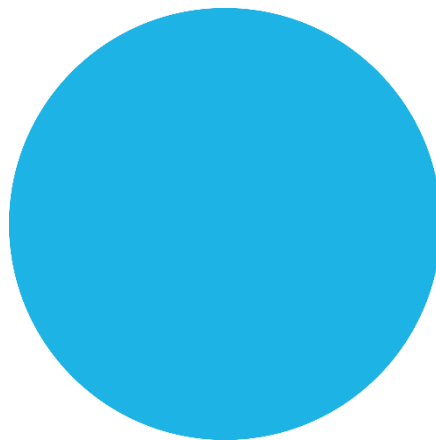




Phins Subsea
Navigating & Positioning
QUICK START GUIDE

Objective

This guide describes the Phins Subsea installation and the basic configuration required before operating the product. For more information, please refer to the flash drive available in the product package. It contains:

- the required software for the use of the embedded web-based user interface
- the full user manuals to get detailed technical information about the product, including product specifications/performances. These documents will help you configuring and operating the product in specific installation or application.

Contents

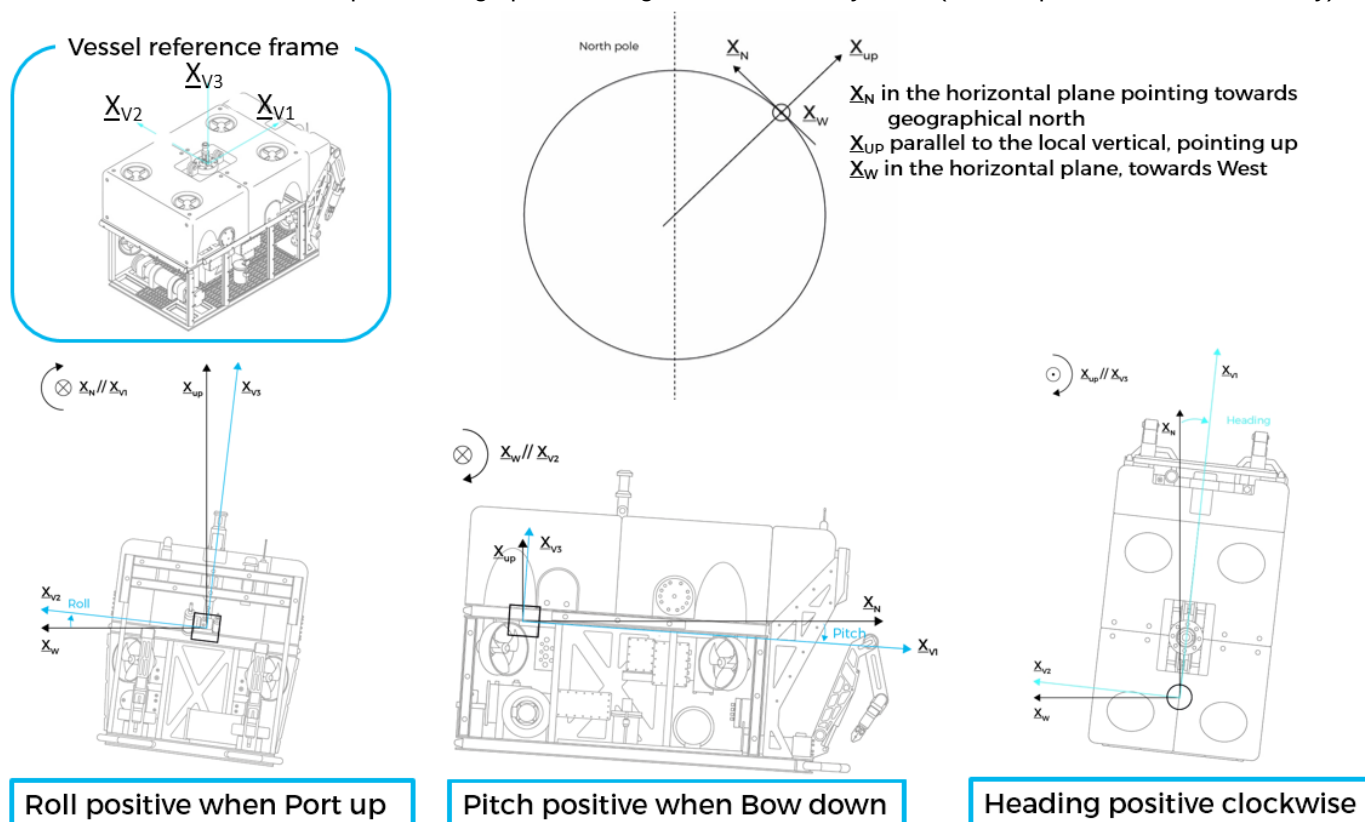
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Phins Subsea System Overview

The Phins Subsea system is an Inertial Navigation System (INS). It delivers heading and attitude information as well as position and speed to control systems, acquisition software or other third party systems. It can receive data from external sensors to improve its accuracy. Phins Subsea contains a self-consistent navigation algorithm based on Kalman Filtering. This structure enables Phins Subsea to work either as a standalone system or to be connected to external sensors (GNSS, Doppler Velocity Log, Depth sensor, acoustic positioning systems etc.). Phins Subsea is delivered with a powerful and easy-to-use embedded Web-Based User Interface, which allows you to configure and operate your product.

