

WinFrog Device Group:	ROV
Device Name/Model:	Sonsub Innovator3
Device Manufacturer:	
Device Data String(s) Output to WinFrog:	See Telegram Specification section below.
WinFrog Data String(s) Output to Device:	See Telegram Specification section below.
WinFrog Data Item(s) and their RAW record:	ROVDATA 496 POSITION 303 HEADING 409 BOTTOMDEPTH 911 ATTITUDE 413 OUTPUT NONE

DEVICE DESCRIPTION:

This is a driver that is designed to both read ROV type data from the Sonsub Innovator3 ROV as well as to send positional data to the Sonsub Innovator3 ROV.

This device requires that the starting position of the ROV is known, the distance travelled can be accurately measured (via properly scaled odometer readings) and that either a survey line be tracked or that the heading data is reliable. WinFrog calculates new positions for the ROV using the known starting position, distance travelled and either the KP of the tracked survey line or the heading data (dead reckoning).

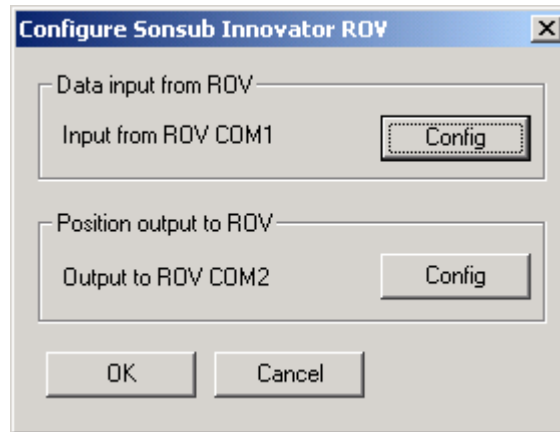
The initial odometer reading is entered in the Sonsub Innovator Configuration dialog box. The odometer readings do not update automatically, you must enter the new odometer readings manually in the Configure ROV window (from the ROVDATA data item) as discussed below.

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Serial
Configurable Parameters

This device requires that two data ports be configured, one for the Data Input to WinFrog from the ROV and the other to output positional data to the Sonsub Innovator3 system. When the device is added to WinFrog the Configure Sonsub Innovator ROV dialog box opens as seen below.



The configuration of these two ports is the same as for any device in WinFrog. Click the Config button for either port and the standard Device I/O Parameters window will open.

WINFROG I/O DEVICES > CONFIGURE DEVICE:

This device must be configured at the I/O Device window level. There are two options available, both of which require an accurately scaled odometer reading. As explained below, the ROV's position will be calculated from either the odometer reading and the heading or the odometer reading and the KP of the tracked survey line. These options are typically used for shallow water operations where USBL acoustic devices are not effective.

In the I/O Devices window, click the device name to select it, then right-click and select Configure Device. The Sonsub Innovator Configuration dialog box appears, as seen below.

Sonsub Innovator Configuration

ROV Positioning

☒ Dead Reckoning

☐ Line Tracking

Odometer Scaling

Scale Factor

Dead Reckoning Heading Calculation

☐ Use Average Heading

☒ Use Instantaneous Heading

Line Tracking KP - Odometer Offset

ROV KP (in meters)

Corresponding Odometer Reading

Note: Enter KP and odometer values that refer to the ROV at the same point in time.

Line Tracking Direction

☒ Forward

☐ Reverse

OK Cancel

There are two options for ROV positioning. The Dead Reckoning option (depicted above) requires that either the Average or Instantaneous Heading Calculation be selected. Some consideration must be given to the stability of the heading data before a choice is made. Also, enter a Scale Factor for the Odometer readings. With a stable heading source and an accurately scaled odometer reading, the ROV can be positioned by using the Dead Reckoning option.

The other option for ROV positioning is the Line Tracking option, depicted below.

Sonsub Innovator Configuration

ROV Positioning

☐ Dead Reconing

☒ Line Tracking

Odometer Scaling

Scale Factor

Dead Reconing Heading Calculation

☐ Use Average Heading

☒ Use Instantaneous Heading

Line Tracking KP - Odometer Offset

ROV KP (in meters)

Corresponding Odometer Reading

Note: Enter KP and odometer values that refer to the ROV at the same point in time.

