

WinFrog Device Group:	GPS										
Device Name/Model:	SEAPATH										
Device Manufacturer:	Kongsberg Seatex AS Pirsenteret N-7462 Trondheim Norway Tel: +47 73 54 55 00 Fax: +47 73 51 50 20 E-mail: firmapost@kongsberg-seatex.no										
Device Data String(s) Output to WinFrog:	Binary input message										
WinFrog Data String(s) Output to Device:											
WinFrog Data Item(s) and their RAW record:	<table> <tr><td>POSITION</td><td>303</td></tr> <tr><td>VELOCITY</td><td>900</td></tr> <tr><td>HEADING</td><td>910</td></tr> <tr><td>ATTITUDE</td><td>413</td></tr> <tr><td>HEAVE</td><td>888</td></tr> </table>	POSITION	303	VELOCITY	900	HEADING	910	ATTITUDE	413	HEAVE	888
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DEVICE DESCRIPTION:

The Seapath device is an integrated heading, attitude, and positioning sensor. It provides a real time heading, altitude and position solution. Seapath utilizes a Seatex MRU-5 inertial sensor and two fixed baseline GPS carrier-phase receivers as raw data providers. The raw sensor data is integrated in a Kalman filter in the Seapath Processing Unit. The Processing Unit contains a processor with Seapath software, the two GPS receivers, RS232/422 user interfaces, and power supply. Feedback of GPS data into the MRU-5 results in absolute and dynamic heading. Seapath provides roll and pitch by utilizing the GPS velocity to compensate for horizontal accelerations. Position and velocity are determined by using GPS phase-smoothed pseudo-range and doppler observations. The data is transformed to the ship's center of gravity, and, if required, to a user defined location by lever arm compensation settings in the setup configuration. In addition, heave and vertical velocity are measured by the MRU-5.

To configure the sensor during installation, the Windows-based Seapath Control Center software is used on a separate installation computer.

DEVICE CONFIGURATION INSTRUCTIONS

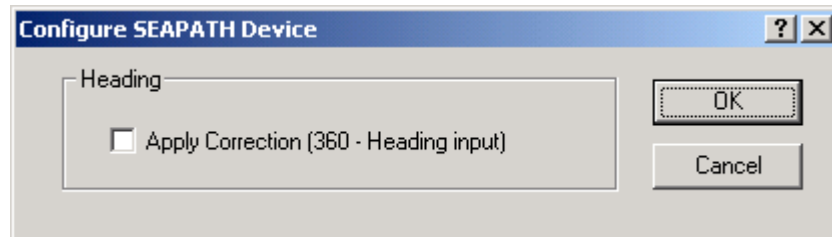
WINFROG I/O DEVICES > EDIT I/O:

Serial

Configurable Parameters

WINFROG I/O DEVICES > CONFIGURE DEVICE:

This device can be configured at the I/O Device window level if you choose to apply a correction to the heading input. In the I/O Devices window, click the device name to select it, then right-click and select Configure Device. The Configure SEAPATH Device dialog box appears, as seen below.

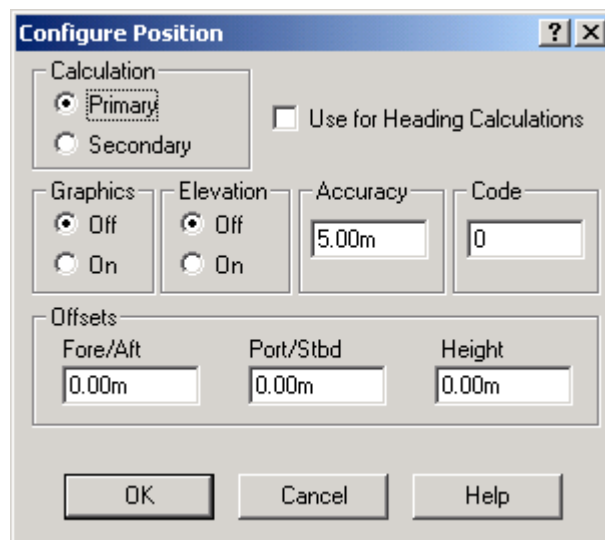


WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the SEAPATH device creates five data items: POSITION, VELOCITY, HEADING, ATTITUDE and HEAVE. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: GPS, SEAPATH, POSITION

The Position data item must be edited once it is added to a vehicle's device list. Highlight the POSITION data item in the vehicle's device list, then click the Edit button. The Configure Position dialog box appears as seen below.



