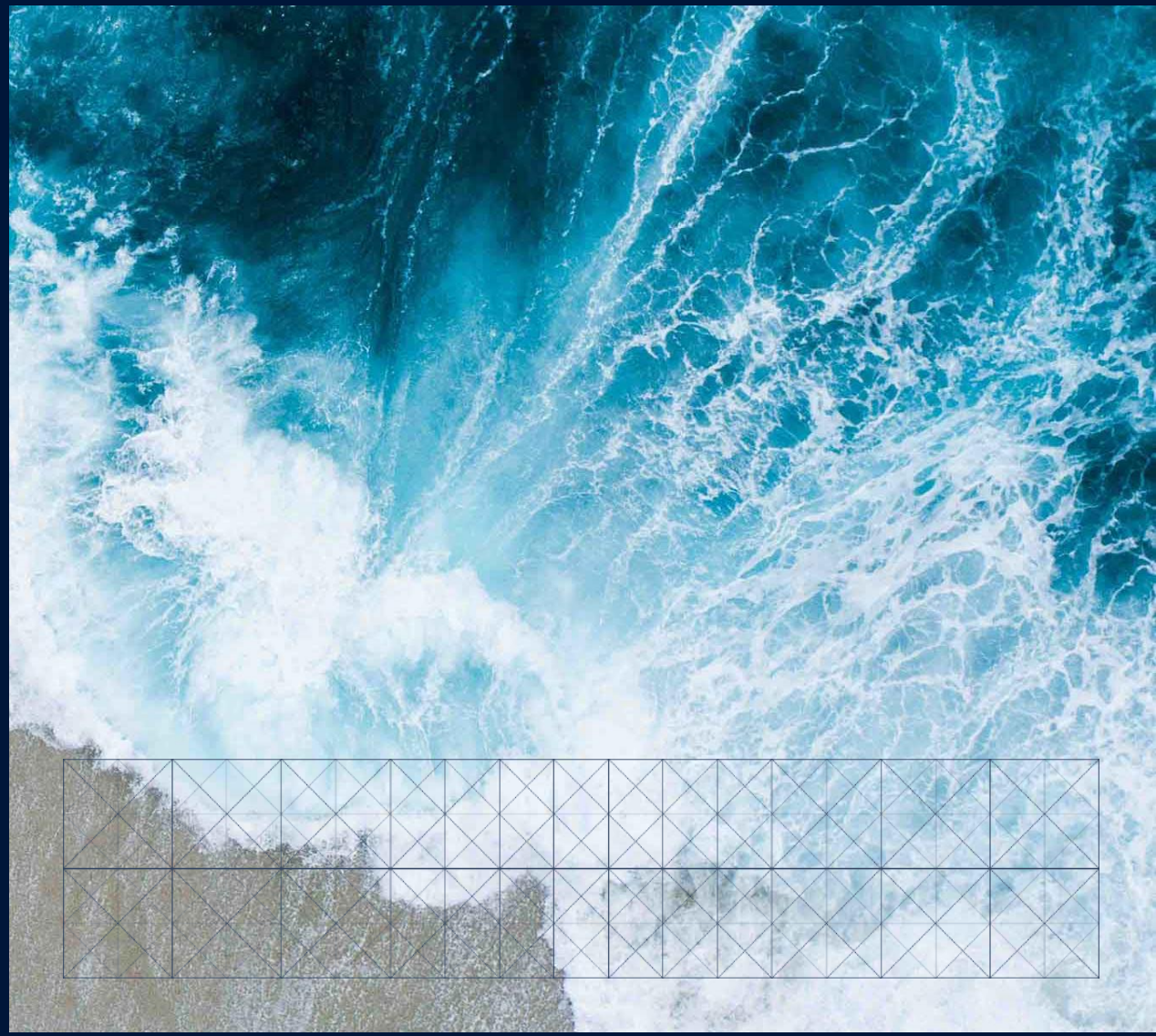
KONGSBERG

KONGSBERG SEATEX

XPR



XPR Operator & Technical Training

KONGSBERG

XPR

Long Range Relative Positioning System

XPR Training

Course Content

- XPR Training
- XPR Operator Training
- XPR Technical Training

XPR Operator Training

Course Content

- XPR Operator Training
  - XPR Introduction
  - XPR Principles
  - XPR Product Modules
  - XPR Operation

XPR Operator Training

Course Content

- XPR Operator Training
  - XPR Introduction
  - XPR Principles
  - XPR Product Modules
  - XPR Operation

XPR

Microwave based DP Reference System

- Features:
  - No maintenance
  - Small size and light weight
  - Easy to install and operate
  - Flexible configuration (100° to 280° coverage)
  - Compatible with Artemis

Front view: XPR Panel

XPR

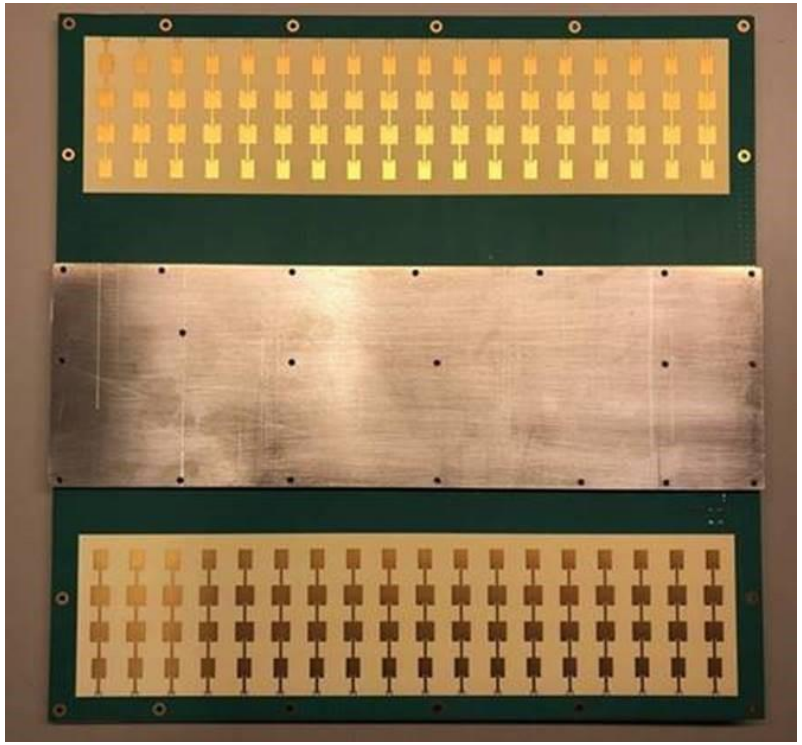
Microwave based DP Reference System

- Features:
  - Easy and quick installation, using existing cabling
  - Operating range from 10m to 5km
  - Automatic target selection (requires Field ID from DP)
  - Operates in all weather conditions
  - Customer replaceable units

XPR

Technical Specifications

- Solid state technology (no moving parts)
- Beam forming by antenna arrays
- Frequency range: 9.2-9.3 GHz
- Range accuracy: 1m
- Bearing accuracy: +/- 0.02°
- Operating range: 10m - 5km
- Digital beam:
  - Horizontal beamwidth 7°
  - Vertical beamwidth 25°
- Horizontal opening angle: 100° pr. panel
- Output rate: 1-4Hz



Front view: Antenna elements

XPR

Mechanical Design

Dimensions: 40 x 40 cm, Depth 5 cm, Weight 9kg

XPR

Improved Performance with XPR-to-XPR Operations

- Faster target acquisition/lock on target (< 30s on 270° scan)
- Automatic target selection
- Improved false target lock mitigation
- Continuous monitoring in all directions (area of operation)
- Exchange of other data/information between the two vessels
- Improved range and bearing accuracy

XPR Operator Training

Course Content

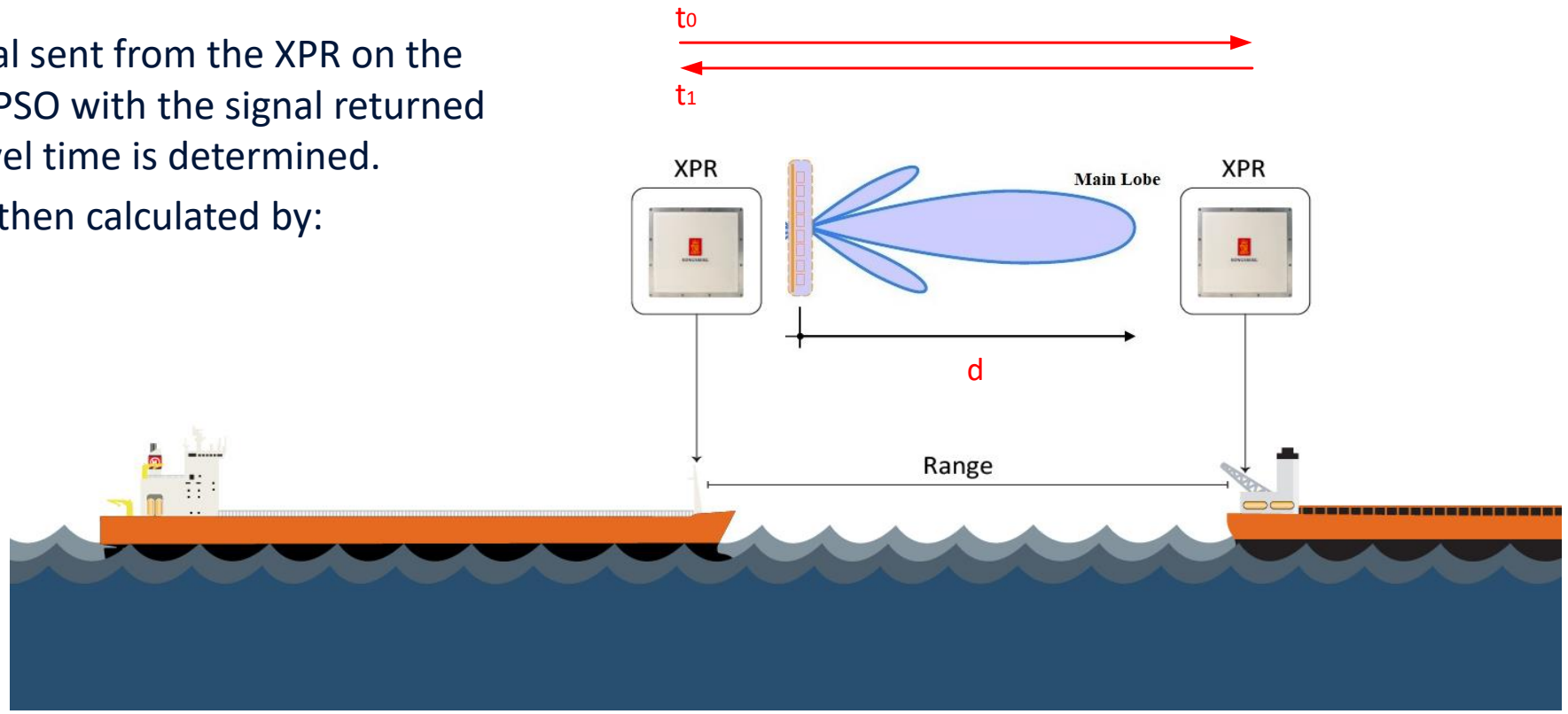
- XPR Operator Training
  - XPR Introduction
  - XPR Principles
  - XPR Product Modules
  - XPR Operation

XPR

Measuring Principle

- Distance/Range:
  - By comparing the signal sent from the XPR on the shuttle tanker to the FPSO with the signal returned from the FPSO the travel time is determined.
  - The distance/Range is then calculated by:
  - $d=\frac{t1-t0}{2} * c$

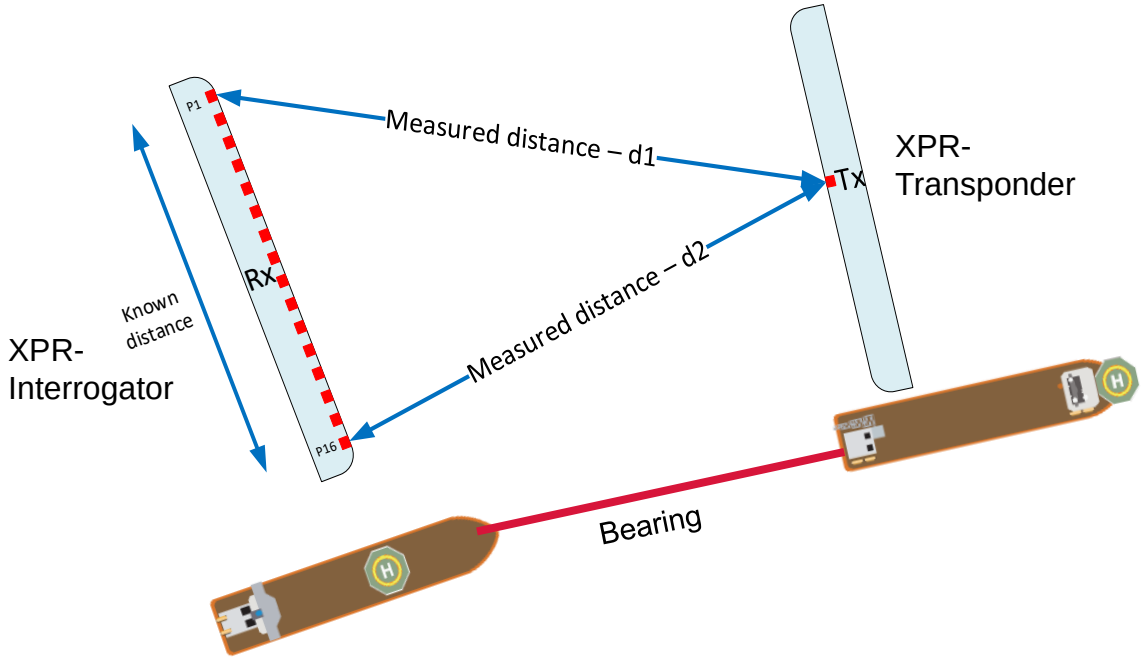
d=distance
t_0= start time
t_1= stop time
c=speed of light



XPR

Measuring Principle

- Bearing calculation is based on:
  - Distance measurement between antenna patch #1 in the interrogator and Tx antenna in the transponder
  - Distance measurement between antenna patch #16 in the interrogator and Tx antenna in the transponder
  - And the known distance between antenna patch #1 and #16



XPR

Frequencies & Address Codes

- The XPR operates on frequencies between 9.2 and 9.3 GHz, same as Artemis:

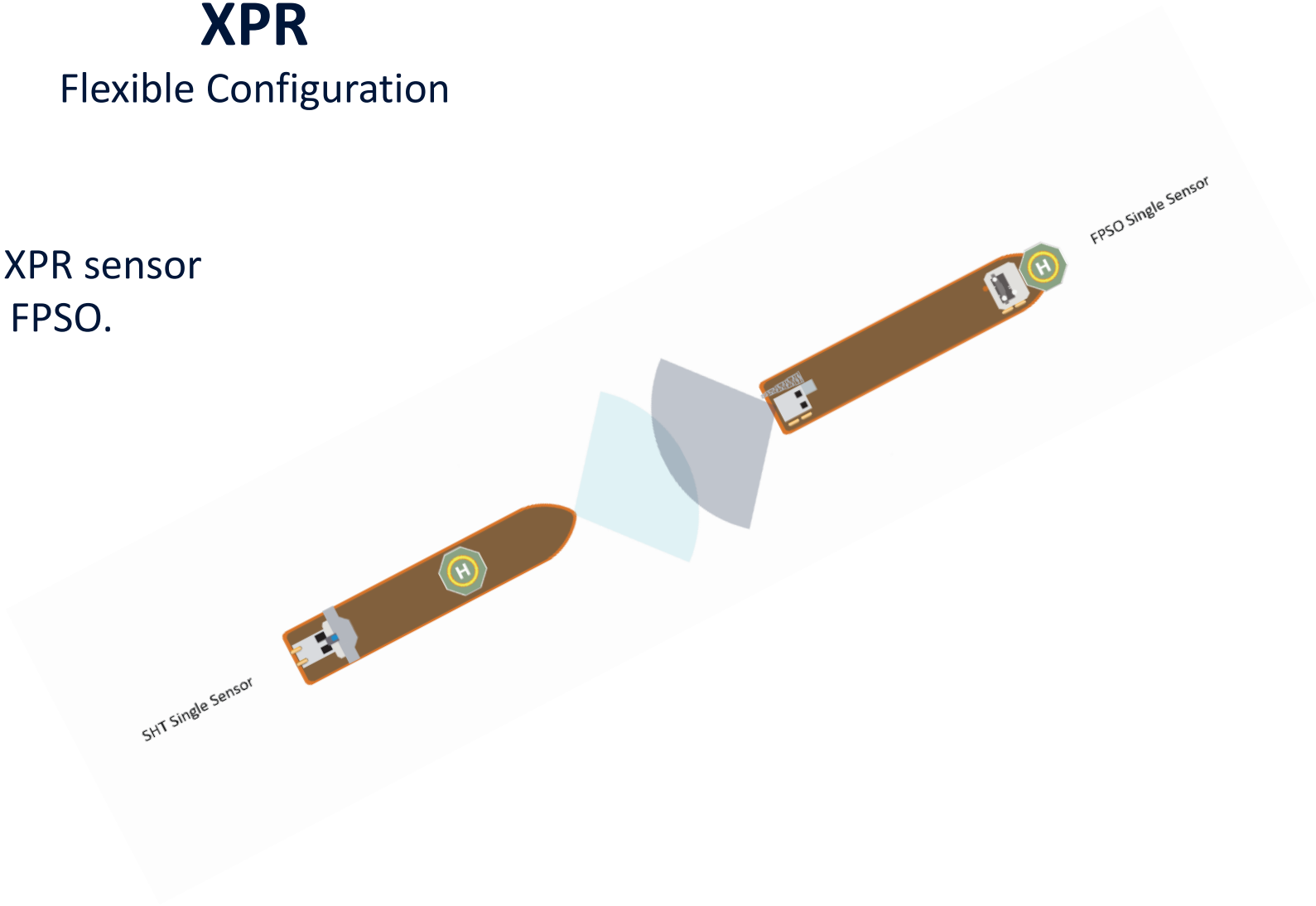
Frequency Pair	0	1	2	3
Interrogator [MHz]	9200	9300	9230	9270
Transponder [MHz]	9230	9270	9200	9300

- In addition to having the correct frequency pair, the selected address code between 0-63 also must be correct.
- The frequency pair and address code is configured in the target list.

XPR

Flexible Configuration

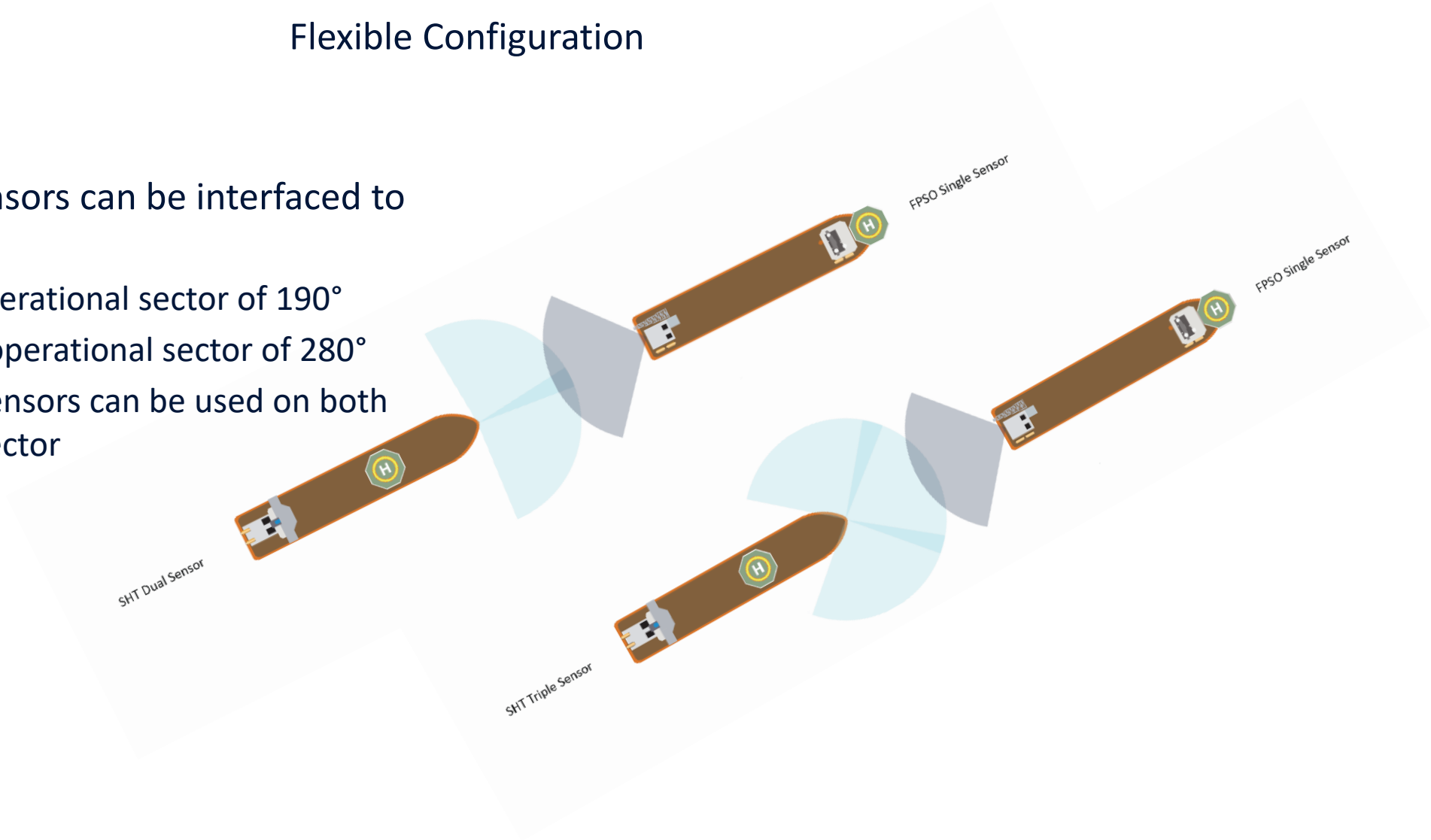
- The XPR is fully operational with one XPR sensor on the Shuttle tanker and one on the FPSO.
  - This gives an operational sector of 100°