Line Tracking Direction

☒ Forward

☐ Reverse

OK Cancel

This option also requires an accurately scaled odometer reading. This option also requires that a survey is tracked by the ROV in WinFrog. Select a point in time where the KP of the ROV, in relation to the line being tracked is known. At that point enter both the KP of the ROV and the odometer reading in the Line Tracking KP – Odometer Offset section. Specify whether the ROV is to travel the line being tracked in either the Forward or Reverse direction.

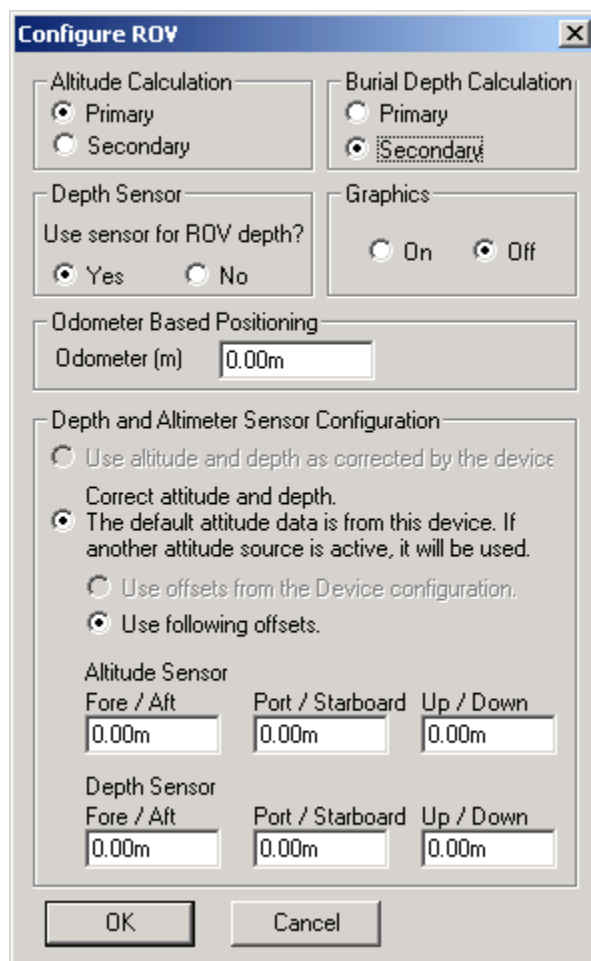
WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the Sonsub Innovator3 device creates six data items: ROVDATA, POSITION, HEADING, BOTTOMDEPTH, ATTITUDE and OUTPUT. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: ROV, Sonsub Innovator3, ROVDATA

This data item is used to read specific ROV type data from the Sonsub Innovator3, as well as to manually enter odometer readings to calculate new positions for the ROV.

Highlight this data item in the vehicle's device list and click the Edit button to open the Configure ROV dialog box as seen below.



The image shows a 'Configure ROV' dialog box with the following sections and controls:

- Altitude Calculation:** Radio buttons for 'Primary' (selected) and 'Secondary'.
- Burial Depth Calculation:** Radio buttons for 'Primary' and 'Secondary' (selected).
- Depth Sensor:** A section titled 'Use sensor for ROV depth?' with radio buttons for 'Yes' (selected) and 'No'.
- Graphics:** Radio buttons for 'On' and 'Off' (selected).
- Odometer Based Positioning:** A text input field for 'Odometer (m)' with the value '0.00m'.
- Depth and Altimeter Sensor Configuration:**
 - Radio buttons for:
 - 'Use altitude and depth as corrected by the device' (disabled).
 - 'Correct attitude and depth.' (selected).
 - 'The default attitude data is from this device. If another attitude source is active, it will be used.' (disabled).
 - 'Use offsets from the Device configuration.' (disabled).
 - 'Use following offsets.' (selected).
 - Altitude Sensor offsets:** Three text input fields for 'Fore / Aft', 'Port / Starboard', and 'Up / Down', all containing '0.00m'.
 - Depth Sensor offsets:** Three text input fields for 'Fore / Aft', 'Port / Starboard', and 'Up / Down', all containing '0.00m'.

At the bottom are 'OK' and 'Cancel' buttons.