Basic Installation: Phins Subsea + DVL + Depth (+acoustic)

This guide describes how to install Phins Subsea with a DVL and/or DEPTH, and the typical configuration required before operating the product. Phins Subsea being versatile, you have to define its configuration to insure optimal operation. **In this installation, we assume that Phins Subsea is aligned with respect to the vessel reference frame** (XV1, XV2, XV3). Angular convention and reference frame used by Phins Subsea are detailed in the figure below. Note that on some output message/protocol, sign convention may differ (refer to product Interface Library).



Pack Contents 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 receipt**. Specifically, you should check that at least all the items shown below are present upon delivery and that none have sustained damage.

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.

Phins Subsea



Power supply block



AC cord cable



SEACON 12 pin
Ti C/D/E Pigtail



SEACON 19 pin
Ti Ethernet Pigtail



SEACON 26 pin
Ti A/B Central Pigtail



19 pin Test Ethernet Cable



SEACON 26 pin
Pressure Cap



SEACON 12/19 pin
Pressure Cap



O-Ring kit



O-Ring insertion Tool
for SEACON 12/19 pin



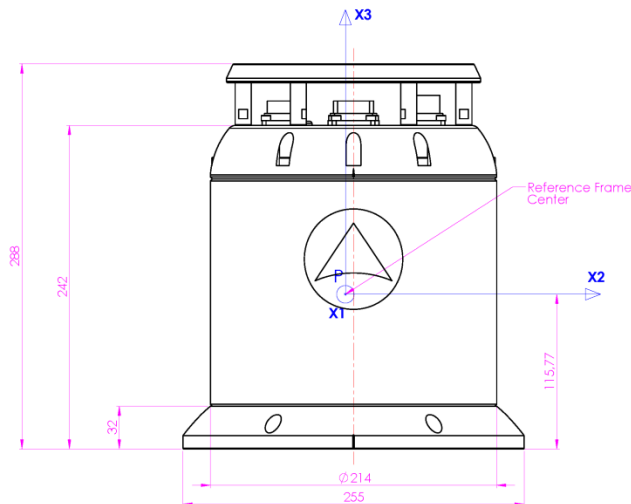
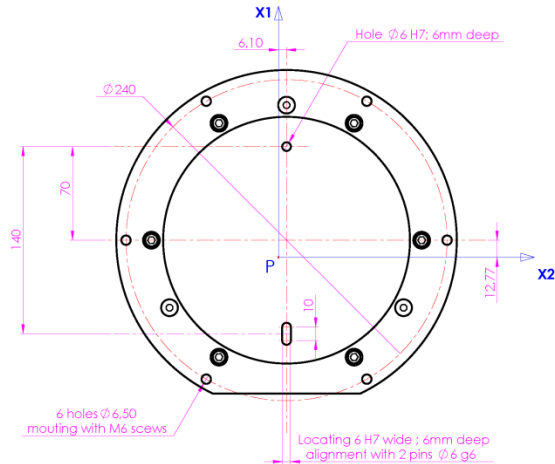
O-Ring insertion Tool
for SEACON 26 pin



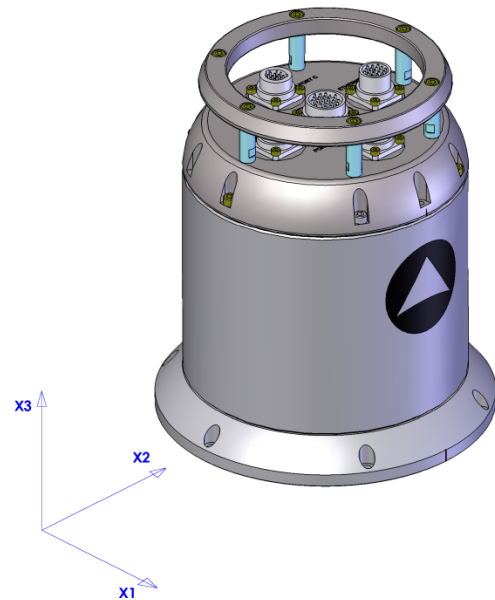
Installing and Connecting Phins Subsea

Step 1 Placing the Phins Subsea on the mounting plate/surface

Phins Subsea has to be aligned either with ROV reference frame either with imagery survey sensor. Reference frame center is defined by (P) and shown in the figure below, it is not located at the center of the unit. **iXblue product reference frame may differ from 3rd party equipment convention.**