XPR

Flexible Configuration

- Maximum of three sensors can be interfaced to one XPR system
  - Two sensors give an operational sector of 190°
  - Three sensors give an operational sector of 280°
  - Extended number of sensors can be used on both sides to increase the sector



XPR

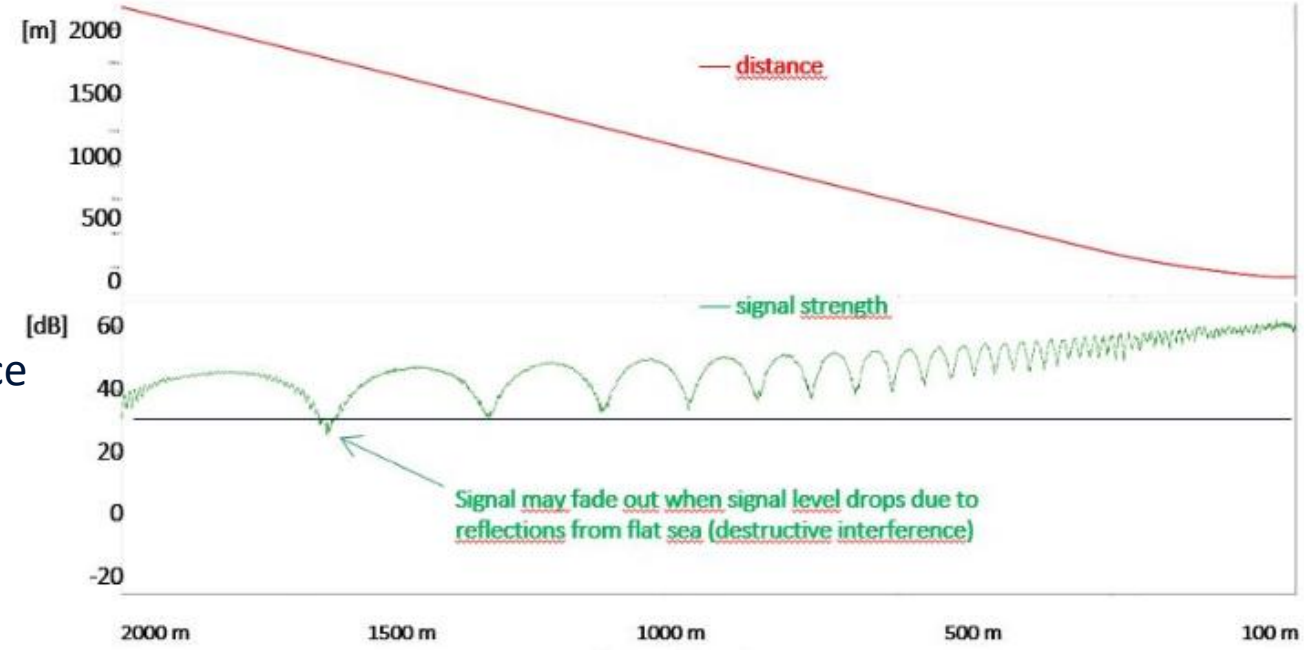
Factors Affecting Performance

- The XPR needs free line of sight between the interrogator on the shuttle tanker to the transponder on the FPSO.
- Any object in front of the interrogator might affect the performance of the XPR.
- Flat sea fading.

XPR

Factors Affecting Performance

- Flat sea fading
  - Signals reflected from flat sea surface will interfere with the direct signals and signal levels can fade.
  - Lock on target may get lost with wave height less than 0.5m.
  - Sea state, antenna height and distance will influence on this effect



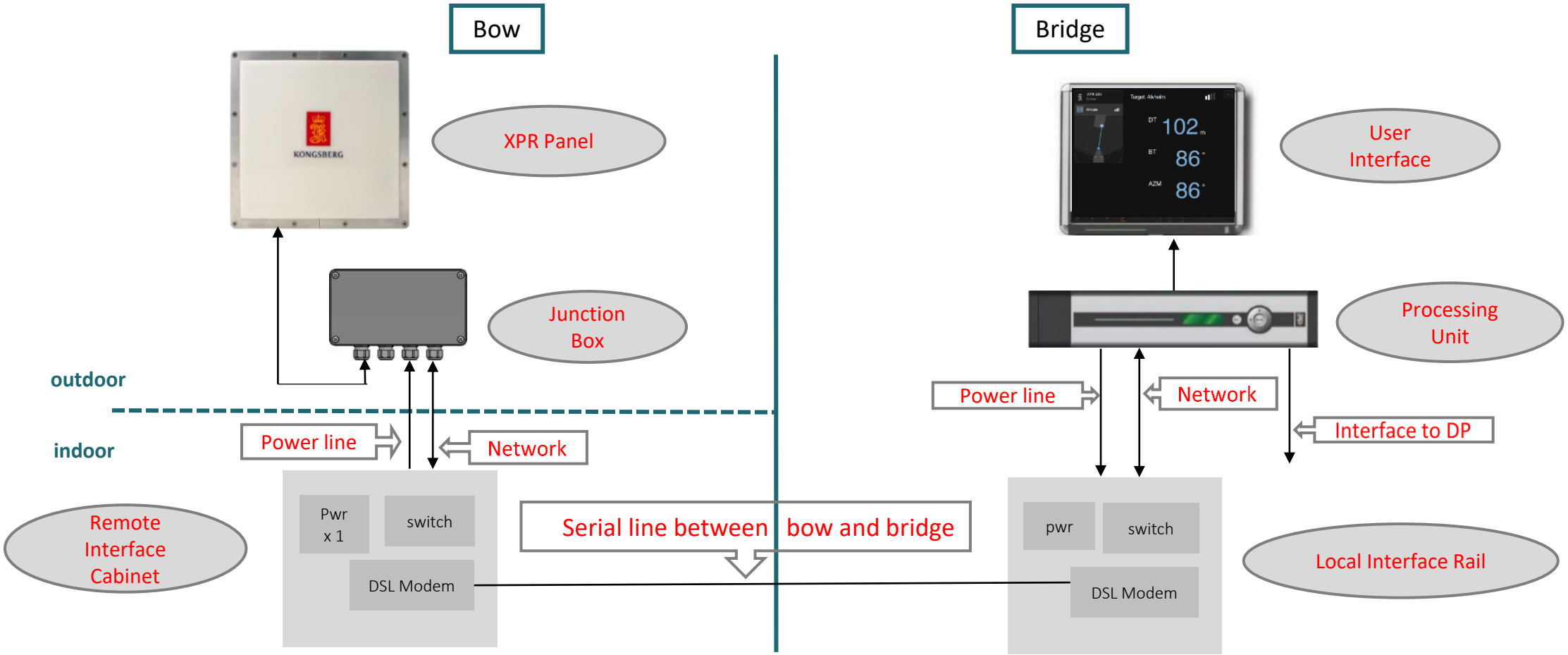
XPR Operator Training

Course Content

- XPR Operator Training
  - XPR Introduction
  - XPR Principles
  - XPR Product Modules
  - XPR Operation

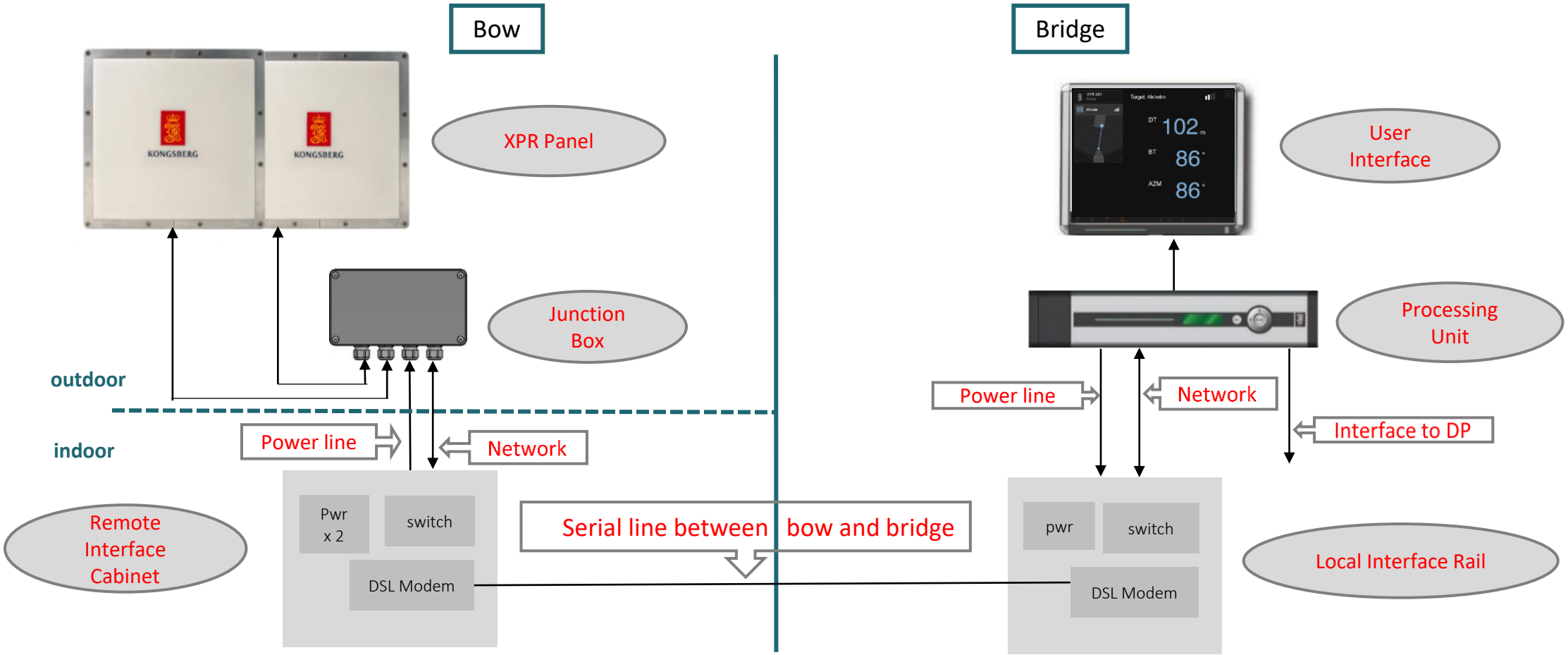
XPR

Single System (SHT)



XPR

Dual System (SHT)



XPR Operator Training

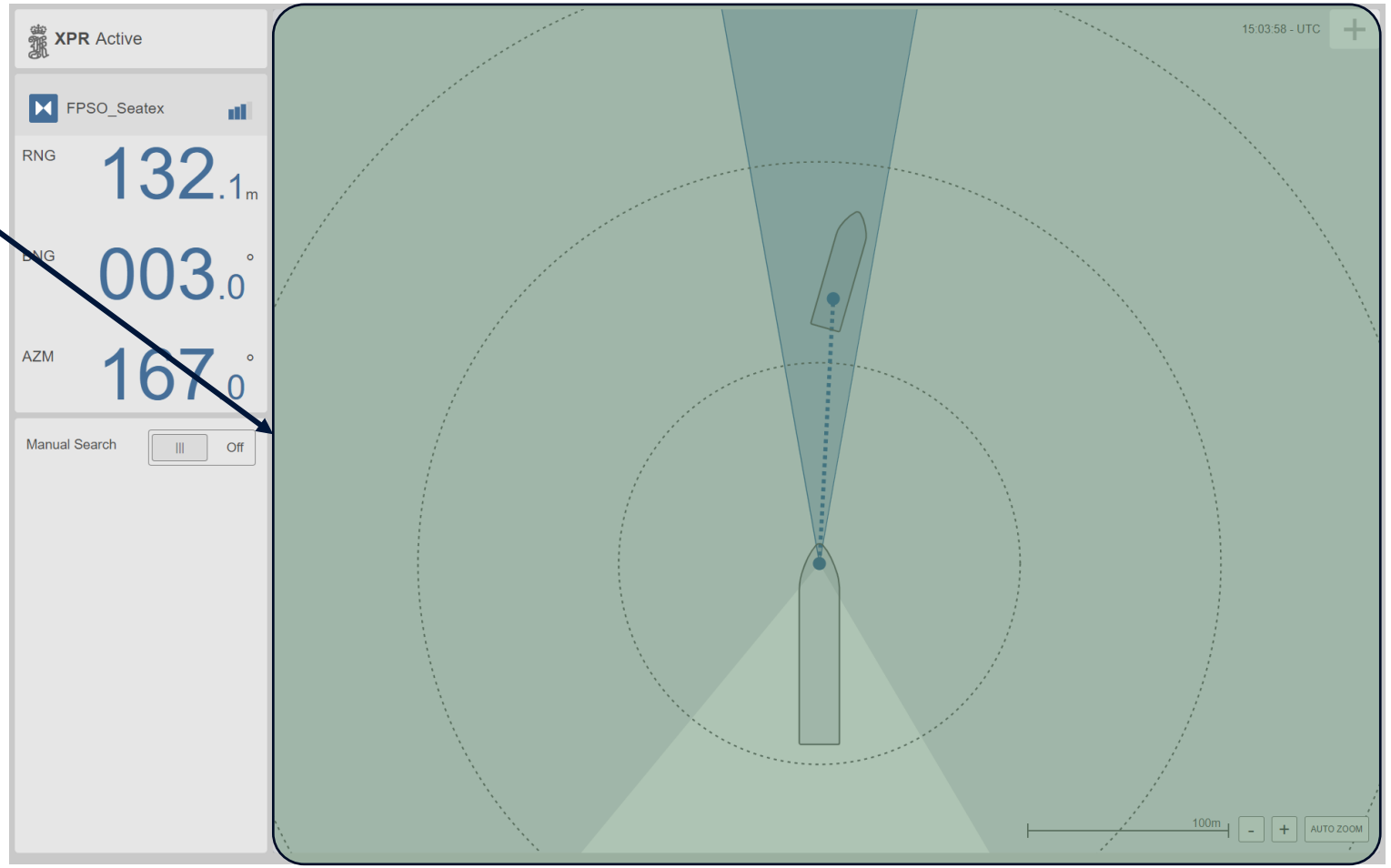
Course Content

- XPR Operator Training
  - XPR Introduction
  - XPR Principles
  - XPR Product Modules
  - XPR Operation

