Rovins

Installation & Setup Guide

iXblue

Revision History

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A	07/2019	Creation
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Rovins Documentation

The following documents give all the information you need in order to understand and to use your product.

- **Rovins Technical Description** *(ref.: MU-ROVINSTD-AN-001*)
  - > Rovins and iXblue technology presentation
  - > Technical specifications
  - > Certification and qualification, life cycle
  - > Mechanical, electrical and communication interface description
- **Rovins Installation & Setup Guide** *(ref.: MU-ROVINSISG-AN-001)*
  - > Conventions
  - > Physical and electrical installation
  - > Connecting to the Web-Based Graphical User Interface
  - > Setup the Rovins
  - > Contacting iXblue support
- **Rovins Operation Guide** *(ref.: MU-ROVINSOG-AN-001)*
  - > Introduction to the Inertial Navigation System
  - > Start-up Phases
  - > Web-Based Graphical User Interface description
  - > Configuring the navigation parameters & managing the external information
  - > Viewing the system information
  - > Recording data
- **Rovins Interface Library** *(ref.: MU-ROVINSIL-AN-001)*
  - > NMEA frames
  - > Digital input and output protocols
  - > Pulses interfaces specification
  - > Control commands
- **Rovins Quick Start Guide**
  - > Pack content verifying
  - > Installing and connecting Rovins
  - > Configuring and operating Rovins
- **SEACON 12 PIN TI 1M Pigtail Cable - Product Description** (Ref.: MU-PDCABLES-AN-001)
  - > cable and pinout of the SEACON 12 pins Pigtail Cable
- **SEACON 19 PIN TI 1M Pigtail Cable - Product Description** (Ref.: MU-PDCABLES-AN-002)
  - > cable and pinout of the SEACON 19 pins Pigtail Cable
- **SEACON 26 PIN TI 1M Pigtail Cable - Product Description** (Ref.: MU-PDCABLES-AN-003)
  - > cable and pinout of the SEACON 26 pins Pigtail Cable
- **Subsea Products - Illustrated Part Catalog** *ref.: MU-SUBSEADP-AN-001*
  - > Detailed part list
  - > Alphanumerical Index
- **Application Note - INS+DVL Calibration** *(ref.: MU-DVLINS-AN-001)*
  - > Configuring the calibration
  - > Calibrating the DVL+INS

- **Application Note - Installation and Configuration of AHRS and INS for Seabed Mapping Measurements** (*ref.: MU-HEAVAPN-AN-001*)
  - Using heave compensation on seabed mapping
  - Effect of vessel transient movements

Rovins Installation & Setup Guide Overview

This document must be read and understood prior to using the product.
The manufacturer shall in no case be held liable for any application or use that does not comply with the stipulations in this manual.

The Rovins Installation & Setup Guide is divided into several parts:

- **Part 1: Definition and Conventions**
  This part gives the definition and conventions used in this document and in the product.
- **Part 2: Process to install and enable the system**
  This part gives a diagram of the steps to be performed in order to install and enable the system.
- **Part 3: Installing the Rovins**
  This part describes the mechanical and electrical installation of the Rovins and how to power the Rovins on.
- **Part 4: Connecting to the Web-Based Graphical User Interface**
  This part describes how to connect the Rovins to the Web-Based Graphical User Interface.
- **Part 5: Configuring the Rovins**
  This part gives the procedures to configure the Rovins with the Web-Based Graphical User Interface.
- **Part 6: Contacting iXblue support**
  This part describes how to contact iXblue support in case of problem.
- **Appendices**
  Procedures to connect Rovins to a PC by serial link and to use the simulation mode.

Abbreviations and Acronyms

ACC	Accelerometer
CTD	Conductivity, Temperature, Depth sensor
DVL	Doppler Velocity Log
EGNOS	European Geo-stationary Navigation Overlay Service
Galileo	European Satellite Navigation System
GGA	Essential fix data which provide 3D location and accuracy data
GLONASS	Global Navigation Satellite System (operated by the Russian Space Forces)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System (operated by the United States Department of Defense)
GST	GPS Pseudo-range Noise (PRN) statistics (The GST message is used to support Receiver Autonomous Integrity Monitoring)
HRP	Heading, Roll, Pitch
IMU	Inertial Measurement Unit
INS	Inertial Navigation System
IP	Internet Protocol
LVA	Lever Arms
PPS	Pulse Per Second
RTK	Real Time Kinematic
SD	Standard Deviation
UTC	International acronym for Coordinated Universal Time (CUT)
UTM	Universal Transverse Mercator
VTG	Vector Track and speed over Ground
ZDA	Time and Date (The ZDA message identifies UTC time, day, month, and year, local zone number, and local zone minutes)
ZUPT	Zero velocity UPdaTe

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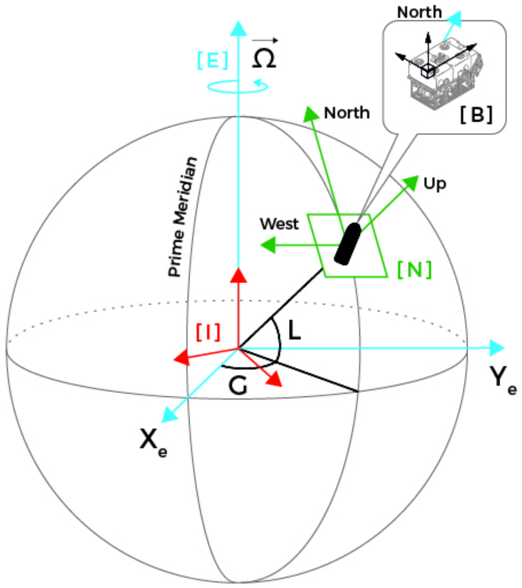
1 Definitions and Conventions

The conventions given in this part are used in all the documentation of Rovins.

1.1 Reference Frame

Navigation data are given in a reference frame. The reference frame is defined by its center and 3 non coplanar axes (preferably orthogonal).
Following are the various frames that are available on the Rovins .



[I]: inertial

- Earth Centered Inertial Fixed
- It is fixed in space, it points to stars

[E]: Earth

- Earth centered, earth fixed

[N]: Navigation

- Centered on the vessel
- Pointing North West Up

[B]: Body

- Reference attached to the vessel
- Pointing usually Front Left Up (not vertical, orthogonal to the floor)

1.1.1 Rovins Reference Frame

The Rovins reference frame center, P, is the reference point for the determination of Rovins and external sensor lever arms. The Rovins reference frame center P is the intersection of the three Rovins reference axis X1, X2 and X3.

Axis definition

When horizontal, three orthogonal axes define a reference frame as follows:

- Axis $\underline{X}_1$ is in the product horizontal plane. It is parallel to the thin shape arrow going from the rear side to the front side.
- Axis $\underline{X}_3$ is vertical and perpendicular to the Rovins horizontal plane, going from the bottom and pointing upward.
- Axis $\underline{X}_2$ is in the horizontal plane, perpendicular to X1, pointing to the left of the product (top view): $\underline{X}_2 = \underline{X}_3 \wedge \underline{X}_1$

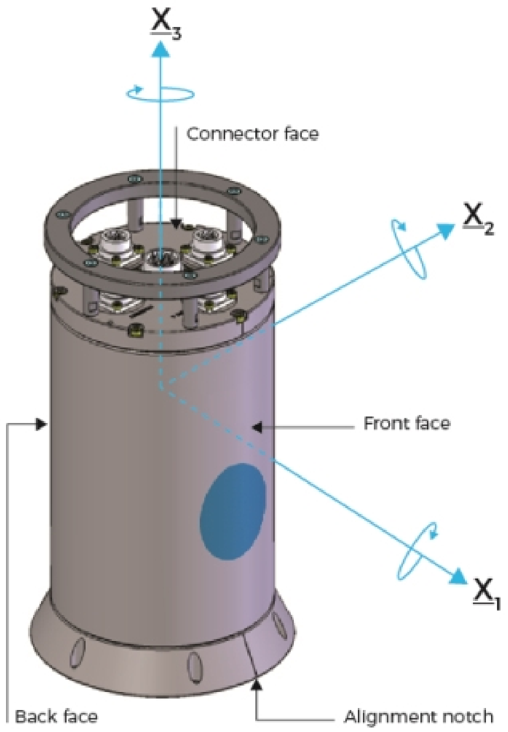


Figure 1 - Definition of axis X1, X2 and X3 and sides

Face Definition

The faces are defined in the figure above. Sign convention is indicated on the top face. The three axes intersect at point P, which is the Rovins reference point.
The logo side and the connector side are used in the installation procedure to configure the inertial product orientation with respect to subsea vehicle (rough misalignment).

1.1.2 SUBSEA VEHICLE REFERENCE FRAME

The vehicle reference frame is defined by the three orthogonal axes $\underline{X}_{V1}$, $\underline{X}_{V2}$ and $\underline{X}_{V3}$ (see Figure 2):

This frame is used to specify sensor lever arms. Computed data are output in this reference frame on main and secondary lever arms.

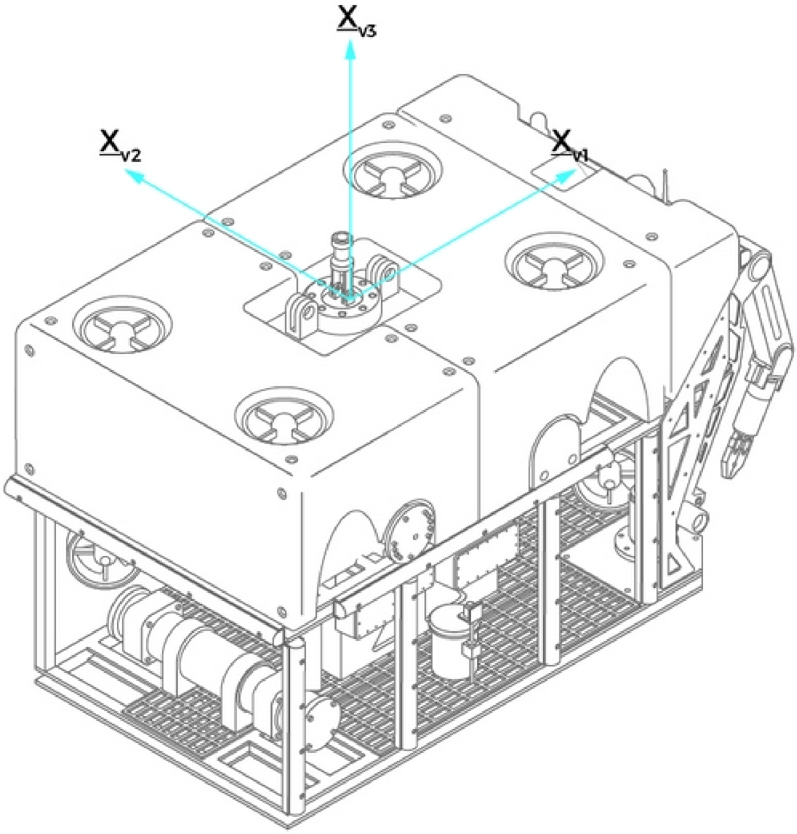


Figure 2 - Definition of the subsea vehicle reference frame

Important

Some applications use different axes conventions (i.e. Vertical axis pointing downward, side axes pointing right …). Special caution must be taken to use the Rovins convention during the installation process.

1.1.3 SUBSEA VEHICLE HORIZONTAL FRAME

This is the subsea vehicle frame compensated from roll and pitch. ($\underline{X}_{VH1}$ and $\underline{X}_{VH2}$ are in the horizontal plane). It is defined by the three orthogonal axes $\underline{X}_{VH1}$, $\underline{X}_{VH2}$ and $\underline{X}_{VH3}$.
This frame is used to output heave, surge, sway and associated speeds.
It is also used to output longitudinal and transverse speed data.

1.1.4 NAVIGATION FRAME

The navigation frame is the local geographic frame defined by the three axes (see Figure 3):

- $\underline{X}_N$, in the local horizontal plane, pointing towards North
- $\underline{X}_W$, in the local horizontal plane, pointing towards West
- $\underline{X}$up, parallel to the local vertical, pointing up

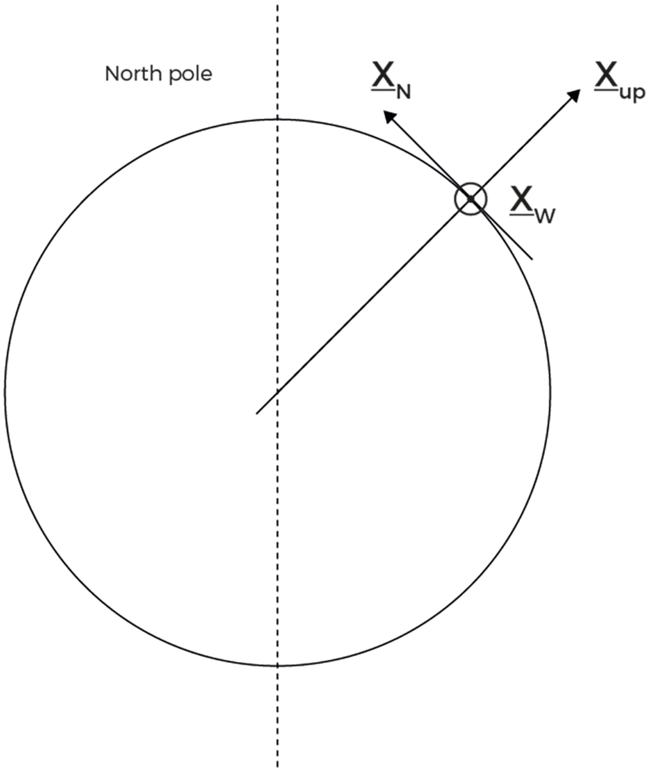


Figure 3 - Definition of the navigation frame

1.2 Attitude and Heading

The angular position of the vehicle is provided in roll, pitch and heading coordinates.
Roll, pitch and heading come from the rotational transformation between the subsea vehicle's frame ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) and the local geographic frame $\underline{X}_N$, $\underline{X}_W$, $\underline{X}_{Up}$).

This rotational transformation is fully described in Appendix and is illustrated in the figure below with positive heading and roll angles and negative pitch angle.

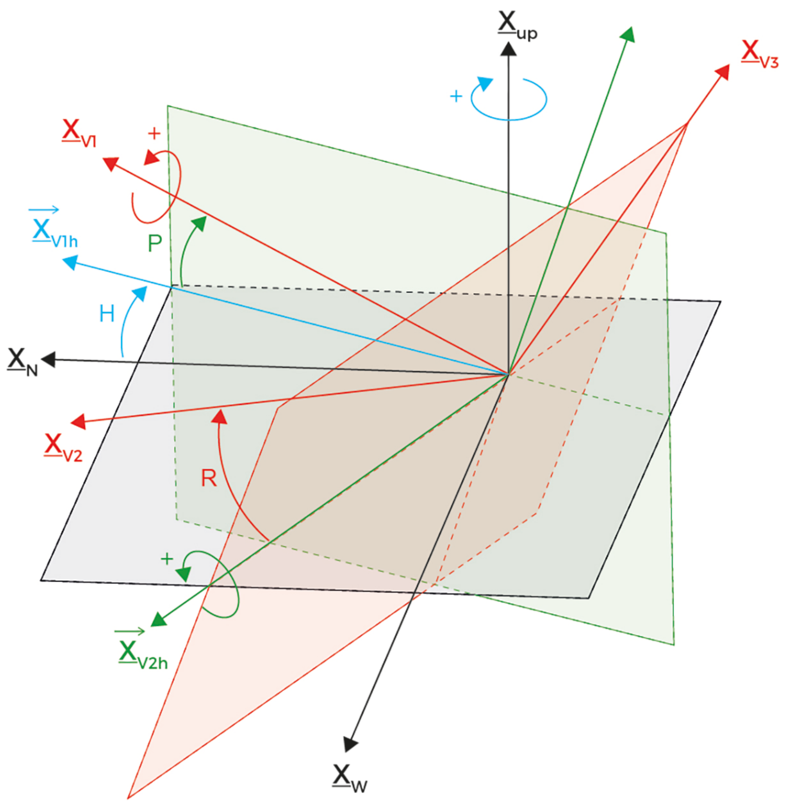


Figure 4 - Definition of heading (H), roll (R) and pitch (P)

The three next sections give the definitions of heading, pitch and roll. They also give simplified situations for a better understanding.

1.2.1 Definition of Heading

Figure 5 gives a simplified description when pitch and roll are null, and no misalignment is taken into account.
Heading varies from 0 to 360 degrees.

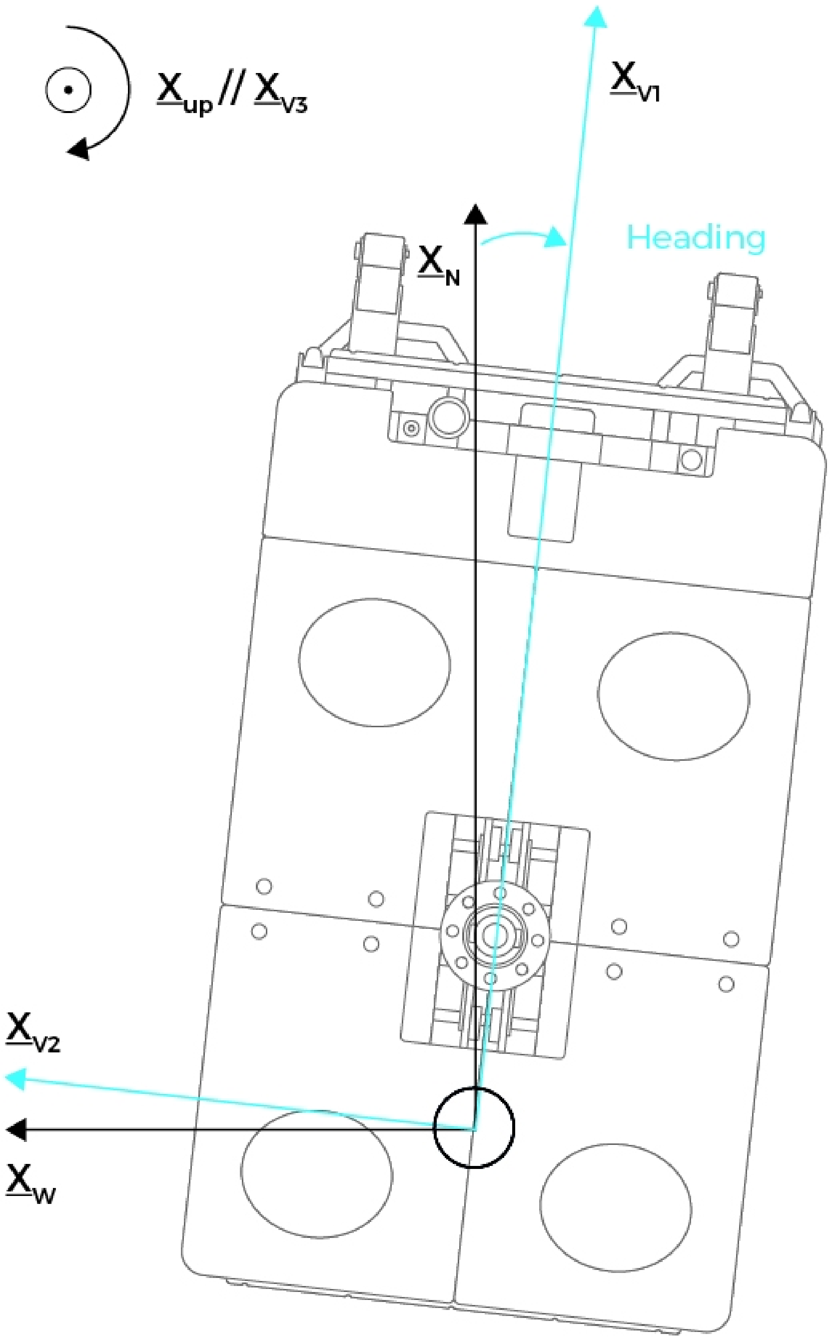


Figure 5 - Definition of heading angle in case of null pitch and roll, and no misalignment

1.2.2 Definition of Roll

Roll is the angular rotation around the $\underline{X}_{V1}$ subsea vehicle axis which transforms the subsea vehicle axis $\underline{X}_{V2}$ into $\underline{X}_{V2h}$.
$\underline{X}_{V2h}$ is included into the local horizontal plane defined by vectors $\underline{X}_N$ and $\underline{X}_W$.

Roll is counted positively when turning counter-clockwise around $\underline{X}_{V1}$.
That means that the **roll is counted positive when subsea vehicle port side is up.**
Roll varies from -180 up to +180 degrees.

Figure 6 shows a simplified description of roll when heading and pitch are null and no misalignment is accounted for.

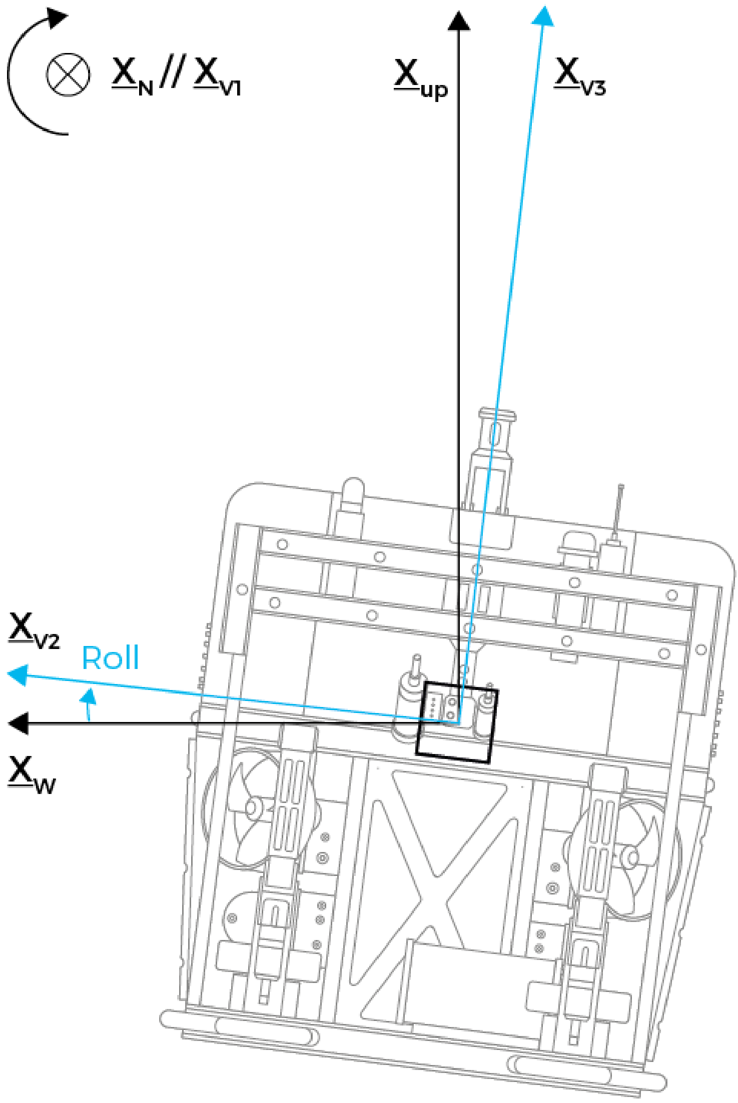


Figure 6 - Definition of the roll angle in case of null heading and pitch, and no misalignment

1.2.3 Definition of Pitch

Pitch is the angle between the $\underline{X}_{V1}$ subsea vehicle axis and $\underline{X}_{V1h}$.
$\underline{X}_{V1h}$ is the $\underline{X}_{V1}$ axis projection in the local horizontal plane defined by the two vectors $\underline{X}_N$ and $\underline{X}_W$.
Pitch is counted positively from the local horizontal plane to the $\underline{X}_{V1}$ axis when turning counter-clockwise around $\underline{X}_{V2}$.
That means that the **pitch is positive when the vessel's bow's front is down**.

The Figure 7 gives a simplified description when heading and roll are null, and no misalignment is accounted for.
Pitch varies from – 90 up to + 90 degrees.

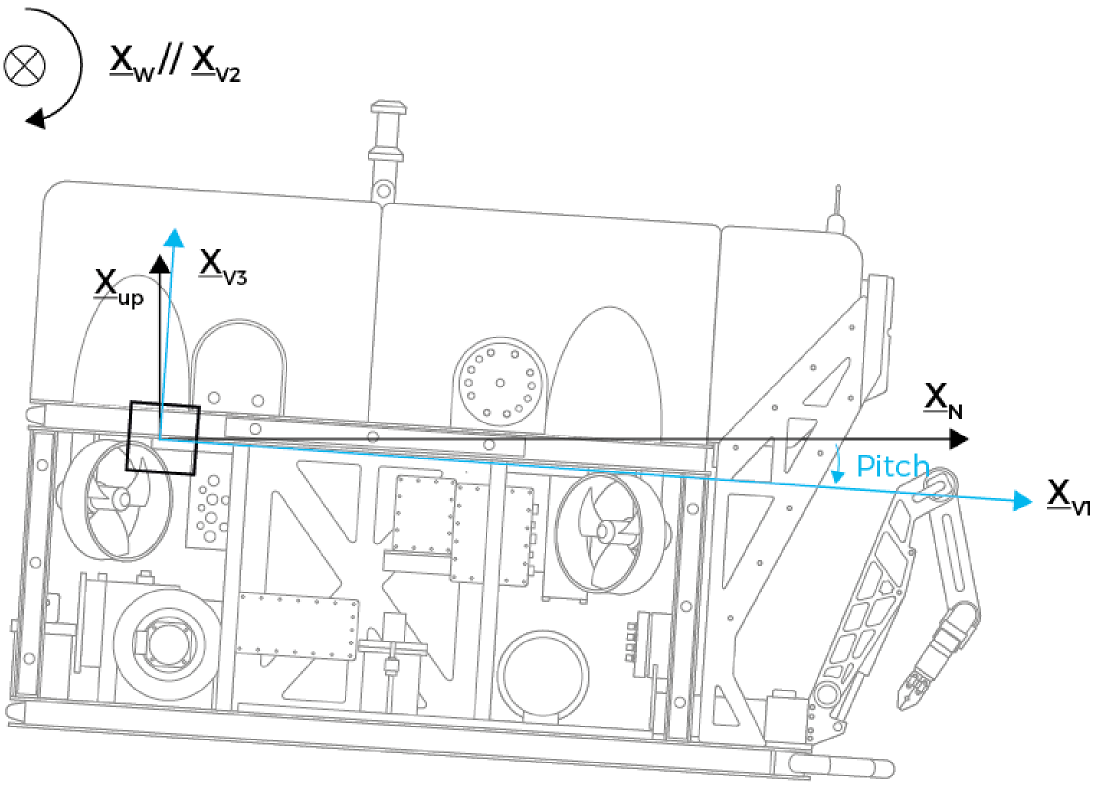


Figure 7 - Definition of pitch angle in case of null heading and roll, and no misalignment

1.3 Position Data

Rovins position is available in usual latitude/longitude/altitude/depth format and in UTM (Universal Transverse Mercator) format.
The reference ellipsoid is WGS 84 ellipsoid.

1.3.1 Latitude, Longitude and Altitude

The conventions are:

Latitude Convention

- For latitude (degrees):
  - > Northern hemisphere latitudes are positive (0 to 90 degrees)
  - > Southern hemisphere latitudes are negative (– 90 to 0 degrees)

Longitude Convention

- For longitude (degrees):
  - > Longitude ranges from 0 to 360 degrees. Longitude zero is the Greenwich meridian and longitude is positive going eastwards.
  - > Longitude can be entered manually into the Rovins Web-Based Graphical User Interface, either from 0 to 360 degrees or from –180 to +180 degrees. Whatever the format of the manually entered longitude, it will be displayed in the Web-Based Graphical User Interface windows as a positive number from 0 (Greenwich meridian) to 360 degrees.
    For instance, if a longitude of –30 degrees is entered manually, it will be displayed as 330 degrees in the Web-Based Graphical User Interface.

Altitude Convention

- For altitude (meters): conventions depend on Rovins, on the output protocol settings and the selected altitude mode. Refer to the altitude modes described in the Rovins Operation Guide.