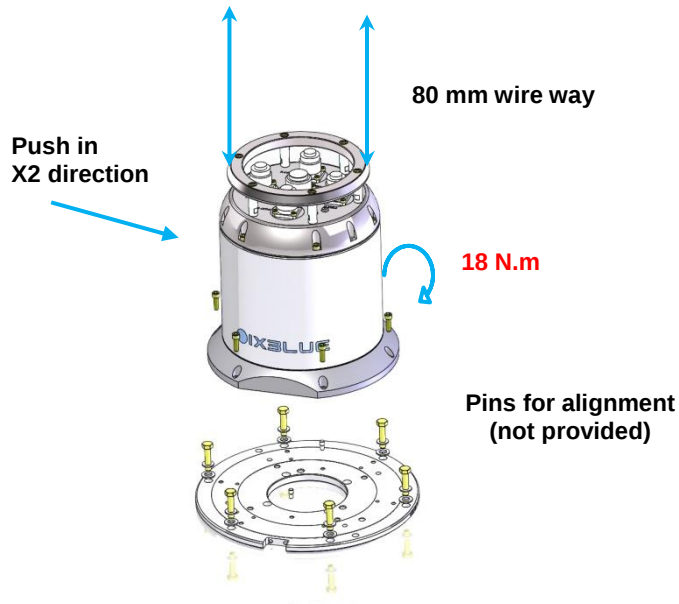


The unit has to be fixed on a strong and very stable place.



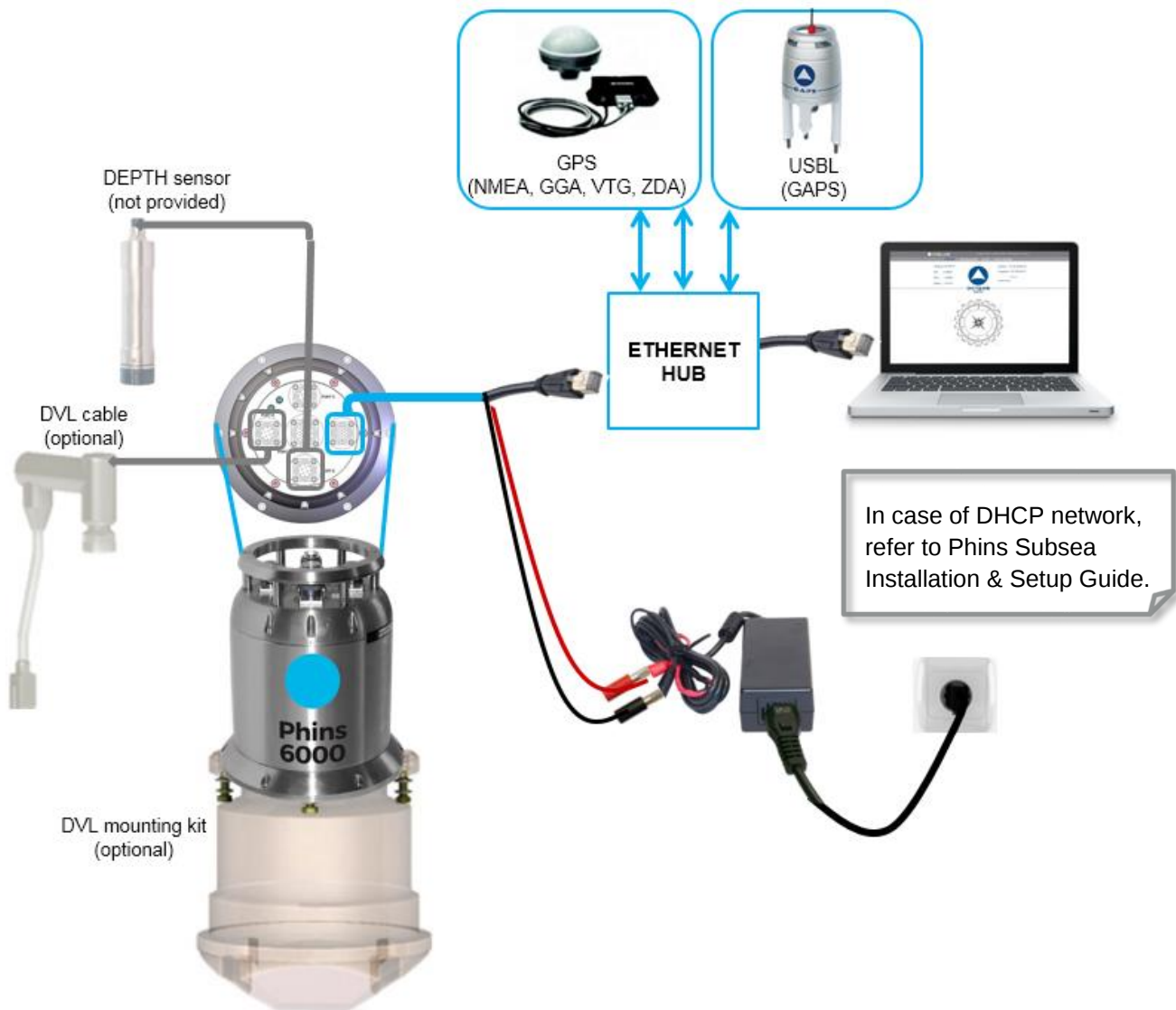
Step 2 Fixing Phins Subsea with 8 screws (not part of standard delivery)