Altitude Calculation:

Primary will result in this vehicle's altitude being determined from the observed altitude value found in the string from this device minus the altitude offset also found on this dialog. This value can be displayed in the Vehicle Text window as ROV Alt.

Secondary will result in no calculation or assignment of the vehicle's altitude from this device. The raw data is still always recorded.

Burial Depth Calculation:

This device does not use this option.

Graphics:

Select the On radio button to display the device name and a square at the location of the tracked offset, within the Graphics and Bird's Eye windows.

Use sensor for ROV depth:

Selecting the Yes radio button will cause the depth of this vehicle's CRP to be determined from the observed depth value found in the string from this device plus the depth offset below. This vehicle's elevation will be the negative of this value. This value will be used to calculate the bottom depth.

The bottom depth will be determined as:

Observed depth + Depth Offset + observed altimeter - altitude Offset

The offsets (see below) are not corrected for pitch and roll when determining the water depth.

Selecting the No radio button will result in this device obtaining the depth of the CRP from the vehicle itself, as opposed to assigning it to the vehicle as above. You must assign another device to determine the depth of the vehicle (e.g. USBL and assigning it as the source for depth).

Note: The observed altimeter value is always used for depth determination regardless of the prime/secondary altimeter setting.

Odometer Based Positioning:

In this window the operator enters the odometer readings. As discussed above these readings are used with either the Dead Reckoning or Line Tracking options to determine the new ROV positions. The operator enters the new odometer readings and WinFrog calculates a new position for the ROV.

Depth and Altimeter Sensor Configuration:

For all ROV devices except Deep Blue ROV, the radio button settings cannot be changed. See the Deep Blue ROV device documentation for information on setting these radio buttons.

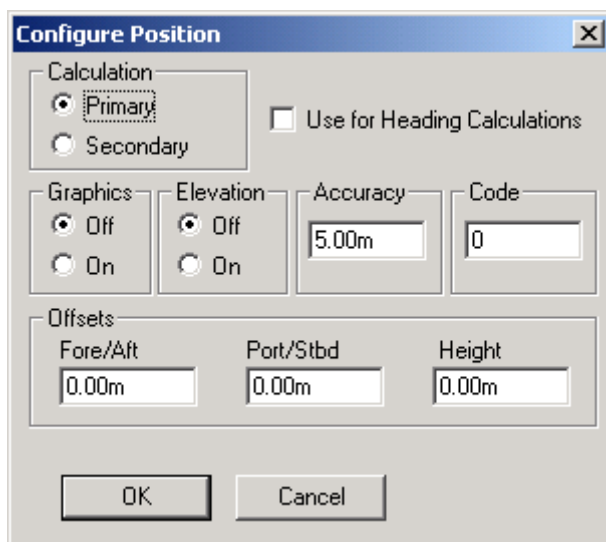
Vertical offsets of the altitude and depth sensors, relative to the CRP, can be entered here. The Altitude Offset is the vertical distance (positive up) from the ROV's CRP to the acoustic beacon tracking the seafloor. The Depth Offset is the vertical distance (positive up) from the ROV's CRP to the sensor that provides depth information of the ROV.

The offset position will be corrected for pitch and roll then the vertical offsets will be applied to determine the depth of the ROV and height of the ROV above the bottom.

Data item: ROV, Sonsub Innovator3, POSITION

This data item is added to the ROV's device list. It is used in conjunction with the updated odometer readings to position the ROV in WinFrog.

Highlight the ROV, Sonsub Innovator3, POSITION data item in the ROV's device list and click the Edit button to open the Configure Position dialog box as seen below.

The image shows a 'Configure Position' dialog box with a blue title bar and a close button. It contains several sections: 'Calculation' with radio buttons for 'Primary' (selected) and 'Secondary', and a checkbox for 'Use for Heading Calculations'; 'Graphics' with radio buttons for 'Off' (selected) and 'On'; 'Elevation' with radio buttons for 'Off' (selected) and 'On'; 'Accuracy' with a text field containing '5.00m'; 'Code' with a text field containing '0'; and 'Offsets' with three text fields for 'Fore/Aft', 'Port/Stbd', and 'Height', all containing '0.00m'. At the bottom are 'OK' and 'Cancel' buttons.