1.3.2 The UTM Coordinate System

The UTM coordinate system is made up of 60 vertical (north/south) zones starting at 180 degree longitude meridian and wrapping around the earth towards East.
Each zone is 6 degree wide and is numbered from 1 to 60.

The system is further divided into 20 horizontal (east/west) bands starting at -80 degrees south latitude with band labeled 'C" and ending north at +84 degrees latitude with band "X" (the letters "I" and "O" are not used to avoid confusion with numbers).

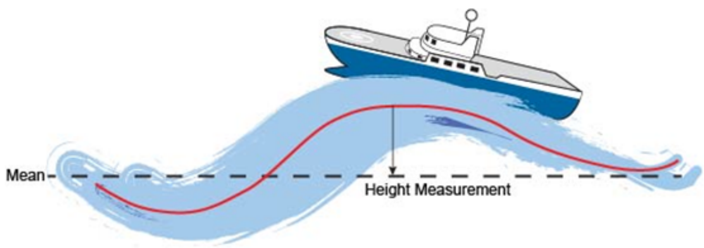
Inside each UTM zone, the coordinates of a point on the earth are expressed by two values in meters: UTM Northing and UTM Easting.
These coordinates are obtained by local projection of the earth on a cylinder.
This kind of projection ensures that the deformation due to plane projection is minimized.

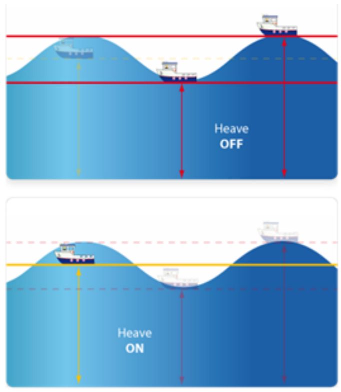
The UTM Northing and Easting coordinates are always positive.

1.4 Heave, Surge and Sway

Heave

The heave is the altitude of the subsea vehicle referenced to the mean altitude (the average value of heave over a long period of time is always zero). It is obtained by filtering and integrating vertical acceleration.
The heave is counted positively upward along the local vertical axis $\underline{X}_{V3}$, in meters.
For example, heave measurement is used to compensate for vertical movement due to sea waves in multi-beam or sonar imagery or to stabilize the pointing of a turret or an antenna.





Surge

The surge is the forward displacement of the subsea vehicle referenced to the mean position (the mean of the surge over a long period of time is always zero).
The surge is counted positively forward along the $\underline{X}_{VH1}$ axis, which is the projection of the $\underline{X}_{V1}$ axis in the local horizontal plane, in meters.

Sway

The sway is the starboard displacement of the subsea vehicle referenced to the mean position (the mean of the sway over a long period of time is always zero).
The sway is counted positively left along the $\underline{X}_{VH2}$ axis, in meters.

The heave, surge and sway speeds are measured along the same axis as heave, surge and sway.

1.5 Speeds

By default, the linear speeds are displayed in the Web-Based Graphical User Interface in geographic coordinates (North, East and Up), unit is meter per second.
Depending on the output protocol used to obtain data from the inertial product, the speeds can also be obtained in different frames available.

1.6 Rates and Accelerations

Attitude Rates

Attitude rates measure the speed of heading, roll and pitch.
They are expressed in subsea vehicle horizontal frame around axis $\underline{X}_{VH1}$, $\underline{X}_{VH2}$ and $\underline{X}_{VH3}$.
They follow the same convention as attitude (detailed in section 1.2): heading/roll/pitch rate are positive when heading/roll/pitch increase.
Unit: °/s

Rotation Rates

Rotation rates are expressed in subsea vehicle frame around axis $\underline{X}_{V1}$, $\underline{X}_{V2}$ and $\underline{X}_{V3}$.
Unit: °/s
Rotation rate resolution is limited to comply with export regulations(1).

Linear Accelerations

Linear accelerations are measured in subsea vehicle frame along $\underline{X}_{V1}$, $\underline{X}_{V2}$ and $\underline{X}_{V3}$ axis.
Unit: m/s^2
Resolution is limited to comply with export regulations(1).

Geographic Accelerations

Unit: m/s^2
Resolution is limited to comply with export regulations(1).

(1)Refer to the Rovins Technical Description to get the limitation of the rotation rate.

1.7 Standard Deviation Data

The standard deviation data are estimations of the uncertainty on the data provided by the inertial product. The standard deviation data readable from Rovins include:

- Estimated uncertainty of the position
- Estimated uncertainty of the speed
- Estimated uncertainty of the Attitude and Heading.

These error estimates are based on theoretical error models of accelerometers and gyrometers associated with external sensor errors estimates. They can be used to monitor the quality of the mission but are not accurate physical measurements of actual errors.

1.8 External Sensor Data

The data of all external sensors connected to Rovins can also be displayed and repeated, unmodified, through the Web-Based Graphical User Interface and/or the outputs protocols.
This feature helps monitoring of external sensor (e.g. quality, performances …), especially in cases they are exclusively connected to the Rovins.
The list of external sensors data readable from Rovins is summarized at the end of the Rovins Interface Library.

1.9 Misalignment Definition

Misalignments are the angle between the Rovins reference frame and the subsea vehicle frame.
All measurements are default-done in the Rovins reference frame defined by the 3 vectors $\underline{X}_1$, $\underline{X}_2$ and $\underline{X}_3$.
Misalignment angles can be entered by the user to account for any orientation of Rovins with respect to the subsea vehicle. This feature allows you to "virtually rotate" the product, to align its reference frame with subsea vehicle reference frame (usually called "baseline").

Two types of angular misalignment between the product and the vehicle are considered and described in the following sections: rough misalignment then fine misalignment.

1.9.1 Rovins to subsea vehicle Rough Misalignment (Rovins Position and Orientation)

Rovins can be set at any location and in any orientation with respect to the subsea vehicle.
The Rovins rough misalignment allows roughly aligning the Rovins reference frame ($\underline{X}_1$, $\underline{X}_2$, $\underline{X}_3$) to the subsea vehicle reference frame ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) by performing Rovins axis inversion.

The axis inversion transforms the Rovins reference frame ($\underline{X}_1$, $\underline{X}_2$, $\underline{X}_3$) into the ($\underline{X}'_1$, $\underline{X}'_2$, $\underline{X}'_3$) frame. This is performed in the Web-Based Graphical User Interface in two steps:

- orientation of the Product Logo Side,
- then orientation of the Connectors Side.

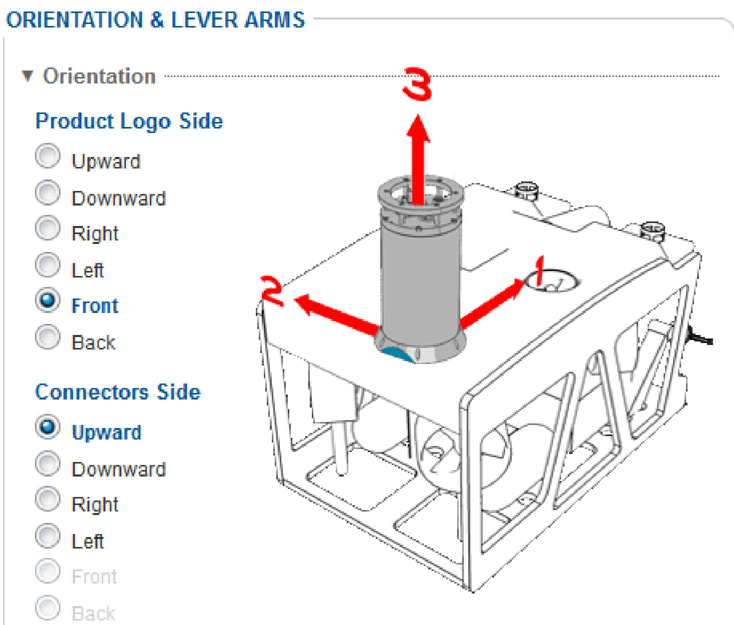


Figure 8 - Rovins orientation in the Web-Based Graphical User Interface

1.9.2 Rovins to subsea vehicle Fine Misalignment

Once rough misalignment has been taken into account, fine misalignment are determined to correct the residual angular offset between the new Rovins axis ($\underline{X}_1'$, $\underline{X}_2'$, $\underline{X}_3'$) and the subsea vehicle's axis ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$).
This rotational transformation is the product of three plane rotations which are described by the three Euler angles misRoll (roll misalignment), misPitch (pitch misalignment) and misHeading (heading misalignment).

Usually, these residual angular offsets are small as they are due to small angular misalignment of the product with respect to the subsea vehicle.

To align a new INS to reference heading, roll and pitch in the subsea vehicle, mainly when one misalignment is greater than 1°, it is recommended to use the excel sheet provided on the product USB flash drive. This table allows to easily compute these misalignment values in order to apply the exact calculation taking into account the sequence of the rotations.

ANGULAR OFFSET CALCULATOR

"YES" => OCTANS (all generation) or PHINS G3 "NO" => PHINS G2	YES

	Actual saved misalignements in MMI		
	Heading (deg) [-180°,+180°]	Roll (deg) [-180°,+180°]	Pitch [-90°;+90°]
AHRS (All Gen.) and INS G3	0,000	0,000	0,000
INS G2	0,000	0,000	0,000

Output readings with above bias		
Heading (deg)	Roll (deg)	Pitch (deg)
0,000	30,000	15,000

Reference values that should be output		
Heading (deg)	Roll (deg)	Pitch (deg)
0,000	40,000	20,000

New misalignments to be entered in MMI		
Heading (deg) [-180°,+180°]	Roll (deg) [-180°,+180°]	Pitch [-90°;+90°]

We recommend to do this operation with confirmed metrology laboratory.

However, any angular correction must be taken into account by setting with caution the fine misalignment angles.

Heading Misalignment Bias

The heading misalignment bias (called misheading in the illustration) is the angle between the projection of product $\underline{X}_1$' axis into the subsea vehicle horizontal plane ($\underline{X}_{V1}$, $\underline{X}_{V2}$) and the vessel axis $\underline{X}_{V1}$.

In the figure below, the value of the heading misalignment bias to be entered in the Web-Based Graphical User Interface to configure Rovins is positive.

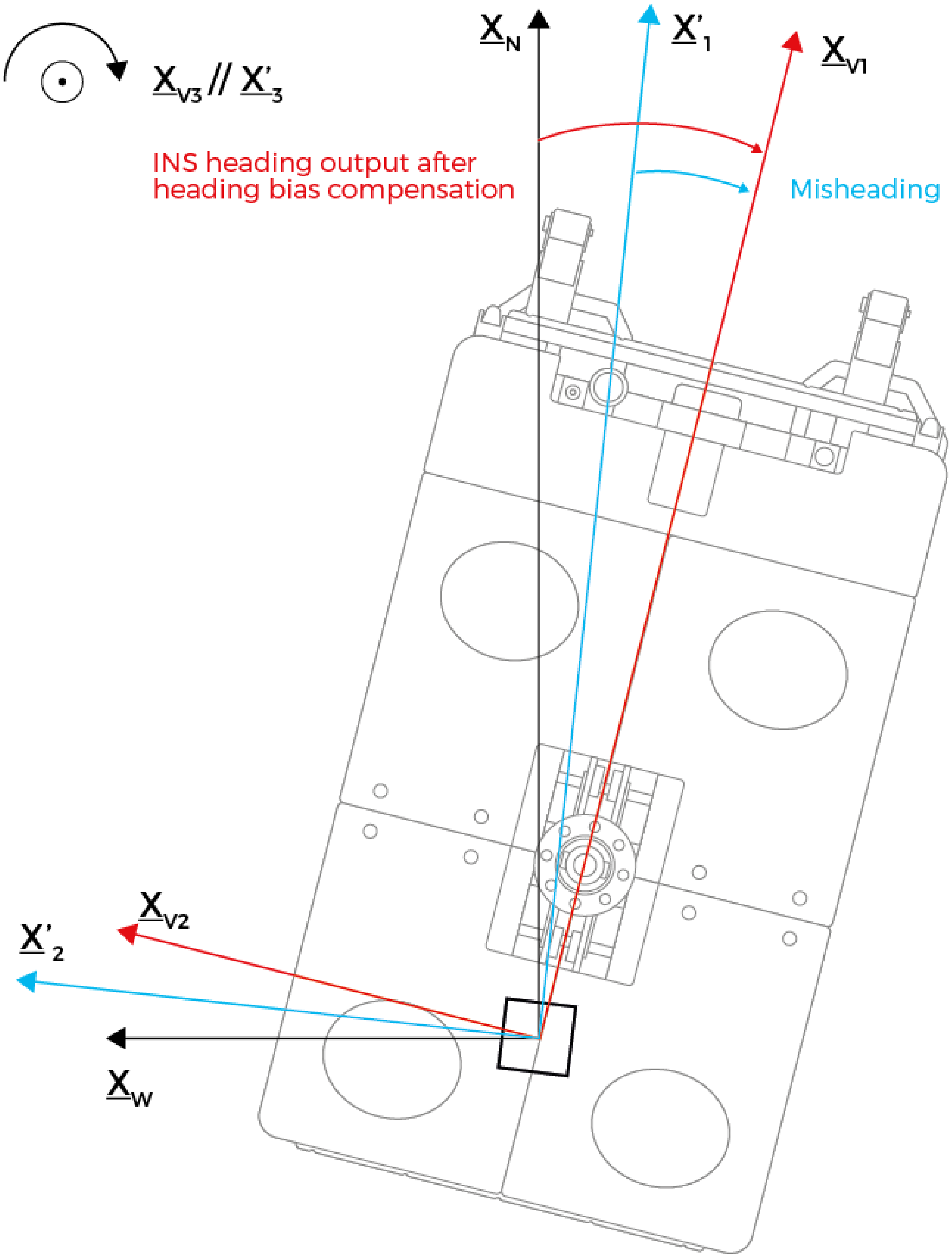


Figure 9 - Heading bias misalignment in case of null roll and pitch

Roll Misalignment Bias

The roll misalignment bias (called misroll in the illustration) is the angle of the rotation around $\underline{X}_1$' axis which brings $\underline{X}_2$' axis into the subsea vehicle horizontal plane ($\underline{X}_{V1}$, $\underline{X}_{V2}$).

In the figure below, the value of the roll misalignment bias to be entered in the Web-Based Graphical User Interface to configure Rovins is negative.

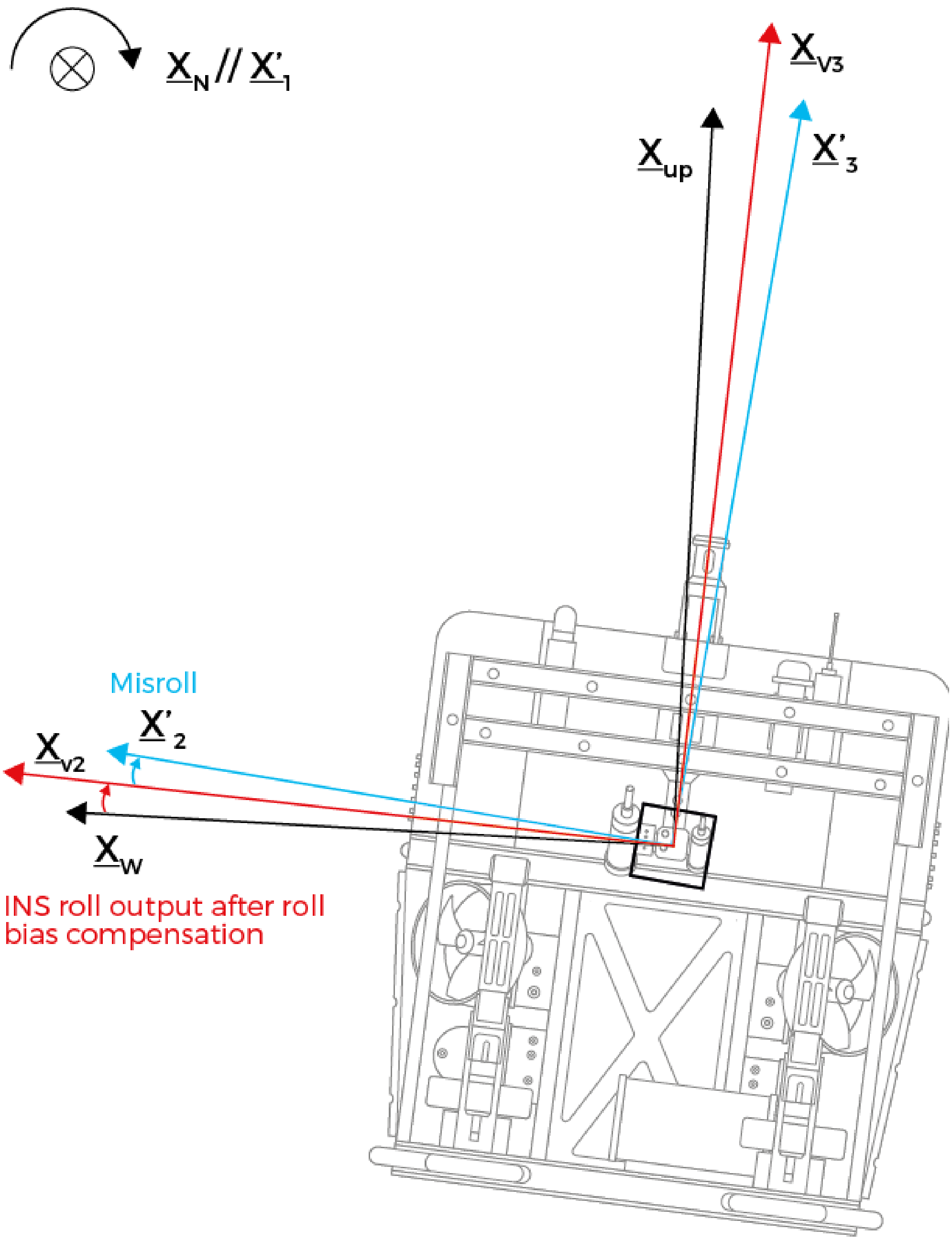


Figure 10 - Roll misalignment bias (in case of null pitch and heading)

Pitch Misalignment Bias

Pitch misalignment bias (called mispitch in the illustration) is the angle between $\underline{X}_1$' axis and its projection in the subsea vehicle horizontal plane (X_{V1}, $\underline{X}_{V2}$).
On the figure below, the value of the pitch misalignment bias to be entered in the Web-Based Graphical User Interface to configure Rovins is negative.

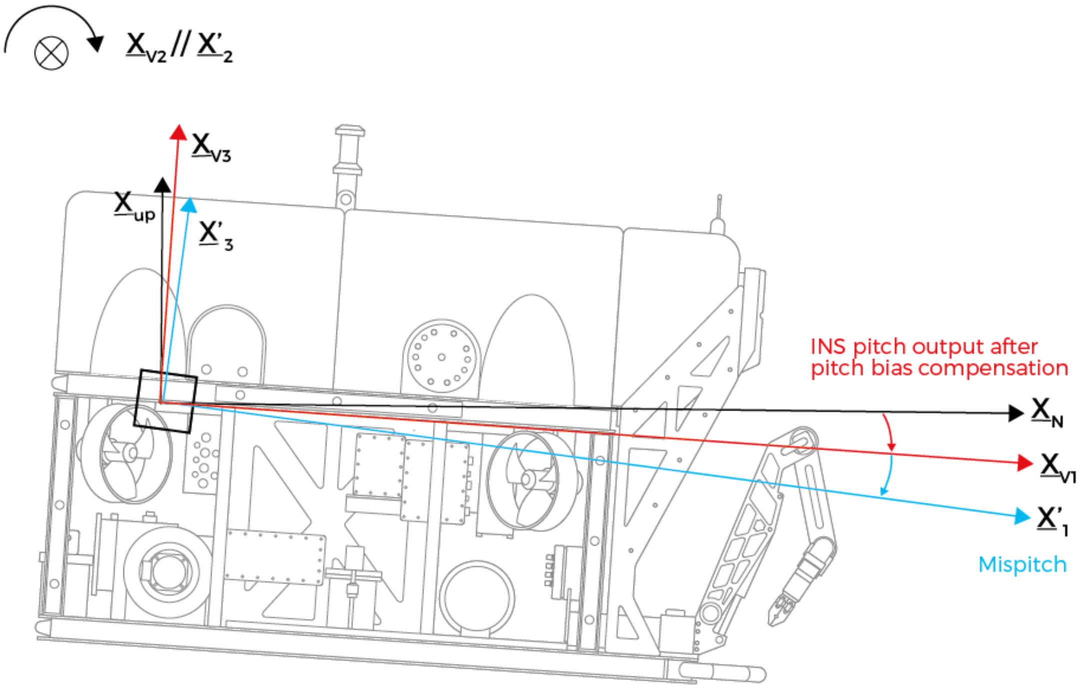


Figure 11 - Pitch misalignment bias in case of null roll and heading

1.9.3 DVL TO ROVINS MISALIGNMENT

Rovins can use speed inputs received from external sensors.

When navigating with speed inputs from an external log sensor, the Rovins expects to receive the 3 speed coordinates from the Log sensor in a frame linked to the sensor, without any compensation.

The log sensor reference frame ($\underline{X}_{S1}$, $\underline{X}_{S2}$, $\underline{X}_{S3}$) is either the sensor body frame or the sensor beam frame.
Speed inputs from external Log Sensor are then corrected for angular misalignment between the vehicle reference frame ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) and the Log Sensor reference frame ($\underline{X}_{S1}$, $\underline{X}_{S2}$, $\underline{X}_{S3}$).

Log Sensor to Rovins misalignment angles are the three Euler angles RS, PS and HS, which allow switching from the vehicle reference frame ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) to the Log Sensor reference frame.

These angles are defined in the figure below, where Rs is positive, Ps is negative and Hs is positive. Rs and Ps define the misalignment between the Log Sensor horizontal plane and the product horizontal plane. These angles are generally quite small.

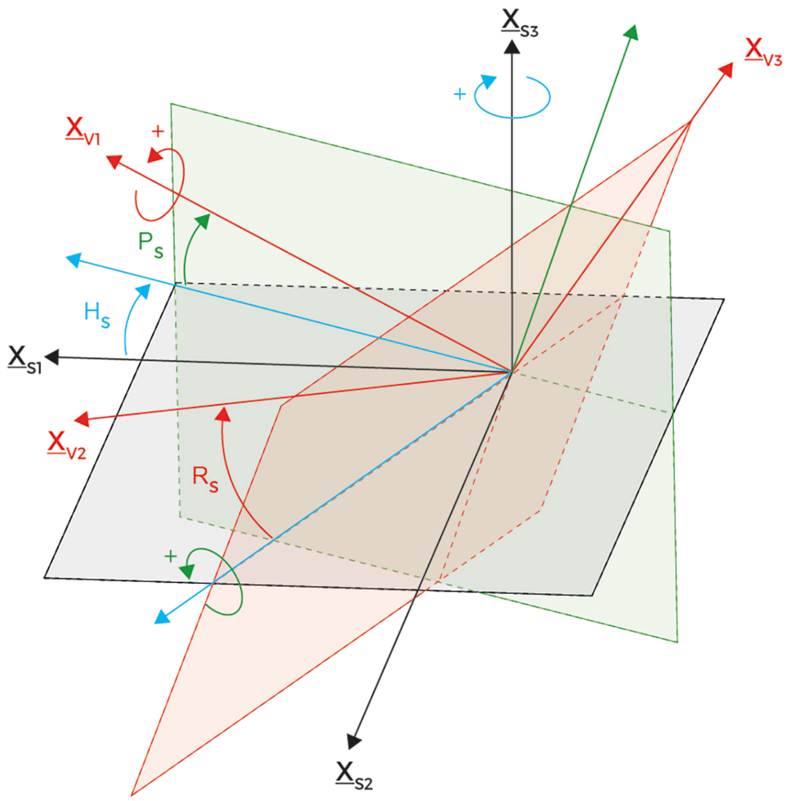


Figure 12 - Definition of Log sensor to Rovins misalignment

1.10 Output Lever Arms

Lever arms are 3 distances along $\underline{X}_{V1}$ / $\underline{X}_{V2}$ and $\underline{X}_{V3}$ that allow transferring data from one point to another one.

Lever arms are used in 3 occasions.

- Rovins is able to calculate the motion of several external monitoring points (one main and three secondaries).
- Data calculated by the Rovins is done at the location of the reference point P (center of measurement of the unit).
  This point is of no interest for the user and in case the user has a redundant architecture, both units do not share the same P point and the switch from one to the other would result in a small jump of position.
  To cover this, you can determine another point to which all data calculated by the Rovins will be projected. Typically, it can be a CCRP (Consistent Common Reference Point).
- You can also define 3 secondary lever arms in order to use the data at an alternative position for specific requirement.
  The selection of the lever arm is made in the output configuration. Data on the Web-Based Graphical User Interface is located at the main lever arm location.

The lever arm (of the main Monitoring Point, of the three secondary ones, of the external sensor, and of the Center of gravity of the Rovins) is represented by three coordinates Length L_{V1}, Length L_{V2}, Length L_{V3} defining the position of external monitoring point M in the ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) subsea vehicle's axes.

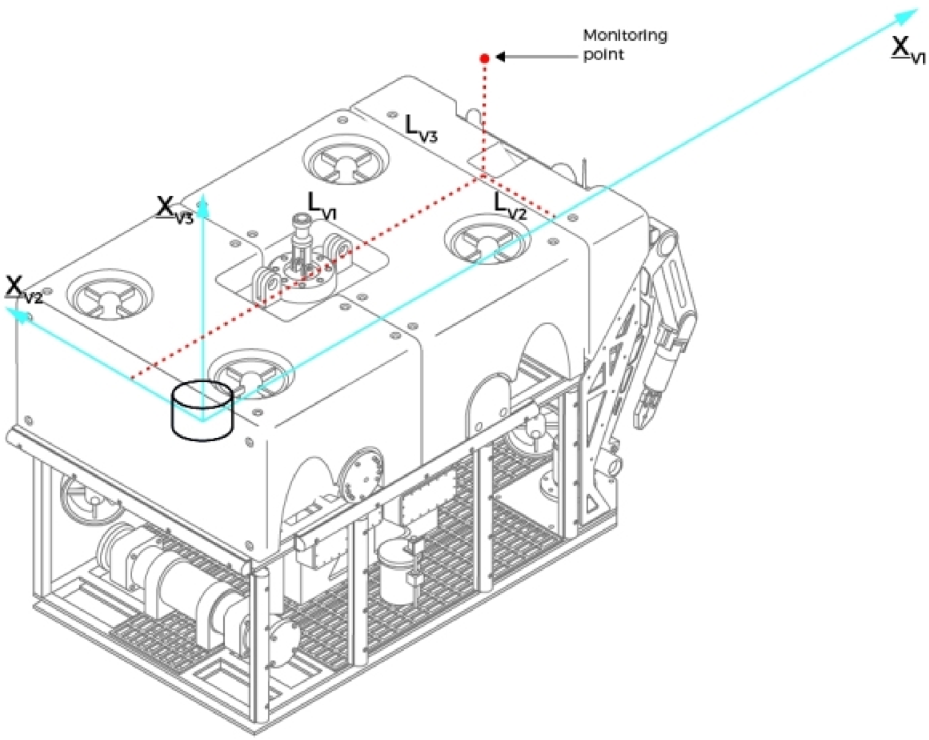


Figure 13 - Definition of Lever Arm

1.11 Center of Gravity (CoG) Lever Arms

Center of Gravity (CoG) lever arm is useful for marine vehicles because a way to avoid the effect of transient Rovins movement is to indicate the COG position by entering levers arms between the unit and the COG of the subsea vehicle.

It is useful only in case of heave, surge and sway being used.

Refer to the Application Note - Installation and Configuration of AHRS and INS for Seabed Mapping Measurements to get more details.

2 Process to install and enable the system

The following diagram presents all the steps to install and configure Rovins in standard installation with Ethernet connection.