In case of installation with alignment pins (e.g. with DVL) it is recommended pushing Phins Subsea against the pins in X2 direction while securing the screws to insure best mounting repeatability.



For mechanical installation recommendations refer to the Phins Subsea Installation and Setup Guide.

Step 3 Connecting Phins Subsea



Caution

At any power supply outage, Phins Subsea restarts its full alignment process. It is then recommended to use an Uninterruptible Power Supply.

Launching the Web-Based Graphical User Interface

Step 1 Checking the version of the required software available on the flash drive

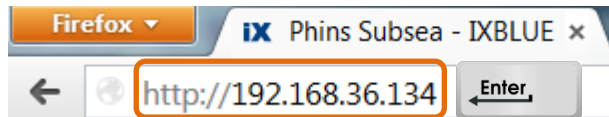


Firefox



Java Environment

Step 2 Launching the web-based user interface with Firefox



The control page is displayed with the compass.



Factory default TCP/IP address

- Note the two last numbers of the Phins Subsea serial number from product label ID.
- Type the following URL address:
192.168.36.1xx
xx is the two last numbers of the Phins Subsea serial number.
For example: in the screen capture the two last numbers of the Phins Subsea is 34 and the URL address is:

192.168.36.134
- To change this URL address, refer to Phins Subsea Installation & Setup Guide.

Configuring the Language and the Display Options

IXBLUE navigation data | events viewer | maintenance | **options**

CONTROL | INSTALLATION | SETUP

MMI DISPLAY OPTIONS

▼ General

Language **English**

Mode **Day**

▼ Coordinates

System **Latitude/Longitude**

Notation **Degrees, Decimal Minutes**

▼ Units

Speed **Meter per second (m/s)**

Angle **Degree (°)**

▼ Norms

Position Std. Dev. **RMS**

▼ Attitude Conventions

Roll Sign **Positive Port Up**

Pitch Sign **Positive Bow Down**

Cancel

OK

Configuring the Mechanical Parameters

IX3BLUE navigation data | events viewer | maintenance | options

CONTROL | **INSTALLATION** | SETUP

MECHANICAL PARAMETERS

ORIENTATION & LEVER ARMS

▼ Orientation

Product Logo Side

☐ Upward

☐ Downward

☐ Right

☐ Left

☒ **Front**

☐ Back

Connectors Side

☒ Upward

☐ Downward

☐ Right

☐ Left

☐ Front

☐ Back

▼ Misalignments

Roll 4.7

Pitch 1.4

Heading 0.1

► Primary Lever Arm

► Secondary Lever Arms

► Vessel Center of Gravity (Heave computation)

Cancel OK

ORIENTATION & LEVER ARMS

Settings have been saved.
Please restart the system to take them into account.

Restart

The orientation menu is used when the product axes orientation differs from vehicle axes orientation (displayed in red). It allows to change axes orientation with 90 degrees rotations of any of the product axis with respect to the vehicle axes.

1. Define simply the orientation by indicating:
 - The direction to which the **Product Logo Side** is pointing to.
 - The direction to which the product **connector side** is pointing to.

2. Enter the value of “misalignments” measured by the metrology survey.

Primary Lever Arm and Secondary Lever Arm allow to compute the inertial position, the heave, surge and sway at remote location.

Primary Lever Arm allows to compute speed and accelerations at remote location.

