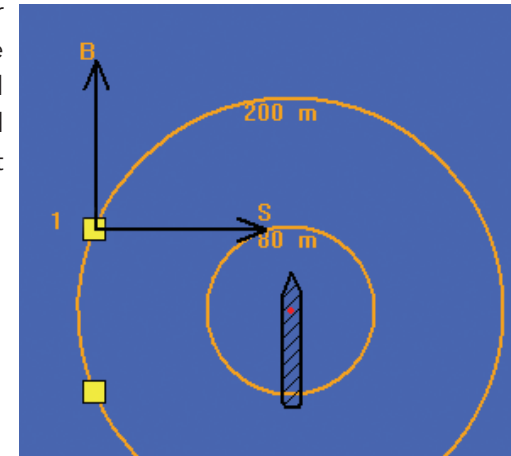
- 1 View the Configuration page within the Property sheet.
- 2 Click the down arrow of the DP Feed Format box to reveal a drop-down list of options.
- 3 Select the appropriate format and then click the  button.

Ensure that the DP system is correctly prepared to receive the new message format.



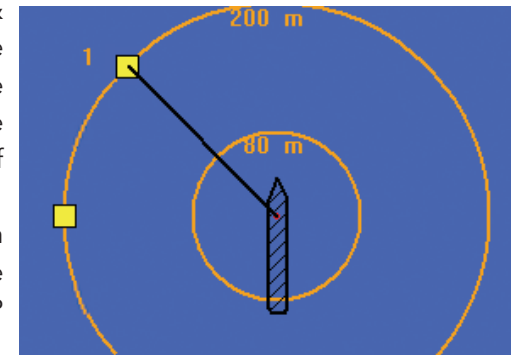
### ⇒ Single Target Display - Range & Bearing

The default display mode for Single Target is to present the position of the sensor vessel in metres along Bow and Starboard axes with origin at the target.



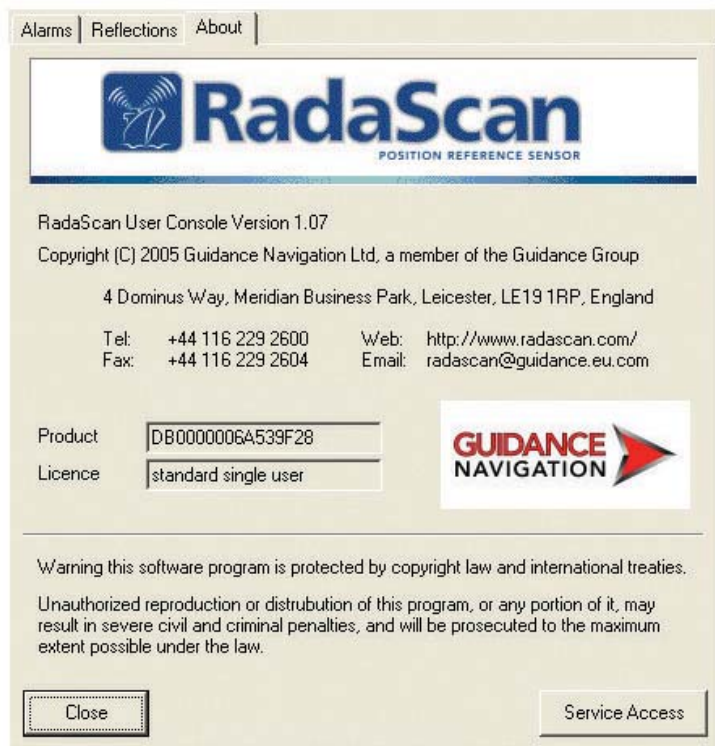
By selecting the Range & Bearing option on the Configuration page, the display is changed to the distance and the bearing of the target from the vessel.

Note: Selecting either option has no effect on the message strings that are sent to the DP system.





## About Property page

Indicates the software version and copyright details. It also allows you to invoke the temporary service access mode in order to adjust certain settings - please refer to the section [Entering service access mode](#) for further details.