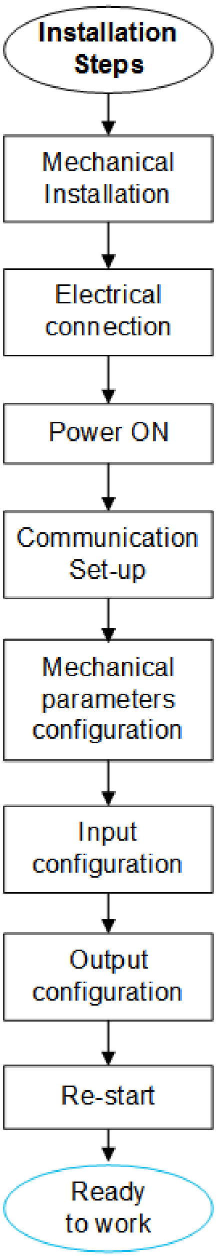


Figure 14 - installation steps

3 Installing the Rovins

3.1 Preparing the Rovins Setup

Before installing and cabling the Rovins, we recommend to prepare the Rovins architecture diagram (power supply, external sensors,...) and by gathering all necessary information:

- misalignment
- lever arms
- center of gravity
- external sensor lever arms
- type of external sensor and its protocol
- what message, frequency, type of connection, baudrate

All this information could be typed in the Setup Forms file available on the Rovins flash drive.

3.2 Pack content verifying

You will find in the shipping case a Packing List detailing all the items delivered.
However, we recommend checking the equipment of the pack immediately after reception.
If you observe any non-conformity or damage, please inform the carrier and iXblue without delay by certified mail, describing in detail the problem encountered.

Rovins

Power supply block &
Power supply cable

19-Pins Ethernet test cable

SEACON 12-pins Ti pigtail

SEACON 19-pins Ti pigtail

SEACON 26-pins Ti pigtail

12, 19, 26 pins pressure cap

SEACON 12 or 19, 26 pins O-ring tool

O-ring Kit

3.3 Mechanical Installation

3.3.1 Rovins location requirements

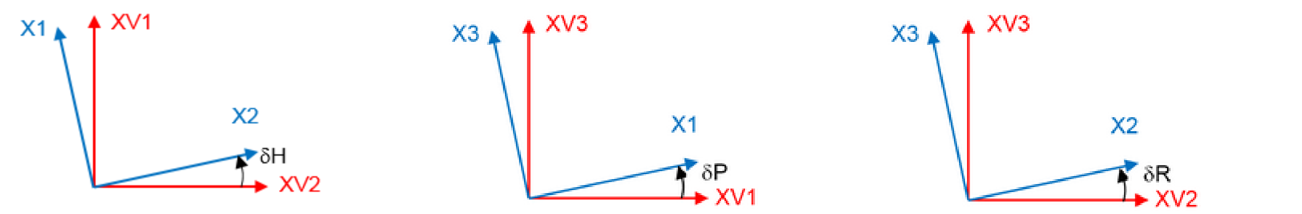
Rovins can be installed in any position or orientation but its location on board of the subsea vehicle should be chosen taking into account the following recommendations:

- It is recommended to mount the unit on a solid and very stable location (linked to the main subsea vehicle beams) and not too far from the navigation data monitoring point in order to limit the impact of the structure's flexure. Do not put it on a thin wall that can be deformed for instance.
- As far as possible it is recommended to move the unit (accurate measuring instrument) away from equipment potentially disrupting: vibration (e.g.: motors), electromagnetic perturbation (e.g.: electric power systems), high temperature variations (e.g. : radiators), etc.
- Ideally keep a point of aim for alignment sessions on the subsea vehicle.

3.3.2 Alignment of Rovins to subsea vehicle Reference Frame

When Rovins is installed on the subsea vehicle, the misalignment of the Rovins reference frame must be measured with respect to the subsea vehicle reference frame as shown below.

Heading misalignment	Pitch misalignment	Roll misalignment



XV1, XV2, XV3: subsea vehicle reference frame.
X1, X2, X3: Rovins reference frame.

Important

The alignment of Rovins to subsea vehicle reference frame must be performed by a professional surveyor.

3.3.3 External Sensor Lever Arm

Lever arms values must be measured and entered into the system.
The lever arms are a point coordinates expressed in the product reference frame.

Errors on lever arms have two main possible impacts:

- Error on absolute position calculated by Rovins due to lever arm error with external sensor.
- If lever arms are not sufficiently accurate with respect to GNSS accuracy the Rovins can reject the external sensor when the subsea vehicle is performing accelerations or gyrations.

To avoid that, order of magnitude of lever arm accuracy should be 1/10 of required absolute accuracy. For example if you want to position the subsea vehicle with a 1-meter accuracy, your GNSS lever arms should be measured with a 10-cm accuracy.

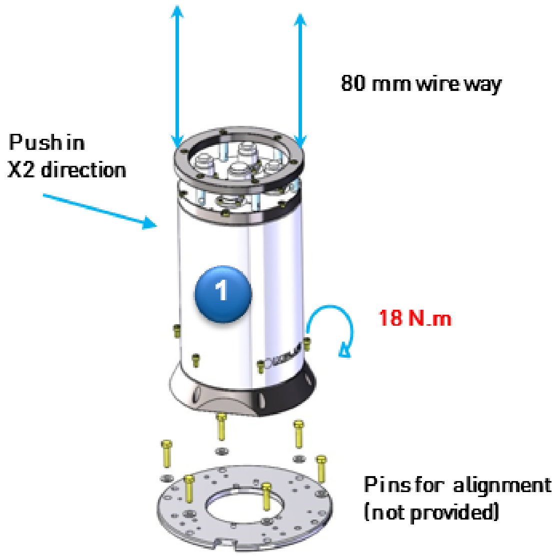
As an example we present accuracy of GNSS lever arm with respect to GNSS accuracy:

GNSS Mode	Standard deviation on position	Accuracy required on lever arm measurement
RTK GNSS	5 cm	5 mm
DGNSS	1 m	10 cm
NATURAL GNSS	10 m	1 m

3.3.4 INSTALLATION PROCEDURE

In this installation, we assume that Rovins is aligned with respect to the subsea vehicle reference frame (XV1, XV2, XV3). Refer to section 1 to get details on the conventions.

1. Fasten Rovins on board using six screws (not part of standard delivery).
In case of installation with alignment pins (e.g. with DVL) it is recommended pushing Rovins against the pins in X2 direction while securing the screws to insure best mounting repeatability.

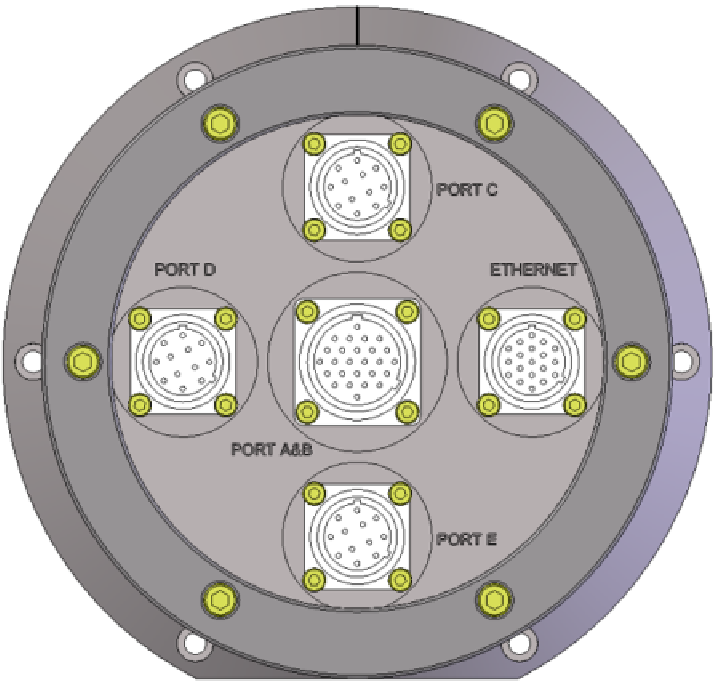


2. Measure the misalignment and the lever arms.

3.4 Electrical installation

3.4.1 ROVINS ELECTRICAL INTERFACE OVERVIEW

Connectors are available on the connector panel of Rovins. These connectors are referenced and identified by markings on the unit. They are all different and fool-proof to avoid any misconnection.



Do not use two power supplies on the main connector and the secondary connector in order to prevent product damage.

Figure 15 - Rovins connector panel

3.4.2 PRE-REQUISITES

Tools The person in charge of the wiring must have a standard tool box with equipment in good working condition and a soldering iron with tin for the Rovins connectors (power and digital).

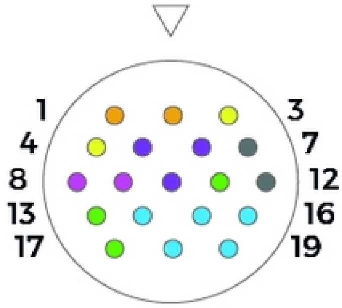
Preparation The person in charge of the wiring must verify that all cables are present with enough cable length to ensure that the connections are possible.

Cabling

It is recommended to use shielded twisted pairs for RS232, RS422 and Pulse communication lines. If you do not use shielded twisted pairs you might encounter cross talk effect. Associate the right thread with the right pin position.

3.4.3 Ethernet Connector

The Rovins Ethernet connector is a SEACON MINK-FCR, size K 19#22 (19 pins).
Refer to the following figure for the corresponding wiring.



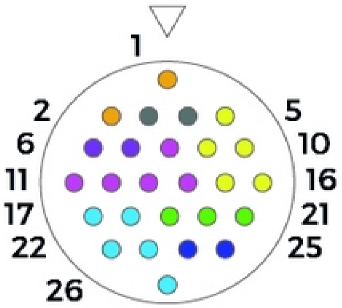
PIN	SIGNAL
1	Ext sensor 1 In (+V1)
2	Ext sensor 1 In GND (0/ +V1 V) (*)
3	Ext sensor 2 In (+V2)
4	Ext sensor 2 In GND (0/+V2 V) (*)
5	Repeater: RS232 TX(+)
6	Repeater RS232 RX(+)
7	Ext Pulse IN + (***)
8	Rovins Power In (+24 V)
9	Rovins Power In GND (0/24 V) (*)
10	Repeater: GND_R (**)
11	Pulse B: OUT TTL
12	Ext Pulse IN -
13	GND_B
14	Shield Ethernet
15	Ethernet TX(+)
16	Ethernet TX(-)
17	Pulse B: IN TTL
18	Ethernet RX(+)
19	Ethernet RX(-)

Figure 16 - Ethernet connector pin definition

(*) Rovins and Ext sensor 1 (resp.2) power lines are insulated from each other. Ext sensor 1 (resp. 2) pins of every connector are linked together. If Ext sensor 1 (resp. 2) is powered from 19-pin connector this voltage will be present on 26-pin and 12-pin connectors.
(**) Serial GND and Pulse GND are common for a given port (i.e., GND_A for port A, GND_R for repeater port).
(***) The external trigger lines are insulated. They can be used for example to trigger acoustic emission of a DVL connected to the Rovins. These lines are connected to the external trigger lines of the other connectors to dispatch the signal.

3.4.4 Port A&B Connector (Central Connector)

Rovins central connector is configured as shown in the following figure.



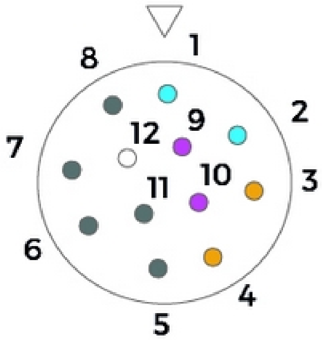
PIN	SIGNAL
1	System Power In (+24 V)
2	System Power In GND (0/24 V)
3	Ext sensor 1 In (+V1) (*)
4	Ext sensor 1 In GND (0/+V1 V) (*)
5	Repeater: GND_R (**)
6	Ext sensor 2 In (+V2)
7	Ext sensor 2 In GND (0/+V2 V) (*)
8	Port A: GND_A (**)
9	Repeater: RS422 TX (+)(B) / RS232 TX (+)
10	Repeater: RS422 TX (-)(A)
11	Port A: RS422 TX (+)(B) / RS232 TX (+)
12	Port A: RS422 TX (-)(A)
13	Port A: RS422 RX (-)(A) / RS232 RX (+)
14	Port A: RS422 RX (+)(B)
15	Repeater: RS422 RX(-)(A) / RS232 RX(+)
16	Repeater: RS422 RX(+)(B)
17	Port B: RS422 TX(+)(B) / RS232 TX(+)
18	Port B: RS422 TX(-)(A)
19	Pulse A : OUT TTL
20	Pulse A: IN TTL
21	Pulse A: GND_A (**)
22	Port B: RS422 RX(-)(A) / RS232 RX(+)
23	Port B: RS422 RX(+)(B)
24	Ext Pulse IN + (***)
25	Ext Pulse IN -
26	Port B: GND_B(**)

Figure 17 - Central connector

(*) Rovins and Ext sensor 1 (resp.2) power lines are isolated from each other.
Ext sensor 1 (resp. 2) pins are linked together. If Ext sensor 1 (resp. 2) is powered from 19 pin connector this voltage will be present on 26 pin and 12 pin connectors.
(**) Serial GND and Pulse GND are common for a given port (i.e., GND_A for port A, GND_R for repeater port).
(***) The external trigger lines are isolated. They can be used for example to trigger acoustic emission of a DVL connected to the Rovins.

3.4.5 Port X (X being C, D or E) Connector

Rovins Port X connector is configured as shown in the following figure.



	PIN	SIGNAL
■	1	Ext sensor 1 Out (+V1)
■	2	Ext sensor 1 Out GND (0/+V1 V) (*)
■	3	Ext sensor 2 Out (+V2)
■	4	Ext sensor 2 Out GND (0/+V2 V) (*)
■	5	Port X: RS422 TX(+)(B)/RS232 TX(+)
■	6	Port X: RS422 TX(-)(A)
■	7	Port X: RS422 Rx(-)(A) / RS232 Rx(+)
■	8	Port X: RS422 Rx(+)(B)
■	9	Ext Pulse OUT + (***)
■	10	Ext Pulse OUT -
■	11	Port X: GND_X (**)
□	12	Reserved except if X=C : Pulse C: IN TTL (****)

Figure 18 - Port X connector

(*) Rovins and Ext sensor 1 (resp.2) power lines are isolated from each other.
Ext sensor 1 (resp. 2) pins are linked together. If Ext sensor 1 (resp. 2) is powered from 19 pin connector this voltage will be present on 26 pin and 12 pin connectors.
(**) Serial GND and Pulse GND are common for a given port (i.e., GND_A for port A, GND_R for repeater port).
(***) The external trigger lines are isolated. They can be used for example to trigger acoustic emission of a DVL connected to the Rovins.
(****) Pulse C only on Port C, Pin 11 common for Pulse and Port C.

3.4.6 ROVINS POWER NETWORK

Rovins is equipped with two external sensor power circuitry, see figure below. They are dedicated to supply power to external sensors, such as DVL or Depth Sensor, which are connected directly to the Rovins. The principle is to use a single cable/connector between ROV control unit/bottle and Rovins. This cable would have to handle three power supplies:Rovins, External Sensor 1 and External Sensor 2. The two last are wired to satellite connectors to power individually each external sensor.
Rovins power network is configured as shown in the following figure.

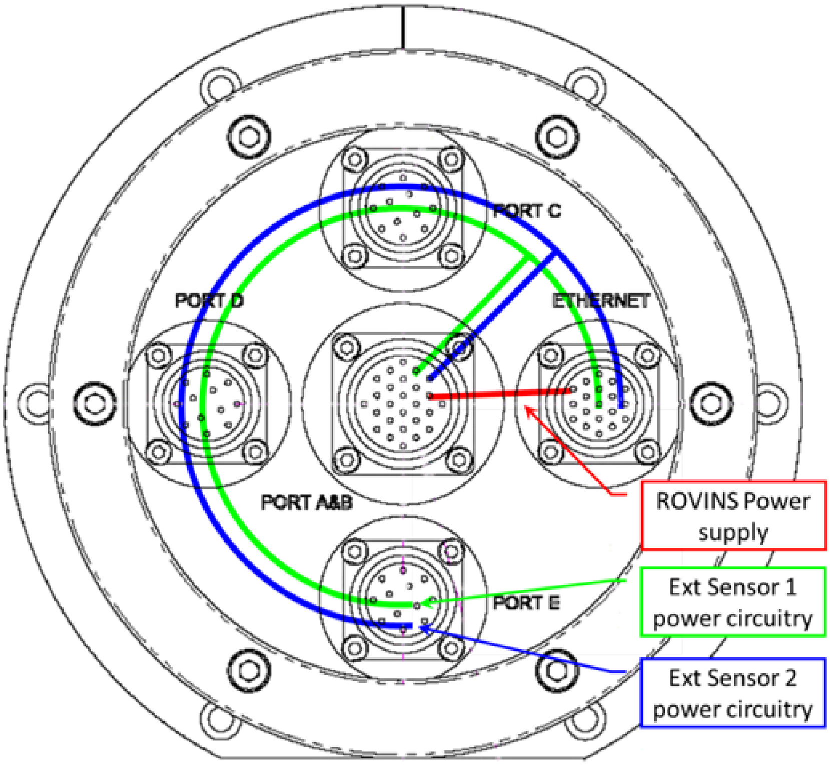


Figure 19 - Power network for the external sensors

To power external sensors to power circuitry can be used:

- with external sensor 1 connected:
  - on pin 3 and 4 of central connector
  - or on pin 1 and 2 of Ethernet connector
- with external sensor 2 connected:
  - on pin 6 and 7 of central connector
  - or on pin 3 and 4 of Ethernet connector

On these pins, the total maximum current is 3 A and the maximum voltage is 250 V.

3.4.7 Connecting Rovins

iXblue recommends to install and connect Rovins in the Ethernet configuration.

It is very important to screw the connectors tight. You might feel resistance, make sure it is tightly screwed otherwise the sealing is not guaranteed.
If one of the connectors is not used, keep the cabochon on.

Important

The electrical ground is different from the mechanical ground.

It is strongly advised against connecting Rovins directly to the subsea vehicle battery. It is recommended to use a dedicated power supply for instrumentation:

1. stable and filtered out from noise.
2. to prevent loss of current. When it is lost, the alignment must start again.

An added UPS may avoid any issue and secure the whole system.

1. Connect the Ethernet cable to the computer.

2. Connect GNSS sensor to Rovins.

3. Connect the power supply to Rovins: the alignment starts.

There is no ON/OFF switch on the Rovins.
As soon as Rovins is powered on, it starts its alignment procedure.

4 Connecting to the Web-Based Graphical User Interface

4.1 Connecting Rovins directly to a PC/Laptop

A PC/Laptop can be connected directly to Rovins for configuration purposes as well as for data insertion and extraction (data in/out).

Equipment required

- 1 x PC or Laptop (with an unused Ethernet port)
- 1 x Cat 3/Cat 5 Cross Ethernet Cable (with new PC Generation, it is possible to use a straight cable. The PC then manages the pin inversion)
- Internet browser on the PC (Mozilla Firefox)

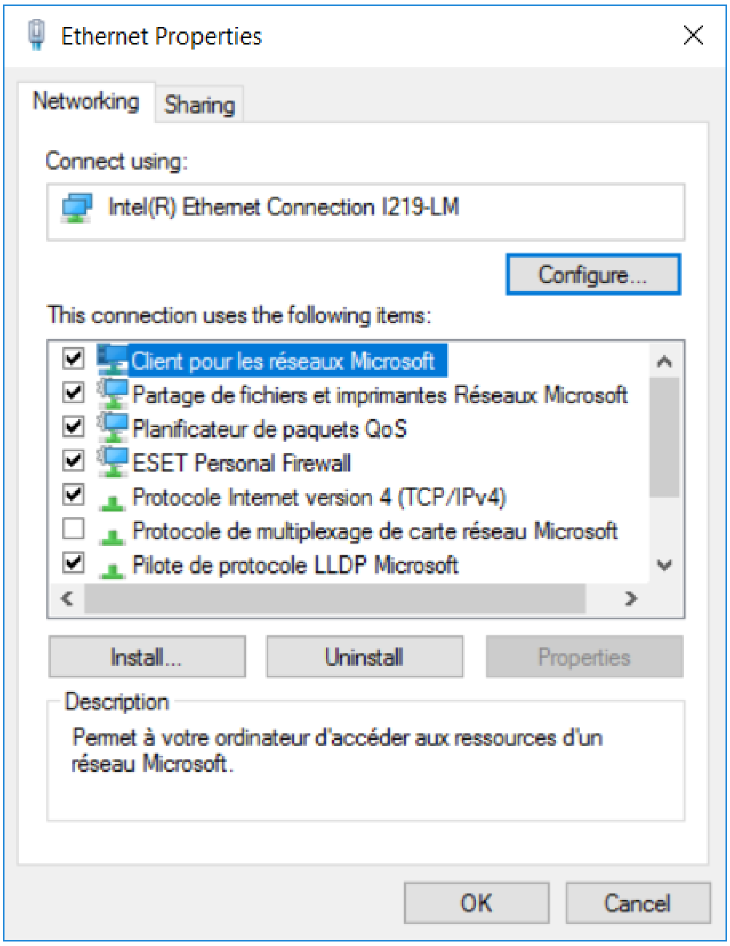
Setting up the PC

By default, Rovins is already assigned with an IP address. When connecting only one PC to Rovins, it is only necessary to configure the PC to adapt to Rovins default IP configuration.
The Rovins factory default IP address is set to 192.168.36.1XX
where XX are the last two digits of the serial number.

Rovins serial number is available on the Rovins label on the product.
Assuming that Rovins has a serial number of QA-12**34**, the last two digits of the serial number is the number **34** and therefore its factory default IP address would be: 192.168.36.134

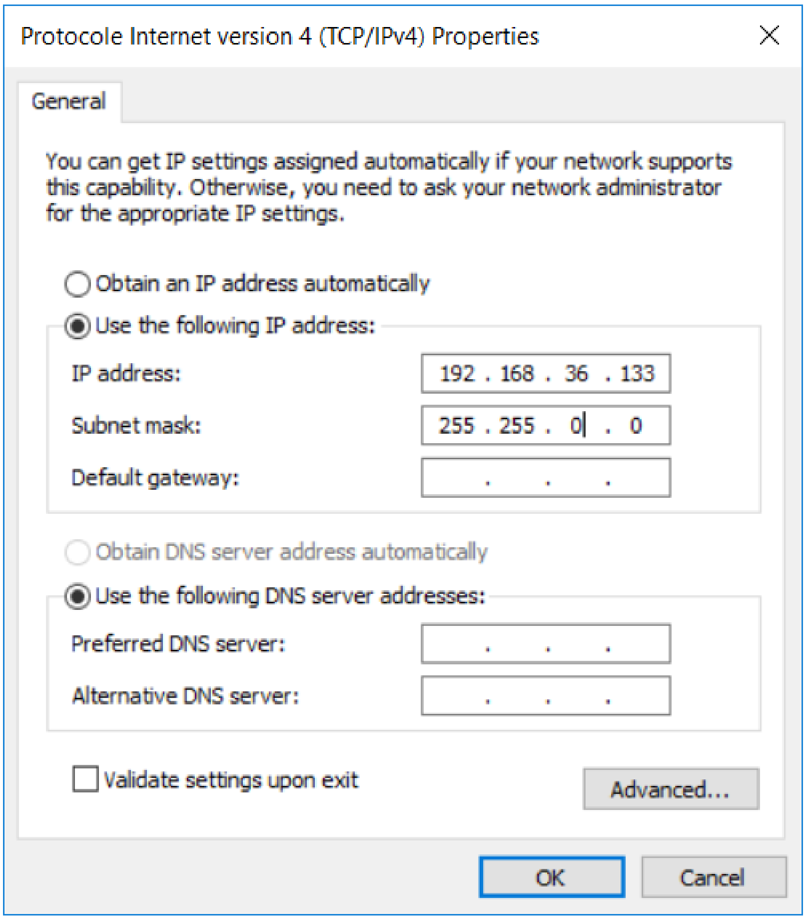
1. Access to Network Connections Window
   - For Windows 7: open Network Connections by clicking the **Start** button, clicking **Control Panel**, clicking **Network and Internet**, clicking **Network and Sharing Centre**, and then clicking **Manage network connections**.
   - For Windows 10: in Search windows, type Control Panel. Click **Control Panel**, click **Network and Internet**, click **Network and Sharing Centre**, and then click **Change Adapter Settings**.

2. Right click on **Local Area Connection** icon and select **Properties.**
   The Local Area Connection Properties window opens:



3. Double click on **Internet Protocol (TCP/IP)** label text.
   The Internet Protocol (TCP/IP) Properties window displays.

4. Select the option **Use the following IP address** and enter **192.168.36.133** for the IP address field and **255.255.0.0** for the Subnet mask.



5. Leave the **Default gateway** and **DNS server addresses** blank.

6. Click on the **OK** button to validate the modifications.

The IP address used here takes into account that Rovins is using its default configuration with its serial number XXXX-1234. You may change its IP address and subnet mask. In either case, the subnet mask of both the PC and Rovins should be the same.

4.2 Launching the Web-Based Graphical User Interface

4.2.1 Required Environments

The Web-Based Graphical User Interface has been optimized and qualified on the Firefox version ESR 45 browser.

Important

It is highly recommended to update your workstation with the Rovins USB flash drive provided with your product and to disable the automatic updates of these software.

4.2.2 Web-Based Graphical User Interface Version

The Rovins user manuals is applicable to the following software version* :

- Pack Name: INS_Pack_12_2_0
- GUI Version: product name/5.76.4-1.125.58.5
- DSP Loader Version: LoaderDSP4_3_10
- DSP Firmware Version: FrmWDSP4_INS_6_43_5_6
- CINT Loader Version: LoaderCINT_5_22.a
- CINT Firmware Version: FrmWCINT_INS_6_55_3_1_7.tar.gz
- Kernel Version: QNX v3.08

* The software version is displayed on the Web-Based Graphical User Interface by clicking on the Maintenance menu.

4.2.3 LAUNCHING THE WEB-BASED GRAPHICAL USER INTERFACE

In order to configure or operate Rovins:

- Rovins must be connected to a PC through the Ethernet.
- the Web-Based Graphical User Interface must be launched with the product powered on.

Connecting on a Workstation

The Rovins Web-Based Graphical User Interface is launched from the Web browser hosted on the workstation. Its default URL address is 192.168.36.1xx, xx being the two last numbers of the product serial number:

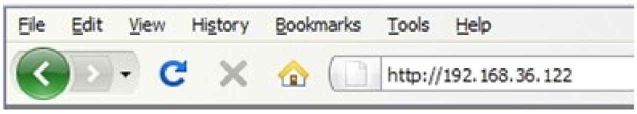


Figure 20 - Example of default URL for Rovins with serial number ending by 22

Connecting on a mobile device

Supports only Wi-Fi connection.
A Wi-Fi router must be connected to the network to which Rovins is connected. With the mobile device, connect to the product network.
Once the connection has been established, enter the IP address of Rovins to launch the Web-Based Graphical User Interface.

Web-Based Graphical User Interface starting process

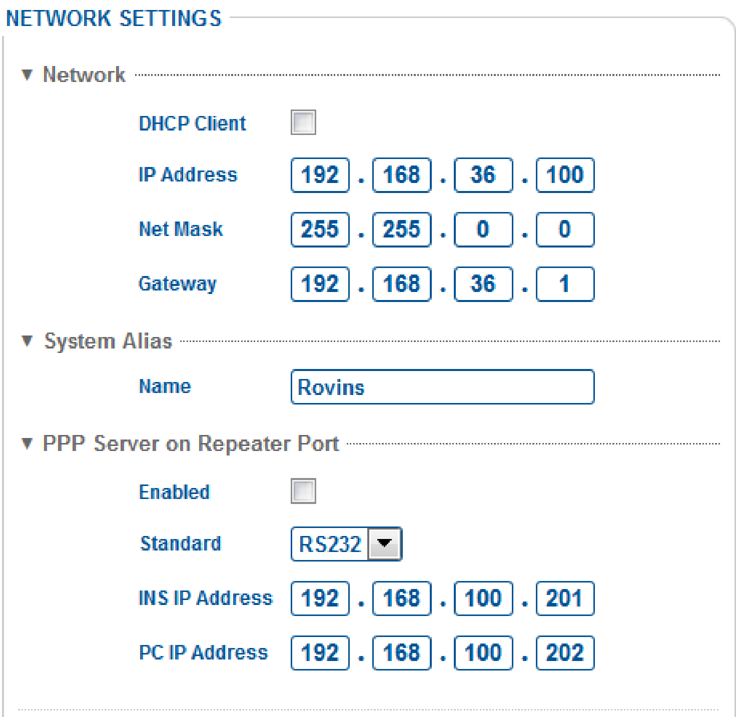
In both cases, during the first seconds the logo is flashing grey-blue indicating that the Web-Based Graphical User Interface is loading the internal configuration of the Rovins. Then the logo turns blue, showing that the alignment sequence of Rovins is starting, refer to Rovins Operation Guide to get details about the start-up phases.