Calculation:

Set the Calculation selection to Primary or Secondary. Devices set to Primary calculation are used to provide a vessel position. Note that more than one Primary positioning device can be added to a vehicle's device list; data from these devices

will be combined in a weighted mean solution. (See the paragraph on Accuracy below for more on the weighting of Primary calculation device data).

If the Calculation type is set to Secondary, WinFrog will simply monitor the device's data. WinFrog will not use the position data from the device in the final solution of the vehicles' position.

Note: In the case of Primary device failure, WinFrog will not automatically use the Secondary devices for the vessel's position computation. Instead, the vehicle's positioning will go to dead reckoning (if dead reckoning is turned on). You must manually change a Secondary device to Primary in order for the data to be utilized.

Use For Heading Calculations:

Select this checkbox if the device is to be used in conjunction with another GPS device for determination of the heading of the vessel. The vessel's heading will be derived by the inverse of the GPS antenna coordinates.

Graphics:

If On is selected, a labeled square will show the raw (offset but unfiltered) location of the GPS antenna in the Graphics and Bird's Eye windows. This provides a means of comparing raw device and filtered vehicle positions.

Elevation:

Setting the Elevation option to On will result in the elevation determined by GPS to be used as the elevation of the vessel referencing the GPS (WGS84) Ellipsoid. The sounder data recorded in WinFrog's .RAW data files will not be affected.

This option is meant only for those applications where there is no fixed vertical reference (i.e. mean sea level), such as on a river. For acceptable results, this option requires the use of high accuracy "RTK" GPS data.

Accuracy:

The Accuracy value entered provides WinFrog with the expected accuracy of the position from this device. This value is used in the weighting of this device compared to other positioning devices that may be added to the vehicle's device list. The smaller the value entered, the more accurate it is considered to be, and hence the more weight that will be applied to the device's data.

The Accuracy parameter can be changed from the suggested values; changes should be made with caution, however, as they will affect the final filtered position of the vehicle.

Code:

This field is used when the GPS data is being received by a remote GPS receiver connected via telemetry link. If this is the case, set the Code to coincide with the code parameters associated with the GPS unit being used.

For all other applications, the Code entry must be set to 0.

Offsets:

Offsets are required to associate the GPS antenna position with the vessel's Common Reference Point (CRP). The offsets are applied *from* CRP (of the vehicle) *to* the GPS antenna location.

Forward Offsets are entered as positive values.

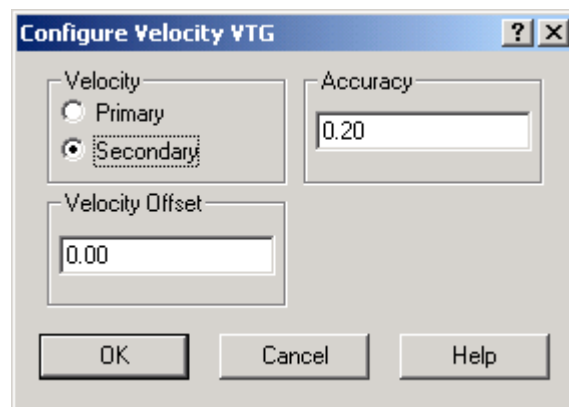
Aft Offsets are entered as negative values.

Starboard Offsets are entered as positive values.

Port Offsets are entered as negative values.

Height Offsets are positive upwards. (It is suggested that the vessel's Height origin should be at the water line.

Data item: GPS, SEAPATH, VELOCITY

**Velocity**

You can select Primary if the Seapath device is to be used to calculate the vessel's velocity. The default setting is Secondary.

Accuracy

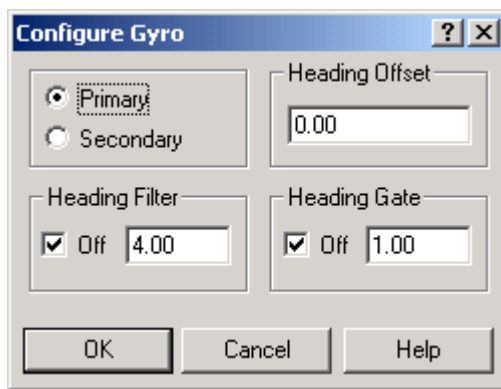
The Accuracy dialog box is where you can specify the expected accuracy, expressed in m/s, of the velocity component from this device.

Velocity Offset

The Velocity Offset is entered in m/s and is added to the velocity input from the Device.

Data item: GPS, SEAPATH, HEADING

The Heading data item must also be edited once it is added to a vehicle's device list. Highlight the HEADING data item in the vehicle's device list, then click the Edit button. The Configure Gyro dialog box appears as seen below.