# Using the on-screen keyboard

In order to accommodate keyboardless computers, RadaScan Console provides an on-screen keyboard option which permits you to enter text using only a mouse pointer. You can activate the on-screen keyboard wherever you see this icon:  This icon is found within the property sheet area on the following pages: Alarms, Multi-target groups and certain Configuration pages (when in service access mode). If the icon is greyed out  then the on-screen keyboard feature is disabled.

*Note: As standard, the on-screen keyboard feature is disabled as most installations are made onto systems that do include keyboards. Please refer to 'To enable the on-screen keyboard feature' for more details.*

When displayed the on-screen keyboard appears as a floating window (as standard it is set to remain 'Always on Top' of all other applications - this can be changed using its Settings menu).

## To use the on-screen keyboard

- 1 Click the icon to display the on-screen keyboard.
- 2 Select an item within RadaScan Console that requires text entry or editing.
- 3 Click the necessary keys on the on-screen keyboard.

## To enable the on-screen keyboard feature

*Note: This procedure can only be carried out when using Service Access mode, for which you require a restricted authorisation code.*

- 1 Enter [Service Access mode](#) using a temporary service access code.
- 2 View the *Configuration* page tab within the Property sheet.
- 3 Click the down arrow of the *Select Configuration Category* box and select the *Communications/Display Options* entry.
- 4 Tick the option *Enable On-Screen Display*.
- 5 Click the *Apply* button.



# Using log files

Whenever RadaScan is navigating it generates a comprehensive set of operation logs which are stored at C:\Program Files\RadaScan. These are segmented into folders containing log information for 1 hour periods. These can be accessed for engineer analysis or sent by email to Guidance Navigation or to your DP supplier.

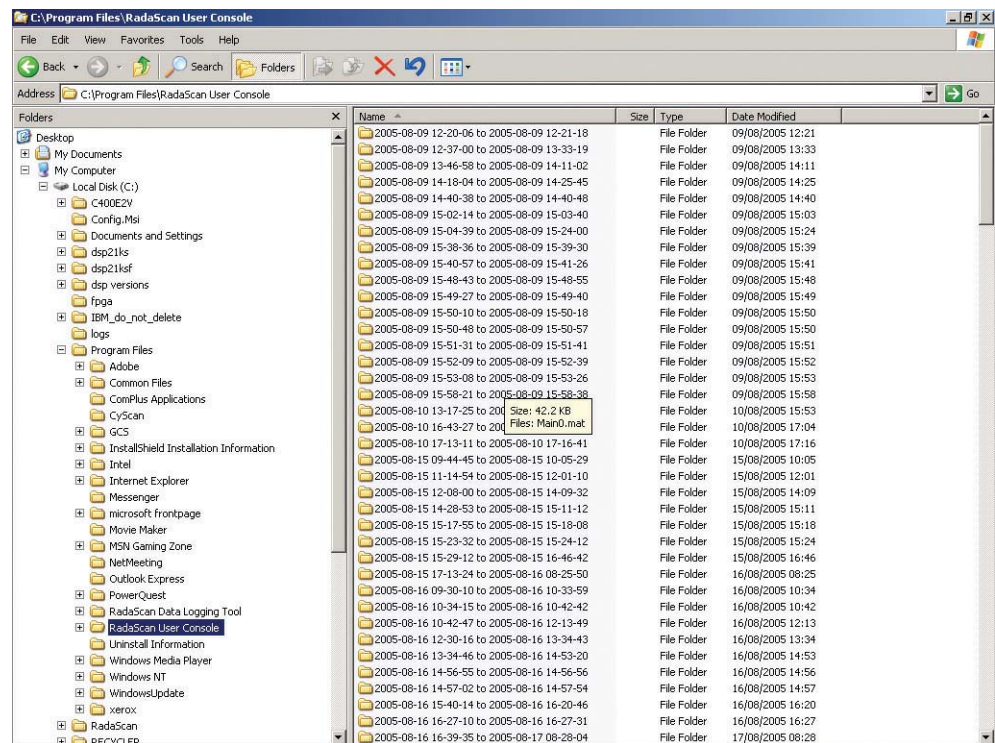
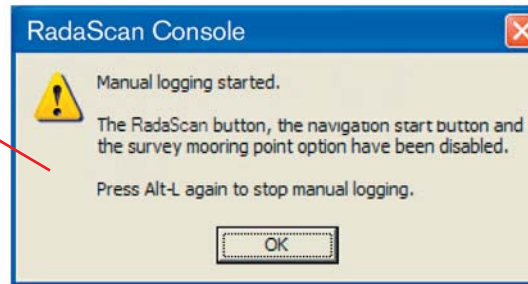
When in service access mode, the system logs can be collected manually, without the need to be navigating against a target, by using the control command Alt + L. Once activated, logs are collected until the Alt + L command is used again to deactivate.