Configuring the Inputs & the Outputs

Step 1 Configuring the DVL input parameters

IX3BLUE navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | SETUP

Heading -3.4717° Latitude 54°55.889624' N

MECHANICAL PARAMETERS INPUTS

INPUT AND EXTERNAL SENSORS SETTINGS

Input Ports Input Pulses

	Input A	Input B	Input C	Input D	Input E	Input F	Input G
Protocol	NONE	NONE	NONE	NONE	NONE	NONE	NONE
GNSS 1							
GNSS 2							
DVL 1	•						
DVL 2							

INPUT A SETTINGS

Protocol RDI PD6

Physical Link Serial only

Serial

Parity None

Stopbits 1.0 bitstop

Standard RS422

Baudrate 9.6 kbauds

Lever Arms

LV1 0 m

LV2 1 m

LV3 0 m

Misalignments

DVL Coupling Mode

Advanced Settings

Cancel OK

Refer to Application note - INS + DVL Calibration:

- to configure the DVL input parameters
- to configure the lever arms
- to calibrate the DVL.

DVL calibration is required for optimum performances.

Purpose is to estimate accurately the angular misalignment and DVL scale factor.

Typical process is to navigate on surface with accurate GNSS + DVL bottom track.

Step 2 Configuring the Depth input parameters

IXBLUE navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | SETUP

Heading -3.4717° Latitude 54°55.889624' N Longitude 5°18.387097' W

INPUTS

INPUT AND EXTERNAL SENSOR SETTINGS

Input Ports Input Pulses

Protocol	Input A	Input B	Input C	Input D	Input E	Input F	Input G
GNSS 1	NONE	NONE	NONE	NONE	NONE	NONE	NONE
GNSS 2							
DVL 1	•						
DVL 2							
EM Log							
USBL 1							
USBL 2							
USBL 3							
LBL							
Depth			•				

INPUT C SETTINGS

▼ Protocol Protocol

▼ Physical Link Physical Link

▼ Serial Parity Stopbits Standard Baudrate

DEPTH SETTINGS

▼ Lever Arms

LV1 m LV2 m LV3 m

▼ Depth Depth Offset m

► Water Type Selection

► Advanced Settings

Refer to Phins Subsea Installation & Setup Guide to configure the depth input parameters.

Refer to Phins Subsea Interface Library to get information about the available protocol and formats.

Step 3 Configuring the GNSS (resp. USBL) input parameters



navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | SETUP

Heading -3.4717°

MECHANICAL PARAMETERS

Latitude 54°55.889624' N

Longitude 5°38.287023' W

INPUTS

INPUT AND EXTERNAL SENSORS SETTINGS

	Input A	Input B	Input C	Input D	Input E	Input F	Input G
Protocol	NONE	GPS	NONE	NONE	NONE	NONE	NONE
GNSS 1							
GNSS 2							
GNSS 3							

• INPUT B SETTINGS

▼ Protocol

Protocol

▼ Physical Link

Physical Link

▼ Serial

Parity

Stopbits

Standard

Baudrate

• GNSS SETTINGS

▼ Lever Arms

Diagram showing lever arms LV1, LV2, and LV3 with measurements in meters (m).

LV1: 1 m

LV2: 2 m

LV3: 3 m

▼ Advanced Settings

Forced Mode ☐

Cancel

OK

- For example, parameters of the inputs for the GNSS:
Protocol: **GPS**
Physical link: **Ethernet only**
Transport layer: **TCP client**
(if the GNSS is acting as a TCP server)
IP: **IP address of GPS receiver**
Port: use the same port ID on the both side (GNSS & PMINS)
- The GNSS **lever arms** corresponds to the lever arm from the product center of measurements to the GNSS antenna.
Note that **X** on the drawing gives its rough location not the real scale.

Step 4 Configuring the UTC input parameters

IX3BLUE navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | SETUP

Heading -3.4717° Latitude 54°55.889624' N

MECHANICAL PARAMETERS INPUTS

INPUT AND EXTERNAL SENSOR SETTINGS

Input Ports Input Pulses

Protocol	Input A	Input B	Input C	Input D	Input E	Input F	Input G
GNSS 1	NONE	NONE	NONE	NONE	NONE	NONE	NONE
GNSS 2							
DVL 1							
DVL 2							
EM Log							
USBL 1							
USBL 2							
USBL 3							
LBL							
Depth							
CTD							
UTC 1							
UTC 2							