XPR

Main View

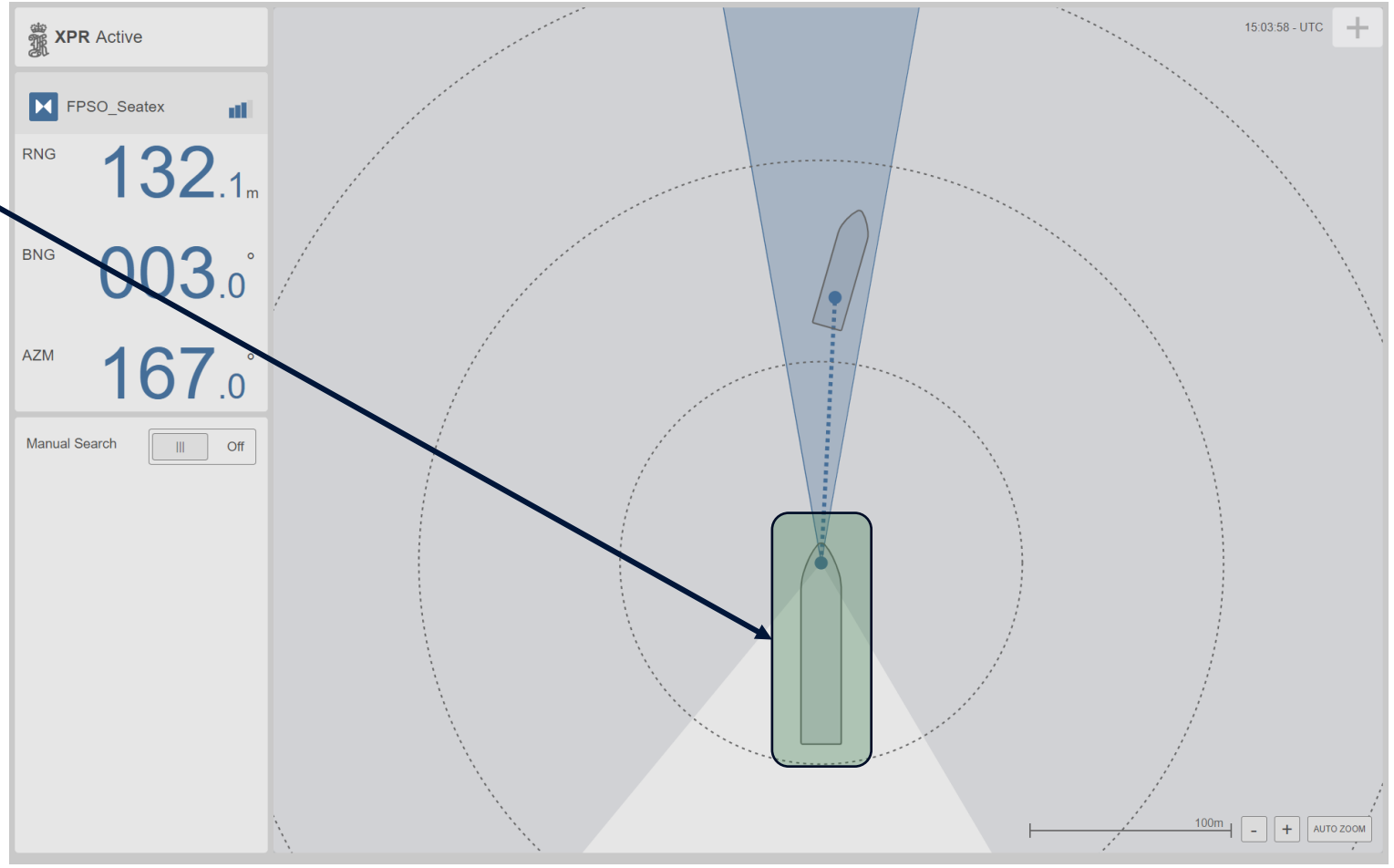
Polar plot



XPR

Main View

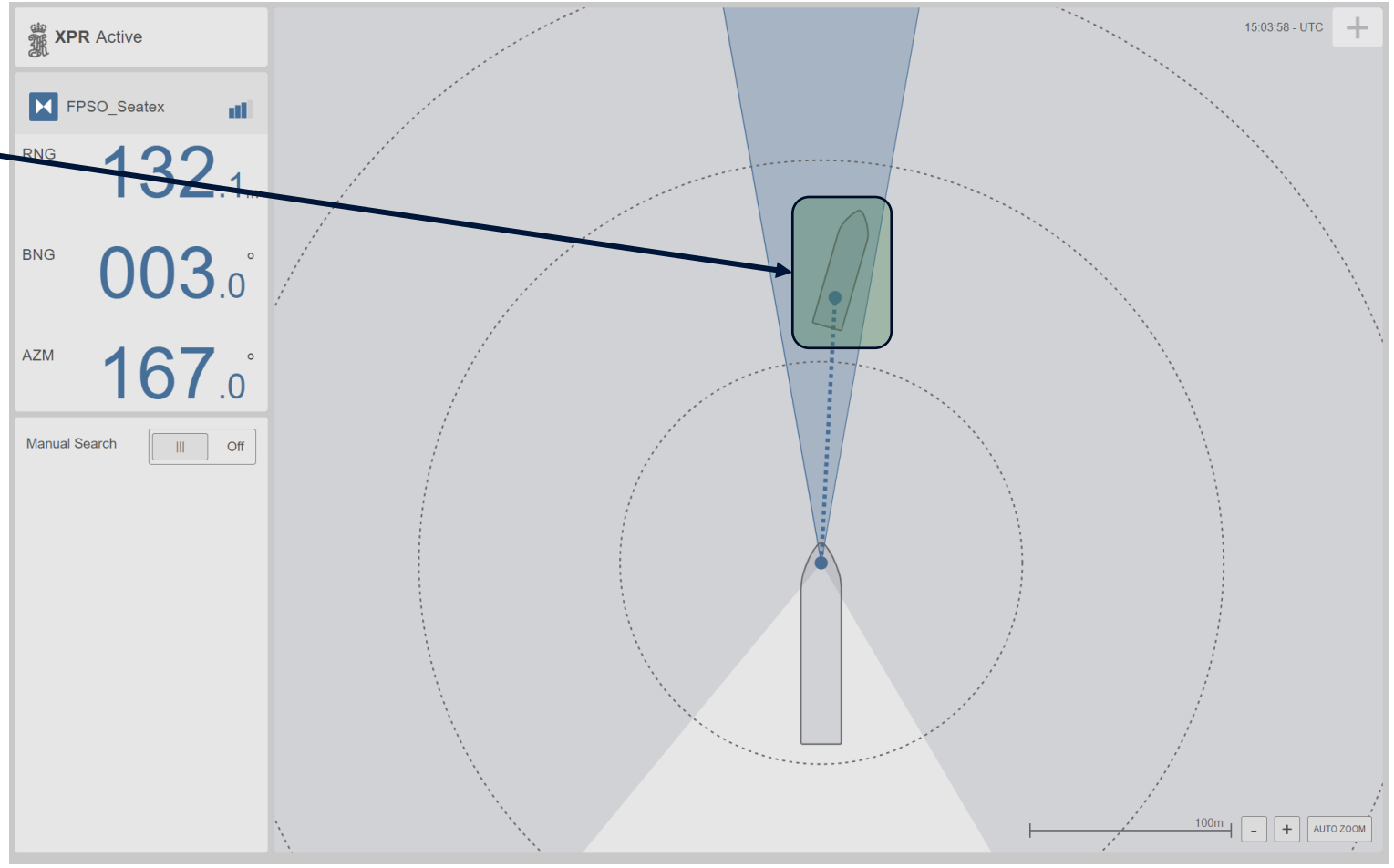
Own Vessel



XPR

Main View

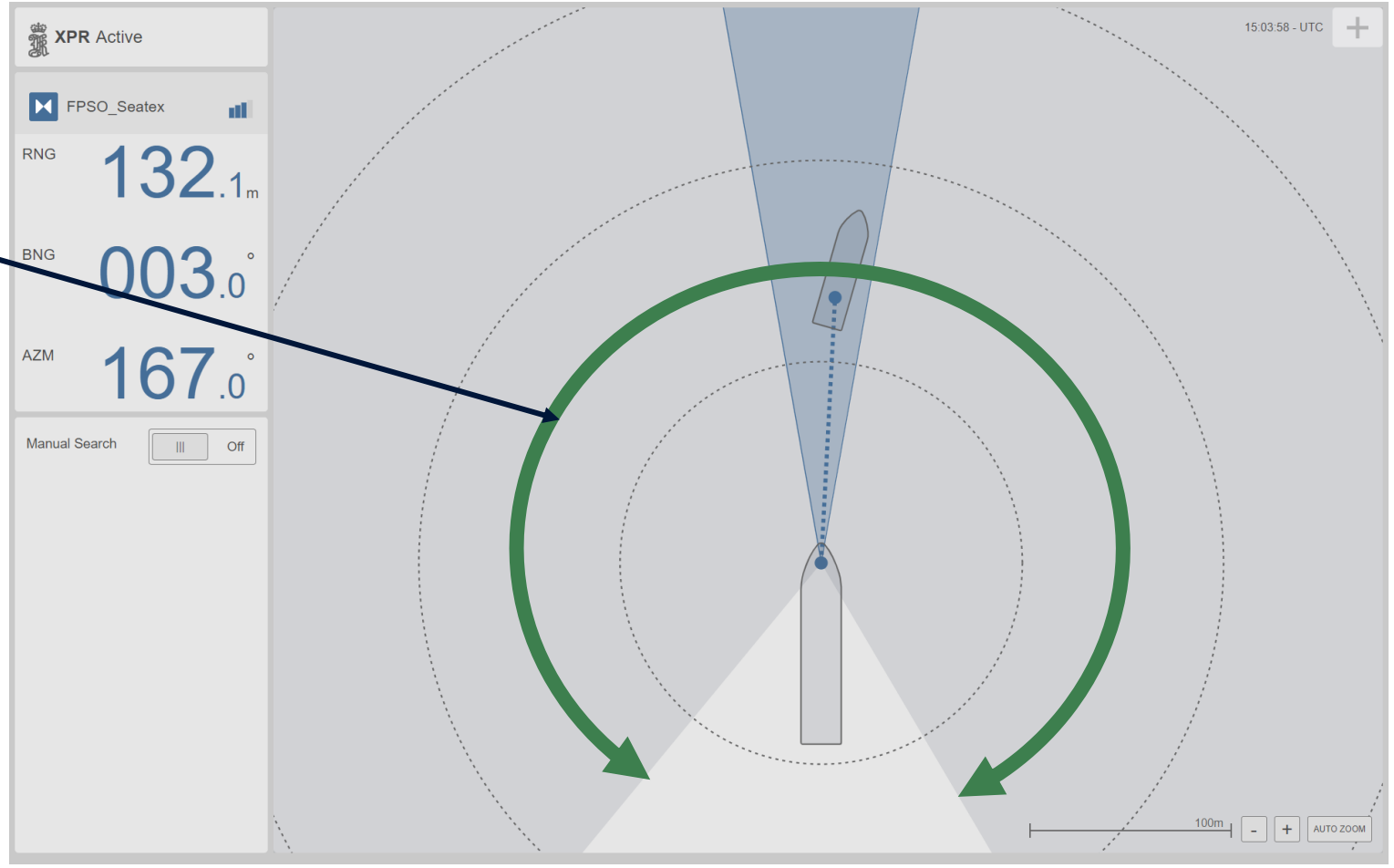
Target



XPR

Main View

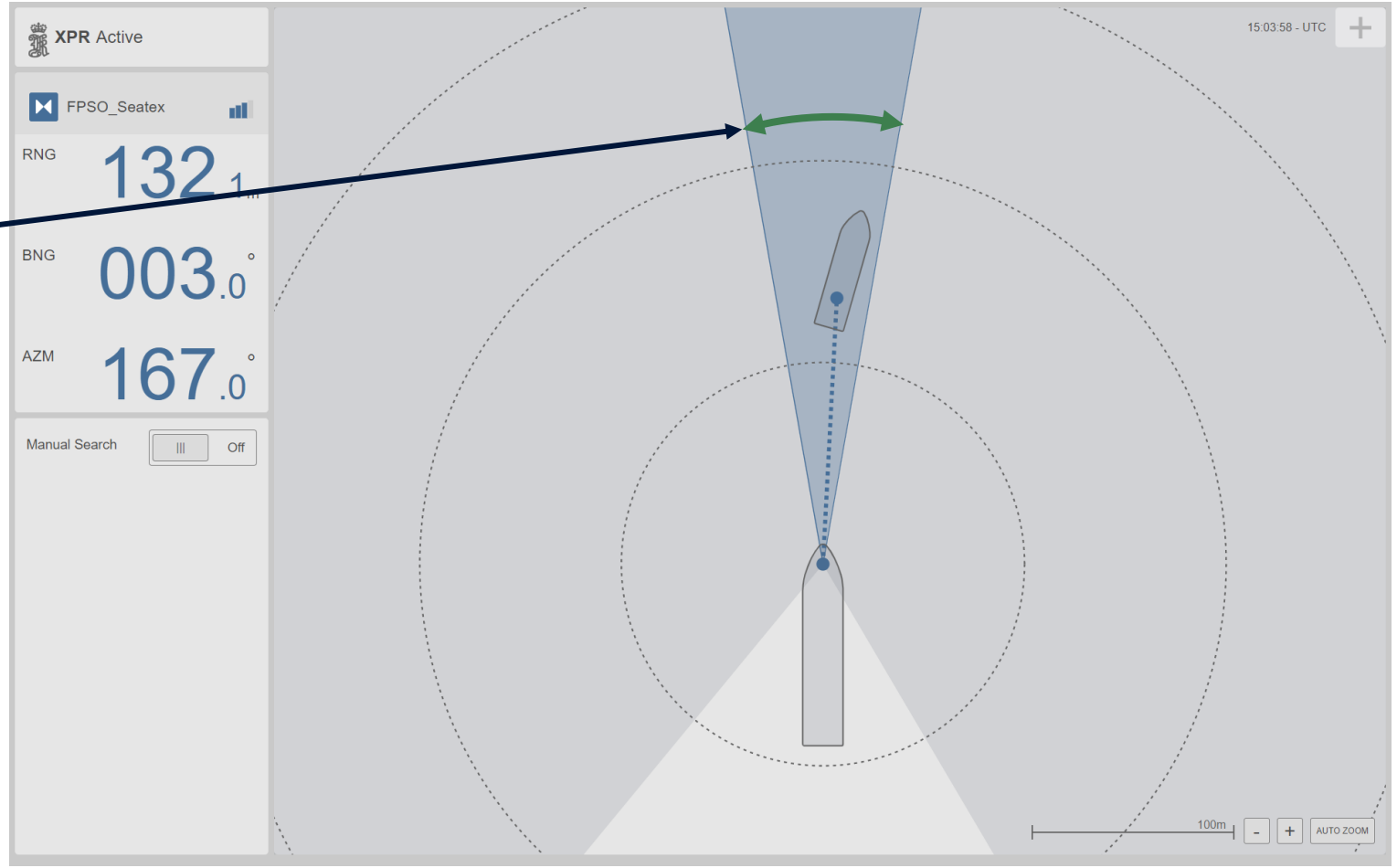
Operational Sector
- Depends on number of XPR panels installed



XPR

Main View

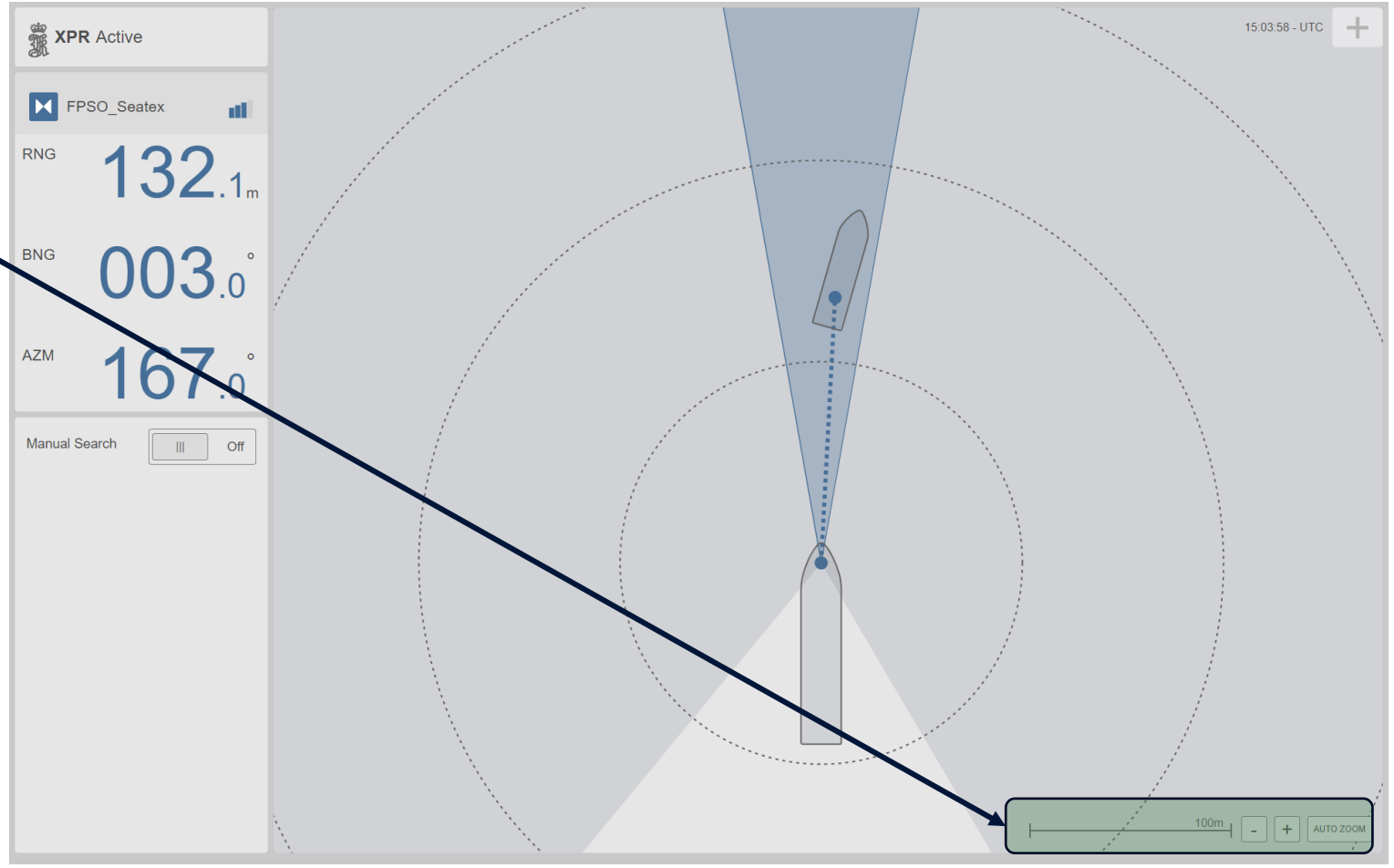
Tracking Sector
- Sector where XPR looks for targets.
- Adjustable but typical 20°.



XPR

Main View

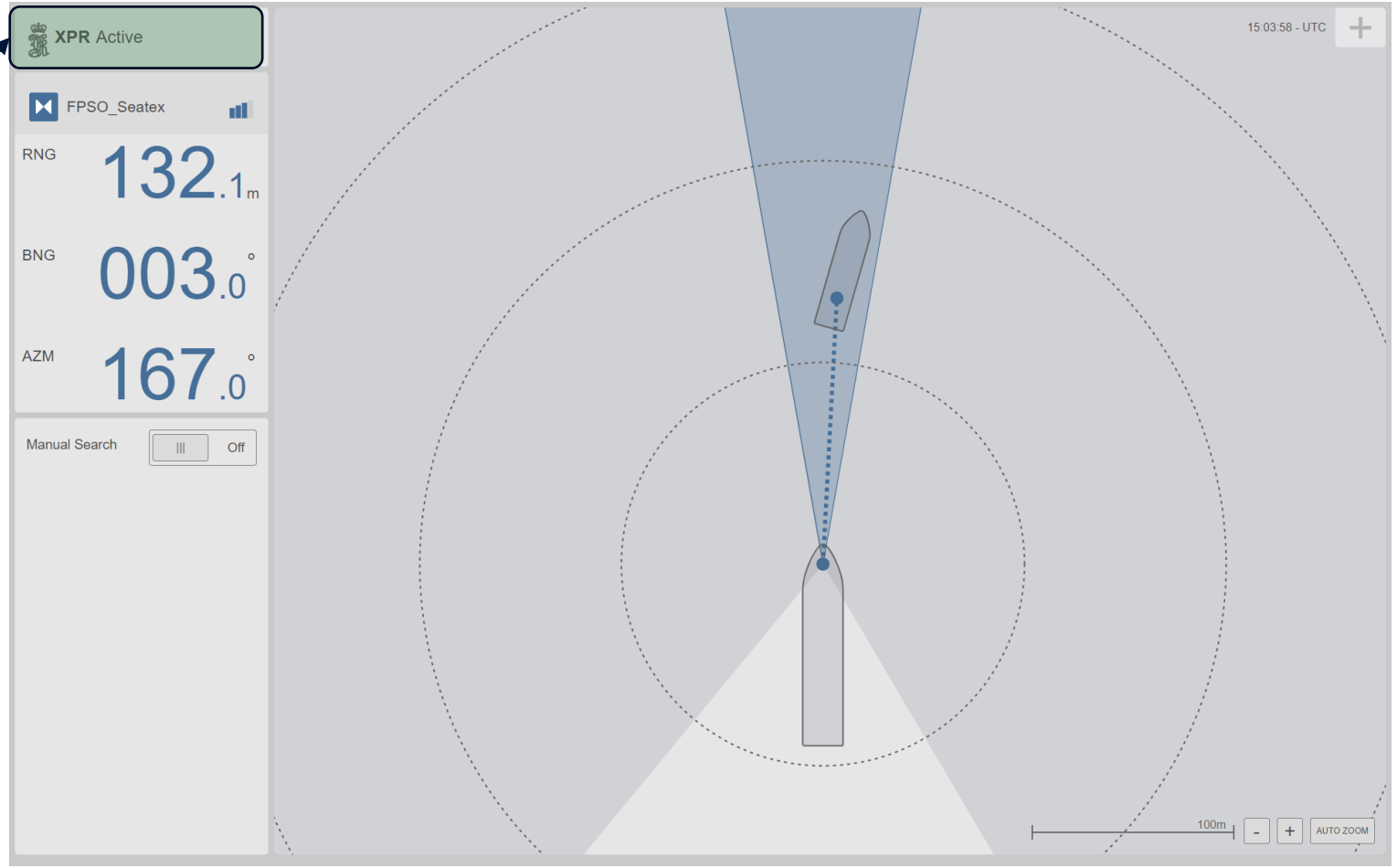
Scale and Zoom
- Manual zoom or Automatic zoom



XPR

Main View

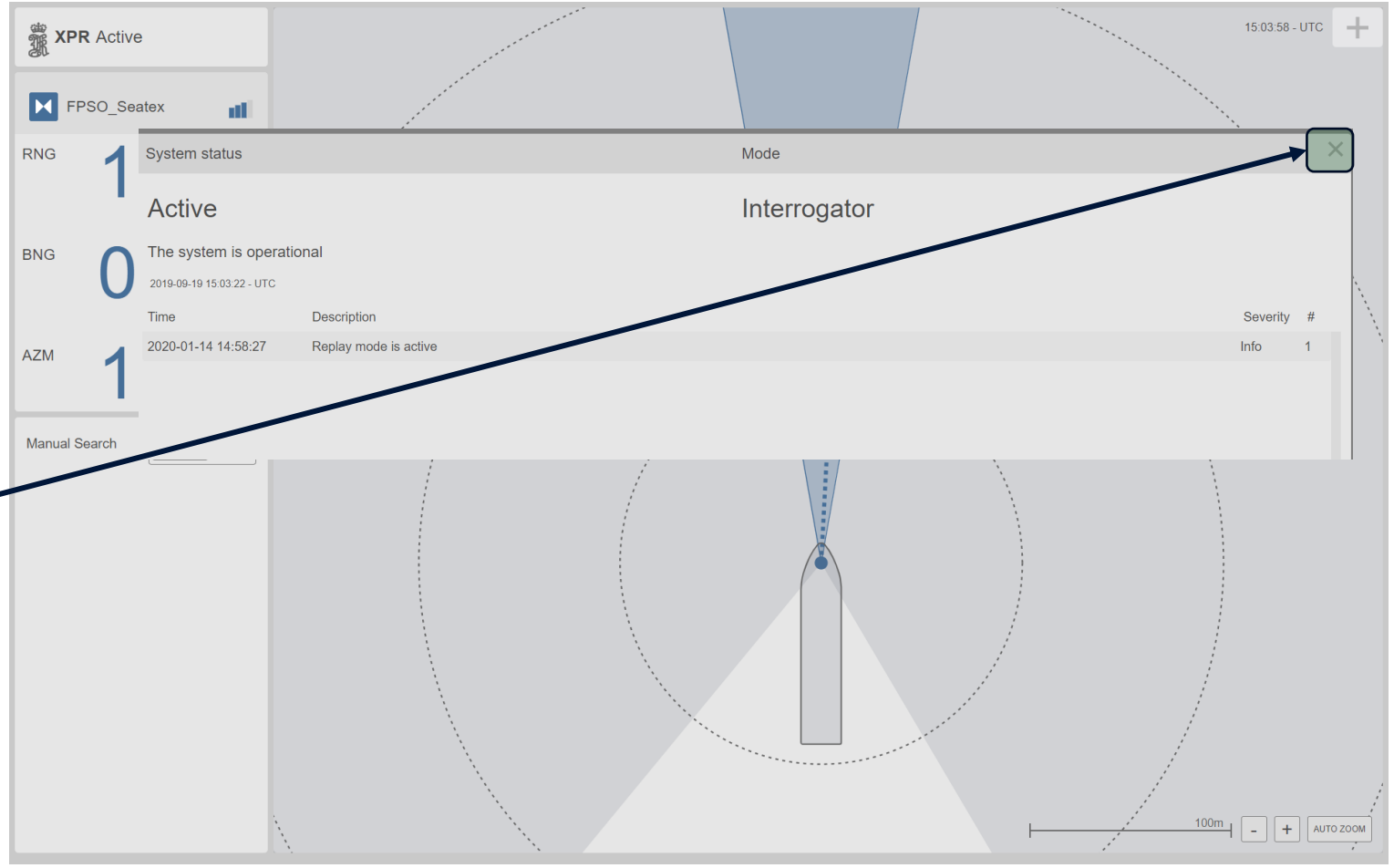
System Status
- Overall status of system.



XPR

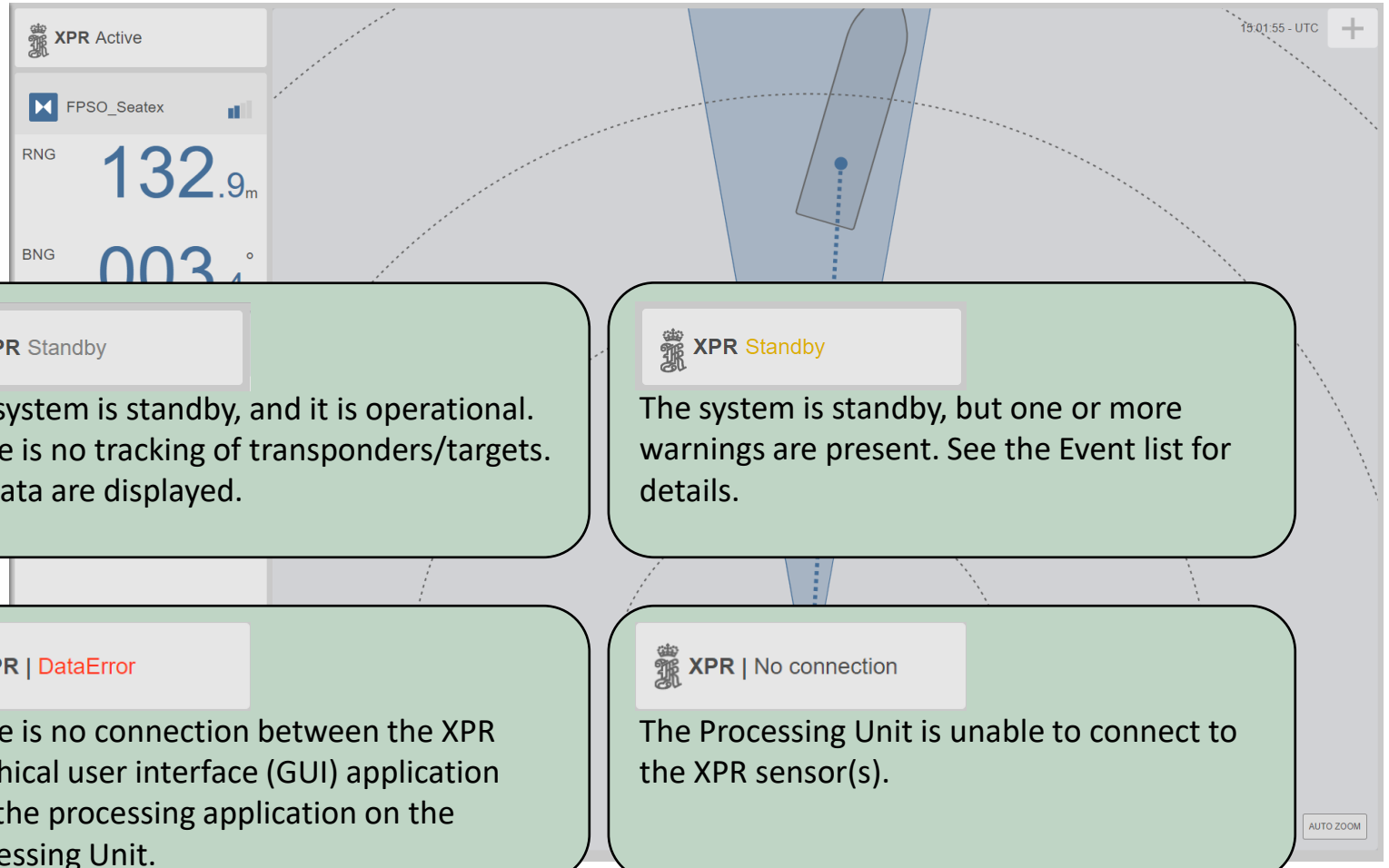
Main View

Click on the **X** to close the view



XPR

Main View



XPR | Active

The system is active and operational. It will search for transponders/targets which are within range. If a transponder/target is within range, the system will display data.