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:

This device does not use this option.

Graphics:

Select the On radio button to display a labeled square showing 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:

This device does not use this option.

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 and is therefore not used by this device.

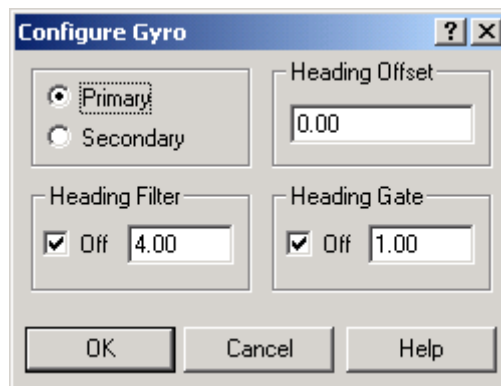
For the Sonsub Innovator device the Code entry must be set to 0.

Offsets:

Typically for the Sonsub Innovator3 device the offsets would be left at the default values of zero.

Data item: ROV, Sonsub Innovator3, HEADING

This data item is used to provide the ROV vehicle, in WinFrog, with heading data. Highlight this data item in the vehicle's device list and click the Edit button to open the Configure Gyro dialog box 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.

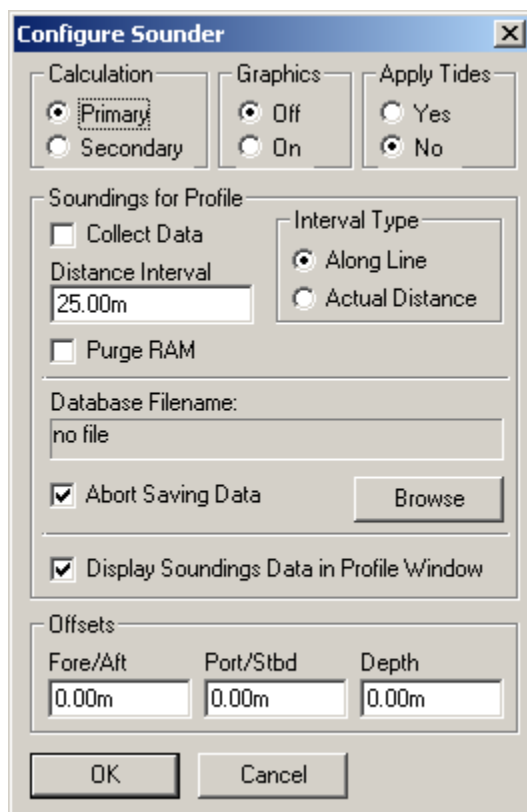
Heading Filter/Heading Gate:

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: ROV, Sonsub Innovator3, BOTTOMDEPTH

Highlight this data item in the vehicle's device list and click the Edit button to open the Configure Sounder dialog box as seen below.



The image shows a 'Configure Sounder' dialog box with the following sections and controls:

- Calculation:** Radio buttons for 'Primary' (selected) and 'Secondary'.
- Graphics:** Radio buttons for 'Off' (selected) and 'On'.
- Apply Tides:** Radio buttons for 'Yes' and 'No' (selected).
- Soundings for Profile:**
 - ☐ Collect Data
 - Distance Interval: 25.00m
 - ☐ Purge RAM
 - Interval Type: Radio buttons for 'Along Line' (selected) and 'Actual Distance'.
- Database Filename:** Text field containing 'no file' and a 'Browse' button.
- ☒ Abort Saving Data
- ☒ Display Soundings Data in Profile Window
- Offsets:** Three text fields for 'Fore/Aft', 'Port/Stbd', and 'Depth', all containing '0.00m'.
- Buttons:** 'OK' and 'Cancel' at the bottom.

Calculation:

Set the type of calculation to Primary or Secondary using the appropriate radio button. WinFrog will only utilize (i.e. display and record) data from a Primary depth sensor device. If there is more than one Primary depth sensor attached to a vehicle's device list, WinFrog will not mean the data (as is done with positional devices), but rather alternate between the devices. Data from a Secondary status depth sensor will simply be monitored.

Graphics:

Select the On radio button to display a labeled square representing the location of the depth sensor in the Graphics and/or Bird's Eye windows.