4.3 Configuring the link between a PC and Rovins with the Web-Based Graphical User Interface

This chapter describes how to configure the link between a PC and Rovins when the product is directly connected to a PC/laptop or when it belongs to an Ethernet network.

The following procedure helps you to set up the default configuration.

1. Click on **Installation** menu then select **Network** option. The following window is then displayed:



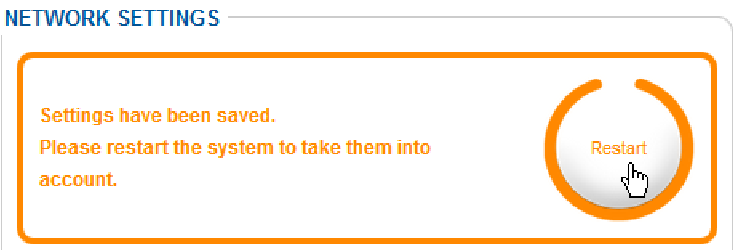
2. Under **Network** area, select then enter the following parameters:

- **DHCP Client**: check box to activate DHCP client.
  When the check box DHCP Client is selected: the product starts up in DHCP mode. If it has not found an address or a DHCP server after one minute, it starts up with the IP Address defined in the IP address field.
  When the check box DHCP is unselected: the product starts up with the IP Address defined in the IP address field.
- **IP Address**: this is the IP address of the Web-Based Graphical User Interface
- **Net Mask**: this is the common network mask address
- **Gateway**: this is the address to use in order to send data outside the local area network.
  For example, if the local area network is 192.168.36.xx and you want to send data to the PC the IP address of which being 192.168.32.xx, you can indicate that the Gateway is 192.168.36.1. In this case the data, the destination of which is 192.168.32.5, will be sent through the gateway 192.168.36.1.

3. Under **System Alias** area, enter the name:
   - **Name**: you can define an alias (Name) for your Rovins IP address to avoid using IP address to launch the Web-Based Graphical User Interface for example or to distinguish easily the starboard (right) and port side (left) product if necessary. This Name appears in the events viewer page.

4. Under **PPP Server** area: for using the repeater with PPP server (=Point to Point Protocol)
   - **Enabled** to launch the Web-Based Graphical User Interface via the serial link. When the check box Enabled is selected, the product will start a PPP server listening on repeater serial port at next reboot. When this option is disabled (default), the repeater port outputs PHINS STANDARD protocol.
   - **Standard**: to choose between an RS232 or RS422 serial link
   - **INS IP Address**: by default it is 192.168.100.201
   - **PC IP Address**: by default it is 192.168.100.202
     The PC IP address is used in case of the PC is connected to two different inertial units. In this case there must be a different IP address on the PC for each PPP interface.
     For example:
     192.168.200.1 on the PC PPP link 1 and 192.168.200.2 on the first Rovins
     192.168.200.3 on the PC PPP link 2 and 192.168.200.4 on the second Rovins connected to the PC.

5. Click on the **OK** button to save the modification. Then the following message is displayed on the top of the window:



6. Click on **Restart** button to take the network parameters into account.

If you want to keep the Rovins in its default configuration, just change the IP address on the PC.

The PC IP address must be taken from the same subset as the IP address configured in the product; the subnet mask of both PC and product should be the same.

Important

When you change the Rovins IP address, carefully note down the new IP address, otherwise you may not be able to connect to the system through the Web-Based Graphical User Interface.

Default Configuration

- Enabled (PPP server): **OFF**.
- DHCP Client: **OFF**.
- IP address:
  - > Default address is **`192.168.36.1xx`** for communication through the Ethernet link (`xx` being the last two number of the INS serial number)
  - > Default address is `192.168.36.201` for communication through the serial link
- Network mask address: **`255.255.0.0`**
- Gateway: by default, it is the Rovins IP address.

5 Configuring the Rovins

Setup forms are available in the installation excel file on the Rovins flash drive.
It is important to fill these forms in order to setup the Rovins parameters in the Web-Based Graphical User Interface.

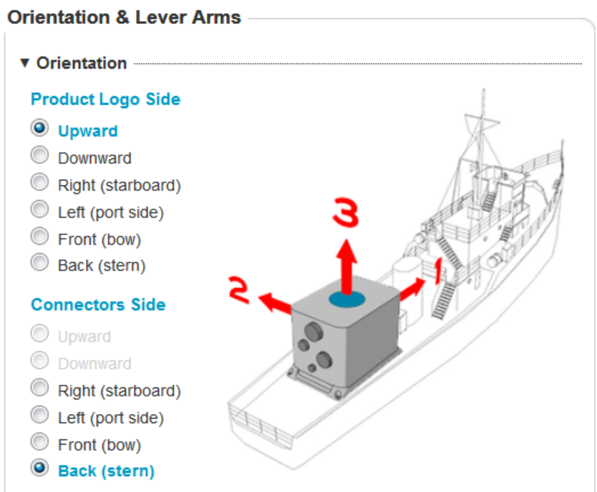
5.1 Configuring the Mechanical Parameters

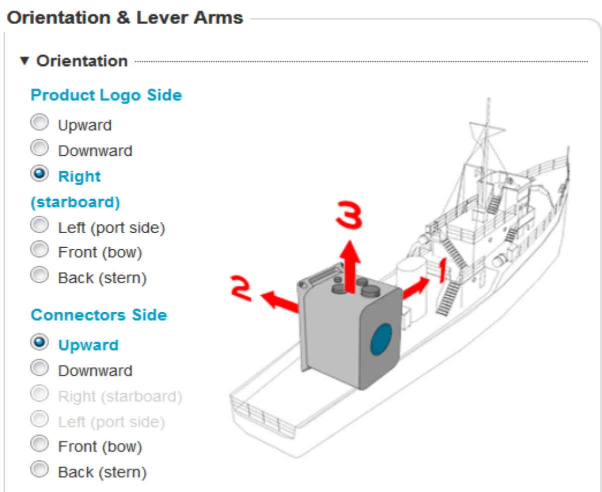
This chapter deals with:

- The definition of the Rovins orientation with respect to the subsea vehiclerough misalignment
- The definition of the remaining roll, pitch and heading fine misalignment between the Rovins and the subsea vehicle
- The definition of primary and secondary lever arms
- The definition of the Center of Gravity (COG) for the subsea vehicle (heave computation).

1. In the Web-Based Graphical User Interface, click on the **INSTALLATION** menu then select **MECHANICAL PARAMETERS**.

2. The **Orientation** area allows you to configure the Rovins to the subsea vehicle orientation. The orientation is used when the product axes orientation is different from subsea vehicle axes orientation (displayed in red), with 90 degrees rotations of any of the product axes with respect to the subsea vehicle axes.





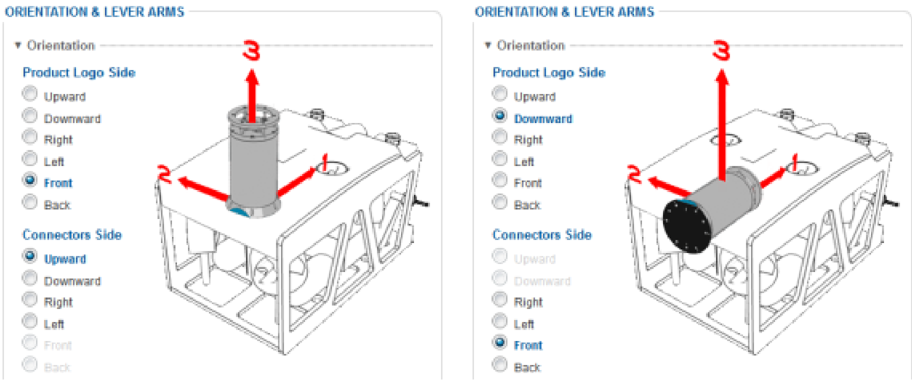


Figure 21 - Illustration of Rovins rough misalignment

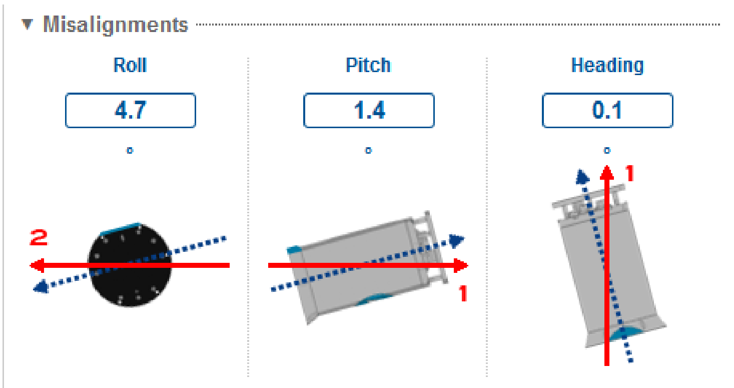
Define simply the orientation by selecting:

- The direction to which the product **Logo Side** is pointing.
- The direction to which the **Product Connector Side** is pointing.

As the foolproof, on the illustration, the product logo side and the product connector side point to the chosen direction.

---

3. Click on **Misalignments**: the Misalignment area is displayed.
Misalignment is used once orientation has been set to correct fine biases between the product and the subsea vehicle axes that are due to angular misalignment of the product with respect to the subsea vehicle.



The illustrations help you to see which angle you have to measure precisely.
Enter the following value in degree. Positive and negative values can be entered.

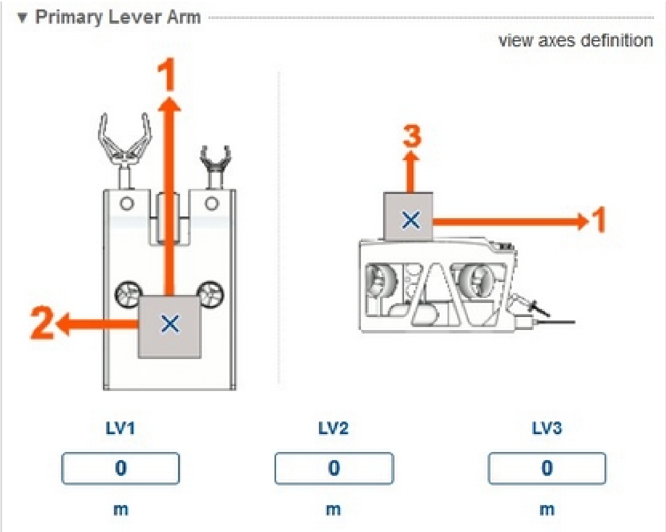
- **Roll** misalignment
- **Pitch** misalignment
- **Heading** misalignment

The illustration displays how your product is installed each time the value is entered.

---

4. Click on **Primary Lever Arm** to configure the primary external monitoring point through its coordinates: the Primary Lever Arm area is displayed.
The primary lever arm corresponds to the lever arm from the product center of measurements to the point to monitor.
The data displayed at the left of the logo provide the Latitude, Heading, Roll, Pitch at the point defined by the primary lever arm coordinates.

The logged Repeater data flow is also computed for the primary lever arm.



Enter the following values in meter. Positive and negative values can be entered.

- **LV1**: the blue cross moves along the first axis
- **LV2**: the blue cross moves according to the LV2 value sign
- **LV3**: the blue cross moves according to the LV3 value sign

A blue cross is displaying on the illustration once the lever arm coordinate is entered in order to show where the monitoring point you just defined is located with respect to the subsea vehicle.

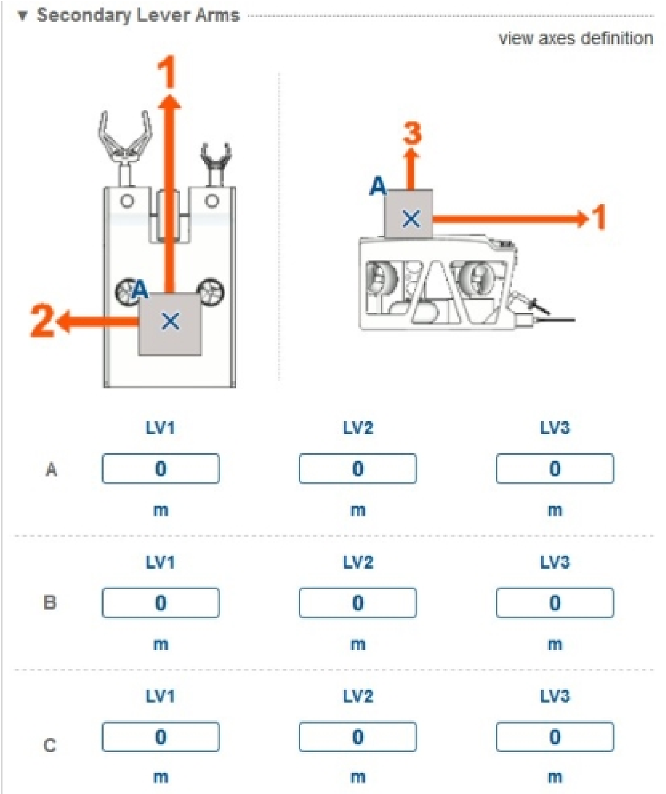
---

5. If needed, click on **Secondary Lever Arm** to configure the secondary external monitoring point through its coordinates: the Secondary Lever Arm area is displayed.
The secondary lever arms are used to compute the heave, surge and sway at locations different than that of the primary lever arm for the output protocols that provide the heave.
Up to three secondary lever arms (A, B, C) can be defined.

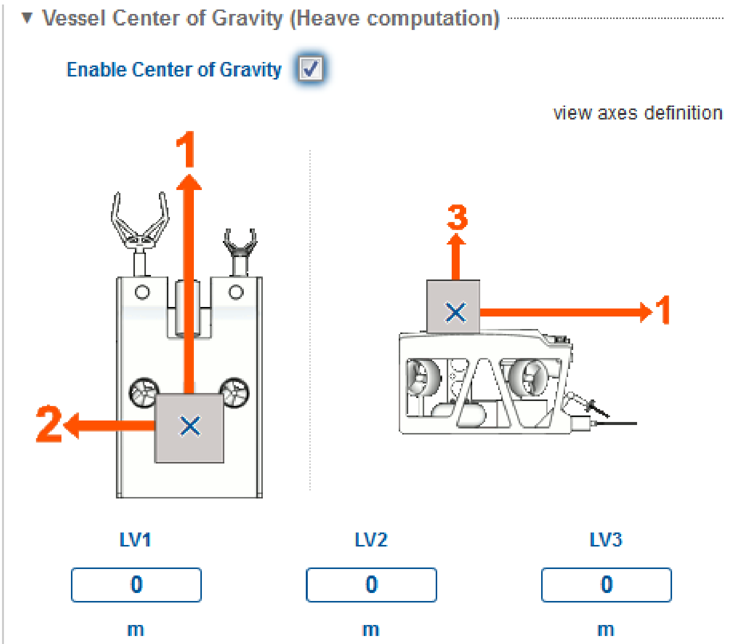
---

6. Enter the following values in meter for each A, B, C secondary monitoring points. Positive and negative values can be entered.

- **LV1**: the blue cross and the letter of the monitoring point is displayed along the first axis
- **LV2**: the blue cross and its attached letter move according to the LV2 value sign
- **LV3**: the blue cross and its attached letter move according to the LV3 value sign



Once the lever arms coordinates of the A, B or C secondary monitoring point are entered, a blue cross with the corresponding letter 'A', 'B' or 'C' is displayed where the secondary monitoring point is located with respect to the vehicle.



Please note that **in this case the primary lever arm is** then **not configurable**.

---

7. To avoid the effect of transient subsea vehicle movement on heave measurement, type in the position of the center of gravity (COG) of the subsea vehicle by entering the lever arms (LV1, LV2, LV3) between the Rovins center of Measurements and the COG of the subsea vehicle.

Enter the following position of the center of gravity (in meter) of the subsea vehicle by entering levers arms (LV1, LV2, LV3) between the product center of measurements and the COG of the subsea vehicle. Positive and negative values can be entered.

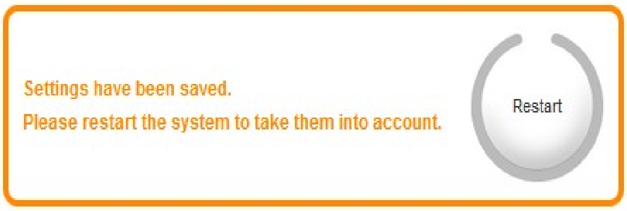
- **LV1**: the blue cross moves along the first axis
- **LV2**: the blue cross moves according to the LV2 value sign
- **LV3**: the blue cross moves according to the LV3 value sign

In this case, Rovins will compute heave data at the COG and add the heave induced by lever arms from the COG to external monitoring points.

Once the center of gravity coordinates are typed in, a blue cross clearly shows where the defined point is located with respect to the vehicle. This helps in detecting a mistake. See an example below

To get more detail about the heave measurement refer to the Inertial Products – Application Note - Installation and Configuration of AHRS and INS for Seabed Mapping

8. Click on the **OK** button to validate the modifications. The following message is displayed on the top of the window.



9. Click on the **Restart** button to validate the modifications.

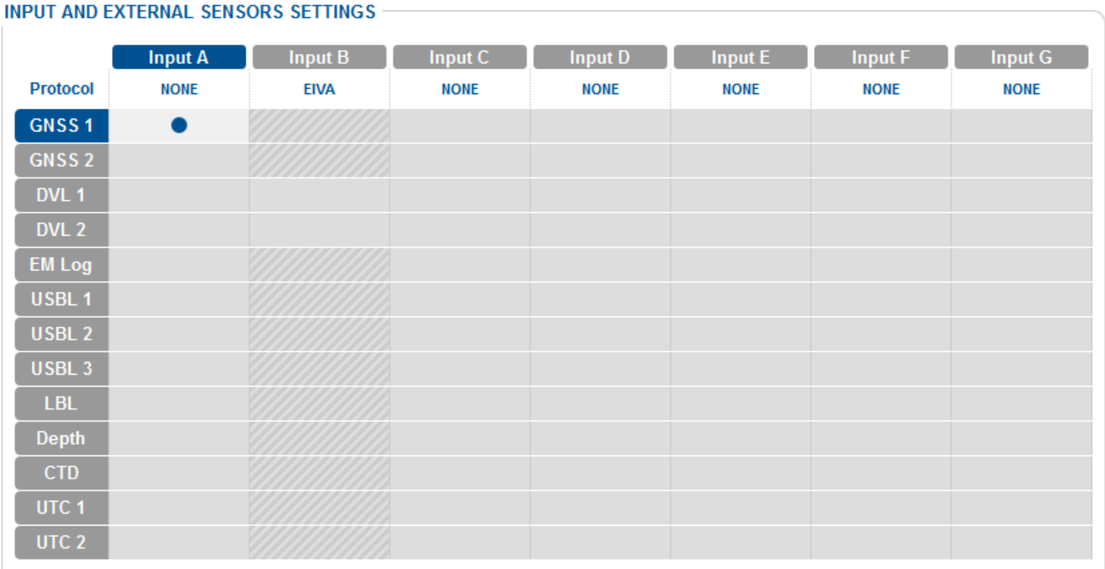
5.2 Configuring Sensor Parameters

Rovins can use external sensor data to improve its performance.

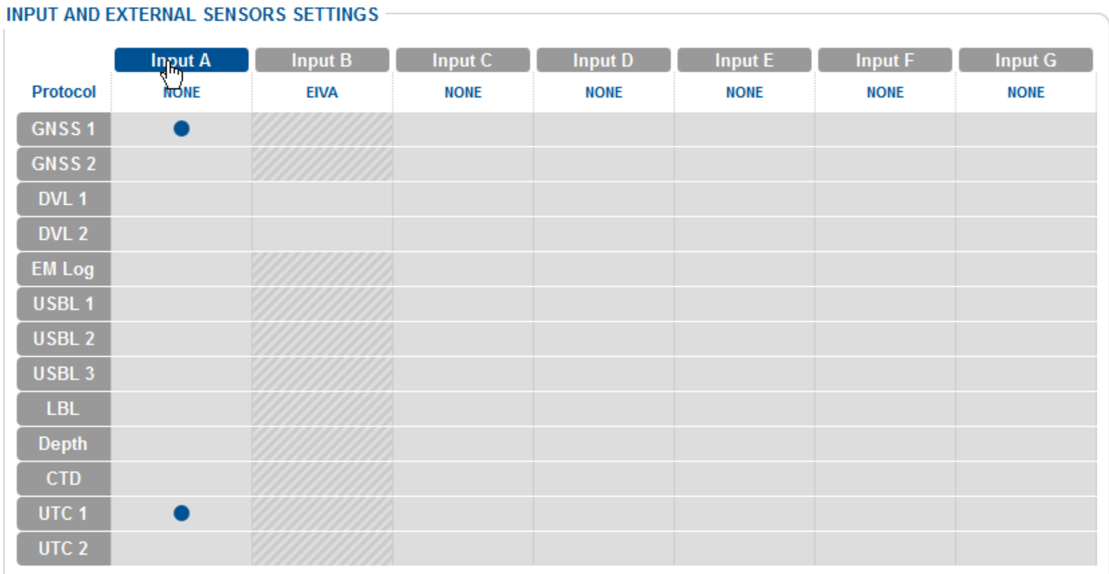
5.2.1 Assigning an External Sensor to an Input

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

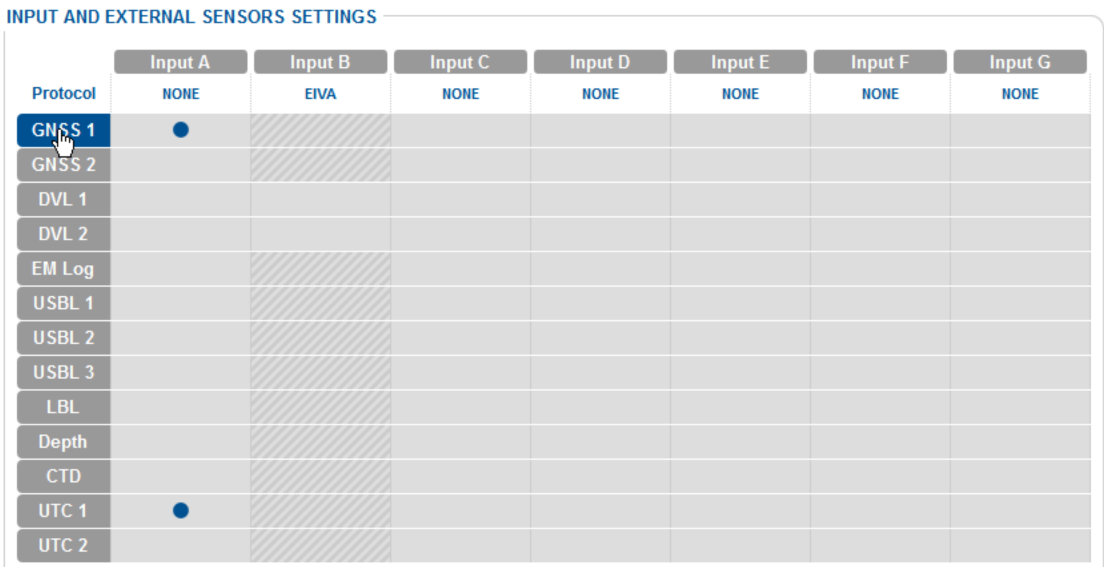
2. Click in the table **to associate the sensor to the input** to which the external sensor is connected (e.g., Input A, Input B, etc.) for the case of an external sensor (or Internal for an internal one).
When the external sensor is assigned to the input, the selection is displayed as follows with a blue circle. The blue circle displays both the external sensor and the input parameters to be configured in one page.



3. **To configure the input settings**, click on the Input "x" text (e.g., Input A, Input B…). Refer to next section to get more details.



4. **To configure the external sensor settings**, click on the sensor type in the column at the left of the table. Refer to the section of configuring the sensor following the type of sensor.



5.2.2 Configuring the Input

Up to 5 serial inputs are available. Up to 7 Ethernet inputs are available. Input F and input G are for Ethernet inputs only.

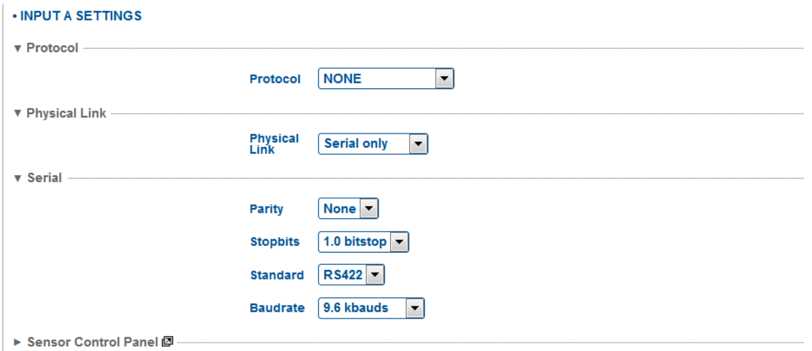
According to the requirements of IEC 61162-450:2018, the Ethernet connectivity of the Rovins should be considered as an Other Network Function (ONF). Therefore, if connected to an IEC 61162-450 network, the network settings must not use any IP or multicast addresses in the range 239.192.0.1 to 239.192.0.64.

Important

For an external sensor, the input data can be received either on Serial or Ethernet device, but not both.

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click on the **Input "x"** text (e.g., Input A, Input B…). The input "x" settings area is displayed.



3. Select the input **protocol** in the **Protocol** drop-down list. Each protocol is defined in the Rovins Interface Library document.

4. Select on which device the data will be transmitted in the **Physical Link** drop-down list.
- Serial only: data is only transmitted via the Serial stream.
- Ethernet only: data is only transmitted via the Ethernet stream.

5. **When "Serial only" physical link is selected**, set the following parameters:
- **Parity**: from Odd, Even or None
- **Stopbits:** from 0.5, 1, 1.5, or 2
- **Standard**: electrical standard for serial output: RS232 or RS422.
- **Baudrate**: from 600 bauds up to 460.8 kBauds

6. **When "Ethernet only" physical link is selected**, set the following parameters:
- **Transport Layer**: TCP server, TCP client, UDP, UDP broadcast, UDP multicast. Refer to Appendix B.2.1 for details on the transport modes.
- **IP**: IP address of the target (only used in UDP and TCP client
- **Port**: port socket number

7. If needed, click on **Sensor Control Panel** to monitor the external sensor data. Refer to section 5.2.11 to get more details.

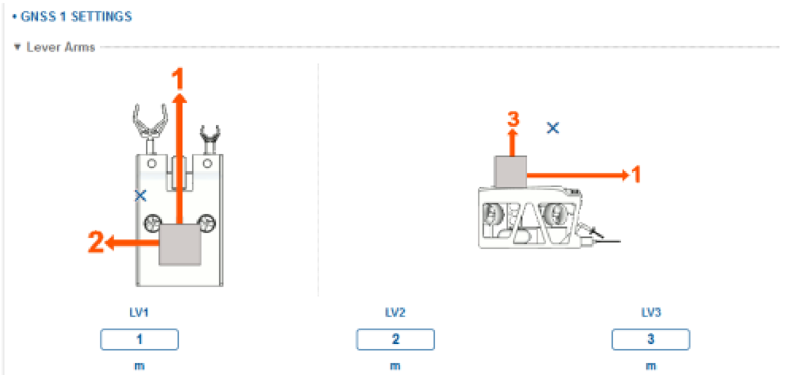
8. Click on the **OK** button to save the settings.

5.2.3 Configuring the GNSS Sensor

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click in the table **to associate the sensor to the input** to which the external sensor is connected (e.g., Input A, Input B, etc.) for the case of an external sensor (or Internal for an internal one). When the external sensor is assigned to the input, the selection is displayed with a blue circle.