XPR Standby

The system is standby, and it is operational. There is no tracking of transponders/targets. No data are displayed.

XPR Standby

The system is standby, but one or more warnings are present. See the Event list for details.

XPR | Reduced

The system is active, but one or more warnings are present. See the Event list for details.

XPR | DataError

There is no connection between the XPR graphical user interface (GUI) application and the processing application on the Processing Unit.

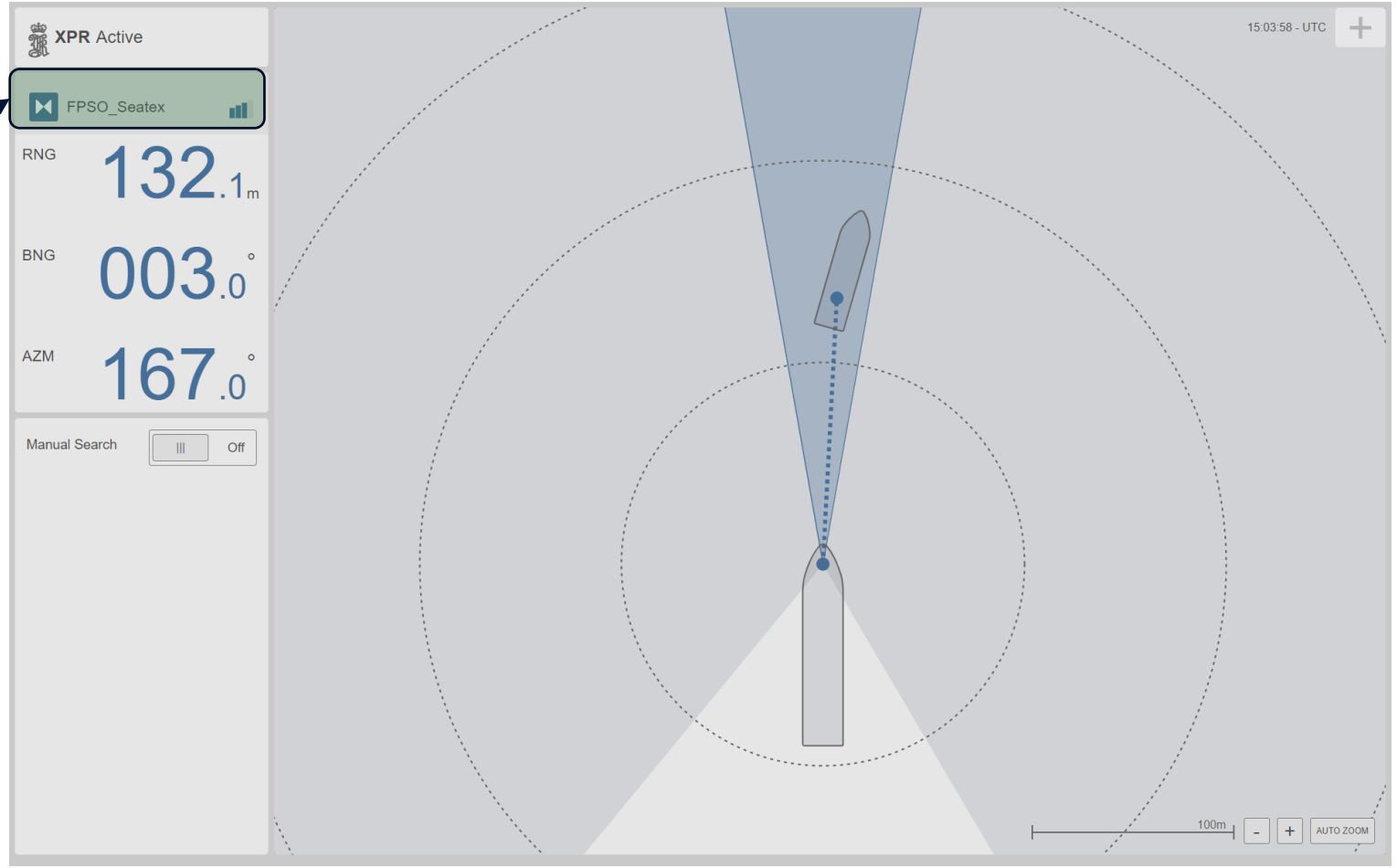
XPR | No connection

The Processing Unit is unable to connect to the XPR sensor(s).

XPR

Main View

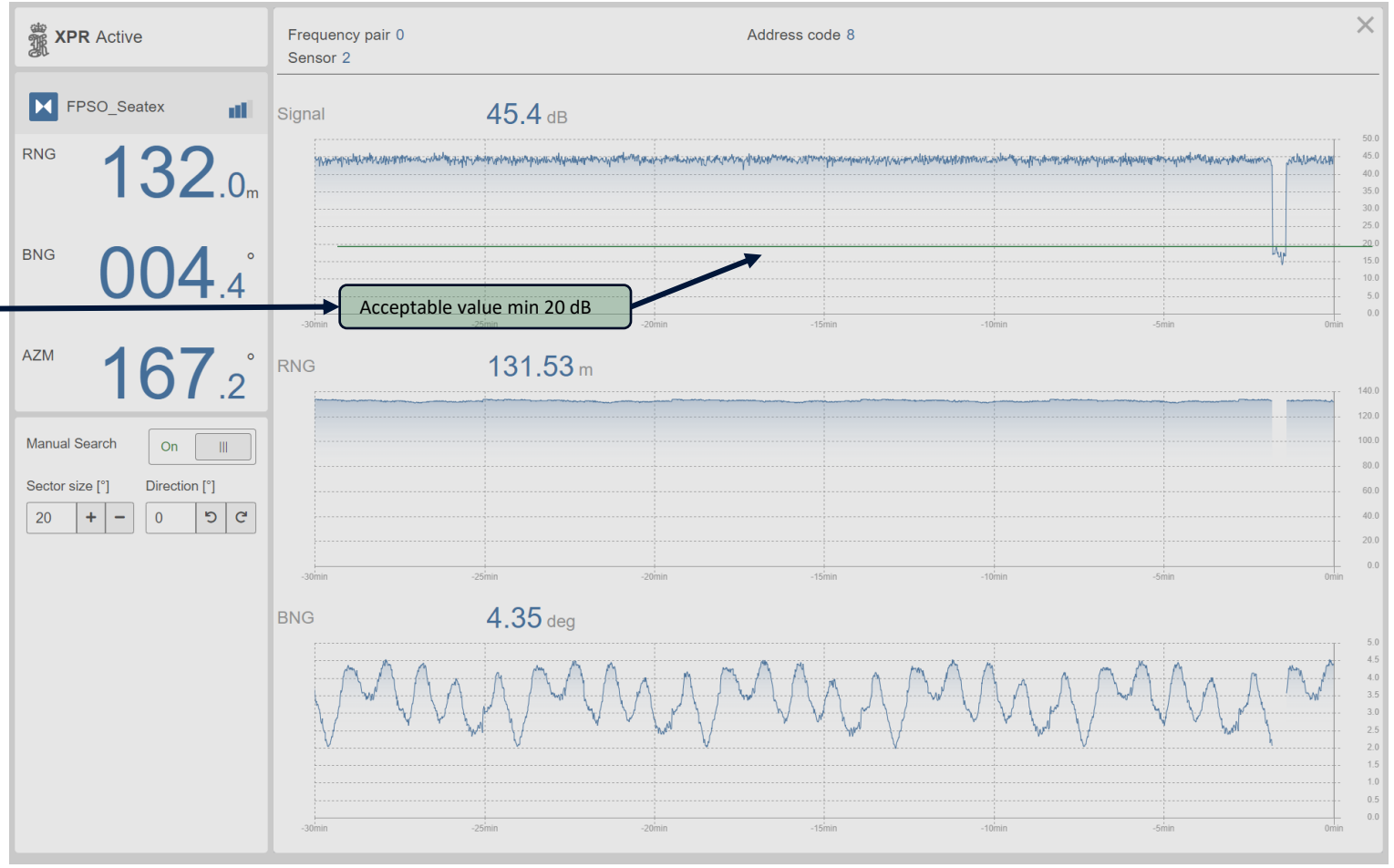
Target Information
- Connected target and signal strength.



XPR

Main View

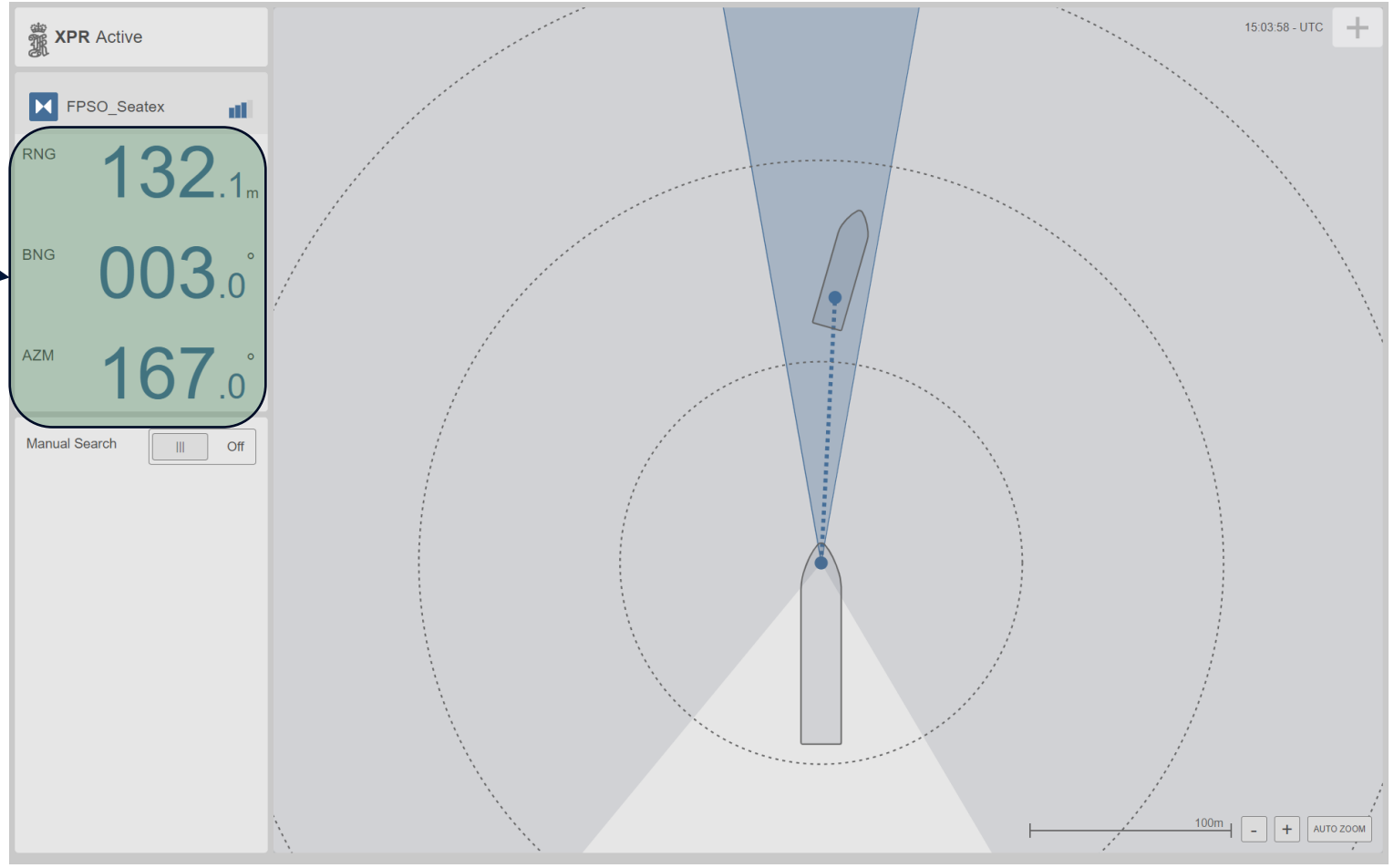
Target Information
- Signal strength, range and bearing for past 30mins.
- Frequency pair, Address code and Sensor that are used.



XPR

Main View

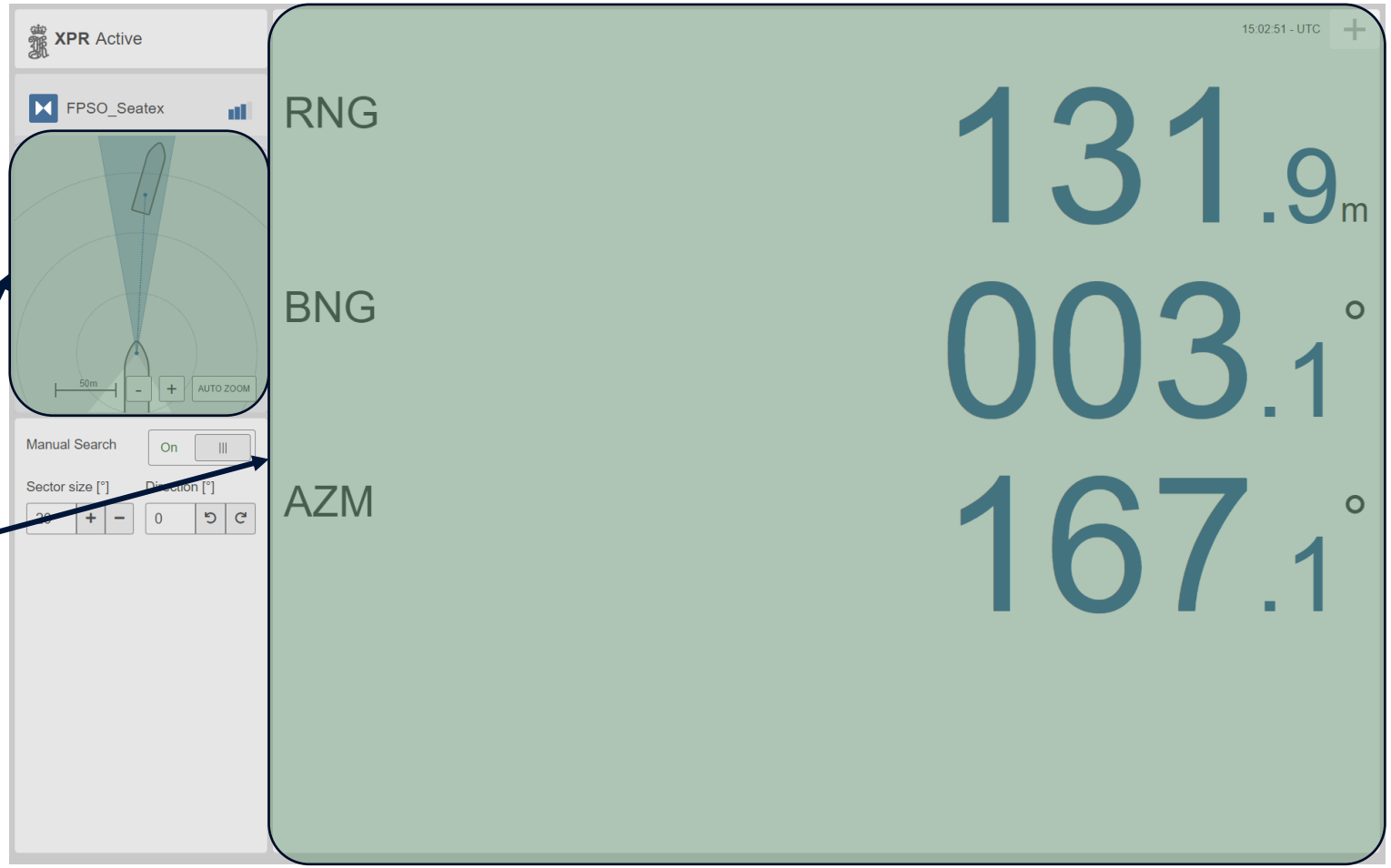
Range/Bearing View
- Clicking on this swaps the Range/Bearing view with the Polar Plot.



XPR

Main View

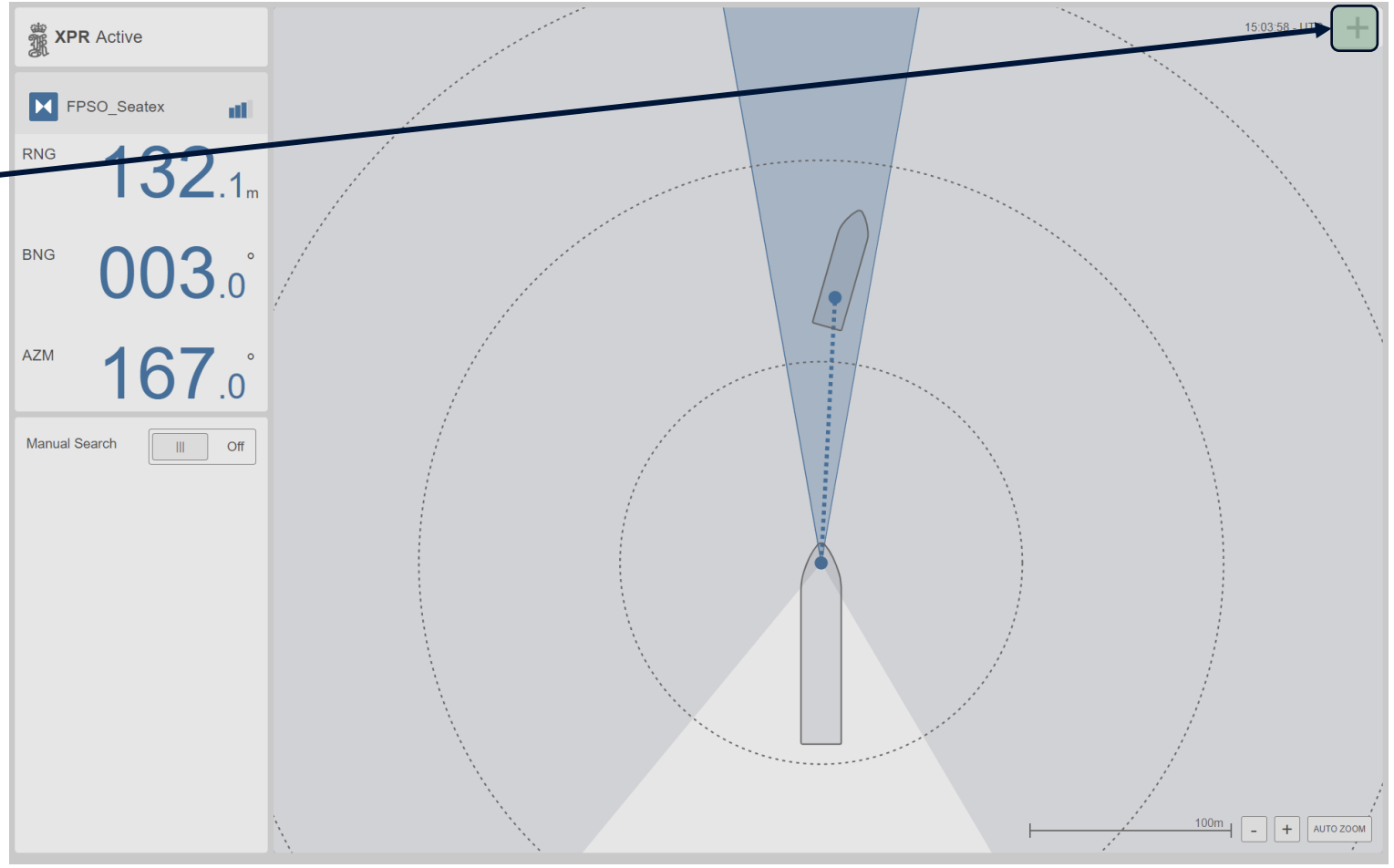
Swapped



XPR

Main Menu

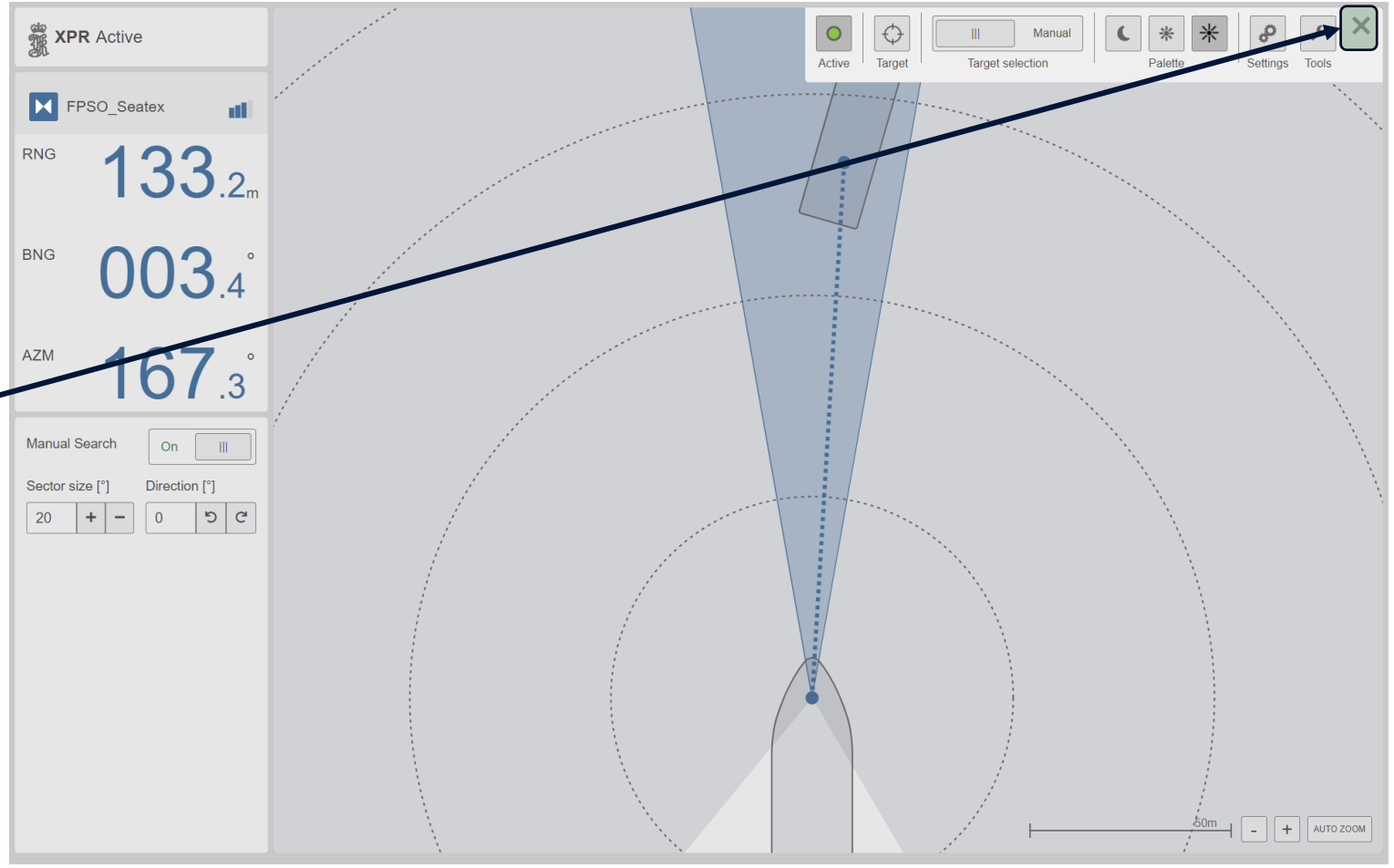
Main Menu
- Click on the **+** sign to open