UTC 1 SETTINGS

▼ Pulse and Protocol

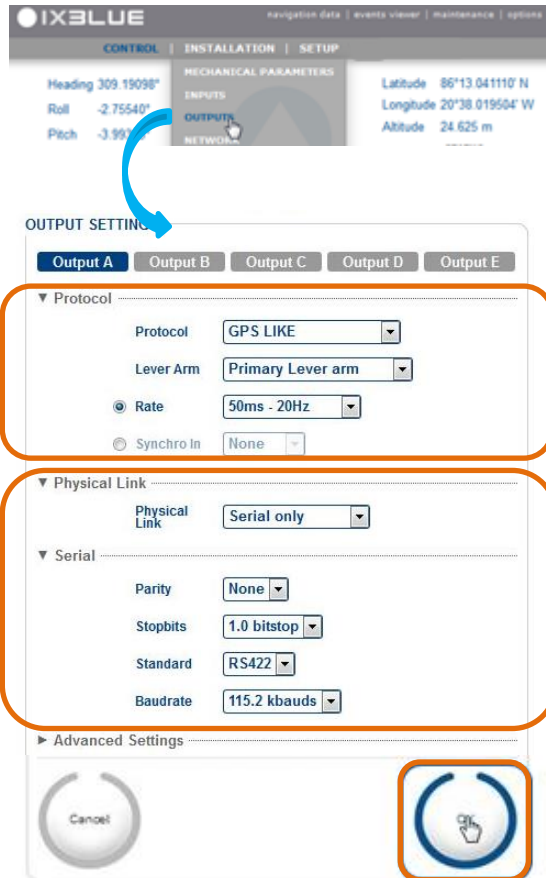
Synchro In Pulse A

Protocol PPS Rising+Time

Cancel OK

For example, parameters of UTC:
Synchro In (for PPS input): **Pulse A**
Protocol: **PPS Rising + Time**
(depending on GNSS configuration)

Step 5 Configuring the Output parameters



Important: when configuring the output port in serial mode, check that sampling rate and baudrate are consistent with the protocol data field length. If not, data output will be corrupted and a “SerOut X full” flag will appear in the detailed status from the control window.

Checking procedure as follows:

- Count the maximum number of bits Nb (including parity and stop bits) in the protocol data frame. ASCII characters are 12 bits long max, each.
- Select Baudrate and Sampling period so that:

$$\text{Nb} \times \text{Sampling Period} < \text{Baudrate}$$

Sampling Period is in ms
 Baudrate is in kBauds

Entering the Manual Position

IXBLUE navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | **SETUP**

POSITION FIX
NAVIGATION PARAMETER

POSITION FIX

Manual Position

Latitude 57° 52.8' N

Longitude 2° 7.38' E

Altitude 100 m

Precision 10 m

Label

Shortcuts

Delete ☐

Replace By Current Position

Advanced Mode

Manual position forced ☒

Cancel OK

Entering the initial position is only necessary if no position input (GNSS, USBL,...) is available.

IXBLUE navigation data | events viewer | **maintenance** | options

CONTROL | INSTALLATION | **SETUP**

RESTART SYSTEM

Click to restart the system.

Restart

As soon as you have clicked on the Restart button, Phins Subsea starts its alignment phase with the manual position (unless receiving GNSS/USBL).