3. Click on the **GNSS** sensor type in the column at the left of the table. The following parameters are displayed:



4. Enter the **value of the lever arms**.
The external sensor lever arm is the distance from the Rovins center of measurement P to the center of measurement of the external sensor (refer to the external sensor User Manual to locate this point).
   - **LV1** is the signed distance from the product center of measurements to the external sensor along axis XV1
   - **LV2** is the signed distance from the product center of measurements to the external sensor along axis XV2
   - **LV3** is the signed distance from the product center of measurements to the external sensor along axis XV3

5. In the **Advanced Settings** area, tick **Forced Mode** box if you wish the incoming sensor data to bypass the rejection filter and directly feed the Kalman filter. Activated this mode is not recommended as it may corrupt the Kalman filter with bad external sensor data input. To get more information, refer to the Rovins Operation Manual. When this mode is selected, it is impossible for the user to enable/disable the related sensor from the **CONTROL** page.

6. Click on the **OK** button to save the settings.

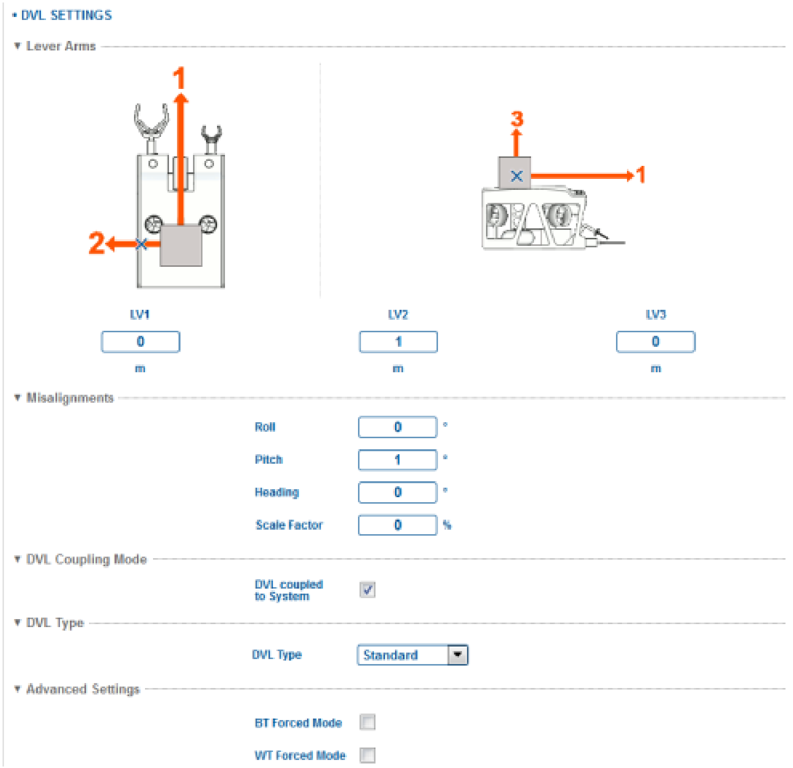
7. Repeat this procedure to configure GNSS2 sensor.

5.2.4 Configuring the DVL Sensor

To get details about the DVL calibration, refer to the Application Note - INS+DVL Calibration.

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click on the **DVL** sensor type in the column at the left of the table. The following parameters are displayed:



3. Enter the **value of the lever arms**. The external sensor lever arm is the distance from the Rovins center of measurement P to the center of measurement of the external sensor (refer to the external sensor User Manual to locate this point).
   - **LV1** is the signed distance from the product center of measurements to the external sensor along axis XV1
   - **LV2** is the signed distance from the product center of measurements to the external sensor along axis XV2
   - **LV3** is the signed distance from the product center of measurements to the external sensor along axis XV3

4. Enter the **Misalignments** values and the scale factor of the DVL in the Misalignments area. The precise values of the misalignment are determined during the DVL sensor calibration.

5. Enable **DVL Coupling Mode** by ticking the DVL coupled to system box. The coupling mode is used to indicate if a DVL is coupled to the system. When a DVL is coupled to the Rovins system, DVL calibration values are updated when user misalignements are modified.

6. Select the **DVL Type** in the list:
   - **Standard**: to select the standard DVL type (doppler). All the axis of the speed of sound are corrected.
   - **Phased array:** to select the phased array DVL type. This means that only vertical speed of sound is corrected for this type of DVL.

7. In the **Advanced Settings** area, select one or several parameters:
   - if you wish the incoming sensor data to bypass the rejection filter and directly feed the Kalman filter, select:
     BT Forced Mode: this mode forces data when DVL is in Bottom Track
     WT Forced Mode: this mode forces data when DVL is in Water Track
     Activated one of these modes is not recommended as it may corrupt the Kalman filter with bad external sensor data input.
     When one mode is selected, it is impossible for the user to enable/disable the related sensor from the CONTROL page.
     For more information on how to enable the external sensors, refer to the Rovins Operation Guide.

8. Click on the **OK** button to save the settings.

9. Repeat this procedure to configure DVL2 sensor.

5.2.5 Configuring the EM Log Sensor

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click on the **EM Log** sensor type in the column at the left of the table. The following parameters are displayed:

3. Enter the **value of the lever arms.**
   The external sensor lever arm is the distance from the Rovins center of measurement P to the center of measurement of the external sensor (refer to the external sensor User Manual to locate this point).
   - **LV1** is the signed distance from the product center of measurements to the external sensor along axis XV1
   - **LV2** is the signed distance from the product center of measurements to the external sensor along axis XV2
   - **LV3** is the signed distance from the product center of measurements to the external sensor along axis XV3

4. Tick the **Forced mode** box if you wish the incoming sensor data to bypass the rejection filter and directly feed the Kalman filter. Activated this mode is not recommended as it may corrupt the Kalman filter with bad external sensor data input. To get more information, refer to the Rovins Operation Guide. When this mode is selected, it is impossible for the user to enable/disable the related sensor from the **CONTROL** page.

5. Click on the **OK** button to save the settings.

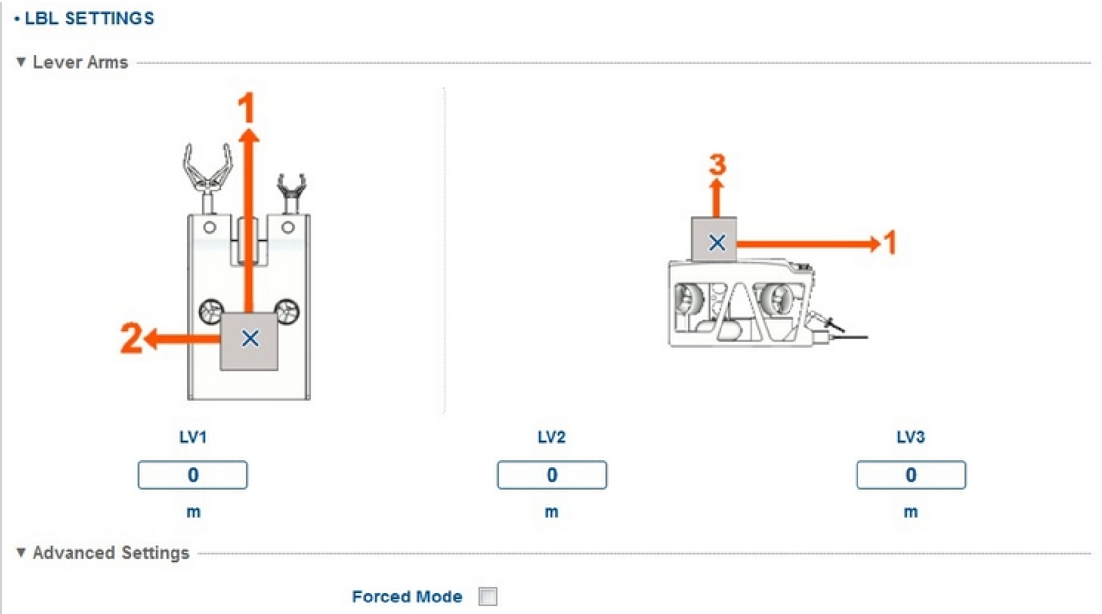
5.2.6 CONFIGURING THE LBL SENSOR

Important

You are strongly advised not to use more than 4 LBL beacons simultaneously with USBL beacons.

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click on the **LBL** sensor type in the column at the left of the table. The following parameters are displayed:



3. Enter the **value of the lever arms**. The external sensor Lever Arms corresponds to the lever arm from the Rovins center of measurements to the external sensor.
   - **LV1** is the signed distance from the product center of measurements to the external sensor along axis XV1
   - **LV2** is the signed distance from the product center of measurements to the external sensor along axis XV2
   - **LV3** is the signed distance from the product center of measurements to the external sensor along axis XV3

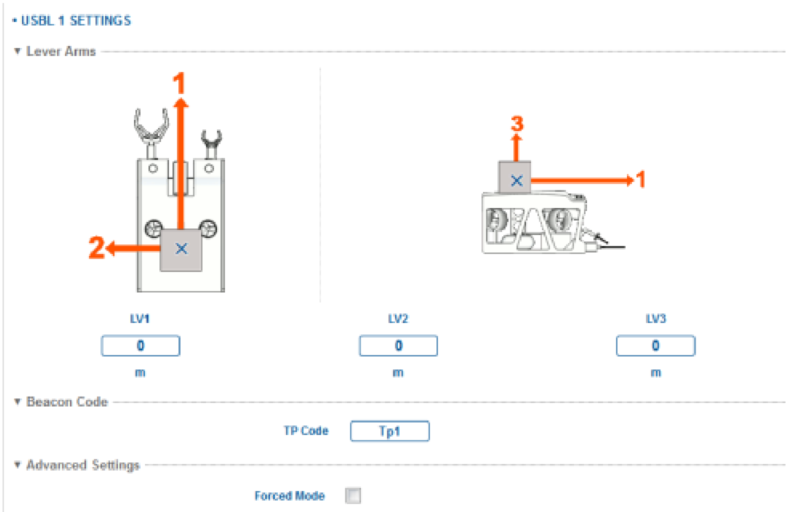
4. Tick the **Forced mode** box if you wish the incoming sensor data to bypass the rejection filter and directly feed the Kalman filter.
   Activated this mode is not recommended as it may corrupt the Kalman filter with bad external sensor data input. To get more information, refer to Rovins Operation Guide. When this mode is selected, it is impossible for the user to enable/disable the related sensor from the **CONTROL** page.

5. Click on the **OK** button to save the settings.

5.2.7 Configuring the USBL Sensor

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click on the **USBL** sensor type in the column at the left of the table. The following parameters are displayed:



3. Enter the **value of the lever arms**. The lever arm of the USBL sensor is the lever arm from the product center of measurements to the beacons. Up to three lever arms can be defined.
   - **LV1** is the signed distance from the product center of measurements to the defined beacon along axis XV1
   - **LV2** is the signed distance from the product center of measurements to the defined beacon along axis XV2
   - **LV3** is the signed distance from the product center of measurements to the defined beacon along axis XV3

4. Enter the **TP code** in the **Beacon code** area.
   This is the transponder code used to discriminate between incoming USBL data in the input protocol. You can enter up to 3 alphanumeric characters. For example: Tp1 for USBL 1, Tp2 for USBL 2 and Tp3 for USBL 3.

5. Tick the **Forced mode** box if you wish the incoming sensor data to bypass the rejection filter and directly feed the Kalman filter.
   Activated this mode is not recommended as it may corrupt the Kalman filter with bad external sensor data input.
   To get more information, refer to Rovins Operation Guide.
   When this mode is selected, it is impossible for the user to enable/disable the related sensor from the CONTROL page.

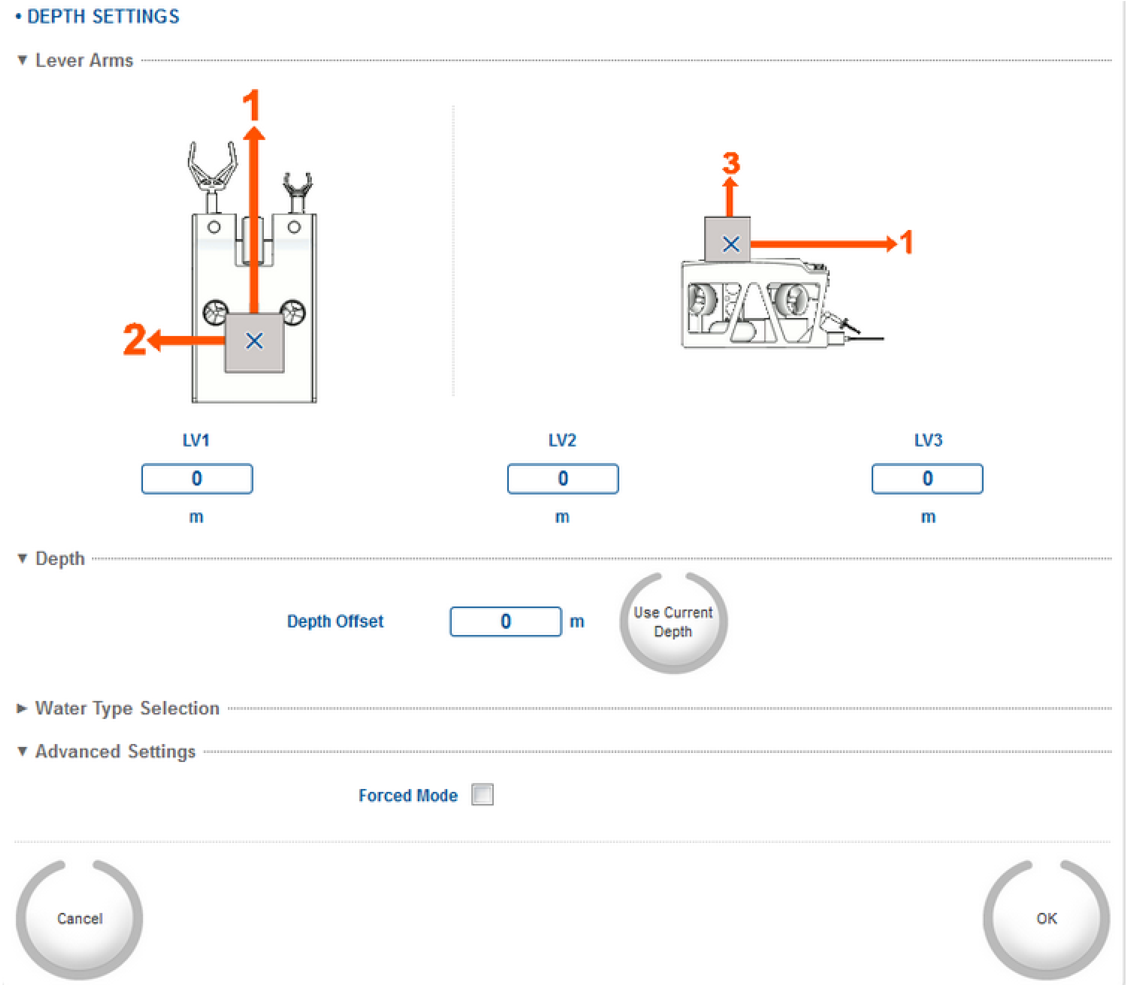
6. Click on the **OK** button to save the settings.

7. Repeat this procedure to configure the other USBL sensors.

5.2.8 Configuring the Depth Sensor

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Click on the **Depth** sensor type in the column at the left of the table. The following parameters are displayed:



3. Enter the **value of the lever arms**.
The external sensor lever arm is the distance from the Rovins center of measurement P to the center of measurement of the external sensor (refer to the external sensor User Manual to locate this point).
   - **LV1** is the signed distance from the product center of measurements to the external sensor along axis XV1
   - **LV2** is the signed distance from the product center of measurements to the external sensor along axis XV2

- **LV3** is the signed distance from the product center of measurements to the external sensor along axis XV3

---

4. Enter the **Depth Offset** in the Depth area.
When clicking on the **Use current depth** button, this offset is set to the current depth measured by the sensor. That means that the Depth sensor can be set to zero using the **Use current depth** button under the DEPTH SETTINGS area.
It can be useful to adjust the depth sensor to zero before submerging it into the sea.

---

5. Click on the **Water Type Selection** title.
Select the Water Type:

- **Salt Water**. The pressure to depth formula from “Unesco Technical Papers in Marine Science n°44, Algorithms for computation of fundamental properties in seawater” is applied).
- **Fresh Water**. You can enter the volumetric mass density rho in kg/m^3 with a resolution of 0.1 kg/m^3. Default value is 1000 kg/m3, value from 950.0 to 1100.0.
  Then the following pressure to depth conversion applies:
  z=P/(rho.g) with the pressure P in Pa, rho in kg/m^3 and the earth gravity g in m/s^2 (1 Pascal= 1 N/m^2. 1 bar= 10-5 Pa). The earth gravity g will be the one calculated by the product.
  The entered values will be between 950.0 and 1100.0.

---

6. Tick the **Forced mode** box if you wish the incoming sensor data to bypass the rejection filter and directly feed the Kalman filter. Activated this mode is not recommended as it may corrupt the Kalman filter with bad external sensor data input.
To get more information, refer to the Rovins Operation Guide.
When this mode is selected, it is impossible for the user to enable/disable the related sensor from the CONTROL page.

---

7. Click on the **OK** button to save the settings.

5.2.9 CONFIGURING THE UTC SENSOR

If available, it is recommended to add a synchronization pulse (Synchro in from Pulse) with the appropriate protocol to improve precision.
Rovins internal clock can be synchronized with data frames coming from an external reference clock (i.e., GNSS clock). The data frames are used in the following order: UTC, ZDA, GGA, GLL,RMC. The selected frame is kept as long as the system is not restarted or the protocol is not modified.
Time will be synchronized with input coming from the selected interface with the appropriate protocol. Rovins updates the offset between UTC time and internal time and uses this offset to convert internal validity time of navigation data into UTC referenced time.

The time synchronization can be done with Time + Pulse Per Second (PPS) signal.
With Time + PPS or PPS + Time, the internal time of reception of the pulse rising / falling edge is latched and the UTC time contained in following / preceding time message is associated to this internal time to determine the UTC offset.

---

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

---

2. Click in the table **to associate the sensor to the input** to which the external sensor is connected (e.g., Input A, Input B, etc.) for the case of an external sensor (or Internal for an internal one).
When the external sensor is assigned to the input, the selection is displayed with a blue circle.

---

3. Click on the **UTC** sensor type in the column at the left of the table. The following parameters are displayed:

---

4. Select **from which pulse input the pulse synchronization is coming** in the **Synchro In** drop-down list (e.g., Pulse A).

---

5. Select **its protocol** in the drop-down Protocol list.

---

6. Click on the **OK** button to save the settings.

---

7. Repeat this procedure to configure UTC2 sensor.

5.2.10 CONFIGURING THE CTD SENSOR

There are no parameters to be configured for this external sensor in the Web-Based Graphical User Interface.

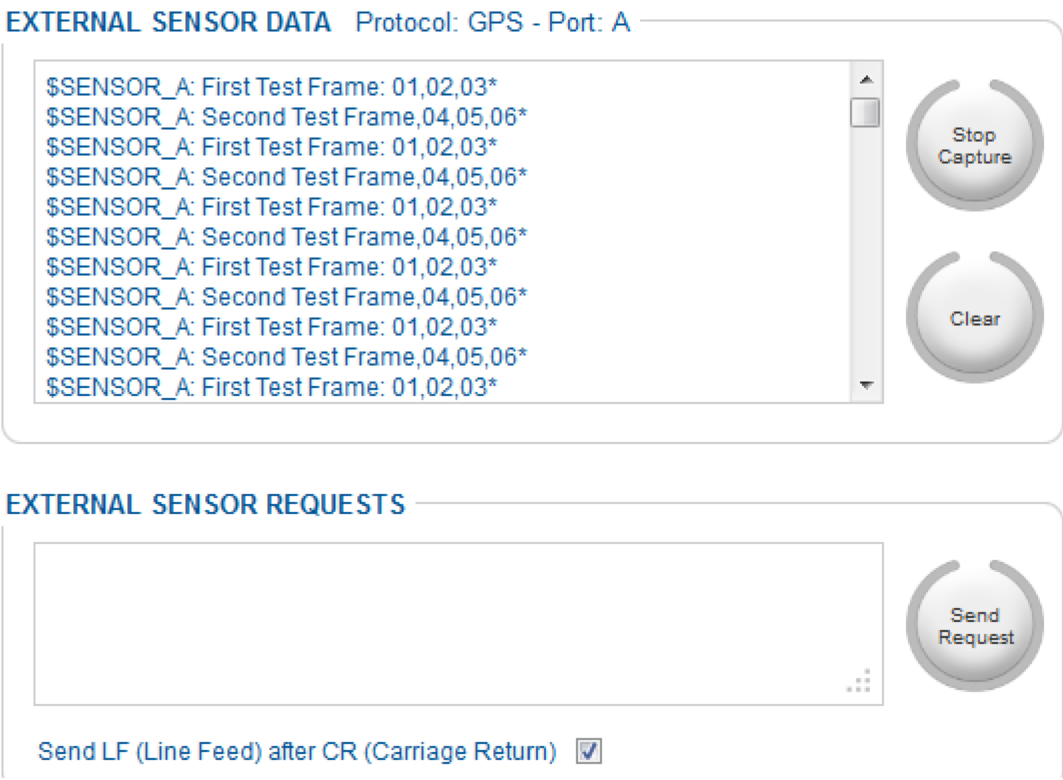
5.2.11 Monitoring the External Sensor Data

Any external sensor that inputs data into Rovins can be monitored.

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. In the first row of the INPUTS table, click on the **input** (e.g., Input A) **to which the external sensor to monitor is connected.**

3. Click on the **Sensor Control Panel** label.
   A pop-up window is displayed with the sensor data; in the following example the data of the GNSS connected to Input A is displayed.



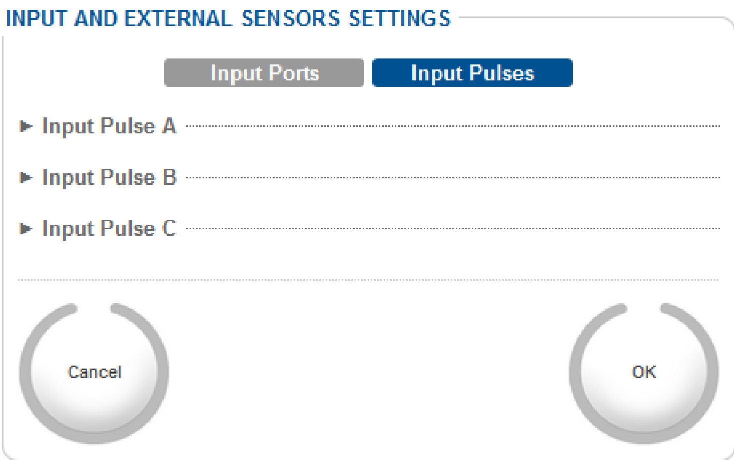
4. From this window, you can:
   - Display the data sent by the external sensor to the product in the dedicated area
   - Stop the display of the data (Stop Capture button) in the dedicated area
   - Reset the display (Clear button) in the dedicated area
   - Send a Request to the external sensor:
     - Use the dedicated area to type the command
     - Press enter after the command if the sensor requires a carrier return after commands
     - Select Send LF (Line Feed) after CR (Carrier Return) option if needed
     - Click the Send Request button to send the command typed in

5.3 Configuring the Input Pulses

Input Pulses allow you to date up to 4 external events for each Input Pulse.
For each input pulse, the available parameters are the way to output them and the triggering type.

1. Click on the **INSTALLATION** menu then select the **INPUTS** option.

2. Select **Input Pulses** tab:



3. Click on each **Input Pulse X** text to be configured. The drop-down list is then displayed. Select the **Function** in the drop-down list to select the pulse polarity.
   - **None**: no trigger
   - **Event Marker Rising**: trigger on rising edge for output in real time.
   - **Event Marker Falling**: trigger on falling edge for output in real time.
   - **Event Marker Rising Postpro**: trigger on rising edge for post processing output in real time.
   - **Event Marker Falling Postpro**: trigger on faling edge for post processing output in real time.

4. Click on the **OK** button to save the settings

5.4 Configuring the Output Ports

The Output data can be duplicated on both Serial and Ethernet devices.
Input and output serial parameters of each port are common. This means that changing output serial parameters of a port impacts the input serial parameters of the port and vice-versa.

Important

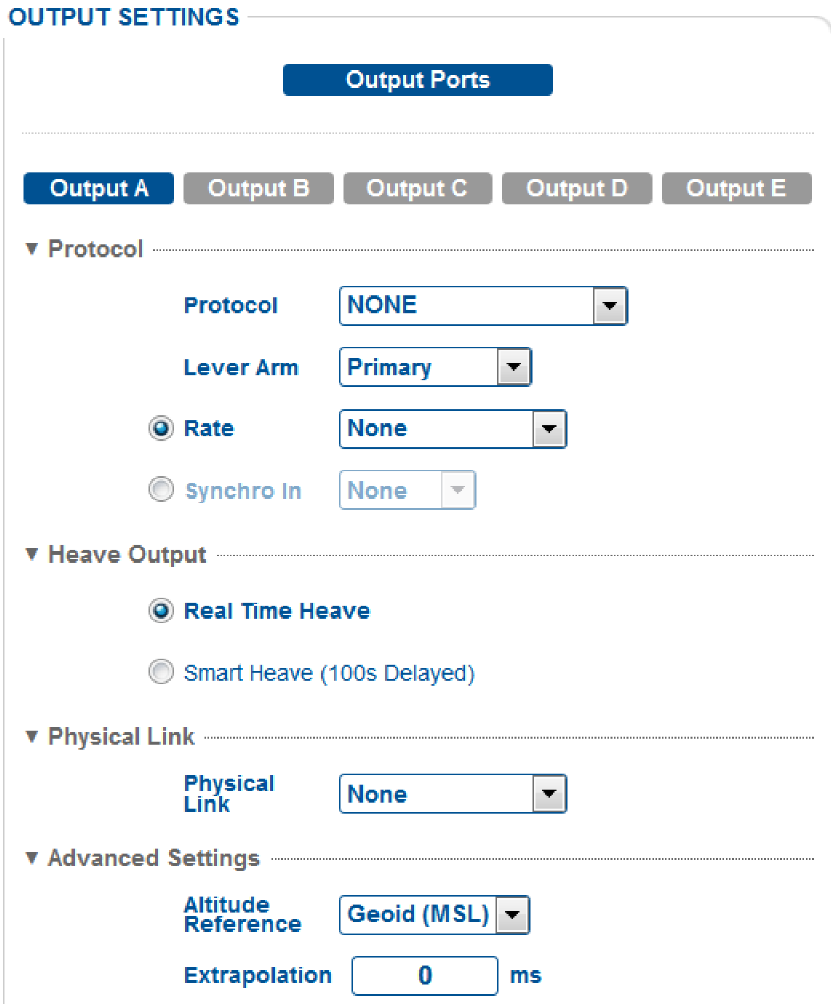
While configuring the output port in serial mode, check that sampling period and baud rate are consistent with the protocol data field length. If not, data output will not be correct, and a "SerOut X full" flag will appear in the product detailed status window. Checking procedure is as follows:

- Count the maximum number of bits Nb (including parity and stop bits) in the protocol data frame. ASCII characters are 10 to 12 bits long max. (1 start bit, 8 bit ASCII character, 0 or 1 parity bit, 1 or 2 stop bit).
- Select the Baudrate and Sampling period so that:
  Nb x Frequency (Hz) < Baudrate (in Bauds)

Example

A 30-character protocol set up with 1 stop bit and even parity will generate 30 x (1(start bit) +8 (ASCII character) +1(stop bit) +1(parity bit)) = 330 bits. If this protocol output rate is 20 Hz (50 ms), the baud rate must be at least 6600 baud. First compatible baudrate in the product is 9600 bauds.

1. Click on the **INSTALLATION** menu then select the **OUTPUTS** option. The following page is displayed:



2. Click on the **output port** to be configured (e.g.: Output A to configure Port A).
When the output port is not connected, there is no need to configure the output.