XPR

Main Menu

Click on the **X** sign to close



XPR

Main Menu

Mode
- Green = Active
- Grey = Standby

Target List
- Target selection, only works in manual mode

Target Selection
- Manual mode: operator selects target from the target list
- Automatic mode: target is selected from the DP

Palette menu
- Provides colour schemes for the display presentation: Day white-Day black-Night

Settings Menu
- Provides parameters for configuration of the XPR system

Tools Menu
- Provides a set of tools to assist in various configuration and diagnostic tasks

XPR

Target Selection - 2 Options

Target selected manually by operator

Operator select target from target list

New targets can be added by operator

Target selected automatically by DP

Target is selected on DP and DP sends target selection to XPR

If target is missing in XPR the target is automatically added to the target list

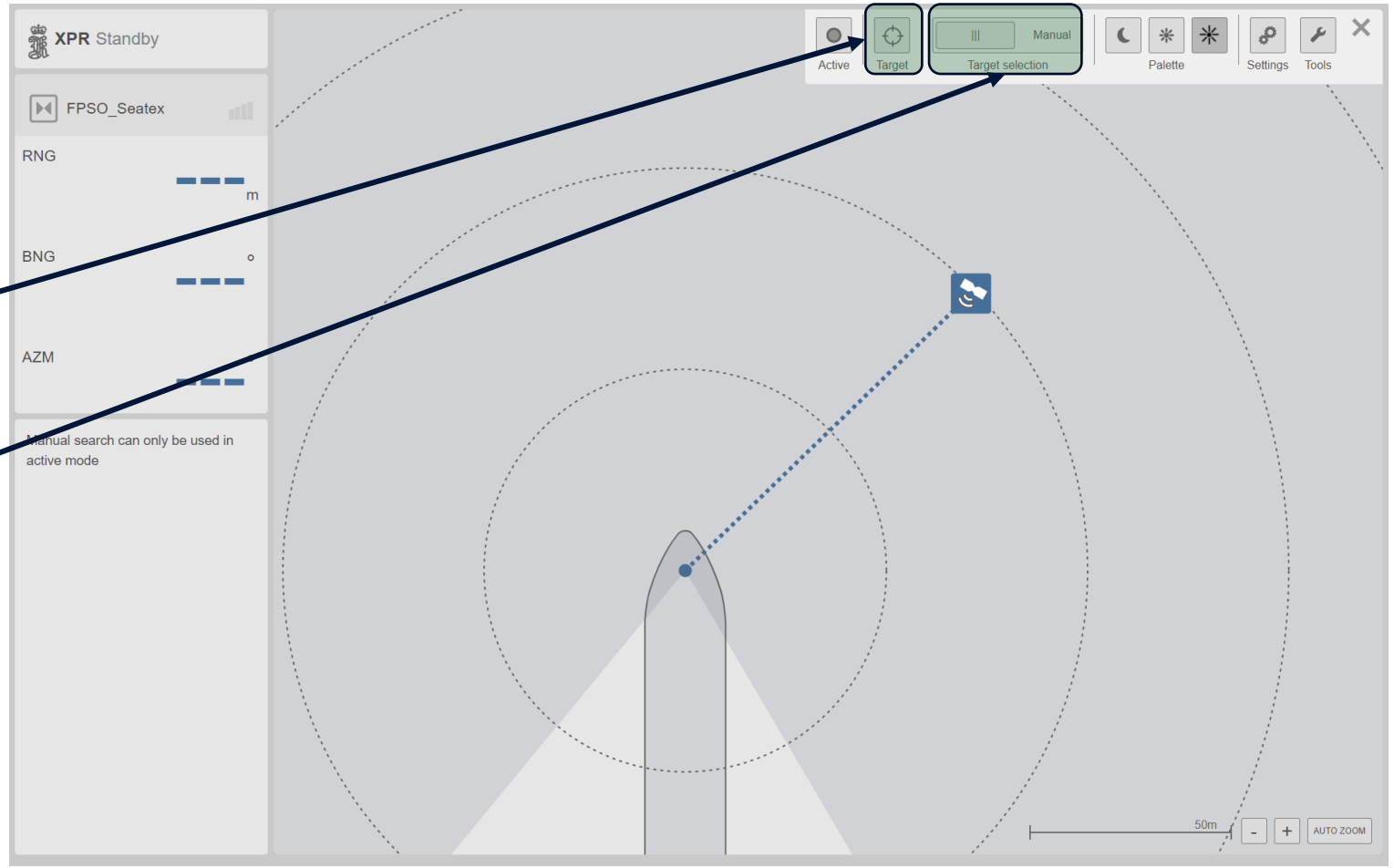
XPR

Target Selection

Manual Mode Target Selection

Manual mode must be selected

Click on Target to open target list



XPR

Target Selection

Manual Mode Target Selection

Select wanted target

Confirm by clicking OK

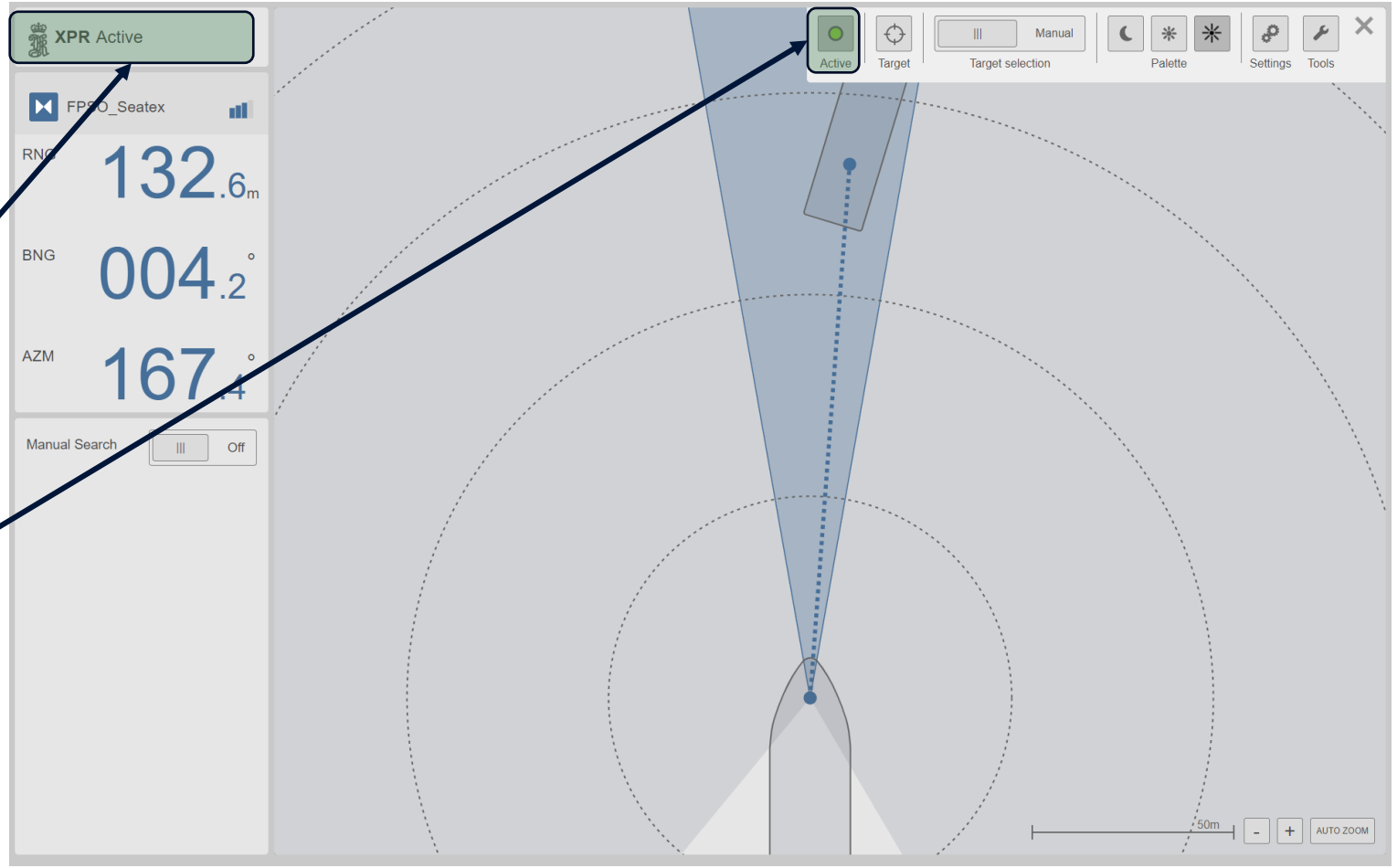
XPR

Target Selection

Manual Mode Target Selection

Selected target should now be seen in the target information view

Make sure that the XPR is set Active after target is selected



XPR

Search Methods

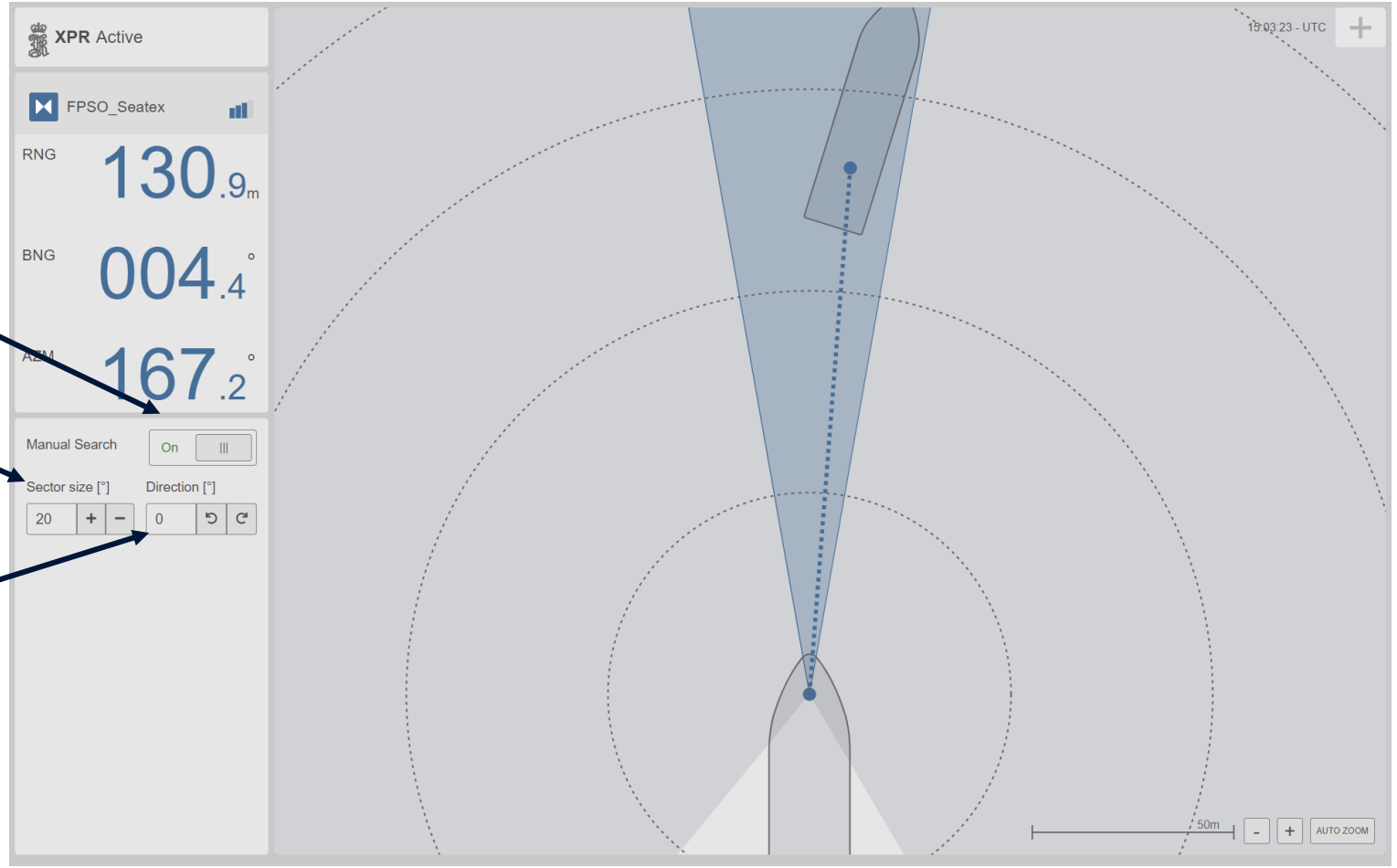
The XPR system have three possible search methods that can be used when the shuttle tanker approaches the FPSO

- Manual search
- Automatic search
- GNSS aided search

XPR

Search Methods

- Manual Search
- Select manual search
- Adjust search sector
- Adjust beam direction