*Note: For details about temporarily switching into service access mode, please refer to the section [Entering service access mode](#) on the next page.*

## To locate and send a log file:

- 1 When a sufficient time period has elapsed in which at least one instance of the expected problem has occurred, end the navigation session.
- 2 Use the 'Start' button and 'My Computer' to access the Local Disk (C:) folders and filing system. Locate the 'Program Files\RadaScan' folder.
- 3 Within the folder, locate the log file whose filename matches the date and time of your session. The name of the folder will include the start and finish dates and times, for example:  
  
03d05m2006y 20h33m03s to 03d05m2006y 20h33m38s
- 4 This folder and its contents should be transmitted via email to (support@radascan.co.uk) or posted on diskette back to Guidance Navigation Ltd where the captured data can be interpreted.

*Note: To compress the whole folder prior to transmission by email, you can make use of the folder compression utility with a right mouse click and by choosing 'Send to compressed folder'. Such compressed folders can be also be decompressed with standard tools such as WinZip.*



## Entering service access mode

There are many settings within RadaScan Console that can seriously affect system operation if they are incorrectly adjusted. For this reason they are concealed until you enter service access mode.

**IMPORTANT: Indiscriminate adjustment of parameter settings can adversely affect the operation of RadaScan. It is not advisable to edit the settings unless directed to do so by a qualified technician or Guidance Navigation Limited.**

Service access mode can be entered by plugging an engineer USB key into any available USB port on the console computer prior to starting the application. It is recommended that the application be re-started without the key in order to return to normal user mode.

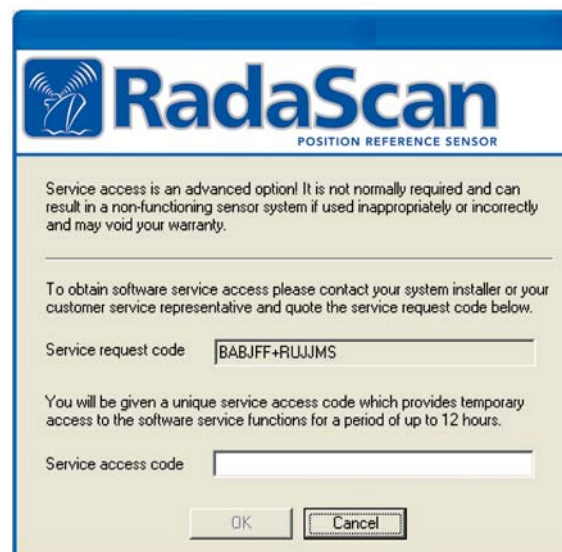
### To obtain and use a temporary service access code

- 1 Within the RadaScan Console application, view the *About* page tab.
- 2 Click the *Service Access* button in the lower right corner of the *About* page. A dialog will be displayed and will show a Service request code.

*Note: The service request code is constructed as two groups of six capital letters [A-Z] separated by a + sign. There are never any numerals in a service access code.*

- 3 Transmit the service access code to Guidance Navigation Limited ([support@radascan.co.uk](mailto:support@radascan.co.uk)) or an authorised customer service representative. A corresponding Service access code will be supplied to you. This code is non-transferable and will operate only with current Console system for a limited period.
- 4 Enter the received code into the *Service access code* field of the displayed page and click OK. Service access will be granted on this system for a maximum period of 12 hours, however, the mode will be automatically ended after 20 minutes - you need to re-click the *Service Access* button within the *About* page.