3. Select the output protocol in the **Protocol** drop-down list.
Refer to Rovins Interface Library document to get more details about the Rovins protocols.

4. Select the lever arm used in the **Lever Arm** drop-down list. Motion sensing output on the protocol selected will be the motion measured at the external monitoring point defined by the lever arm.

5. Select the **output frequency** in the **Rate** drop-down list to specify the time interval in milliseconds between the beginning of two consecutive outputs. The minimum value is 5 ms, corresponding to a maximum output frequency of 200 Hz.
or
Click on the grey bullet to select the input pulse synchronization in the **Synchro in** the drop-down list: when this option is selected, the output frequency is determined by the input coming from the input pulse.

6. If needed, click on **Heave Output** text to select the type of heave output (available only if the heave is computed by the system).
Select:
- **Specific Heave**: real-time which provides heave in real-time mode.
- **Smart Heave**: which provides a measurement of heave with a 100 s fixed delay. This data will give the best accuracy in all sea conditions. This data is available through protocols which output heave.

7. Select on **which device the data will be transmitted** in the Physical Link drop-down list.
- **Serial only**: data is transmitted via the Serial stream only. The Serial area is then displayed.
- **Ethernet only**: data is transmitted via the Ethernet stream only. The Ethernet area is then displayed.
- **Serial-Ethernet**: data is transmitted via both Ethernet and Serial stream. The Serial and Ethernet areas are then displayed.

8. When "**Serial only**" physical link is selected, set the following parameters:
- **Parity**: from Odd, Even or None
- **Stopbits**: from 0.5, 1, 1.5, or 2
- **Standard**: electrical standard for serial output: RS232 or RS422
- **Baudrate**: from 600 bauds up to 460.8 kBauds

9. When "**Ethernet only**" physical link is selected, set the following parameters:
- **Transport Layer**: TCP server, TCP client, UDP, UDP broadcast, UDP multicast. Refer to Appendix B.2.1 for details on the transport modes.
- **IP**: IP address of the target (only used in UDP and TCP client)
- **Port**: port socket number

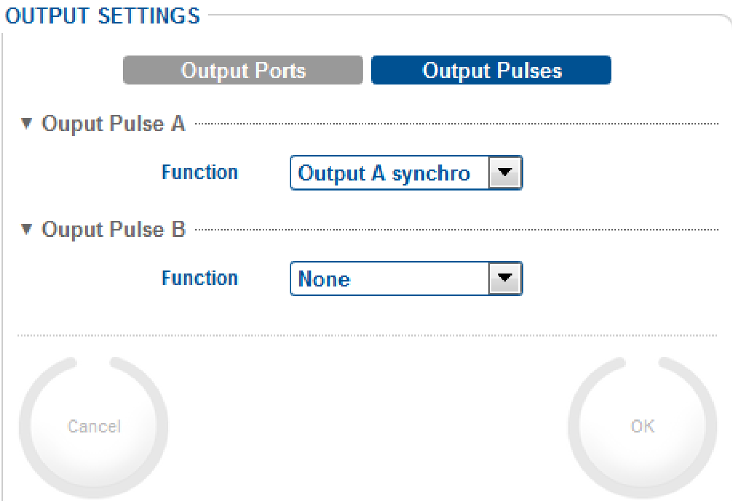
10. If needed, click on **Advanced Settings** text to configure advanced parameters.
If necessary, select the Altitude Reference to be applied:
- **WGS84 Geoid (MSL)**: altitude is referenced to the Geoid surface also called Mean Sea Level (MSL). It is an equipotential gravity surface of the earth that coincides with the mean ocean surface.
- **WGS84 Ellipsoid**: altitude is referenced to an Ellipsoid surface (WGS84). It is a mathematical geometric model which represents an approximation of the geoid.

11. Click on the **OK** button to save the settings.

5.5 Configuring the Output Pulses

1. Click on the **INSTALLATION** menu then select the **OUTPUTS** option.

2. Click on the **Output pulses** text in grey. The following page is displayed:



3. Select the pulse function in the **Output pulse A or B** to generate an envelope signal on the corresponding output pulse.
Select the function from which will be generated a TTL signal:

- **Output A envelope**
- **Output B envelope**
- **Output C envelope**
- **Output D envelope**
- **Output E envelope**
- **Distance travelled rising**: distance in meters that will trigger the pulse
- **Distance travelled falling**: distance in meters that will trigger the pulse
- **PPS Like**: PPS associated with output ZDA in some protocols
- **Time rising**: number of milliseconds that will trigger the pulse
- **Time falling**: number of milliseconds that will trigger the pulse

For get information on the output pulses, refer to Rovins Interface Library.

4. Click on the **OK** button to save the settings.

5.6 Configuring the Advanced Position Filtering

The Advanced Position Filtering must be enabled and configured at the Rovins installation with the help of iXblue support.

1. Click on **SETUP** menu then select **ADVANCED POSITION FILTERING** option.

2. To enable the Advanced Position Filtering, click on the **OFF** button until displaying **ON**:

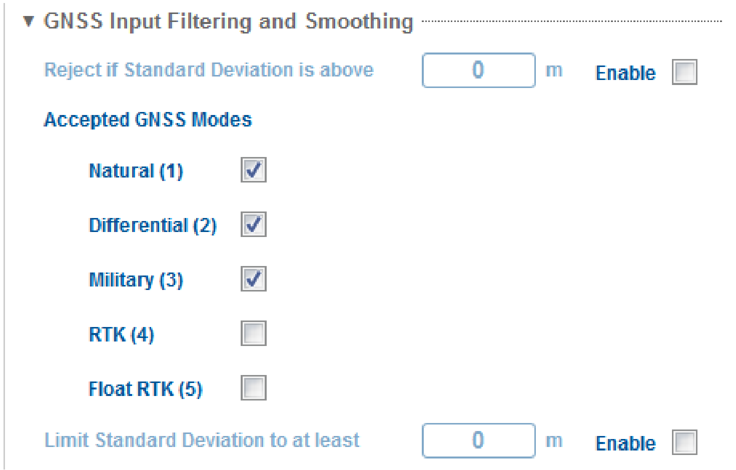
Some parameters are displayed with default values.
To restore the default values, click on the **Default values** button.

3. Select the **Position Input Priority** in order to declare which position sensor has the highest priority between the following choice: GNSS, USBL, none.

- **GNSS**: exclusive priority to GNSS sensor.
- **USBL**: exclusive priority to USBL sensor.
- **None**: no exclusive priority.

For example if USBL is selected only USBL data will be taken into account at Rovins input. If USBL data is lost for a timeout greater than 60 s (drift < 0.8 m in Pure inertial for Rovins) then GNSS data is taken into account. As soon as USBL data is present at input it is taken into account in an exclusive manner. In any case if several USBL beacons and several GNSS are configured at Rovins input the rule applies to any of these position data.

4. Enable the GNSS **Input Filtering and Smoothing** parameters to optimize the position rejection and the GNSS positions smoothing.

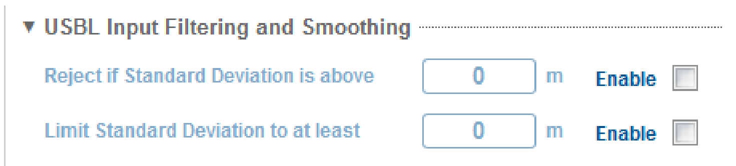


- Tick the **Enable** box next to **Reject if Standard Deviation** is above parameter in order to reject the position if the standard deviation is strictly greater than the entered value from 0.01 m to 100 m.
- Select the **Accepted GNSS mode**, one or several modes can be selected. This parameter allows you to define the quality factor values accepted by the Rovins at GNSS input. For any other value than the one selected GNSS data is rejected.
- Tick the **Enable** box next to **Limit Standard Deviation to at least** parameter then enter the value from 0.01 m to 100 m. This is the minimum value of the GNSS standard deviation to optimize the smoothing position.

For example if the user enters a value of 10 m and the standard deviation on position in the GNSS telegram is 0.3 m then the value taken into account by the Rovins will be 10 m. If the value in the GNSS telegram is > 10 m the GNSS telegram value is taken into account. By increasing this value smoothing will be improved but the risk is greater to accept GNSS fix that could be too far from the true position. Trade-off needs to be found.

---

5. Enable **USBL Input Filtering and Smoothing** parameters to optimize the position rejection and the USBL positions smoothing.

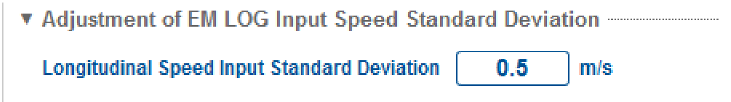


- Tick the **Enable** box to enable the **Reject if Standard Deviation is above** parameter then enter the value from 0.01 m to 100 m in order to set the level of USBL pre-filtering on the criteria of an input position standard deviation strictly greater than a chosen setting value.
  For example if the setting is 0.3 m and the x, y position standard deviation in the USBL telegram is > 0.3 m the position is rejected by the Rovins.
- Tick the **Enable** box to enable the **Limit Standard Deviation to at least** to optimize position smoothing of USBL position when USBL is coupled to Rovins, then enter a minimum position standard deviation associated to input USBL position data in the input field range: 0.01 m to 100 m.

For example if a user enters a value of 10 m and the standard deviation on position in the USBL telegram is 0.3 m then the value taken into account by Rovins will be 10 m. If the value in the USBL telegram is > 10 m the USBL telegram value is taken into account. By increasing this value smoothing will be improved but the risk is greater to accept USBL fix that could be too far from the true position. Trade-off needs to be found.

---

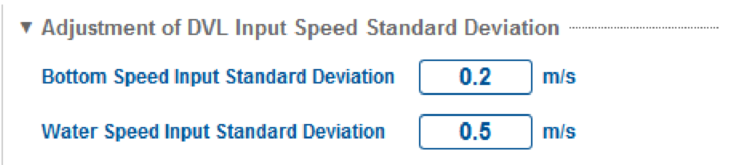
6. Enter **Adjustment of EM LOG Input Speed Standard Deviation** to set the input standard deviation value associated with the EM LOG by setting a value in the input field range from 0.01 m/s to 100 m/s.



By reducing the EM LOG standard deviation value, more confidence is associated to the sensor data which will improve the Schuler oscillation filtering on speed data in pure inertial navigation. It can also be used to reduce confidence to gain robustness. The chosen value should be as close as possible to the real speed standard deviation of the EM LOG used. In case of doubt, default value should be set to 0.5 m/s.

---

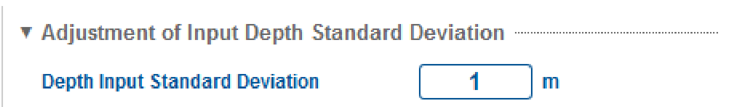
7. Enter **Adjustment of DVL Input Speed Standard Deviation** to set the speed standard deviation associated with the input data in the input field range: [0.01 m/s to 10 m/s]. This applies to all input protocols with Water speed and Bottom speed associated with the DVL input. If input protocol sends speed standard deviation then the setting does not apply.



- **Bottom Speed Input Standard Deviation**: value from 0.01 m/s to 10 m/s.
- **Water Speed Input Standard Deviation**: default value is 0.5 m/s.
  Standard deviation on speed should be set as close as possible to real speed standard deviation of the sensor. This depends on DVL technology (i.e: doppler, correlation...) and application.

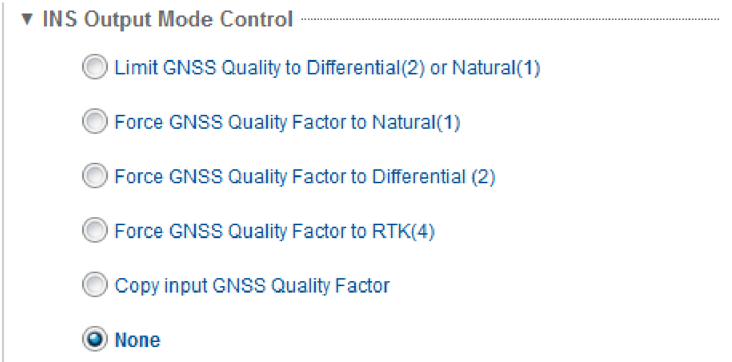
---

8. Enter **Adjustment of Input Depth Standard Deviation** to set the input standard deviation value associated with the depth by setting a value in input field range from 0.01 m to 100 m. This applies to all protocols that send a depth value at Rovins input for depth sensor input.
If input protocol sends depth standard deviation then the setting does not apply.



- **Depth Input Standard Deviation:** value from 0.01 m to 100 m: default value is 1 m.

9. Select **INS Output Mode Control** to control the position output quality factor or force the output quality factor value sent in the GGA string at INS output. This is only applied when INS is coupled to an external sensor.



- **Limit GNSS quality to Differential (2) or Natural (1)**
- **Force GNSS quality factor to Natural (1)**
- **Force GNSS quality factor to Differential (2)**
- **Force GNSS quality factor to RTK (4)**
- **Copy input GNSS quality factor:** when both GNSS1 and GNSS2 are received, the better quality factor (valid) is used.
- **None**

For the following mode “Limit GNSS quality to Differential (2) or Natural (1)”, the following table applies:

Rovins Output table		
SD (m)	**Q**	**After Q limitation**
< 0.1	4	2
< 0.3	5	2
< 3	2	2
< 10	1	1
>= 10	6	1

For example if calculated Rovins position SD is < 0.1 m then quality factor output in GGA telegram will be set to Q=2.

10. Click on the **OK** button to save the settings.

5.7 Configuring the Warning

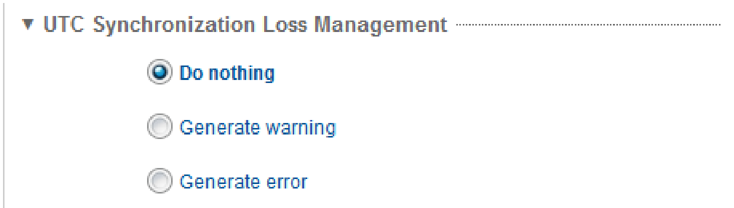
According to the various sensors connected and the parameters chosen for your mission, you can be informed or not (**Do nothing** option) in case of:

- Loss of UTC synchronization (UTC time or PPS lost)
- Loss of one position sensor (configured and activated)
- Loss of one speed sensor (configured and activated)
- Increase of the heading and/or position standard deviation

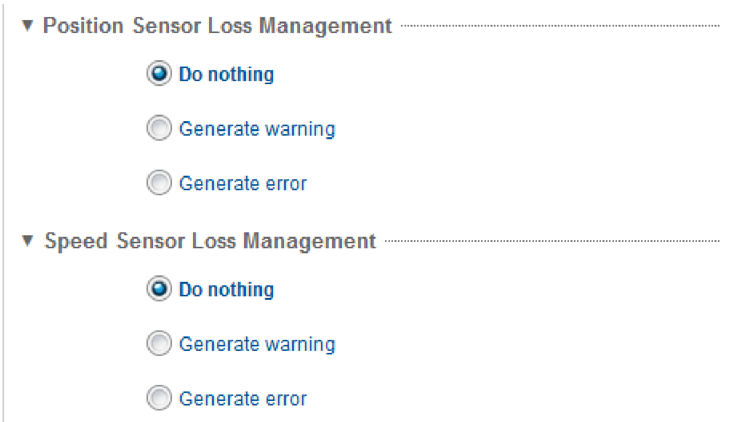
When Generate warning option selected, the logo is displayed in orange and some messages will be displayed.
When Generate error option selected, the logo is displayed in red and some messages will be displayed.

1. Click on the **SETUP** menu then select the **WARNING CONFIGURATION** option.

2. For the **UTC synchronization**, decide whether or not to be informed in case of UTC synchronization loss (UTC time or PPS lost) by clicking on the corresponding check box:



3. **For the external sensor connected**, decide whether or not to be informed in case of synchronization loss of the position and/or speed data by clicking on the corresponding check box:



4. To generate warning concerning the **standard deviation of the heading and position**, you have to select, in a drop-down list, the thresholds from which warning will be generated:

5. Click on the **OK** button to save the settings.

5.8 Saving the Rovins Settings

The product configuration can be saved into a text file. Alternatively, the saved configuration can be restored on the product.

The default location of the product settings file is defined by your Web browser options (Download folder).

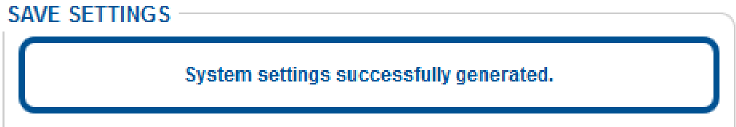
The name of the product settings file is Settings_product_xxxx-zzz_yymmdd.txt

where:

- "product" is the name of your Rovins
- xxxx-zzz is the Rovins serial number
- yymmdd is the creation date of the settings file (year-month-day)

The configuration file can be opened with any notepad software.

1. Click on the **SETUP** menu then select the **SETTINGS MANAGEMENT** option.
2. In the **SAVE SETTINGS** area, click on the Save Settings button. A window is displayed to save the file.
3. Click **OK** to save the file. The files are recorded in the default location for download of your web browser and the following message is displayed:

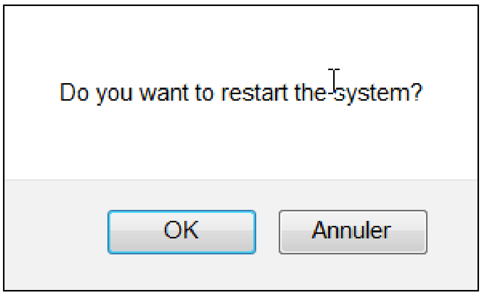


5.9 Restarting Rovins

The alignment sequence starts again after restarting Rovins

1. Click on the **maintenance** menu.

2. In the **RESTART SYSTEM** area, click on the **Restart** button.
A confirmation window is displayed.



3. Click on the **OK** button to restart. After restarting, the disc of the Web-Based Graphical User Interface is flashing in grey/blue during the initialization (20 s).

5.10 Loading the Rovins settings

1. Click on the **SETUP** menu then select the **SETTINGS MANAGEMENT** option.

2. In the **LOAD SETTINGS** area, browse to find the settings file to be loaded by clicking on the **Browse…** button, then select the file.

3. Click on the **Load Settings** button to load the file. The Rovins automatically restarts. The product settings previously saved are now restored on Rovins.

5.11 Activating the Licence Code

Rovins must be activated before using.

To retrieve the activation code:

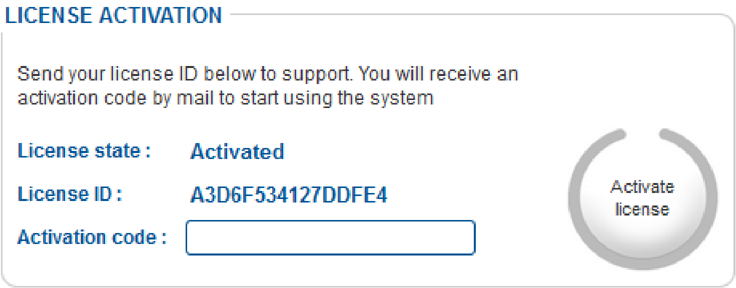
- Note the license ID in the LICENSE ACTIVATION area of the maintenance page.
- Send a message to iXblue support to ask for the activation code with the Rovins license ID.

Important

If Rovins is not activated with the activation code, it will display null values for the position.

1. Click on the **MAINTENANCE** menu. The maintenance page is displayed.

2. In the **LICENSE ACTIVATION** area, enter the Activation code provided by the iXblue support.



3. Click on the **Activate license** button. The “License activated” message is displayed in front of the License state field. The Rovins is activated, the position is updated.

5.12 Managing the Passwords

A password management mechanism has been integrated to the Web-Based Graphical User Interface to avoid unexpected device parameter changes.

Important

Only the administrator can manage the passwords.

Three different user roles can be selected to manage security access:

- **Navigator**: the navigator can only view the system computed data by taping in the address bar of the web browser the following link:
  http://192.168.36.1xx/control_expertview/
  xx being the two last numbers of the product serial number.
- **Operator**: the operator can view the system computed data and control basic system settings, but is not allowed to change the mechanical or installation settings.
- **Administrator**: the administrator can view and modify all system parameters and can also perform maintenance tasks.

The list of access rights per role is defined in the following table.

	Administrator	**Operator**	**Navigator**
Control page	✔	✔	✘
Navigation data page	✔	✔	✔
Options page	✔	✔	✘
Navigation parameters	✔	✔	✘
Mechanical installation page	✔	✘	✘
Input setting page	✔	✘	✘
Output setting page	✔	✘	✘
Network setting page	✔	✘	✘
Maintenance page	✔	✘	✘
DVL calibration page	✔	✘	✘
Warning configuration page	✔	✘	✘

	Administrator	Operator	Navigator
Setup page	✓	✗	✗
Advanced Position Filtering page	✓	✗	✗

Activation rules

Access control is disabled by default. The administrator will need to configure passwords to activate security mechanisms in the dedicated password setup page (see procedure after).
Passwords are activated page by page. Once activated, you will be asked to log in before the page can be displayed.
Navigator and Operator passwords cannot be created if the administrator password does not exist.
When only an administrator password is defined, any user can freely connect to the system and use it as an operator, so long as he does not access the administrator restricted pages, where a login is required.
If an operator/navigator password is set, you will need to login before being able to use the system as an operator/navigator. The login page asks for both role and password.
Once an access control has been granted, it remains valid until the browser is closed or the browser cache is cleaned (the password session time management depends on the browser options).

Operator/ Navigator

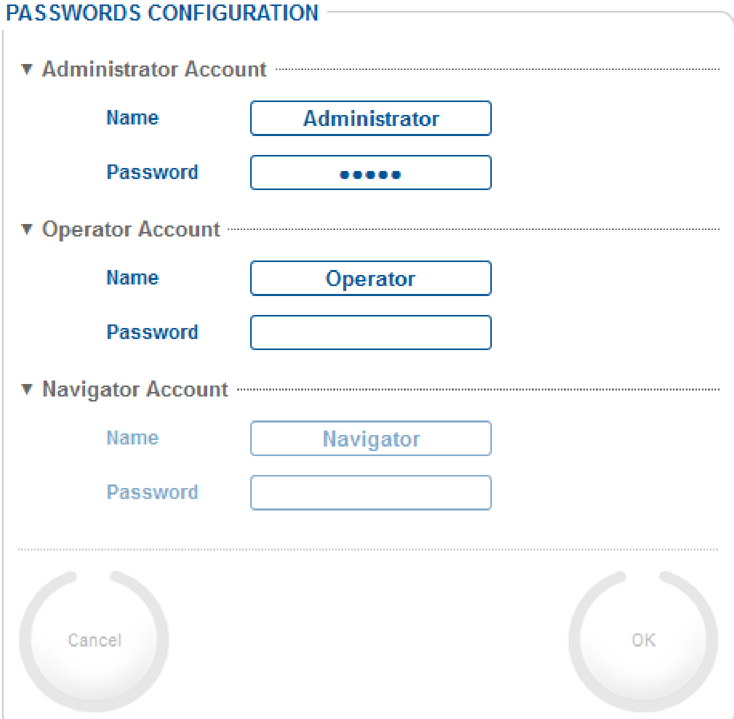
If the operator or navigator user cannot remember its password or if he wants to modify it, he should ask the administrator to change it.

Administrator

If the administrator has lost the administrator password: refer to the Rovins Interface Library for the control commands.

⚠ To log out the Web-Based Graphical User Interface, press Ctrl+Shift+Del keys in order to delete the browser history. Then the next user must press the F5 function key to load the page again and to get the password input window relative to his user role.

1. Click on the **SETUP** menu then select the **PASSWORDS** option. The following page is displayed.



The password shall contain only alpha-numeric characters. The length of the password shall be 15 characters maximum, and shall be a multiple of 3. If those constraints are not fulfilled, Rovins will require a password reset done by using a specific control command. Refer to Rovins Interface LibraryInterfaceControlDocument.

2. First, configure the **Administrator** Account by entering a Name (login) then a password (15 alphanumerical characters maximum). Enter the Administrator password again to confirm it in the Confirmation text box.

3. Click on the **OK** button to save the settings.

4. If needed, configure the **Navigator** Account by entering a Name (login) then a password (15 alphanumerical characters maximum). Enter the Operator password again to confirm it in the Confirmation text box.

5. Click on the **OK** button to save the settings.

6. If needed, configure the **Operator** Account by entering a Name (login) then a password (15 alphanumerical characters maximum). Enter the Operator password again to confirm it in the Confirmation text box.

7. Click on the **OK** button to save the settings.

6 Contacting iXblue Support

For 24/7 URGENT support by phone

- North America / NORAM
  +1 617 861 4589
- Europe Middle-East Africa Latin-America / EMEA-LATAM
  +33 1 30 08 98 98
- Asia Pacific / APAC
  +65 6747 7027

For non-URGENT support

- by email: support@ixblue.com
- using the form on the iXblue web site www.ixblue.com
- through the Web-Based Graphical User Interface, you can create a support ticket to send directly to iXblue support through an email (assuming the computer is connected to the World Wide Web, and the setting of the email tool has been correctly done).

Please note the following information before contacting the iXblue support:

- Serial number of your unit
- Firmware/loaders versions
- User interface version you are using
- Record the configuration file
- Record a set of data for analysis
- The latitude/longitude where currently the system is running
- Description of your application / potential problem your are facing to

For more information, refer to the Rovins maintenance manual.

Appendices

A Rotational and Vectorial Transformation

This section describes the conventions used to perform a transformation between two frames each defined by a triplet of three orthogonal vectors (A, B, C) and (A', B', C').

This transformation is described by three plane rotations around 3 orthogonal axes, with angles Ψ, θ and φ (Euler angles) that correspond to heading, roll and pitch angles.

This rotational transformation is for instance used to define the inertial product fine misalignment with respect to the vehicle reference frame (see section 1.9) and to define the angular position of the vehicle with respect to the local geographic frame.

To transform the (A, B, C) frame into the (A', B', C') frame the following plane rotations are performed:

1. Rotation of (A, B, C) around the C axis, **angle Ψ** (see the Figure 22) to yield (A_h', B_h', C).
   This plane rotation is described by the orthogonal matrix $M_\Psi(\Psi)$, defined as:

$$M_\Psi(\Psi) = \begin{pmatrix} \cos(\Psi) & \sin(\Psi) & 0 \\ -\sin(\Psi) & \cos(\Psi) & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

   Ψ is defined positive clockwise around C; Ψ is positive so that it corresponds to heading sign convention (opposite to usual Euler sign convention).

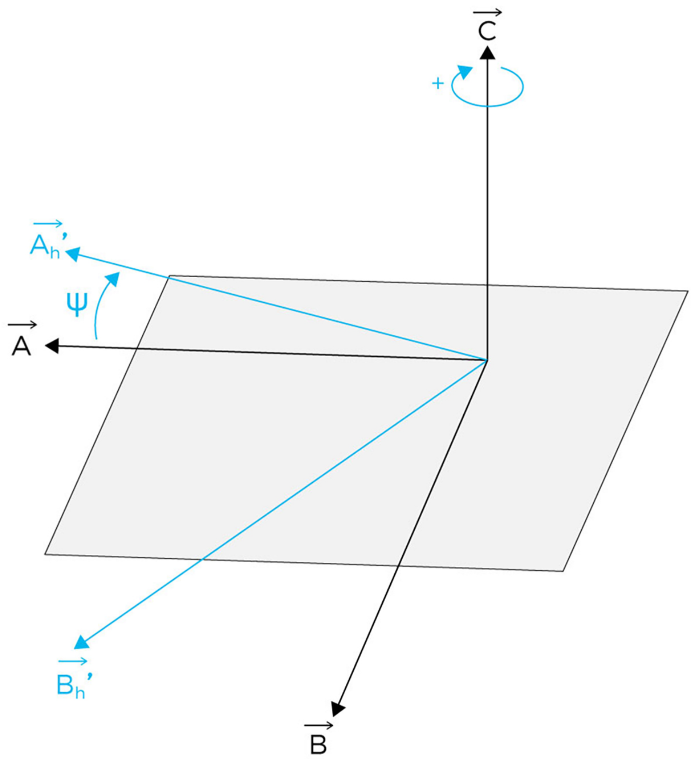


Figure 22 - Illustration of the first rotation around C

2. Rotation of ($\underline{A}_h$', $\underline{B}_h$', $\underline{C}$) around $\underline{B}'_h$ **angle θ** (see the Figure 23) to yield ($\underline{A}$', $\underline{B}$h', $\underline{C}$'').