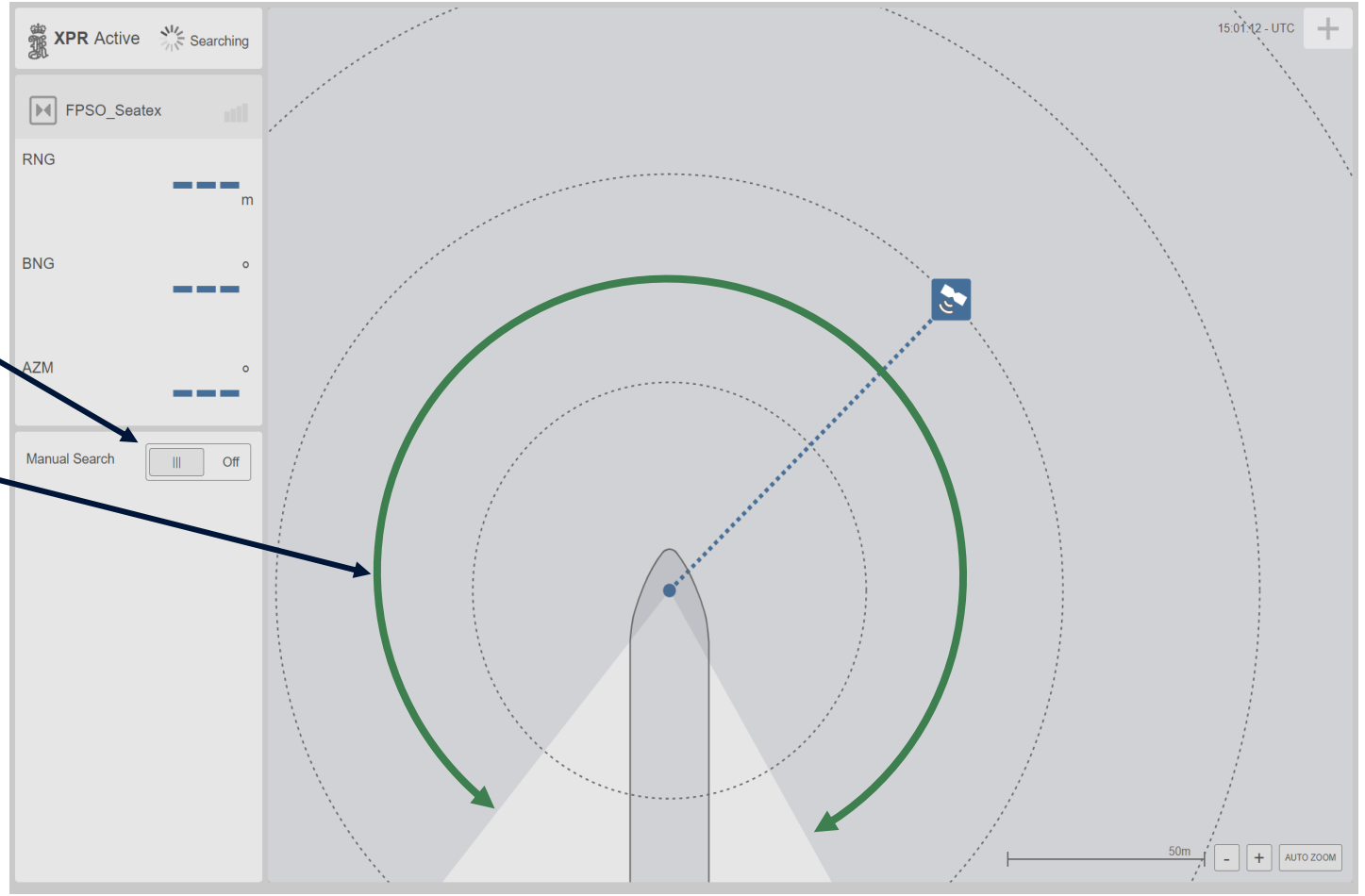
XPR

Search Methods - Automatic Search

Automatic Search

Turn manual search off

Search for targets within the operational sector

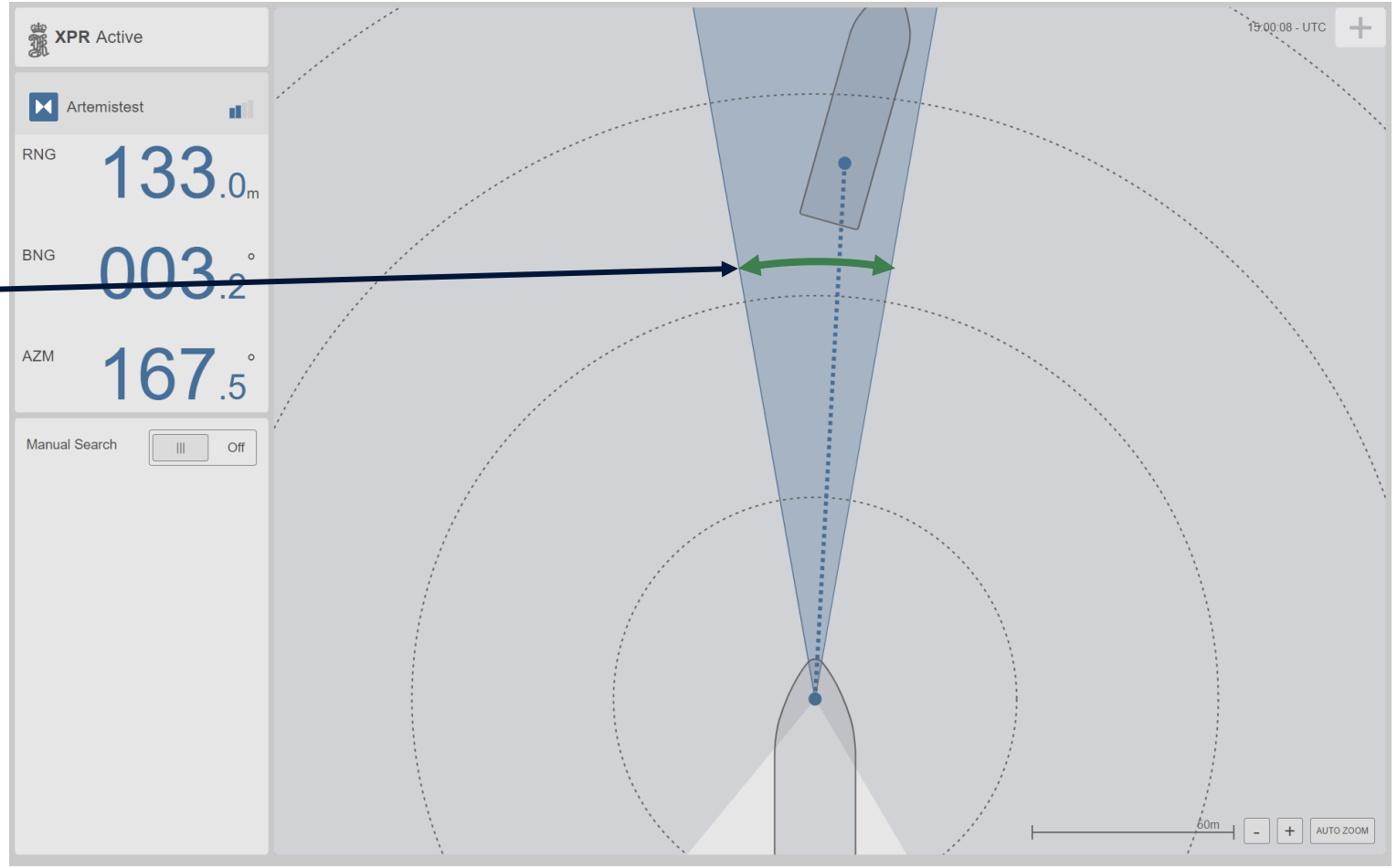


XPR

Search Methods

Automatic Search

Search sector reduced when target is located



XPR

Search Methods

AUTO SEARCH

Step 1

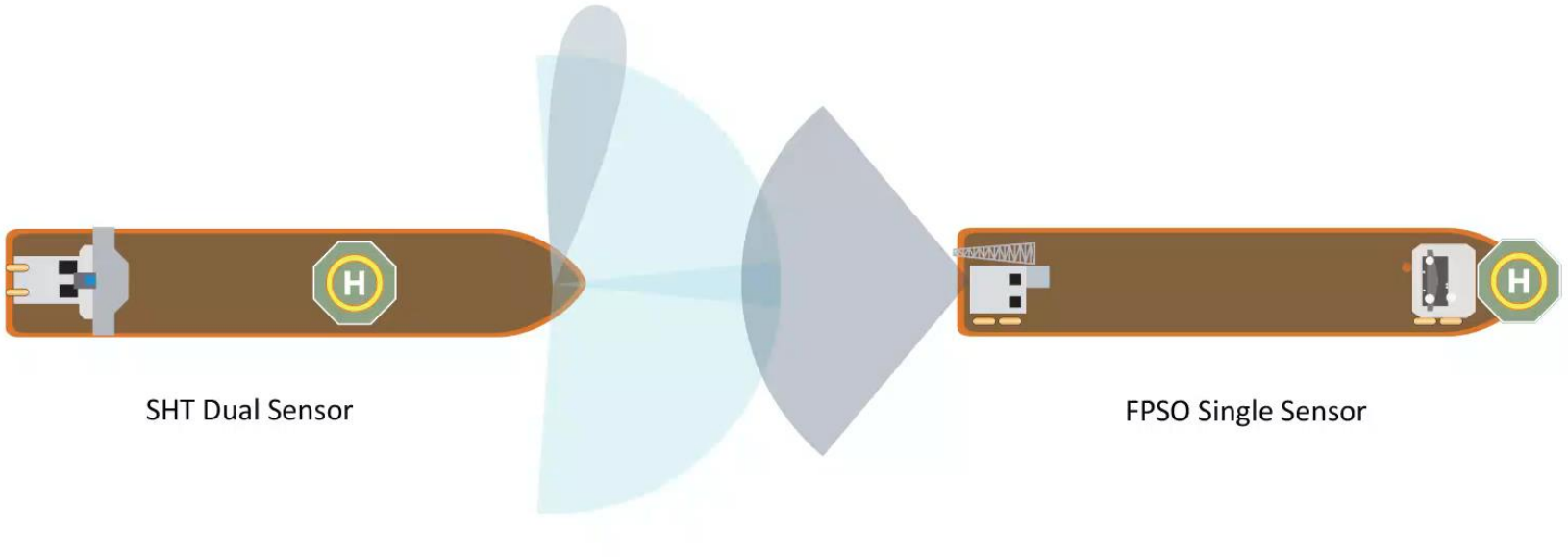
Full search in operational sector is performed

Step 2

Search sector reduced, target found

Step 3

Lock on target



XPR

Search Methods

- **GNSS Aided Search**
  - Requirements
    - GNSS position input to XPR
    - True heading input to XPR
    - Target configured with correct position in target list

XPR Technical Training

Course Content

- XPR Technical Training
  - XPR System Description
  - XPR Configuration
  - XPR Maintenance
  - XPR Service/Troubleshooting

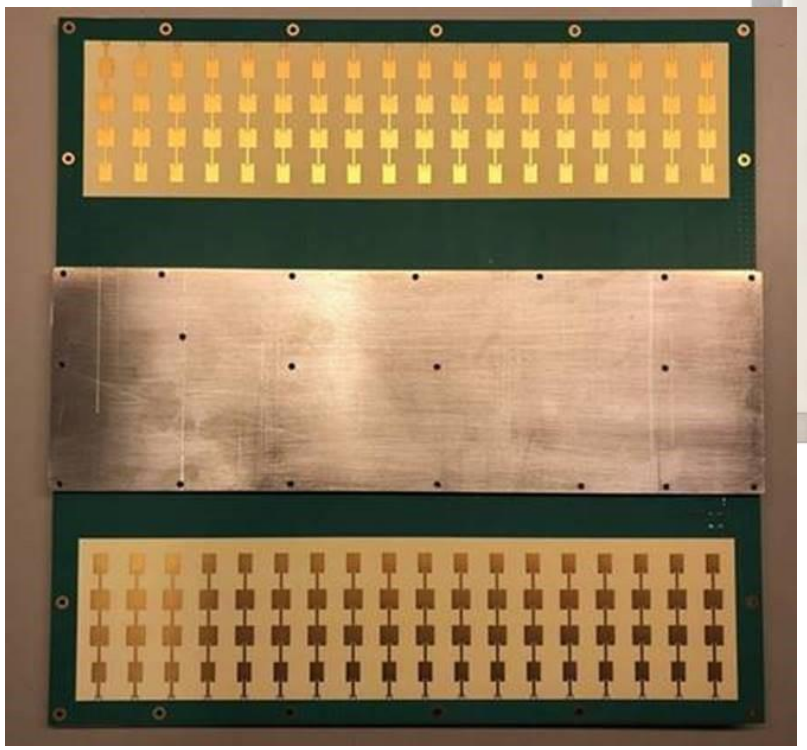
XPR Technical Training

Course Content

- XPR Technical Training
  - XPR System Description
  - XPR Configuration
  - XPR Maintenance
  - XPR Service/Troubleshooting

XPR

Hardwares



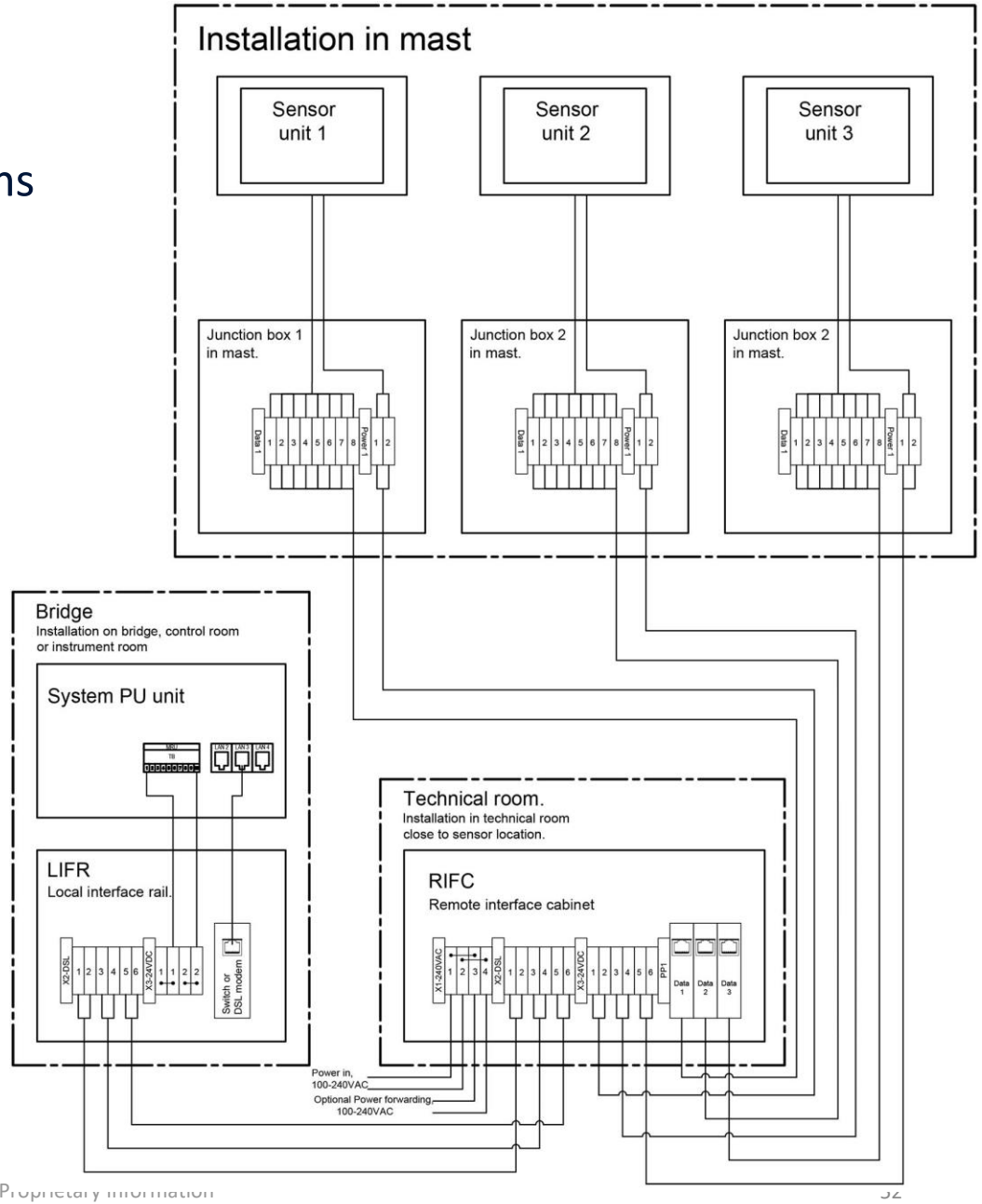
XPR

Triple Systems

Maximum three panel/sensor can be connected to one PU

Each panel/sensor has its own junction box (JB)

Cables are run from the JB to the Remote interface cabinet (RIFC) in a technical room, close to sensor location

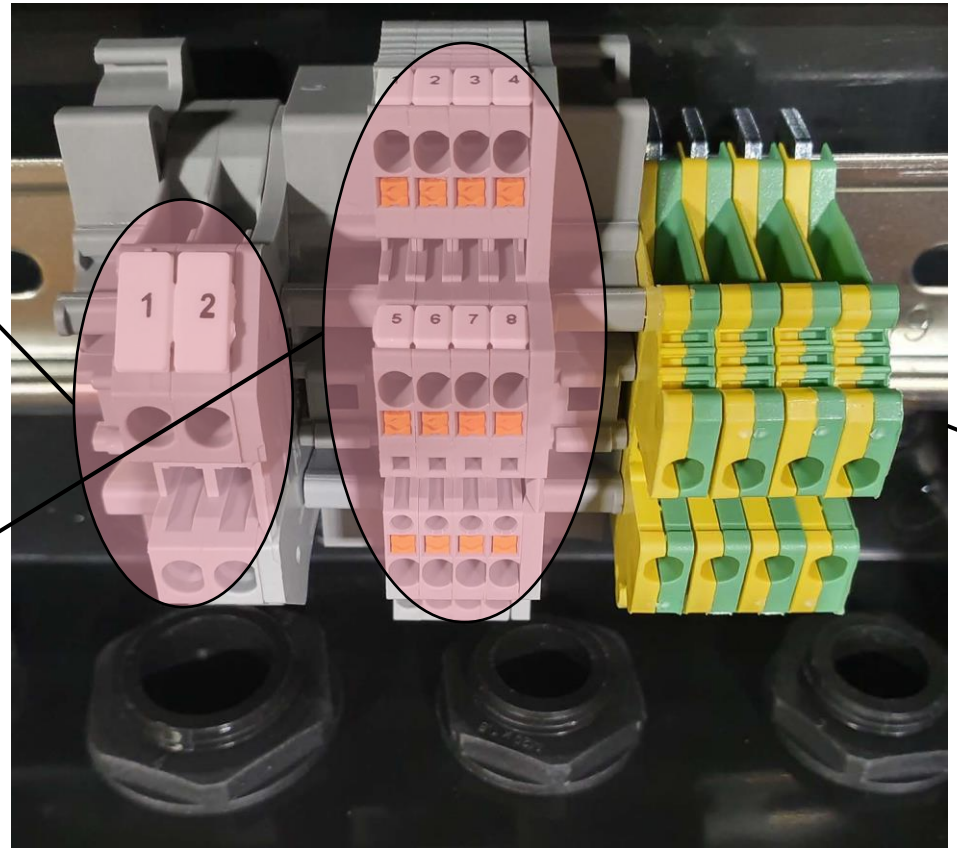


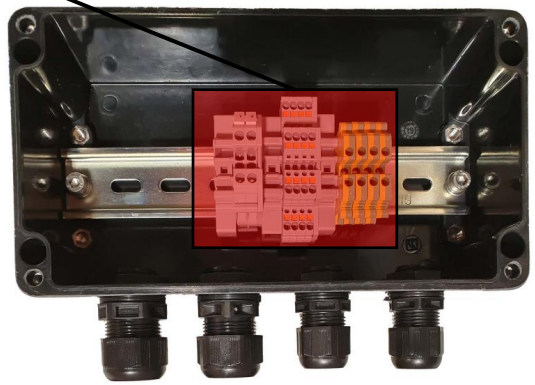
XPR

Junction Box

24 VDC to sensor:
1 – Blue +
2 – Black -

Data line to sensor:
1 – Orange/White
2 – Orange
3 – Green/White
4 – Blue
5 – Blue/White
6 – Green
7 – Brown/White
8 - Brown

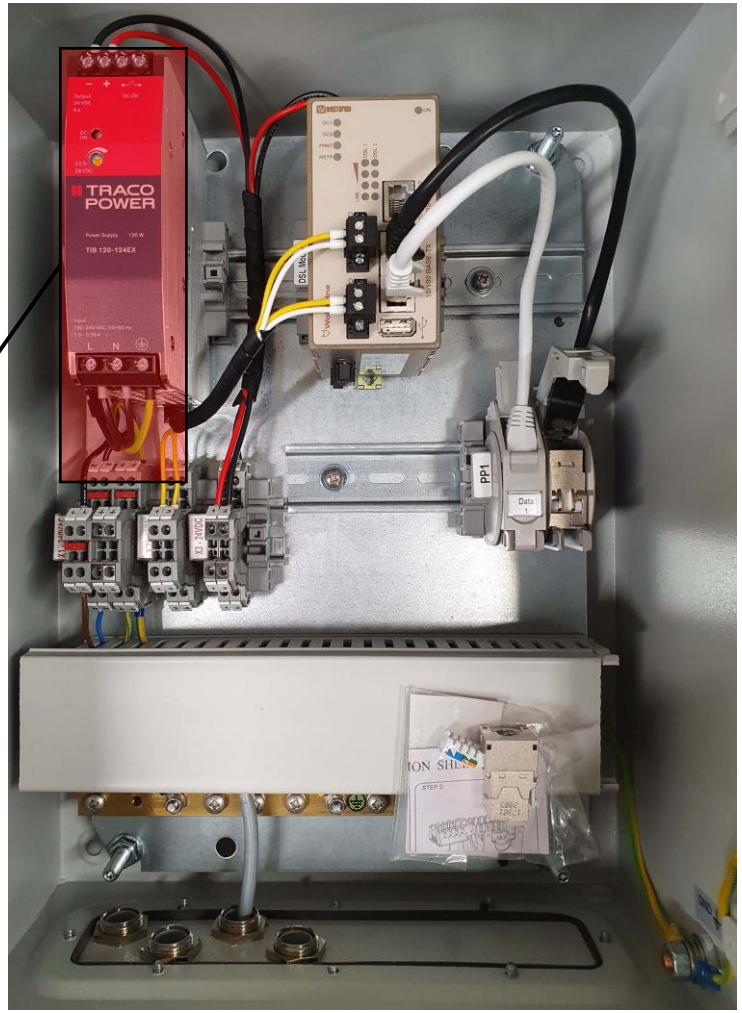




XPR

Remote Interface Cabinet (RIFC)

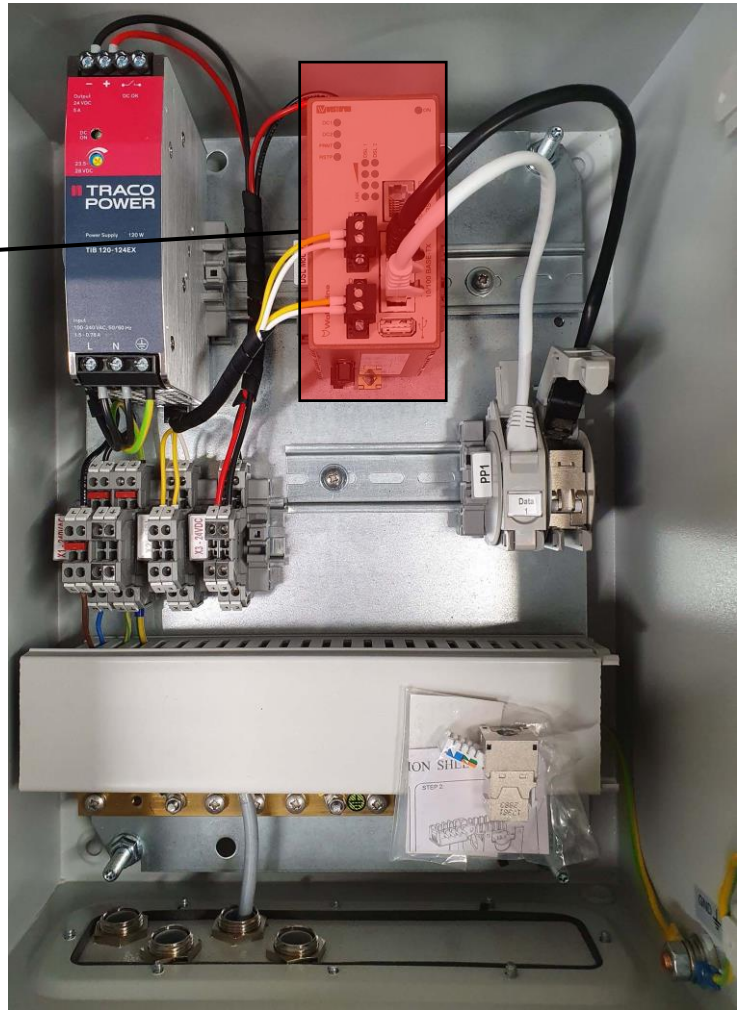
One 24 VDC power supply for each sensor unit installed



XPR

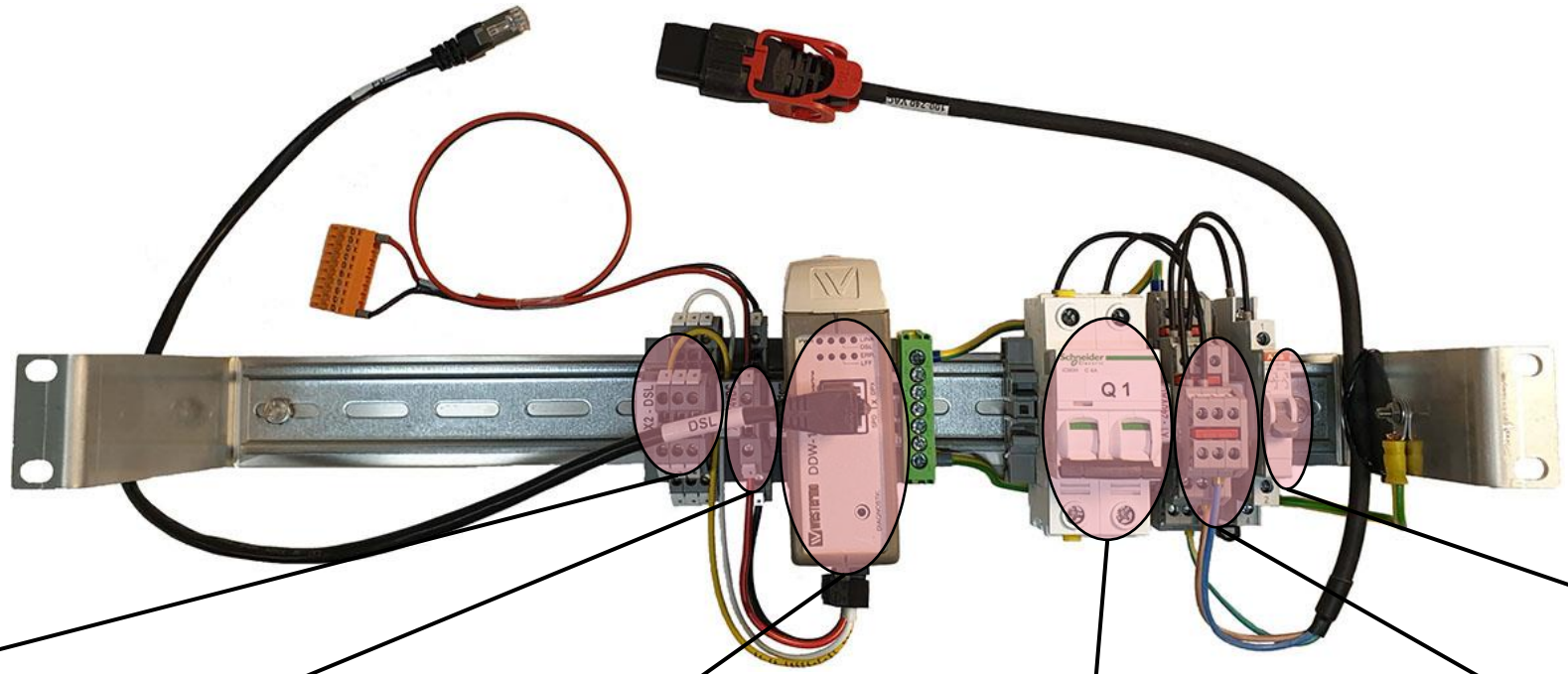
Remote Interface Cabinet (RIFC)