*Note: The service access code is a 12 digit hexadecimal number [0-9, A-F].*



Service access code dialog showing the request code and an area to enter a corresponding access code

## The Configuration page

In service access mode, the Configuration page of the property sheet provides a number of extra items. Firstly, the full range of DP Feed types become selectable within the General category.

Additionally, use the *Select Configuration Category* control to select the *Communications* and *File Transfer/Admin* pages.

See [Using the on-screen keyboard](#) for details.

The screenshot shows the 'Configuration' dialog box with the 'Select Configuration Category' dropdown set to 'Communications / Display Options'. The dialog contains three sections: 'DP Feed Behaviour' with 'Keep DP feed always enabled' checked and 'Allow refresh timer & zero strings' unchecked; 'Console Options' with 'Display Bow Orientation' set to 'Top' and 'Enable On-Screen Keyboard' unchecked; and 'Datalog Options' with 'Enable' selected and a path of 'C:\Program Files\RadaScan User Console\'. Buttons for 'Close', 'Apply', and 'Cancel' are at the bottom.

The screenshot shows the 'Configuration' dialog box with the 'Select Configuration Category' dropdown set to 'Vessel Parameters / File Transfer'. The dialog contains a 'Vessel Parameters' section with fields for 'Name' (Default Vessel), 'Length' (117 m), 'Breadth' (19 m), 'Bow Offset' (37 m), 'Starboard Offset' (9.5 m), and 'Bearing Offset' (0 deg). There are 'Import' and 'Default' buttons below the fields. Buttons for 'Close', 'Apply', and 'Cancel' are at the bottom.



# Specifications

## Sensor

|                             |  |
|-----------------------------|--|
| Emitter type                | FMCW operating in the 9.2-9.3GHz maritime radiolocation band |
| Operating range             | 10 to 1000m  |
| Range accuracy              | better than 0.05% of operating range                         |
| Angular repeatability       | 0.06° (1 mrad) at 500m                                       |
| Rotation                    | uni-directional 1-3Hz  |
| Beam shape                  | divergent  |
| Close-range elevation angle | +35° @ 25m   |
| Temperature control         | thermostatic heating circuit                                 |

## Vessel Interface

|                       |  |
|-----------------------|--|
| Power requirement I/O | 90-264 VAC 47-63Hz<br>sensor to Control Console - ethernet<br>sensor to DP - RS422 9600 baud, ethernet |
| Data formats          | compatible with all DP and other vessel control systems using standard or customised message types     |

## Control & Data Display

|                  |  |
|------------------|--|
| Operating system | PC Windows XP Pro Embedded   |
| Software         | dedicated real-time interactive  |
| Hardware options | compact marine standard PC module + 15" TFT monitor.<br>Hatteland Type Approved integrated PC/TFT screen |

## Environmental

|                           |              |
|---------------------------|--------------|
| Operating temperature     | -25 to 55°C  |
| Water and dust protection | Standard     |
| EMC                       | CE certified |

## Mechanical

|            |                               |
|------------|-------------------------------|
| Enclosure  | radome on anodised alloy base |
| Dimensions | 1200mm (Ø), 920mm (h)         |
| Weight     | ca. 63kg                      |
| Mounting   | securing bolt holes in base   |

## Target

|                    |   |
|--------------------|---|
| Type               | self-contained retro-reflective transponder |
| Environmental use  | ATEX certified                              |
| Azimuth response   | ±85° @<100m, ±45° @<500m                    |
| Elevation response | ±35°  |
| Power              | non-wired. exchangeable battery cassette    |
| Battery life       | 2 years continuous use                      |
| Dimensions (wxhxd) | 350 x 540 x 190 mm                          |
| Weight             | 18 kg                                       |

Guidance Navigation Limited reserves the right to alter or amend this published specification without notice.

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