   This plane rotation is described by the orthogonal matrix $M_\theta(\theta)$, defined as:

$$M_\theta(\theta) = \begin{pmatrix} \cos(\theta) & 0 & \sin(\theta) \\ 0 & 1 & 0 \\ -\sin(\theta) & 0 & \cos(\theta) \end{pmatrix}$$

   θ is defined positive counter-clockwise around $\underline{B}_h$', the rotation angle θ is negative.

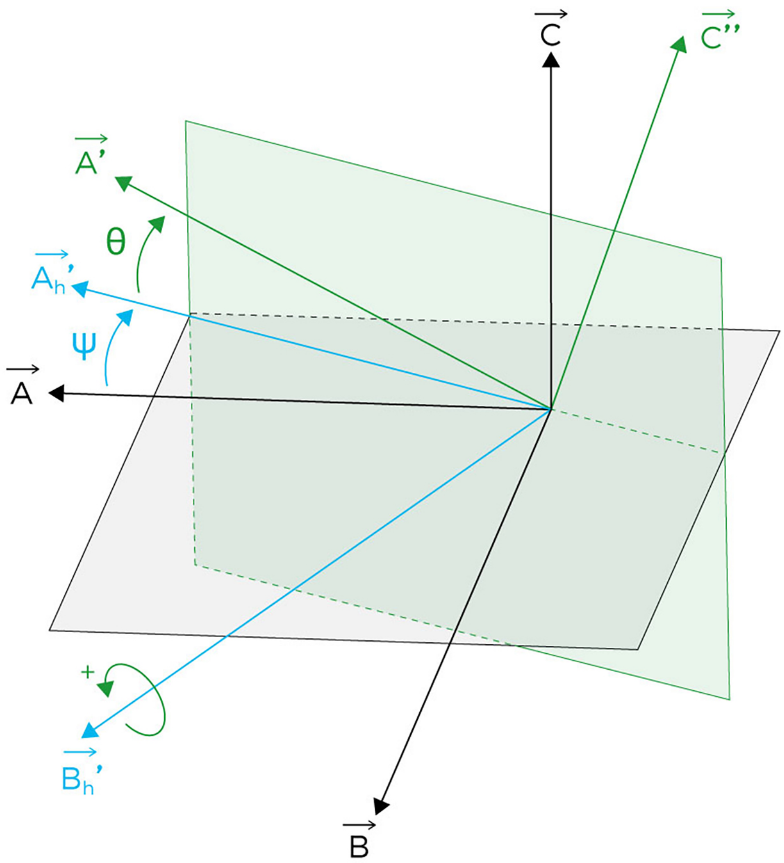


Figure 23 - Illustration of the second rotation around $\underline{B}_h$'

3. Rotation of (A'',B_h',C'') around A'=A'';
   angle φ (see Figure 24) to yield (A',B',C').
   φ is defined positive counter-clockwise around A'', φ is positive.
   This plane rotation is described by the orthogonal matrix Mφ(φ), defined as:

$$M_{\varphi}(\varphi) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos(\varphi) & -\sin(\varphi) \\ 0 & \sin(\varphi) & \cos(\varphi) \end{pmatrix}$$

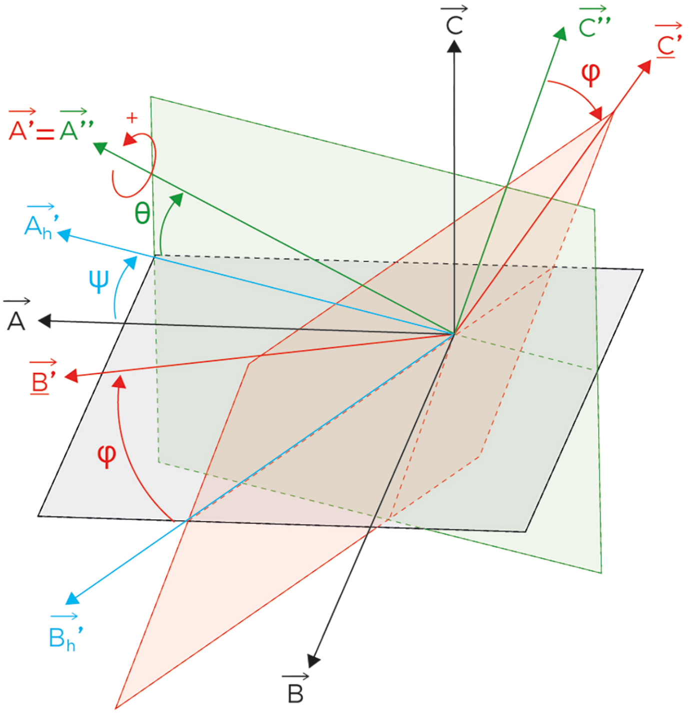


Figure 24 - Illustration of the third rotation around A'

Important

The relationship between the coordinates (a,b,c) in the (A, B, C) frame and the coordinates (a',b',c') in the (A', B', C') frame of a vector V is:

$$\begin{pmatrix} a \\ b \\ c \end{pmatrix} = M_{\Psi}(\Psi) \times M_{\theta}(\theta) \times M_{\varphi}(\varphi) \begin{pmatrix} a' \\ b' \\ c' \end{pmatrix}$$

The relationship between the coordinates ($\underline{a}_{V1}$, $\underline{a}_{V2}$, $\underline{a}_{V3}$) in the ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) reference frame and the coordinates ($\underline{a}'_1$, $\underline{a}'_2$, $\underline{a}'_3$) in the ($\underline{X}'_1$, $\underline{X}'_2$, $\underline{X}'_3$) frame of vector is:

$$\begin{pmatrix} a_{v1} \\ a_{v2} \\ a_{v3} \end{pmatrix} = M_\Psi(misheading) \times M_\theta(mispitch) \times M_\varphi(misroll) \begin{pmatrix} a'_1 \\ a'_2 \\ a'_3 \end{pmatrix}$$

The matrices MΨ, Mθ and Mφ are defined in section .

A.1 Vectorial Transformation Between Local Geographic Frame and Vehicle

The relationship between the coordinates $\underline{a}_V$ = ($\underline{a}_{V1}$, $\underline{a}_{V2}$, $\underline{a}_{V3}$) in the ($\underline{X}_{V1}$, $\underline{X}_{V2}$, $\underline{X}_{V3}$) subsea vehicle body frame and the coordinates $\underline{a}_n$ = ($\underline{a}_N$, $\underline{a}_W$, $\underline{a}_{Up}$) in the ($\underline{X}_N$, $\underline{X}_W$, $\underline{X}_{Up}$) navigation frame of the vector $\underline{V}$ is:

The matrices M_Ψ, M_θ and M are defined in section .

Important

Notice that the order of the matrix multiplication is extremely important since inverting the matrices will produce erroneous results.

The preceding product of matrix is:

$$C_v^n = \begin{pmatrix} \cos(\theta).\cos(\Psi) & \cos(\varphi).\sin(\Psi) + \sin(\varphi).\sin(\theta).\cos(\Psi) & -\sin(\varphi).\sin(\Psi) + \cos(\varphi).\sin(\theta).\cos(\Psi) \\ -\cos(\theta).\sin(\Psi) & \cos(\varphi).\cos(\Psi) - \sin(\varphi).\sin(\theta).\sin(\Psi) & -\sin(\varphi).\cos(\Psi) - \cos(\varphi).\sin(\theta).\sin(\Psi) \\ -\sin(\theta) & \sin(\varphi).\cos(\theta) & \cos(\varphi).\cos(\theta) \end{pmatrix}$$

n: navigation frame
b: subsea vehicle frame

B Advanced Communication Setup

B.1 Configuring Rovins in an Ethernet Network

Inserting Rovins into an Ethernet network allows you to configure it and access to its data from any part of the network.

By default, the Rovins is already assigned with an IP address.

Depending on the nature of the network where it is inserted, the Rovins is required to be configured so that it adapts to the Ethernet network. If the Ethernet network has not been setup, the user may take reference from the next section to select IP addresses.

Equipment Required

- 1 x Ethernet Wireless Router with incorporated wired switch (Router should have LAN address configuration functionality)
- 1 x PC/Laptop with a free Ethernet port or a wireless adaptor
- 2 x Cat 3/Cat 5 Straight Ethernet Cable

Only 1 cable is required if the PC/Laptop has a wireless adaptor.

B.1.1 Choosing an IP Address

If you decide to change the default configuration of Rovins, you will need to provide two IP addresses for both Rovins and the PC/Laptop.

It is important to keep track of the addresses entered on both systems as their addresses are different.

You will need to setup a private network between the PC and the inertial product, thus you will need to select an address for the PC and the inertial product.

In private network addresses, it is usually recommended to use addresses of

- Either Class B (169.254.0.0 to 169.254.255.255) – Subnet Mask: 255.255.0.0
- Or Class C (192.168.0.0 to 192.168.255.255) – Subnet Mask: 255.255.255.0

Important

For Class C, the first (e.g. 192.168.0.0) and last (e.g. 192.168.255.255) addresses are reserved and therefore they cannot be used.

It is recommended to select two addresses from the same range set:

- Either 169.254.0.1 for the inertial product and 169.254.0.2 for the PC (Subnet 255.255.0.0)
- Or 192.168.1.10 for the inertial product and 192,168.1.11 for the PC (Subnet 255.255.255.0)

IP address options

Inserting the inertial product into the network mainly depends on the configuration of the local private network.

The system integrator can have:

- Either set DHCP=ON, so that the inertial product will acquire IP address information from the local DHCP Server/Router. No setting of IP address will be required.
- Or set DHCP=OFF, and the user will need to specify an address for the inertial product, which is taken from the same subset of the local private network.

Rovins DHCP Option

Most routers sold today do come along with DHCP functionality. This allows the router to automatically assign unused IP addresses to all devices connected to the network.

- If the network where the inertial product is inserted is DHCP enabled, you may use this option for the setup.
- If the network is not DHCP enabled, you will need to specify an address for the inertial product, which is taken from the same subset of the local private network.

Refer to section 4.3 to configure DHCP functionality.

B.1.2 Retrieving the IP address of Rovins

If you do not know theRovins IP address or if you want to know which IP address was attributed by the DHCP server, connect the repeater cable to your PC and start a serial terminal (HyperTerminal, BBTALK, etc.) configured at 19200 baud, no parity, 1 stop bit, 8 data bits. Reboot the inertial product once connected. You will get the Rovins boot sequence message that contains its attributed IP address (line beginning with “IFCONF”):

Image QNX iXSea vXXX
Welcome to eOCTANS
DRV : 0 00198C000199
WAIT_EN : 0
IFCONF 1 : 0 **192.168.36.199**
IF_UP 1 : 0
IDEQNX3 : 0
FIN ---

B.1.3 TESTING THE CONNECTION

Checking the Connection with a Ping Command

The ping command is a computer network utility used to test whether a particular host is reachable across an Internet Protocol network and to measure the round-trip time for packets sent from the local host to a destination system, including the local host own interfaces.

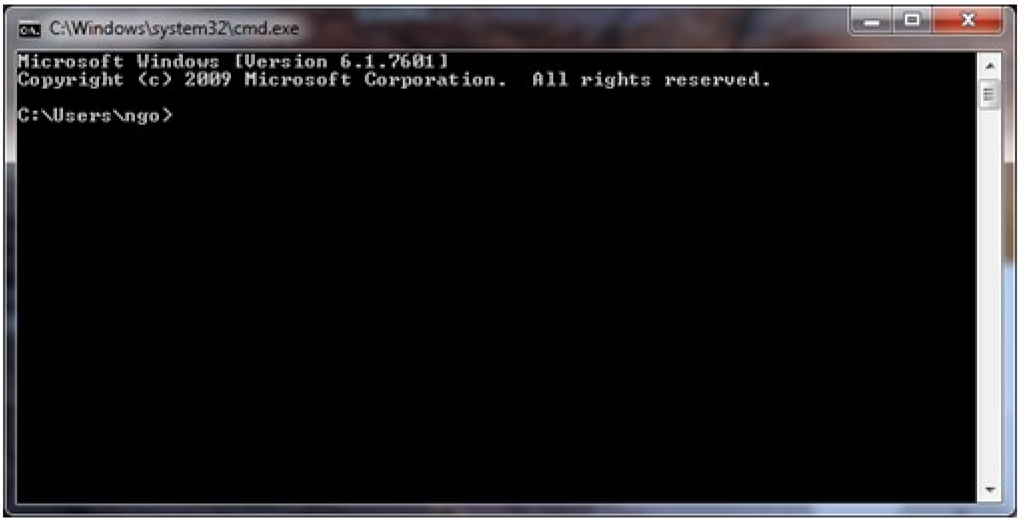
You need to know the IP address of Rovins to perform the procedure:

- The default IP address is 192.168.36.1xx, xx being the two last digits of the serial number of your unit.
- See section B.1.2 to retrieve a lost IP address.

1. Open the command window:

- From Windows 7: from Start menu, type in cmd in the search box then press [Enter].
- From other Operating systems: from Start menu, choose execute then type in cmd and press [Enter].

The command window opens:

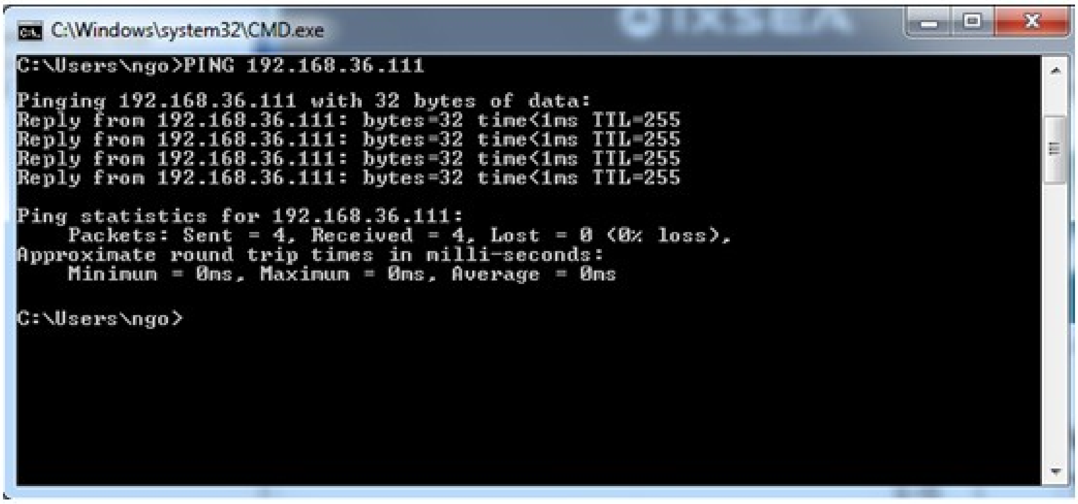


2. In the command window, type in:

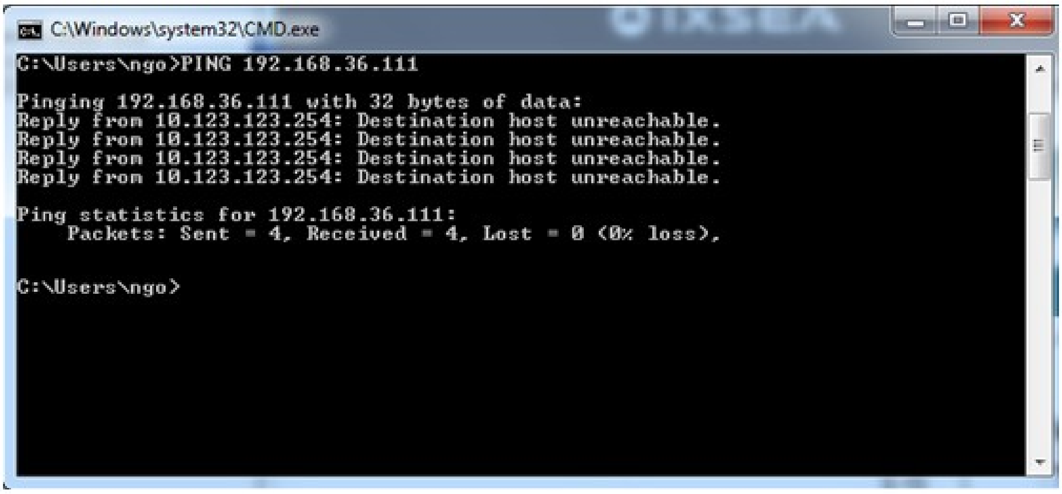
```
PING yyy.yyy.yyy.yyy
```

replacing yyy.yyy.yyy.yyy by the IP address of your inertial system unit.

The successful command reply is looking like the following: here it is the example for the IP address 192.168.36.111



The unsuccessful command reply is looking like the following: here it is the example for the IP address 192.168.36.111



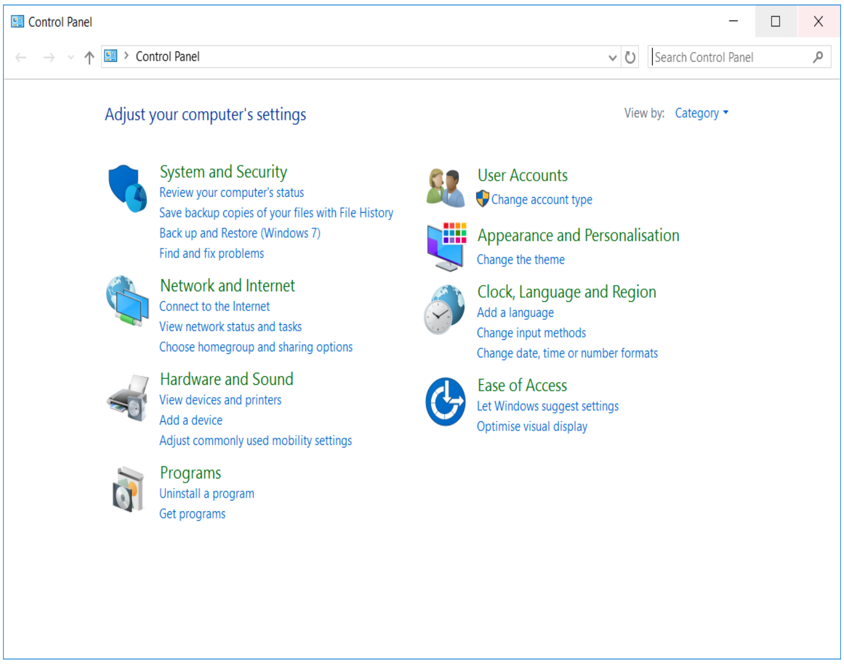
If you could not reach your inertial system using the ping command, you have to check the setting of your computer (see section 1), the issue may be on your side due to wrong settings of your PC.

Reading the Data Flow with a Telnet Command

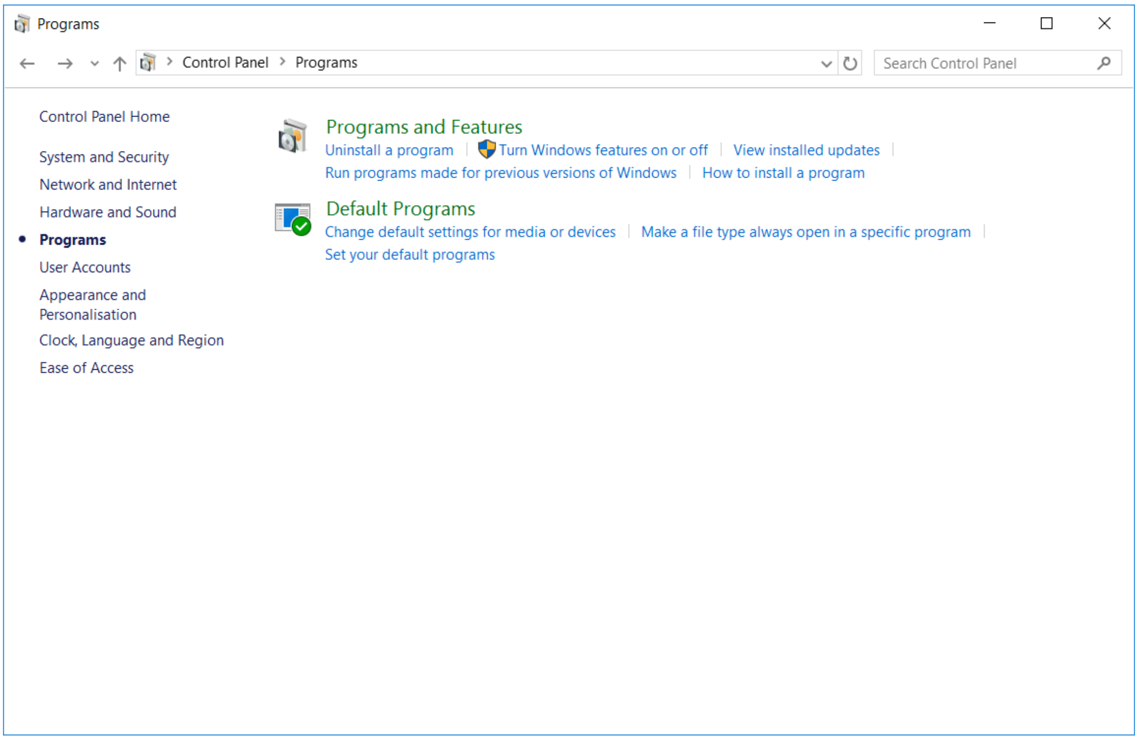
You can check the Rovins data flow using a Telnet command.
For Windows 7 Operating Systems, you need to activate the telnet command before using it:

1. Open the Control Panel (**Start** menu, **Control Panel** option)

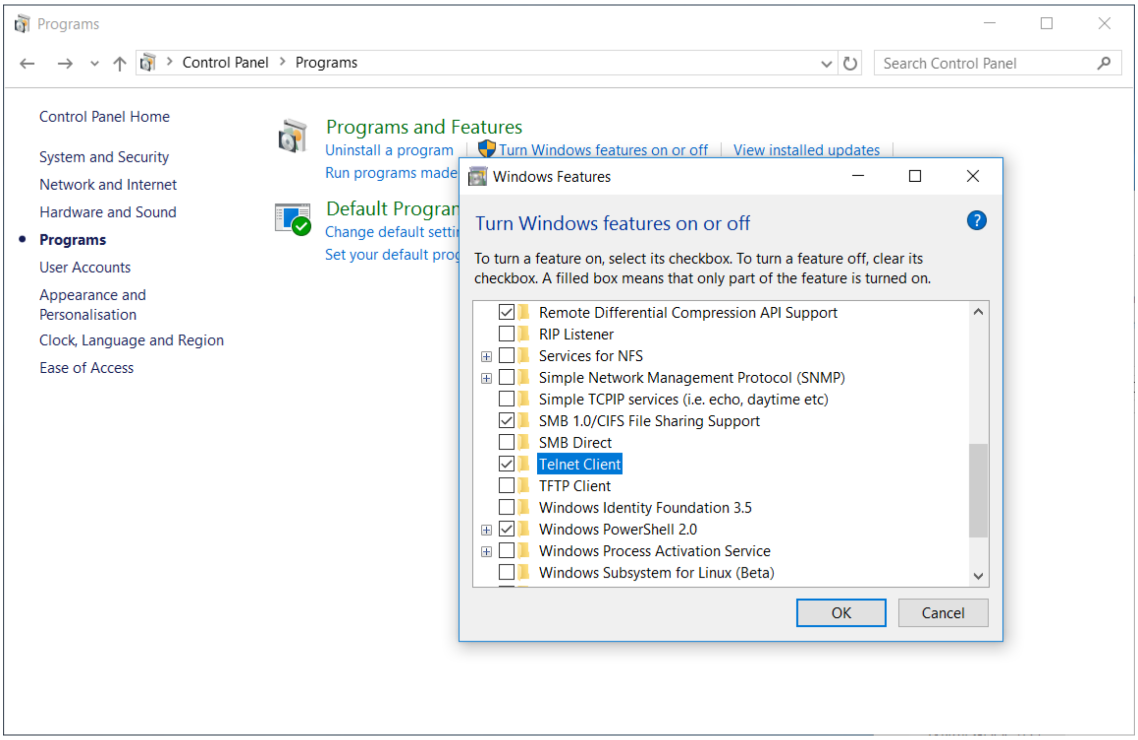
The Control Panel opens:



2. Click **Programs** then under **Programs and Features** menu, choose **Turn Windows features on or off** option:



3. In the Windows Features window that displays select **Telnet Client** by clicking in the associated tick box then click **OK**.



4. Close the Control Panel.

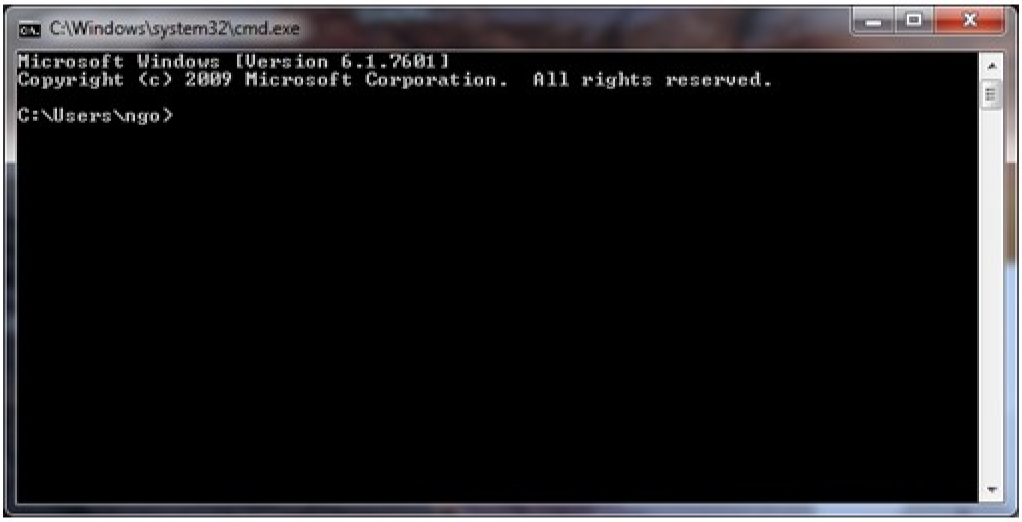
Launching the Telnet command

You need to know the IP address of Rovins to perform the procedure:

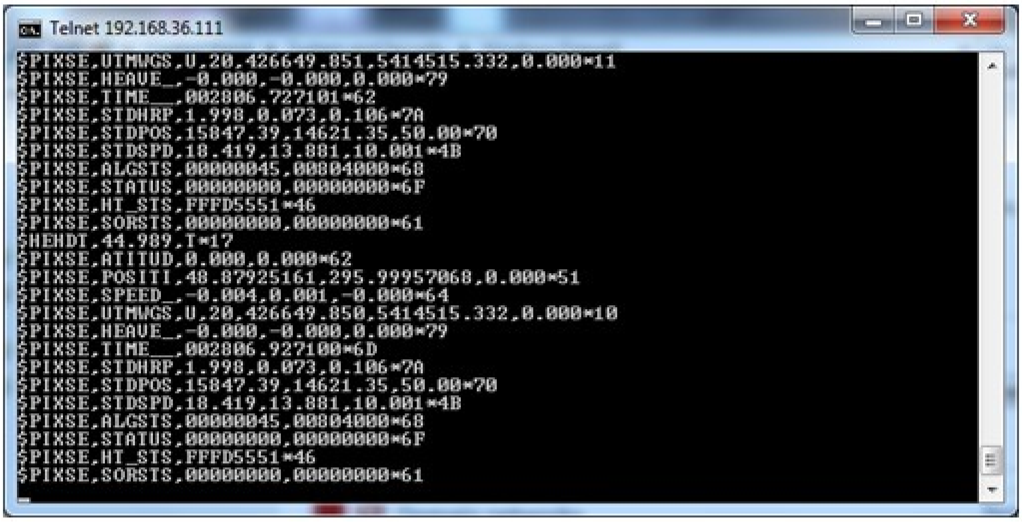
- The default IP address is 192.168.36.1xx, xx being the two last digits of the serial number of your unit.
- See section B.1.2 to retrieve a lost IP address.