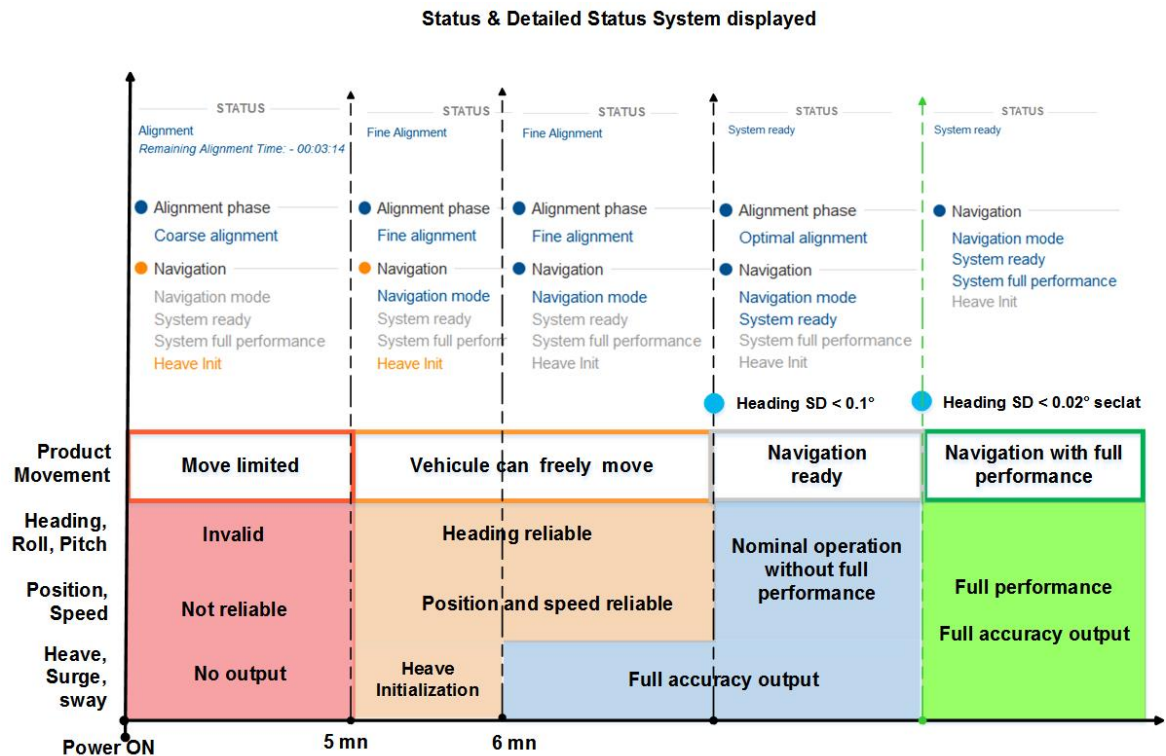
Operating Phins Subsea

Step 1 Starting Phins Subsea

When it is powered ON or re-started, Phins Subsea performs an initial alignment which starts by a coarse alignment: Phins Subsea inertial sensor data (accelerometers and gyrometers) are computed to estimate heading, roll and pitch angles. The coarse alignment phase is followed by a fine alignment phase to improve the accuracy of roll, pitch and heading estimations. During this phase the position is initialized with valid position data received from the external sensor. If no position is available, Phins Subsea uses the most recent position saved in the non-volatile memory of the system or a position entered manually.

In the fine alignment mode the algorithm will use both inertial sensors and external sensors to compute optimal estimates of attitude, heading, speed and position. During this sequence the Phins Subsea needs to observe large heading changes (~90°). E.g.: NE = 15 mn, NW = 15 mn.

After the fine alignment, Phins Subsea switches to the Optimal alignment. At this time, the system is ready but it does not reach its full performance. Optimal alignment means that the system is reaching the specified heading performance. When optimal alignment is completed, the system is ready and gives all the data with full performance.



Step 2 Toggle the External Sensors input to navigation solution

The screenshot displays the IXBLUE navigation control interface. At the top, the 'CONTROL' tab is selected, indicated by a blue arrow. The main display shows navigation data: Heading 268.479°, Roll -0.260°, Pitch -0.118°, Heave -0.074 m, and Speed 0.188 m/s. On the right, it shows Latitude 78.89910162° N, Longitude 2.06356426° E, and Depth 9.916 m. The status is 'System Ready'. Below this is the 'DETAILED STATUS' section with three columns: Input / Output, System, and Ext. Sensors. The 'Ext. Sensors' column shows 'Altitude' (Altitude reception, Altitude valid), 'GNSS 1' (GNSS1 reception, GNSS1 valid (RTK)), 'GNSS 2' (GNSS2 reception), and 'DVL 1' (DVL1 BT reception, DVL1 BT valid, DVL1 WT reception). At the bottom, the 'EXTERNAL SENSORS' section shows four toggle switches: GNSS 1 (ON), DVL BT 1 (ON), DVL WT 1 (OFF), and Depth (OFF). A blue arrow points from the 'Depth' toggle in the bottom section to the 'Depth' toggle in the top section, indicating the transition from the main control page to the external sensors control page.

IXBLUE navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | SETUP

Heading 268.479°
Roll -0.260°
Pitch -0.118°
Heave -0.074 m
Speed 0.188 m/s

Latitude 78.89910162° N
Longitude 2.06356426° E
Depth 9.916 m
STATUS
System Ready

PHINS SUBSEA

DETAILED STATUS

Input / Output

- Inputs
 - Input A
 - Input B
 - Input C
- Outputs
- Pulses In
- Others

System

- Alignment phase
 - Optimal alignment
- Navigation
 - Navigation mode
 - System ready
 - System full performance
 - Heave Init
 - GNSS altitude
- System
- Sensors

Ext. Sensors

- Altitude
 - Altitude reception
 - Altitude valid
- Zupt
- GNSS 1
 - GNSS1 reception
 - GNSS1 valid (RTK)
- GNSS 2
 - GNSS2 reception
- DVL 1
 - DVL1 BT reception
 - DVL1 BT valid
 - DVL1 WT reception

EXTERNAL SENSORS

GNSS 1 ☒ ON

DVL BT 1 ☒ ON

DVL WT 1 ☐ OFF

Depth ☐ OFF

EXTERNAL SENSORS

GNSS 1 ☒ ON

DVL BT 1 ☒ ON

DVL WT 1 ☐ OFF

Depth ☒ ON

While operating, the operator can enable/disable the external sensor into the inertial solution from the main control page.