Calculation (Primary/Secondary):

Set the type of calculation to Primary or Secondary by selecting the appropriate radio button. Devices set to Primary are used to provide the vehicle with heading information. However unlike the Position data items, WinFrog does not calculate a weighted mean solution for multiple Heading data items. If more than one Heading data item is set to primary, the vessels heading, in WinFrog, will jump back and forth between the two. Devices set to Secondary are simply monitored, and are not used in the vehicle's calculations.

In the case of Primary device failure, WinFrog will not automatically use the Secondary device(s). You must manually change a Secondary device to Primary status in order for it to be used in the vehicle's calculations.

Heading Offset:

A correction value (as determined from a gyro calibration) can be input in the Heading Offset box. This value is added to the heading value from the Device to provide a corrected heading for the vehicle. Note that positive or negative values can be entered.

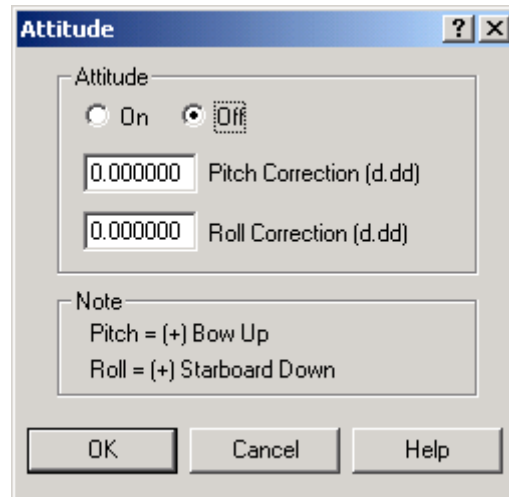
Heading Filter/Heading Gate:

The Heading Filter is used to "smooth" heading values used by the vehicle. The value entered in the Heading Filter indicates the number of headings that will be used to predict the next heading value. The larger the value entered, the "heavier" the filter will be – i.e. the slower the vehicle's heading will respond to changes.

The heading gate defines a tolerance value to limit the use of anomalies in gyro readings. If the next observed gyro value received falls outside the specified range of predicted values (i.e. plus or minus the entered value), the value will not be used.

Data item: GPS, SEAPATH, ATTITUDE

The Attitude data item must also be edited once it is added to a vehicle's device list. Highlight the Attitude data item in the vehicle's device list, then click the Edit button. The Attitude dialog box appears as seen below.

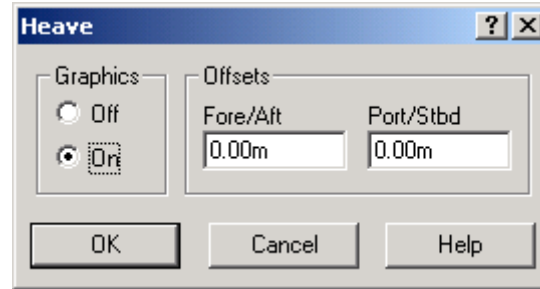


By default, the sensor mode is off, meaning that data from the Attitude device will not be used in the vehicle's calculations. To turn the sensor on, and begin using the inclination corrections in the position output, click the 'On' radio button.

Correction values can also be added in this section of the dialog. The correction values (entered in units of degrees-decimal degrees) are added to the raw pitch and roll values received from the Attitude device before the data is applied to the vehicle's calculations.

Ensure that entered values adhere to the sign convention used by WinFrog. You can verify that the corrections are entered properly by viewing the pitch and roll values in the I/O Device window and the Vehicle Text window.

Data item: GPS, SEAPATH, HEAVE



Graphics:

The Graphics Off/On radio buttons have no application at this time. This is to say that when the graphics is turned on, no display of the unit's position will appear.

Offsets:

The Fore/Aft and Port /Stbd fields allow you to enter Offsets from the vessel's Common Reference Point (CRP) to the heave sensor. These offsets are used to reduce heave measurement errors that occur when the heave sensor is located at any position other than the vessel's center of gravity (COG).

WinFrog will apply pitch and roll data to the entered offsets to calculate the heave at the vessel's COG. In order to minimize potential erroneous offset entries, it is advised to place the vehicle's common reference point (CRP) at the vessel's COG.

Pitch and roll are not affected in the same manner as heave when the unit is installed at a location other than the COG. For this reason, offsets are not applied to the Pitch and Roll values.

The heave data is only recorded for use in post processing, i.e. if an echo sounder is added to WinFrog, recorded depths are not corrected for heave. If real time heave corrected depth data is required, you must use an echo sounder that is capable of interfacing to the heave sensor and applying the heave data internally.

TELGRAM SPECIFICATION:

Binary input message