1. Open the command window:
   - From Windows 7 or Vista: from **Start** menu, type in `cmd` in the search box then press **[Enter]**.
   - From other Operating system: from **Start** menu, choose execute then type in `cmd` and press **[Enter].**

The command window opens:



2. In the command window, type in:
`TELNET yyy.yyy.yyy.yyy 8110`
Replacing `yyy.yyy.yyy.yyy` by the IP address of Rovins.
The successful command reply is looking like the following: here it is the example of a product with the IP address 192.168.36.111.



B.2 Setting up the Rovins Data Connection

The Rovins features several data outputs/inputs. All these inputs and outputs can be accessed via one single Ethernet cable.
To differentiate between the individual inputs and outputs within the Ethernet connection, the data is transmitted using different port numbers. Each port number used will be represented by one socket port.

B.2.1 TRANSPORT MODES

There are four transport modes available, namely:

- **TCP Server:**
  - Protocol used: TCP.
  - Address specified: N.A.
  - This requires a client to establish the connection to the inertial product.
    The address for the client to access the inertial product is the same address used in the repeater port.
- **TCP Client:**
  - Protocol used: TCP.
  - Address specified: address of the server that receives the data.
  - Rovins will establish the connection to the server.
- **UDP:**
  - Protocol used: UDP.
  - Address specified: address of terminal that receives the data.
  - The specific terminal will need to listen for the data from Rovins. Other terminals in the network will not be able to receive this data through normal means.
- **UDP Broadcast:**
  - Protocol used: UDP.
  - Address specified: broadcast address is limited to subnet mask. For example, if the subnet mask is 255.255.0.0 and system IP is 192.168.36.3, the broadcast address will be 192.168.255.255
  - All connected terminals will be able to receive the same data simultaneously by opening the same port to listen for the data.
- **UDP Multicast:**
  - Protocol used: UDP.
  - Address specified: multicast subscription group that receives the data
  - Equipment that needs to receive the output flow will have to subscribe to the same UDP multicast address and port. Multicast transmission method allows sending the same information to several different targets without broadcasting it to the entire network, thus saving network bandwidth.

For the Ethernet version of the Repeater port, the Graphical User Interface uses TCP Client as default transport mode to access to Rovins. This setting cannot be changed. This means there can be only one terminal connected to the Rovins repeater port.

B.2.2 Port Numbers

In computer applications, port numbers are used to identify how data come from the process that produces the data, to the end process which receives the data.
Rovins uses port numbers to separate data from each port so that data that come from the IP address can be differentiated.

You can select any number above 1024 as port numbers.
Port number for repeater port is fixed at 8110.
By default, the 8111 to 8120 are used for outputs and inputs of Rovins.

Important

To prevent conflicts with other systems or applications, it is important that no identical numbers are used and that reserved ports are not used.

B.2.3 Configuring a Port with the TCP Transport Modes

The following parameters and their values will be needed to configure the port:

- Transport: TCP Server or TCP Client
- Port: any 4-digit number you want that is above 1024 (e.g. 8111)

The selected port number must be the same as the one used on the server or client.
The choice between Server and Client depends on the configuration of the whole system. Whether Rovins establishes the connection or the server is the one that establishes the connection.

B.2.4 Configuring a Port with the UDP Transport Modes

iXblue recommends to set up input and output on different port numbers.

Unlike TCP which requires TCP clients to establish a connection/handshake with the server before data is streamed, UDP packets will be streamed onto the network once the inertial product is powered ON. This means that the data transmission is unsecured and the server does not guarantee the data packets are received in order/sequence at the client side.
There will be instances where packets are dropped. Such instances mainly depend on the integrity of the network. Fortunately, UDP still ensures that the data received is same as it is transmitted.
However, UDP has its advantages.
UDP is faster, throughput is better than TCP due to smaller packet headers used.
Selecting **UDP Broadcast** option under Transport field, Rovins will stream data onto the network. This means everyone connected to that network will be able to receive the data, in other words for the same output port number, more than one computer will be able to receive the same data.
Configuring for a UDP connection is similar to configure a TCP connection. The only difference will be to select **UDP** or **UDP Broadcast** under **Transport** option.

B.3 Connecting Rovins directly to a PC/laptop by serial link

Equipment required

- 1 x PC or Laptop (with an unused Serial port)
- 1 x test Serial Cable (provided)
- 1 x Cat 3/Cat 5 Cross Ethernet Cable (for changing the inertial product IP address) (With new PC Generation, it is possible to use a straight cable. The PC then manages the pin inversion)

Approach

The connection between Rovins and the PC is made through a serial link. Rovins works as a PPP Server that provides the ability to transport TCP/IP traffic over the serial link.

Rovins Configuration

Rovins is already assigned with an IP address. Before connecting the serial link, you need to activate the PPP mode using an Ethernet link and the Web-Based Graphical User Interface .

When PPP mode is activated, Rovins will start a PPP server listening on repeater serial port at next reboot.

In this configuration, the Rovins IP address over PPP will be automatically set to 192.168.36.201 and the PC will connect as a PPP client to Rovins using a dial-up connection.

Thus, to connect to the Rovins Web pages in PPP mode, open http://192.168.36.201 on your browser after that the PC/Rovins connection is established. Note that in this mode, first page loading can take several minutes.

B.3.1 Access to Network Connection Window

Access to **Network Connections Window:**

- **Either** locate the icon “My Network Places” on the desktop screen of the PC, right-click on the icon then select Properties
- **Or** if you cannot locate this icon, you can still proceed by selecting Start menu > Connect > Show all connections.
- **Alternatively**, if you are using the Classic Start Menu, select Start menu > Settings > Control Panel, then double click on the icon Network Connections.
- **For Windows Vista**: Open Network Connections by clicking the Start button, and then clicking Control Panel. In the search box, type adapter, and then, under Network and Sharing Centre, click View network connections.
- **For Windows 7**: Open Network Connections by clicking the Start button, clicking Control Panel, clicking Network and Internet, clicking Network and Sharing Centre, and then clicking Manage network connections.

B.3.2 Creating a direct connection between Rovins and your PC

1. Connect Rovins to your PC using the provided test cable.
2. Access to **Network Connections** Window.
3. On the left panel of the **Network Connections** window, click on **Create a New connection**. *The New Connection wizard opens.*
4. Read the Welcome page then click **Next**. *The Connection Type Selection appears.*
5. Select **Set up an advanced connection** then click **Next**. *The Advanced Connection Options page appears.*
6. Choose **Connect directly to another computer** then click **Next**. *The Host or Guest? page appears.*
7. Choose **Guest** then click **Next**.
   The Connection Name page appears.
8. In the **Computer name** box, type a name for the connection.
   On the Select a Device page, select a **Communications Port**, and then click **Next**.
9. If you want this connection to be made available to all users of this computer, on the **Connection Availability** page, click **Anyone's use** and then click **Next**.
10. If you want to reserve the connection for yourself, select **My use only**, and then click **Next**. *The Completing the New Connection Wizard page appears.*
11. Click **Finish**.
12. Once created, right-click on the new connection name created and choose **Properties…** *The Properties window of the new connection appears.*
13. Under **General tab**, click **Configure** button. The Modem Configuration window opens, set the **Maximum speed (bps) to 57 600** and unselect '**Enable hardware flow control**' option then click **OK**.
14. Under **Options tab**, unselect '**Prompt for name and password, certificate, etc**.' option and click **OK**.
15. Click **OK** in the Properties window.

B.3.3 Activating the New Connection

1. Access to **Network Connections** Window. Refer to Appendix B.3.1
2. In the **Network Connections** window, activate the new connection by **double-clicking on its name**.

B.3.4 CREATING A SERIAL DIRECT CONNECTION UNDER WINDOWS 7

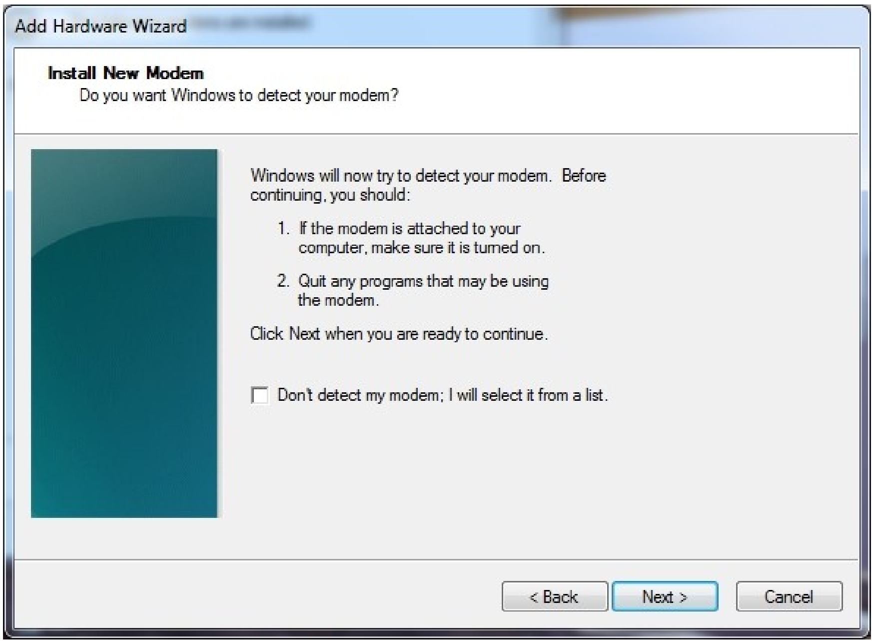
Installing a New Modem

1. Open the Control Panel.

Click on Phone and Modem icon. *The Local Information window opens.*
You don't need to fill in the form, click **OK**.
The Phone and Modem window opens.

2. Choose the **Modems** tab.

3. Click on **Add...** button.
The Add Hardware Wizard window is displayed.



4. Select **Don't detect my modem; I will select it from a list**. option then click **Next**.

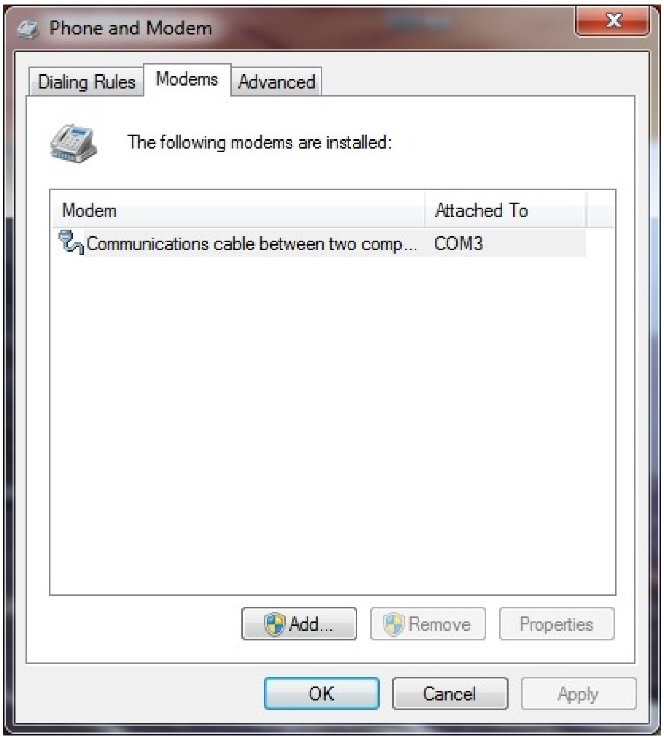
5. Under **Models list**, select **Communication cable between two computers option.**

6. Click **Next**.

7. Choose **Selected ports**. *The available list of ports displays.*

8. Choose the port which is connected to Rovins then click **Next**.
The message "Your modem has been set up successfully" displays.
Click **Finish**.

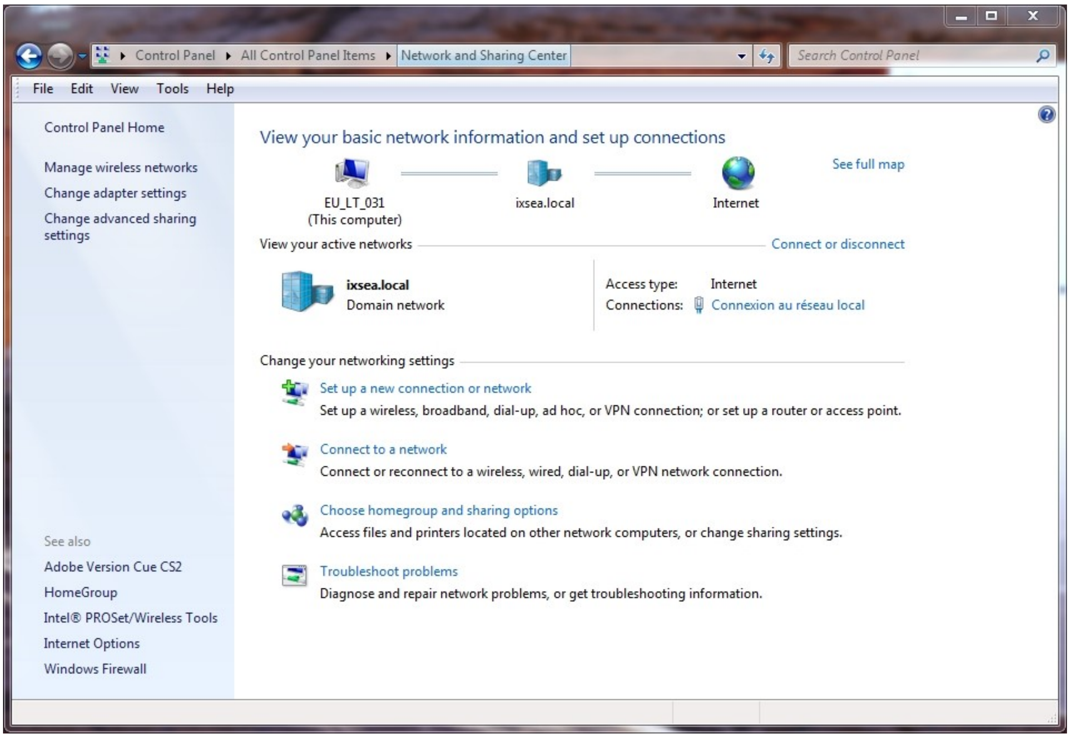
9. This new modem appears now in the Phone and Modem window:



10. Click on OK button.

Configuring the Connection

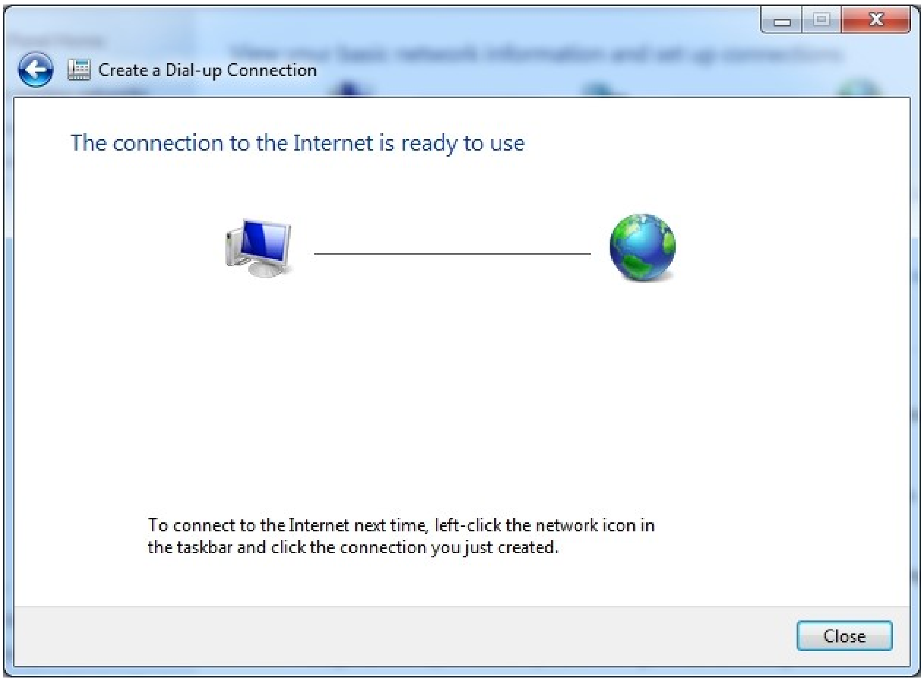
1. Open the Control Panel then click on Network and Sharing Centre icon.



2. Click on **Set up a new connection or network** text label.
   The window Set up a Connection or Network opens.
   Choose **Set up a dial-up connection** option then click **Next**.
   The window Create a Dial-up Connection opens.

3. Except for the Connection name field, the values you enter in this window are not important. For example, we have entered INS PPP for the Connection name

4. Then click **Connect**.
   The connection fail, click on **Set-up connection** anyway and the following window displays next page.



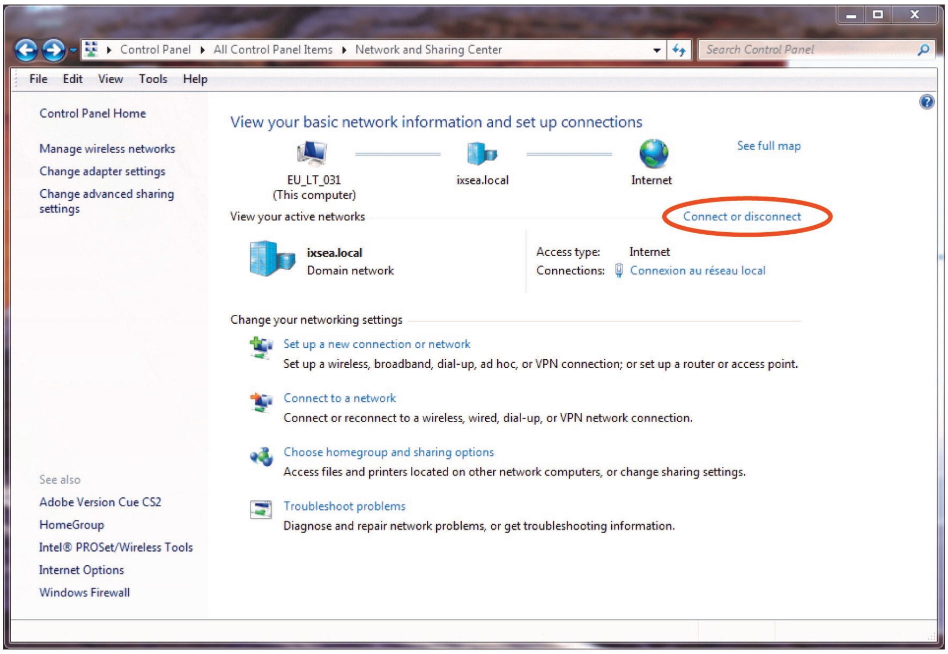
5. Click on the Close button.

6. To configure the settings of the serial port:

- Change the properties of the `rasphone.pbk` file which is under `C:\ProgramData\Microsoft\Network\Connections\Pbk` to enable modifications inside.
- Using Notepad for example, edit the `rasphone.pbk` file. And change the initial values of some parameters to obtain the following configuration:
  `Type=4`
  `MEDIA=serial`
  `Port=COM3` (if the connection coming from the inertial Product enters from the COM3 of your computer)
  `Device= Communications cable between two computers`
  `ConnectBPS=57600`
- Save the `rasphone.pbk` file.

7. To establish the connection:

- Either double click on the `rasphone.pbk` file.
- Or in the Control Panel/Network and Sharing Centre, click on **Connect** or disconnect text label.



8. Then double-click on **INS PPP**.

The connection establishes.

B.3.5 Rovins Configuration

Important

To launch the Web-based User Interface through a direct serial link:

- The PPP mode must have been activated
- A direct connection must have been created.

Before connecting the serial link, you need to activate the PPP (Point to Point Protocol) mode using an Ethernet link and the Web-based User Interface:

1. In the Web-Based Graphical User Interface, click on the Installation menu then select the Network option.

2. Under **PPP Server area** for using the repeater with PPP server.
   - **Enabled** to launch the Web-Based Graphical User Interface via the serial link. When the check box Enabled is selected, the product will start a PPP server listening on repeater serial port at next reboot. When this option is disabled (default), the repeater port outputs PHINS STANDARD protocol.
   - **Standard**: to choose between an RS232 or RS422 serial link
   - **INS IP Address**: by default it is 192.168.100.201
   - **PC IP Address**: by default it is 192.168.100.202
     The PC IP address is used in case of the PC is connected to two different inertial units. In this case there must be a different IP on the PC for each PPP interface.
     For example:
     192.168.200.1 on the PC PPP link 1 and 192.168.200.2 on the first Rovins
     192.168.200.3 on the PC PPP link 2 and 192.168.200.4 on the second Rovins connected to the PC.

When PPP mode is activated, the Rovins will start a PPP server listening on repeater serial port at next reboot.
In this configuration, the Rovins IP address over PPP will be automatically set to 192.168.36.201 and the PC will connect as a PPP client to the product using dialup connection. Thus, to connect to the Rovins web pages in PPP mode, open http://192.168.36.201 on your browser after that the PC/product connection is established. Note that in this mode, first page loading can take several minutes.

C Enabling the Simulation Mode

When the simulation mode is enabled, all DSP computed data from the interface board is ignored and replaced by simulated values.
Each simulated value is directly entered under the SIMULATION PARAMETERS area. Thus the Web-Based Graphical User Interface and all output protocols will output simulated values instead of live ones.

Important

The simulation mode can be used during customer protocol debug and to check installation repeaters on ship.

Simulated parameters

The list below details all parameters that can be simulated (refer to Table 1 to know the range and step value of each simulated parameter):

- Heading, roll and pitch and associated standard deviations
- Main lever arm position and associated standard deviations
- Linear speeds and associated standard deviations
- Heave, surge and sway
- Rotation rates
- Accelerations
- Accelerations in body frame
- Sensor and algorithm statuses

A simulated sensor status (default to 0) will allow dummy system (without FOG and ACC) to run without having sensor error flags raised in the Web-Based Graphical User Interface.
The system outputs heading, roll and pitch and linear speeds as configured sinus signal, defined by the following equation:

Value(t)=Mean+((Amplitude peak-peak)/2)*sin(2* *t/Period)

Where Mean, Amplitude peak-peak and Period are to be entered in the simulation page.

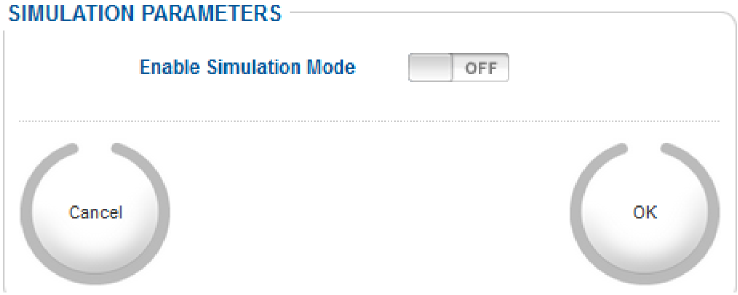
Table 1 - List of product parameters in simulation mode

Rovins Output Parameters	Name and location in simulation page	Range	Step
Heading(3)			
Mean value	Heading / Mean (°)	0 to 360	0.001
Period	Heading / Period (s)	0 to 100	0.001
Amplitude	Heading / Amplitude (°)	0 to 360	0.001
Attitude: Roll			
Mean value	Attitude / Roll / Mean (°)	-180 to +180	0.001
Period	Attitude / Roll / Period (s)	0 to 100	0.001
Amplitude	Attitude / Roll / Amplitude (°)	-180 to +180	0.001
Attitude: Pitch			
Mean value	Attitude / Pitch / Mean (°)	-90 to 90	0.001
Period	Attitude / Pitch / Period (s)	0 to 100	0.001
Amplitude	Attitude / Pitch / Amplitude (°)	-90 to 90	0.001
Heading and Attitude Standard Deviation			
Heading	Attitude Std. Dev./ Heading Std. Dev. (°)	0.01 to 5	0.01
Roll	Attitude Std. Dev./ Roll Std. Dev. (°)	0.01 to 5	0.01
Pitch	Attitude Std. Dev./ / Pitch Std. Dev. (°)	0.01 to 5	0.01
Position			
LATITUDE	Position / Latitude (°)	-90 to 90	0.000001
LONGITUDE	Position / Longitude (°)	0 to 360	0.000001
ALTITUDE	Position / Altitude (m)	-15000 to 15000	0.001
Position Standard Deviation			
LATITUDE STD	Position Std. Dev. / Latitude Std. Dev. (m)	0.01 to 500	0.01
LONGITUDE STD	Position Std. Dev. / Latitude Std. Dev. (m)	0.01 to 500	0.01
ALTITUDE STD	Position Std. Dev. / Altitude Std. Dev. (m)	0.01 to 500	0.01
Linear Speeds: North XV1 (2) Linear speed / XV1 -250 to 250 0.01			
Mean	Linear speed / XV1 / Mean (m/s)	-250 to 250	0.01
Period	Linear speed / XV1 / Period (s)	0 to 100	0.01
Amplitude	Linear speed / XV1 / Amplitude (m/s)	-250 to 250	0.01
Linear speed: East XV2 (2)			
Mean	Linear speed / XV2 / Mean (m/s)	-250 to 250	0.01
Period	Linear speed / XV2 / Period (s)	0 to 100	0.01

Rovins Output Parameters	Name and location in simulation page	Range	Step
Amplitude	Linear speed / XV2 / Amplitude (m/s)	-250 to 250	0.01
Linear speed: Vertical XV3 (2)			
Mean value	Linear speed / XV3 / Mean (m/s)	-250 to 250	0.01
Period	Linear speed / XV3 / Period (s)	0 to 100	0.01
Amplitude	Linear speed / XV3 / Amplitude (m/s)	-250 to 250	0.01
Heave, Surge and Sway			
SURGE	Heave, Surge, Sway / Surge (m)	-10 to 10	0.01
SWAY	Heave, Surge, Sway / Sway (m)	-10 to 10	0.01
HEAVE	Heave, Surge, Sway / Heave (m)	-10 to 10	0.01
Accelerations			
North XV1	Acceleration / XV1 or North Acceleration (m/s^2)	-300 to 300	0.01
East XV2	Acceleration / XV2 or East Acceleration (m/s^2)	-300 to 300	0.01
Vertical XV3	Acceleration / XV3 or Vertical Acceleration (m/s^2)	-300 to 300	0.01
Rotation Rates			
Roll XV1 (1)	Rotation rates / Roll rate (°/s)	-750 to 750	0.001
Pitch XV2 (1)	Rotation rates / Pitch rate (°/s)	-750 to 750	0.001
Heading XV3 (1)	Rotation rates / Heading rate (°/s)	-750 to 750	0.001
Sensor status			
FOG Error	N/A	N/A	N/A
ACC Error	N/A	N/A	N/A
Source Error	N/A	N/A	N/A
Temperature Error	N/A	N/A	N/A
Degraded Mode	N/A	N/A	N/A
Failure Mode	N/A	N/A	N/A
Algo Status			
Static Alignement	N/A	N/A	N/A
Navigation	N/A	N/A	N/A
Altitude Saturation	N/A	N/A	N/A
Speed Saturation	N/A	N/A	N/A

(1) Rotation rate inputs of the simulation page will be used as both Heading Roll Pitch rates and body rotation rates to limit the number of inputs in the page.
(2) Linear speed inputs of the simulation page will be used as geographical speeds, body speeds and heave, surge and sway speeds to limit the number of inputs in the page.
(3) True course value will be assigned the input heading value

1. Click on the **SETUP** menu then select the **SIMULATION MODE** option. The following page is displayed:



2. In the **SIMULATION PARAMETERS** area, click on the **Enable Simulation mode** switch until displaying **ON**. Then the page is displayed completely with all the parameters.

3. **Enter and/or notch the parameters** to be simulated.

4. Click on the **OK** button to save the settings. The message “simulation mode” is displayed in the Status area of the control page to warn that the system output data is not lived.

To disable the simulation mode, unselect the Enable Simulation Mode option then click OK. The protocol outputs the real data and the interface too.