DSL modem for serial line communication to another DSL modem in the Local interface rack (LIR) on the bridge



XPR

Local Interface Rail



Connection of DSL line to Remote Interface Cabinet
1/2 – DSL line 1
3/4 – DSL line 2, optional
5/6 – DSL line 3, optional

Power connection for DSL modem and switch, 24 VDC

DSL modem, for DSL line to Remote Interface Cabinet

Fuse 4A. Power to system monitor

240 VAC. Power distribution for system

Main switch for system

XPR

Processing Unit (Front)

Behind the lid on the left:

- Power switch
- LAN1, network connector, User configurable
- USB port for software upgrades, backup and to copy log files out from the system

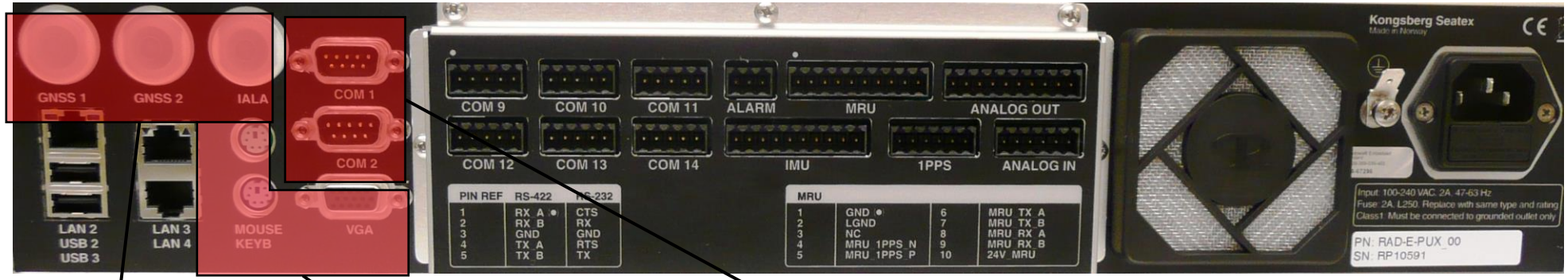
XPR

Processing Unit (Front)

There are 4 light indicators on the front
- LED 1, left most, Power/SW LED
- LED 4, right most, Network card status
- LED 2 & 3, No function in this system

XPR

Processing Unit (Rear)



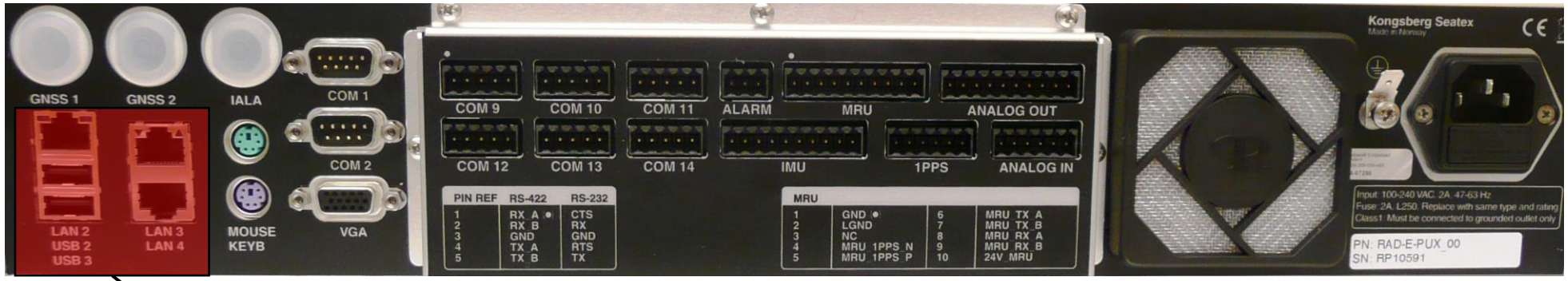
GNSS 1 – GNSS 2 – IALA
Not used by this system

Mouse – Keyboard- Monitor connectors

COM1 –COM2
RS-232 user configurable

XPR

Processing Unit (Rear)



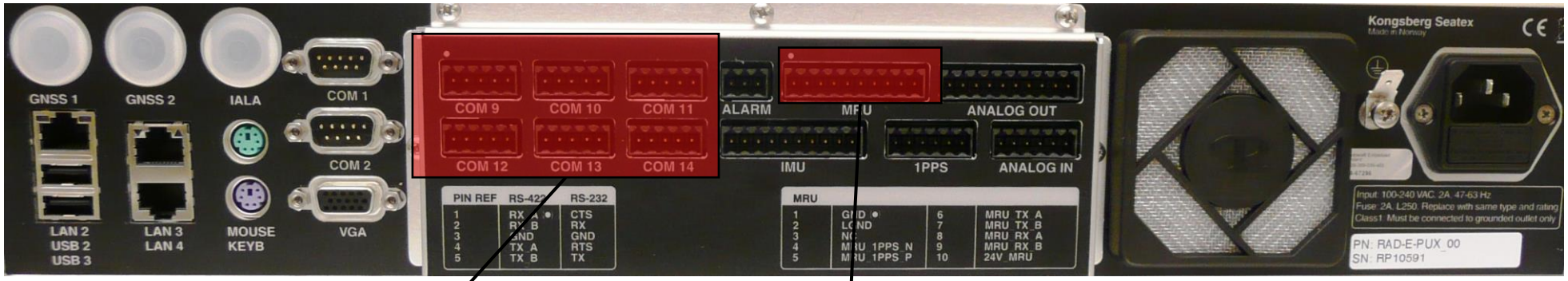
LAN 2 – User configurable
LAN 3 – User configurable
LAN 4 – User configurable

USB 2 & 3 – User configurable

Port		(IP) address
LAN 1	At the front. Reserved for support	192.168.4.55
LAN 2	Sensor units (Local interface rail/DSL modem) optional DSL line or distribution of data	192.168.1.55
LAN 3	Sensor units (Local interface rail/DSL modem)	192.168.2.55
LAN 4	User configurable	192.168.3.55

XPR

Processing Unit (Rear)

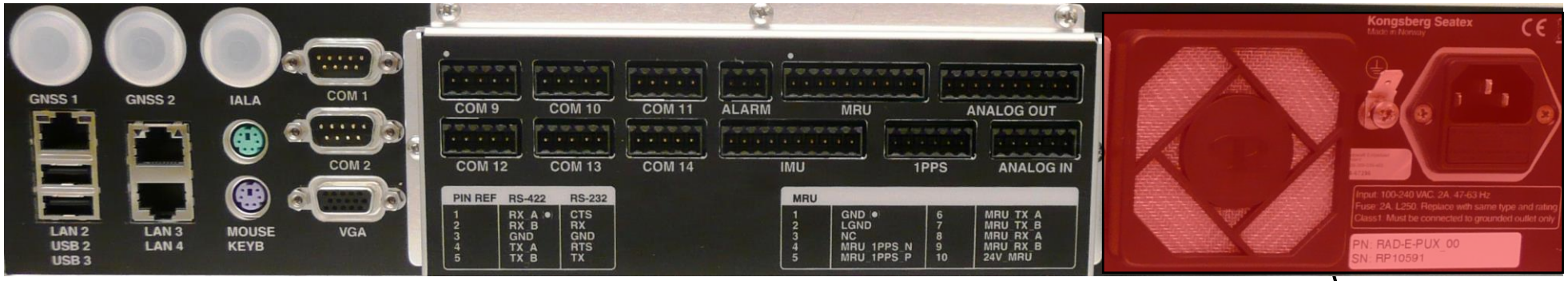


COM9 to COM14
RS-422, user configurable

MRU
Power to DSL modem in
Local Interface Rail (LIR)

XPR

Processing Unit (Rear)



Power input, 100 to 240 V AC 50/60 Hz
Fuse, integrated in Power connector

Cooling fan, with filter

XPR

Bracket for three panels

Installed bracket for three XPR panels (sensors)

XPR

Three panels installed

Three XPR panels (sensors) installed

XPR Technical Training

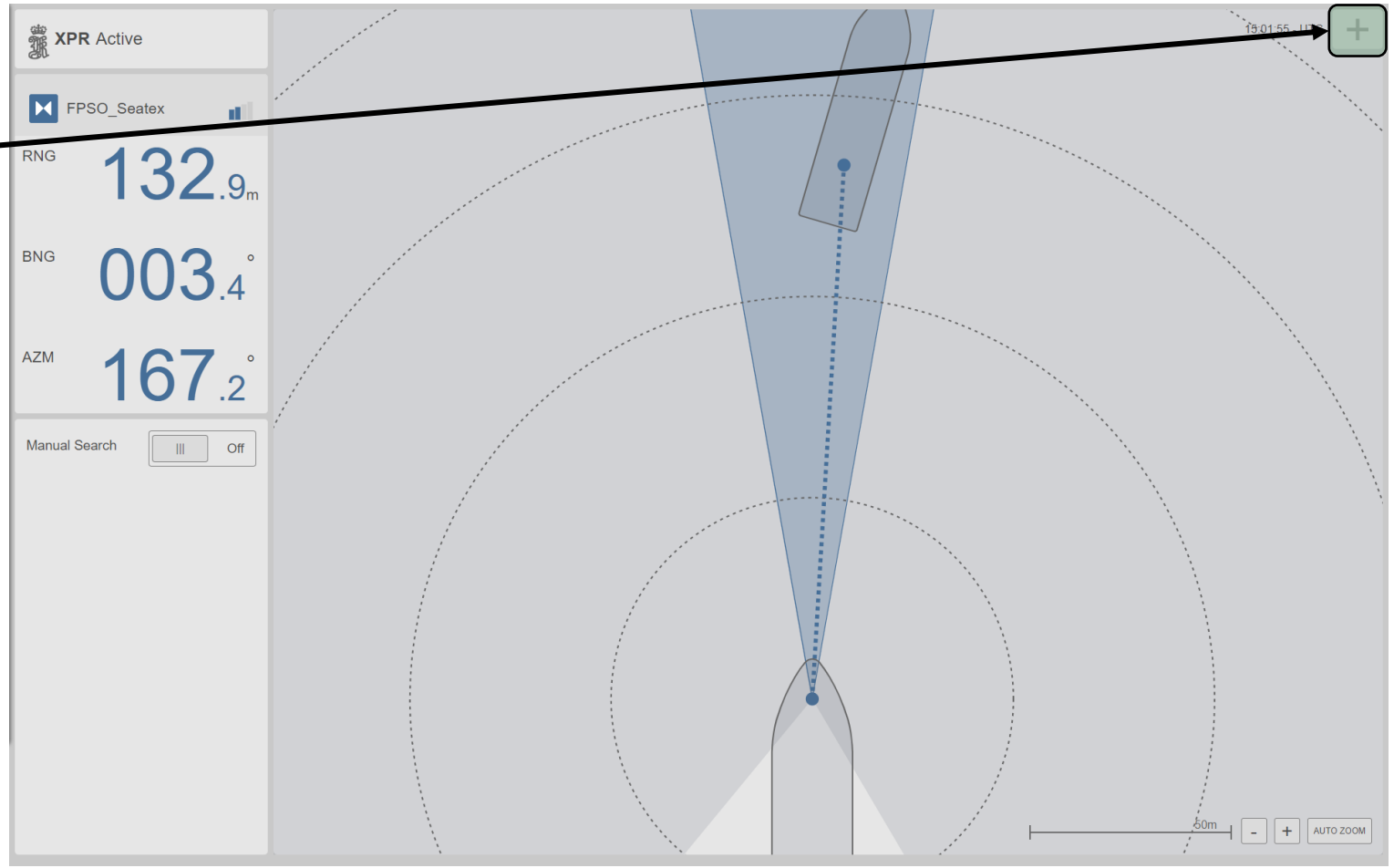
Course Content

- XPR Technical Training
  - XPR System Description
  - XPR Configuration
  - XPR Maintenance
  - XPR Service/Troubleshooting

XPR

Configuration

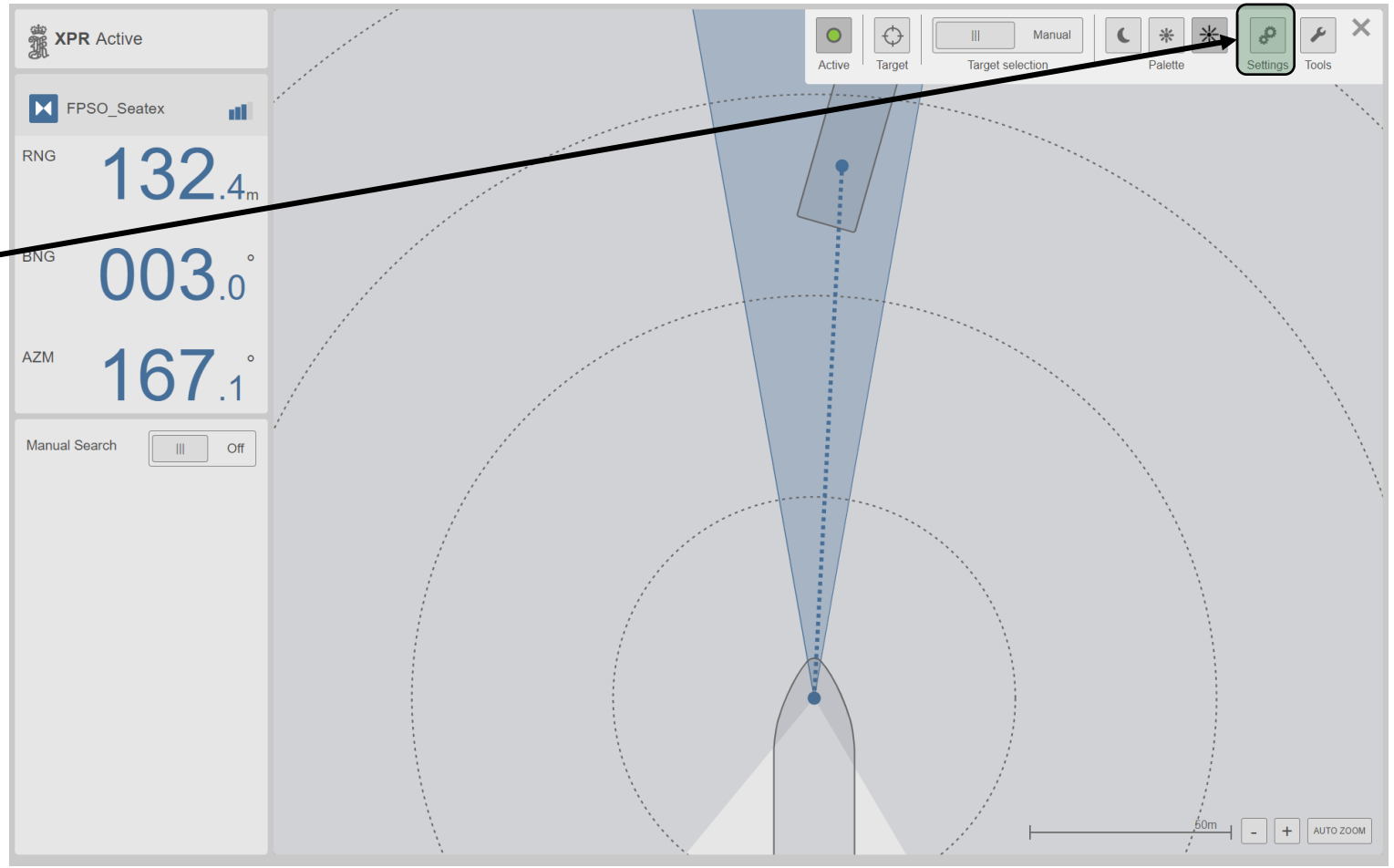
Click on the **+** sign to open main menu