Apply Tides:

If the Yes radio button is selected, WinFrog will apply tidal corrections to the observed water depths. Depths displayed in the Vehicle Text window and recorded in automatic event (i.e. .DAT, .SRC, and .RCV) and type 351 raw files will refer to the datum corrected depths. Note that type 911 raw data records will remain truly raw and will not reflect the tide correction.

The tide information can be supplied by a real time telemetry system or by predicted tide files. Either way, the tide “device” must also be attached to the same vehicle’s device list. For more information, refer to documentation on Tide devices.

Soundings for Profile:

This section of the Configure Sounder dialog permits the collection of sounding data to an .mdb database file for display in WinFrog’s Profile window. This collection is completely separate from automatic event or raw data collection.

Collect Data

Select this checkbox to enable the collection of data to an .mdb database file.

Interval Type

Select to utilize either Along Line or Actual Distance (i.e. between successive position updates) calculations for data collection intervals. Selecting Along Line requires that you also enable survey line tracking.

Distance Interval

Specify the distance interval at which the data will be collected.

Purge RAM

Sounding data is stored in the RAM memory of the computer. Any data collected which will not be required at later time can be deleted by selecting the Purge RAM checkbox, then clicking the OK button to exit the dialog box.

Database filename

Click the Browse button to define where and to what filename the .mdb file will be written. The file name and location is displayed in this window.

Abort Saving Data

Select this checkbox to abort saving data to the .mdb file. In other words, to save data to the .mdb file ensure that this box is NOT checked.

Display Soundings Data in Profile Window

Select this checkbox to enable the display of this data in WinFrog’s Profile window.

Offsets

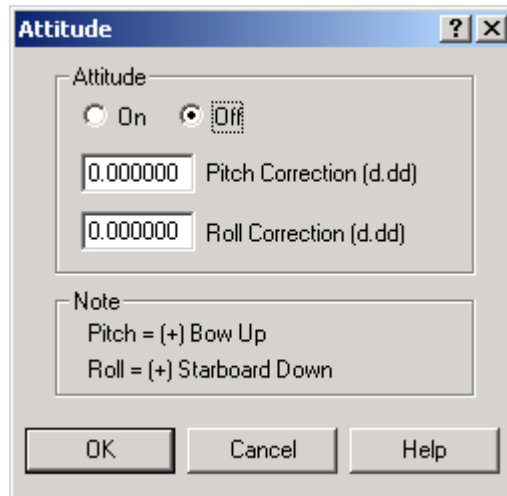
This section of the dialog allows for entry of offset values as measured from the vessel’s Common Reference Point (CRP). Note that the Fore/Aft and Port/Stbd offsets are used for “cosmetic” visual purposes only: A depth sensor is not a positioning device, and hence its horizontal offsets have no application. If the depth sensor’s position is to be recorded correctly, you must create and enable a vehicle Tracking Offset for that specific location. The offsets entered here can simply be used as a means of graphically confirming that the Tracking Offset values have been entered correctly.

The Depth Offset is applied; the entered value will be added to the received depth sensor data.

Depths displayed in the Vehicle Text window and recorded in automatic event (i.e. .DAT, .SRC, and .RCV) and type 351 raw files will refer to the corrected depths. Note that type 911 raw data records will remain truly raw and will not reflect the depth offset correction.

Data item: ROV, Sonsub Innovator3, ATTITUDE

Highlight this data item in the vehicle's device list and click the Edit button to open the Attitude dialog box as seen below.



Attitude

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

Correction values can also be added in this section of the window. 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: ROV, Sonsub Innovator3, OUTPUT

This data item outputs the ROV position, in grid coordinates (E,N), as well as the ROV KP to the Sonsub Innovator3 system.

There are no Edit or configuration options available for this data item, however, it must be added to the appropriate vehicle's device list in order for the position and KP output to take place.

TELGRAM SPECIFICATION:

The Input data telegram from the Sonsub Innovator3 system contains the following data;

Field	Data
1	\$PSSI
2	Hheading
3	Ppitch
4	Rroll
5	Ddepth
6	Aaltimeter

The Output data telegram to the Sonsub Innovator3 system contains the following data;

Field	Data
1	\$NAV
2	easting
3	E
4	northing
5	N
6	kp