Step 3 Monitoring Phins Subsea



The embedded Built In Test, also called Status, monitors Phins Subsea stats warning and failures thanks to large set of flags.

Status are displayed on the web-based user interface with the following colors:

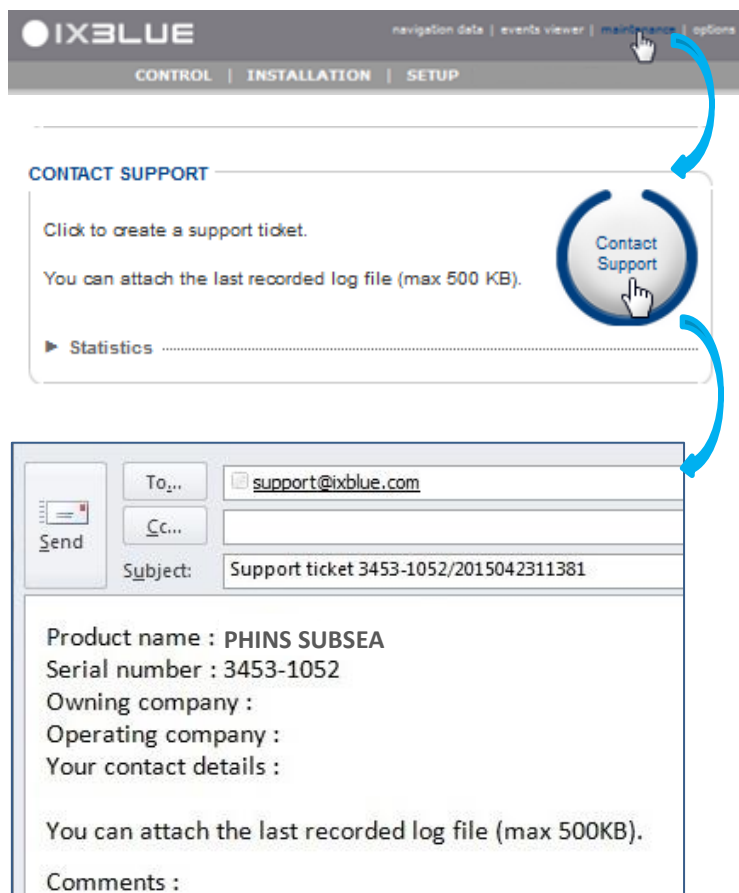
- **Message in blue:** information message
- **Message in orange:** warning message
- **Message in red:** error message
- **Grey:** disabled

For explanation of the status, refer to Phins Subsea Interface Library

In this example:

- Phins Subsea is in full performance mode
- DVL BT rejected status means that the data is received but it is not taken into account by the rejection filter.

Contacting iXblue Support



IXBLUE navigation data | events viewer | maintenance | options

CONTROL | INSTALLATION | SETUP

CONTACT SUPPORT

Click to create a support ticket.

You can attach the last recorded log file (max 500 KB).

► Statistics

To: support@ixblue.com

Cc:

Subject: Support ticket 3453-1052/2015042311381

Product name : PHINS SUBSEA
Serial number : 3453-1052
Owning company :
Operating company :
Your contact details :

You can attach the last recorded log file (max 500KB).

Comments :

Mandatory information to be provided:

- 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 maintenance manual.

Troubleshooting

Phins Subsea has a Built-In status and error Test (BIT) which raises alarms (through the color of the iXblue Logo) and displays messages in the Phins Subsea Web-Based User Interface.

If you encounter problems when installing or using Phins Subsea, please refer to the following table.

If you still cannot resolve the problem, please contact iXblue support (see previous page).

Symptom	Possible causes	Solution
Impossible to display the Web-based User interface	Incorrect URL address entered in the Web browser	Type in back the URL address Default address is 192.168.36.1xx, xx being the last two numbers of your Phins Subsea serial number. Check computer IP address should be in the same range as the unit.
	The URL address has been changed by another person	1) Retrieve the new Phins Subsea IP address: 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 Phins Subsea once connected. You will get the Phins Subsea boot sequence message that contains its attributed IP address (line beginning with "IFCONF") 2) Enter this URL address in the Web browser
Status displayed red	Error message	Refer to Phins Subsea Interface Library to get the explanation of the messages
Status displayed orange	Warning message	Refer to Phins Subsea Interface Library to get the explanation of the messages
After clicking on "Contact support" button, a message is displayed	No mail software is installed	Install a mail software on the computer (Outlook for example)

iXblue Contact - Support

For non-emergency support:
support@ixblue.com

For genuine emergencies only:
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