XPR

Settings Menu

Click on Settings

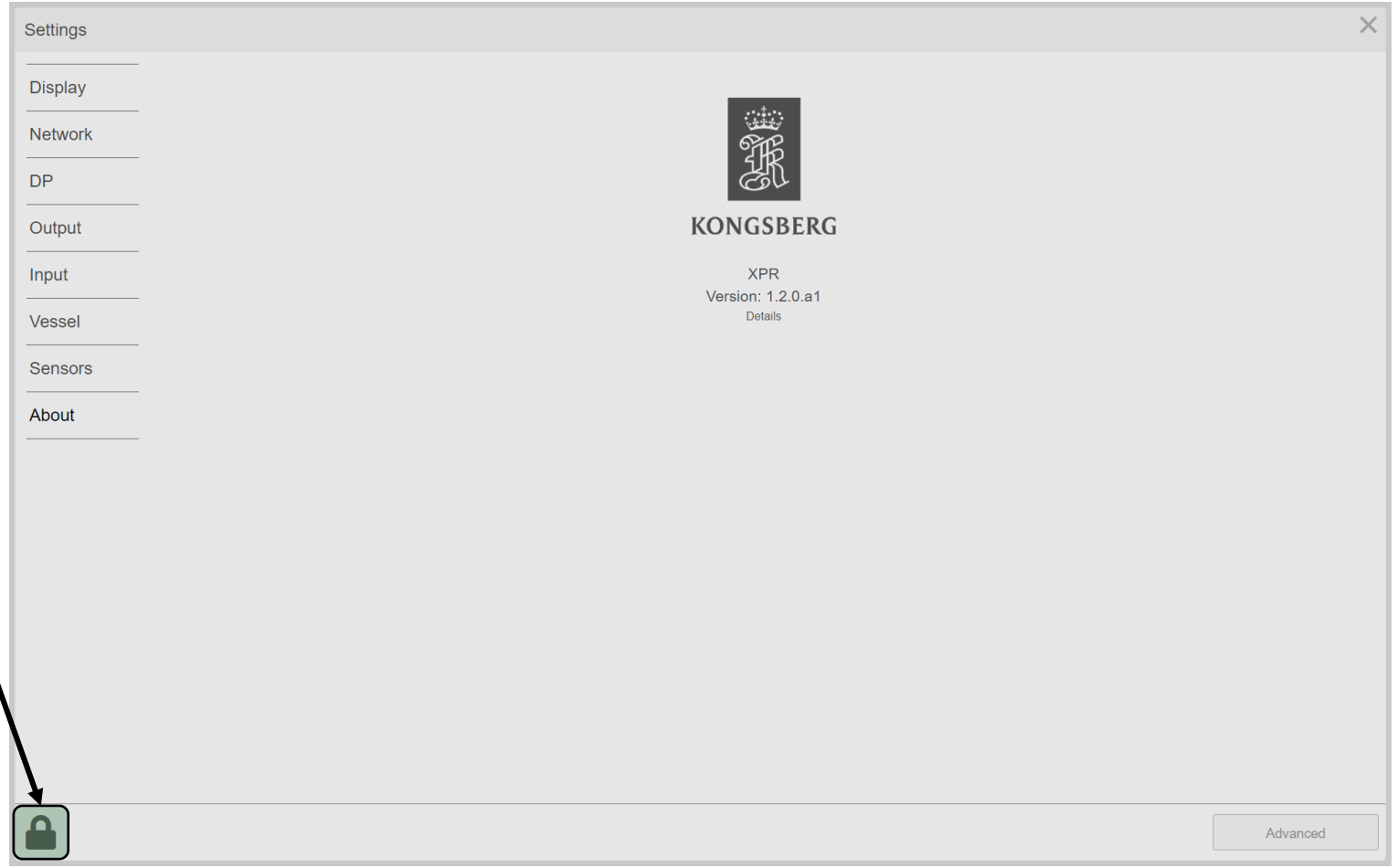


XPR

Settings Menu

By default, the system is locked for editing

To unlock click on the «lock» symbol

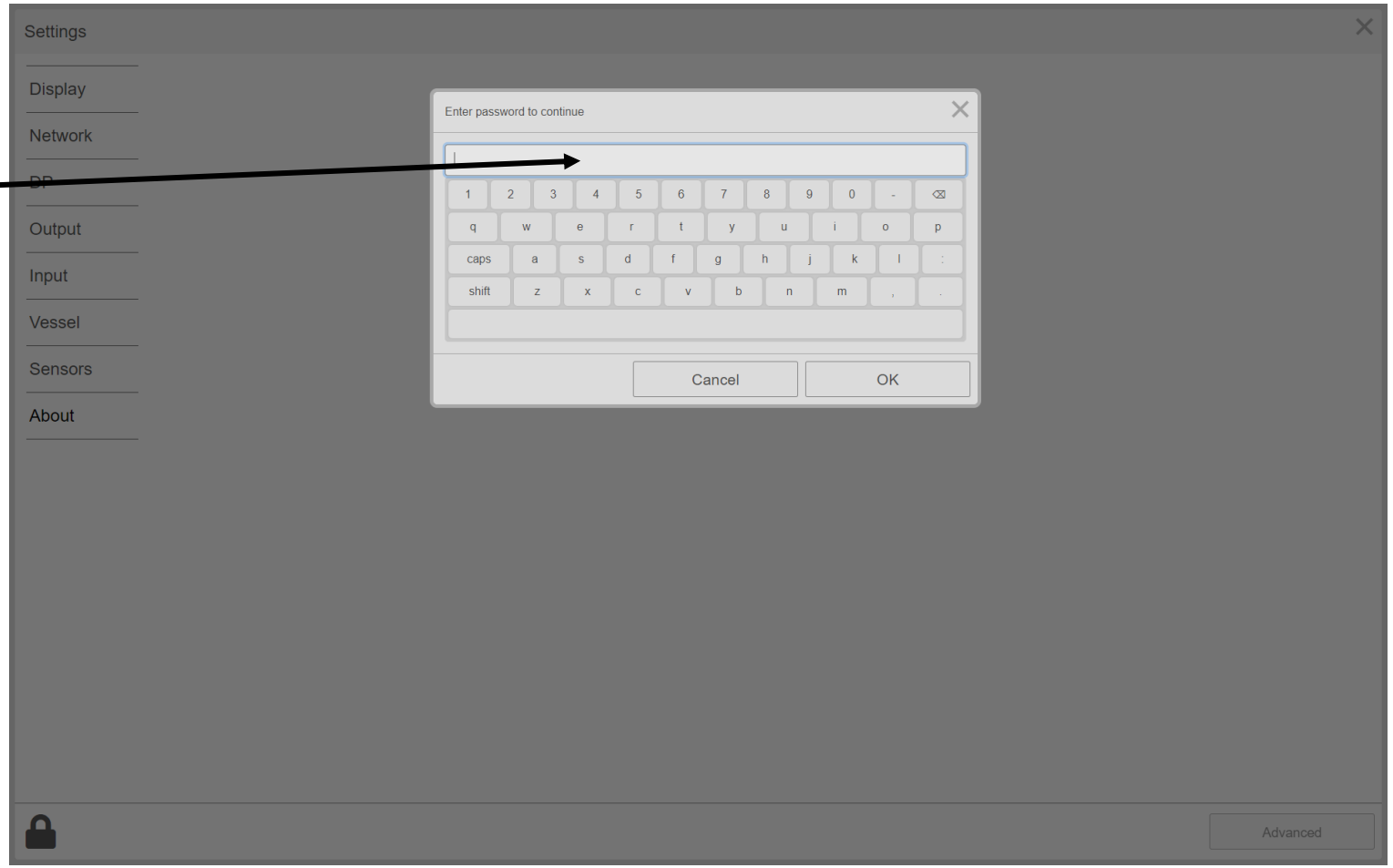


XPR

Settings Menu

Type in the password, by using the onscreen keypad or the keyboard

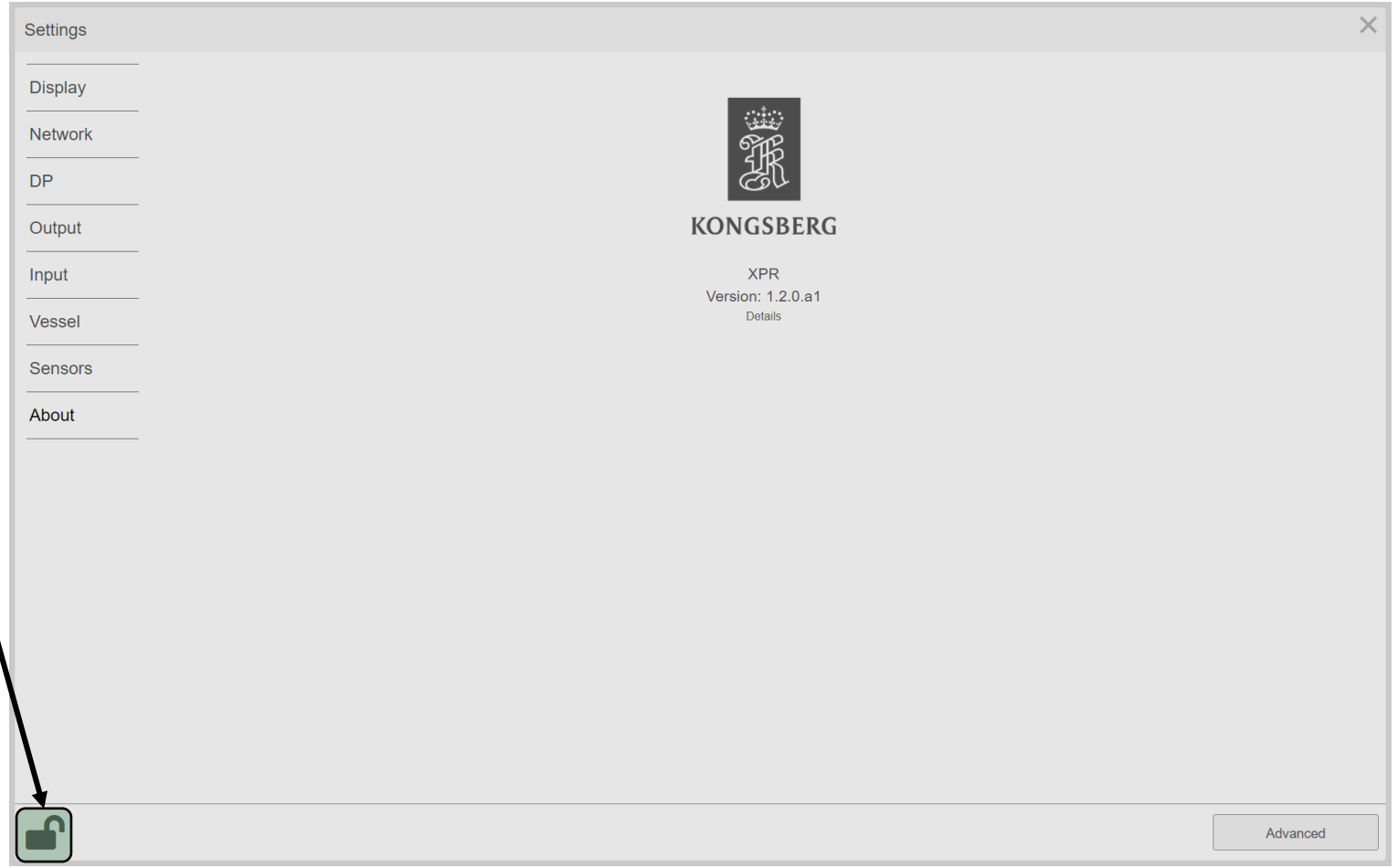
The password is «stx»
Note: the password is case sensitive



XPR

Settings Menu

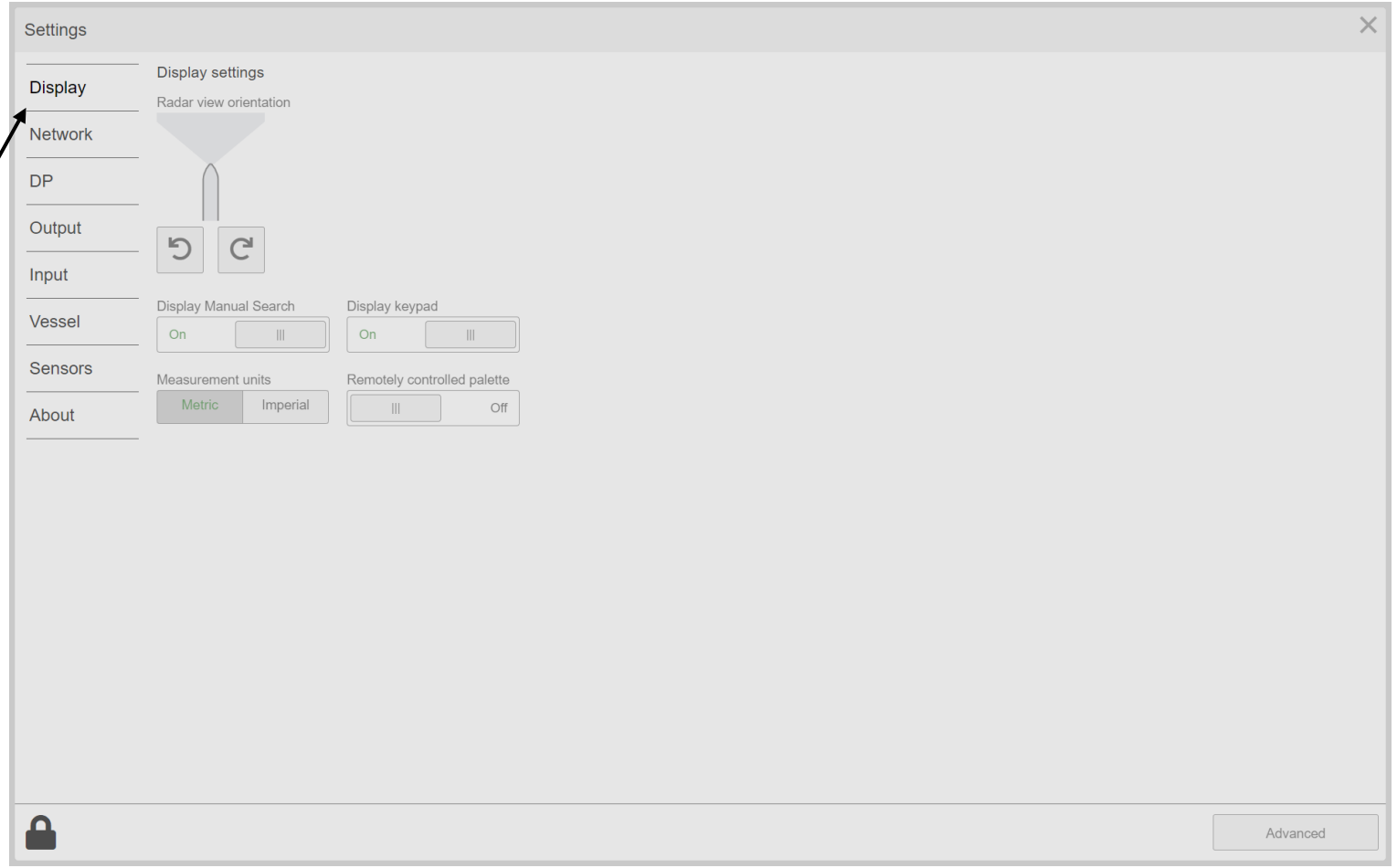
XPR shows «un-lock», and configuration can be changed



XPR

Settings Menu

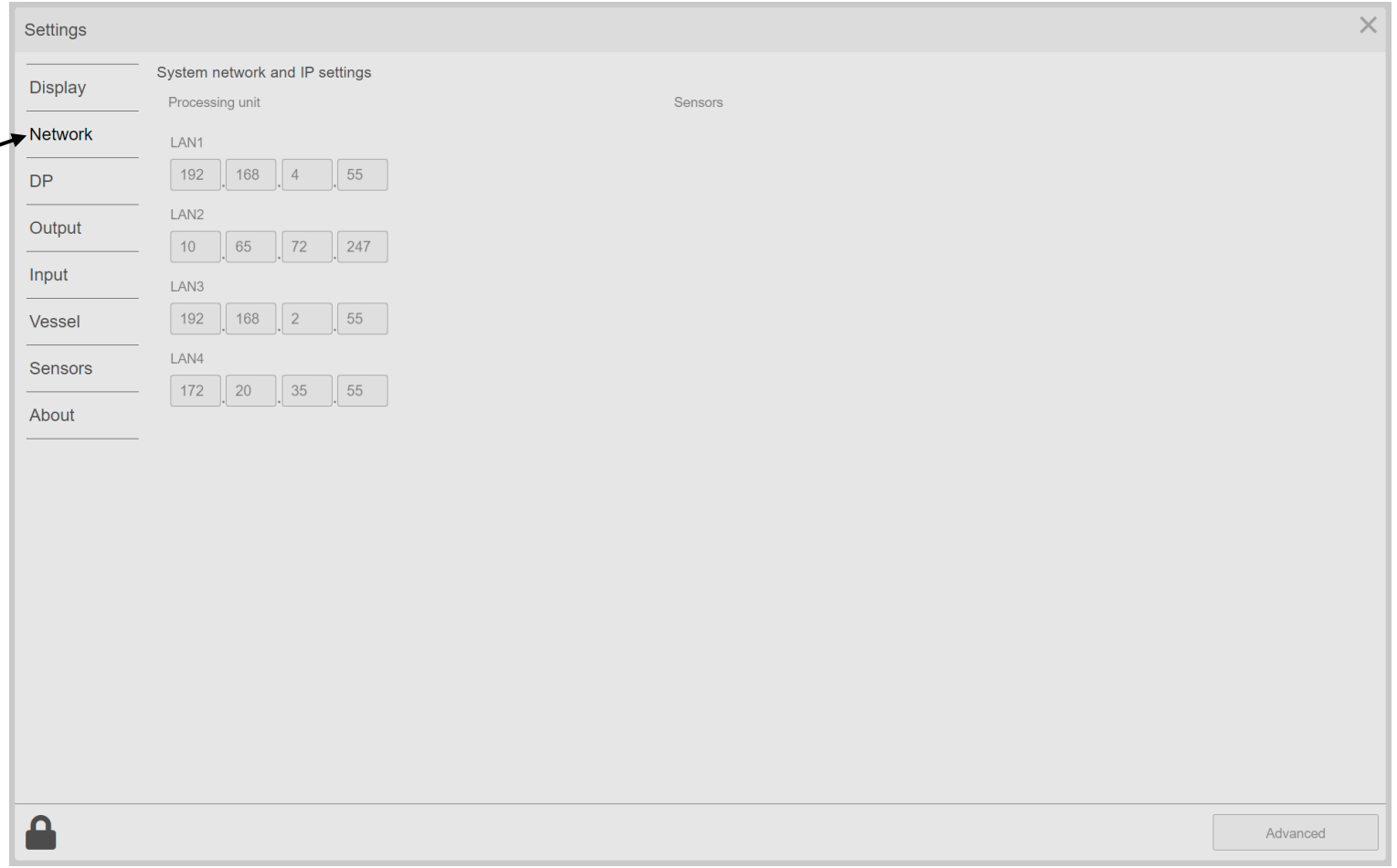
Display settings:
- View orientation
- On/off the display of manual search
- On/off the view of the display keypad
- Select measurements units
- On/off remotely controlled palette



XPR

Settings Menu

Network settings:
Adjust IP-address for the different interfaces



XPR

Interfaces

Typical XPR interfaces through serial or network

DP-interface
Relative position

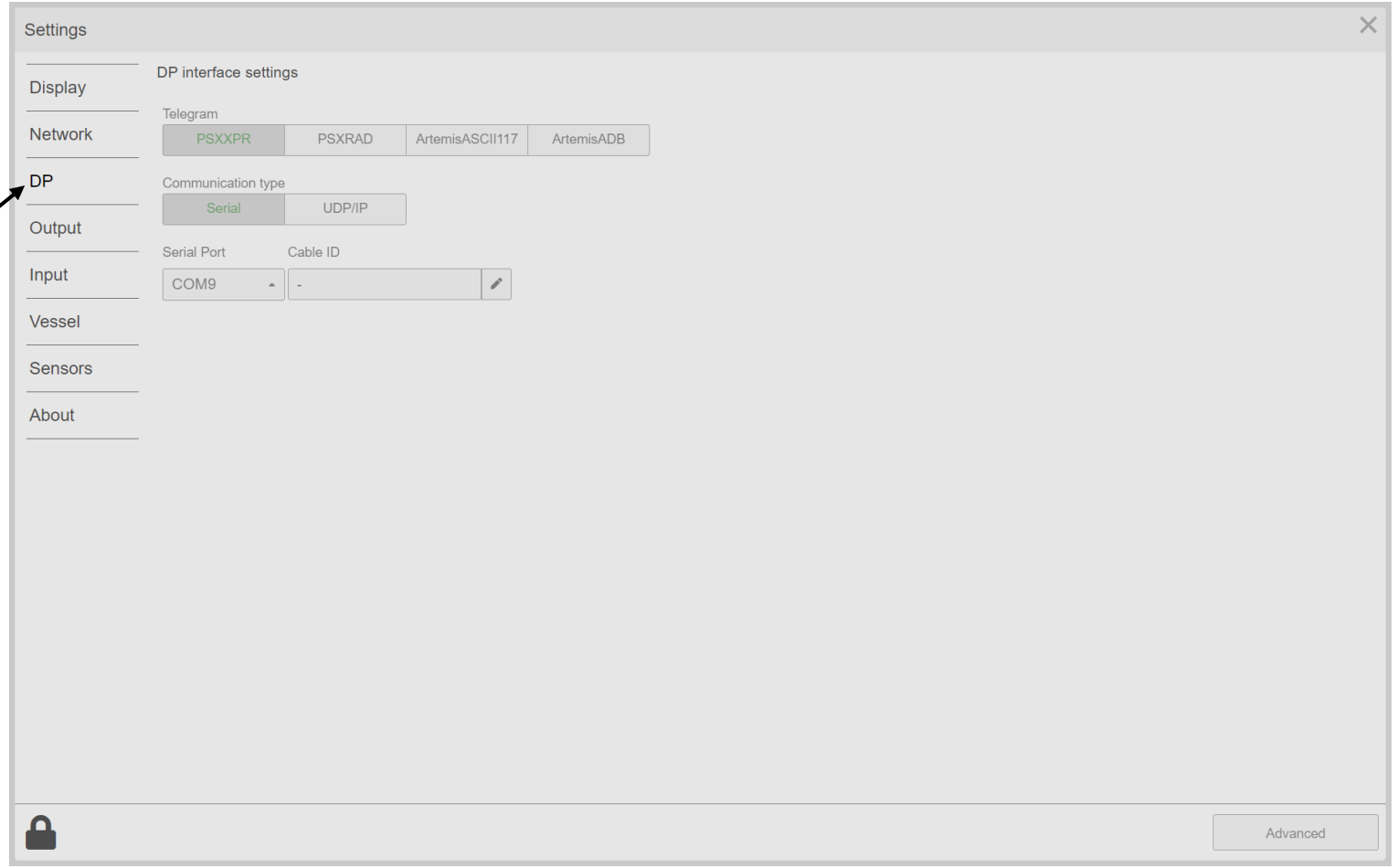
DARPS-interface
Target selection, heading, position

Data logger, Blom/Parker Maritime, relative position

XPR

Settings Menu

DP interface settings:
- Telegram type
- Communication type, either Serial or UDP/IP
- Serial port
- Cable ID, marking on the serial cable

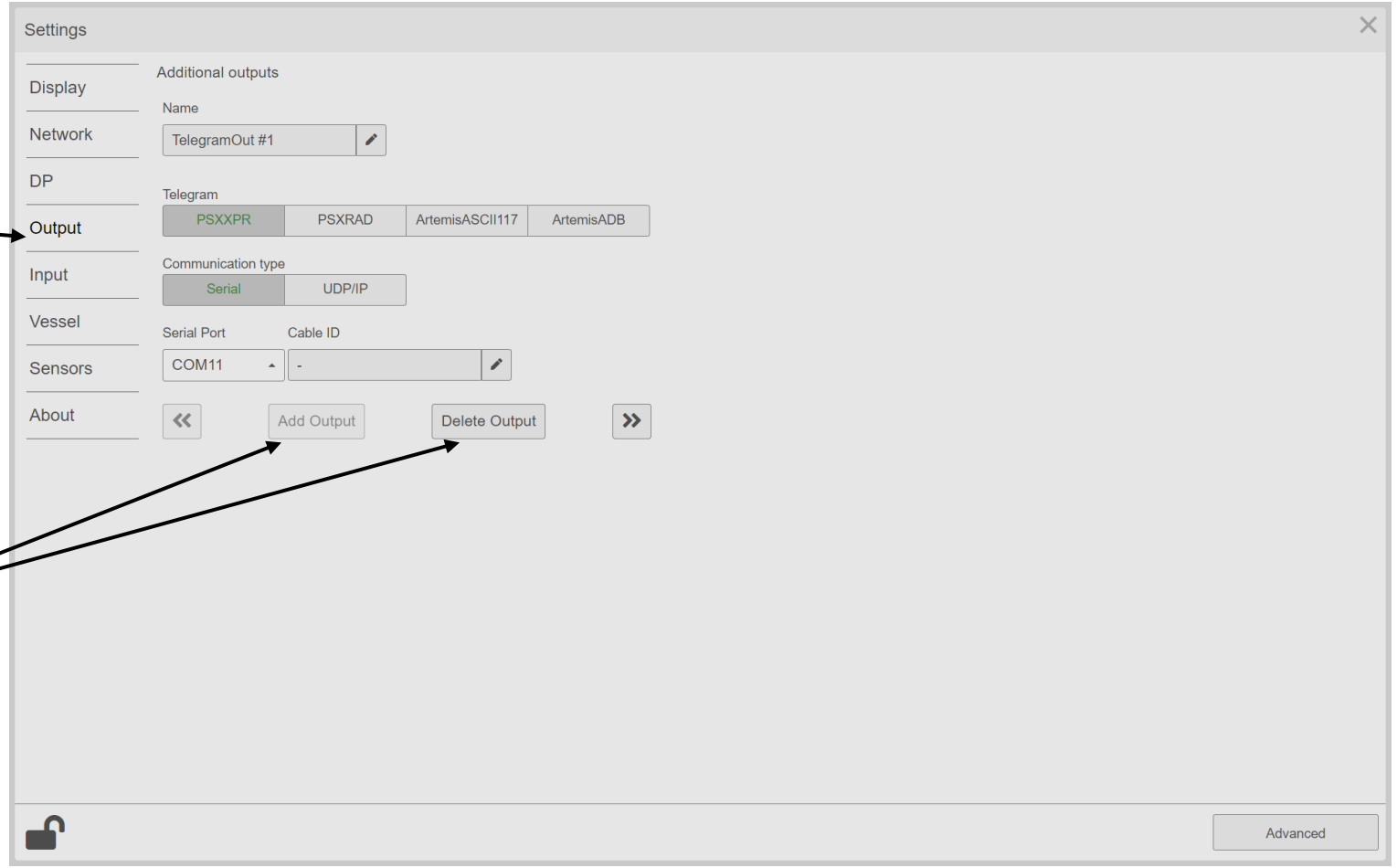


XPR

Settings Menu

Output settings:
Up to five additional outputs from the XPR can be configured.

Add or Delete output is used to remove and output or add a new one

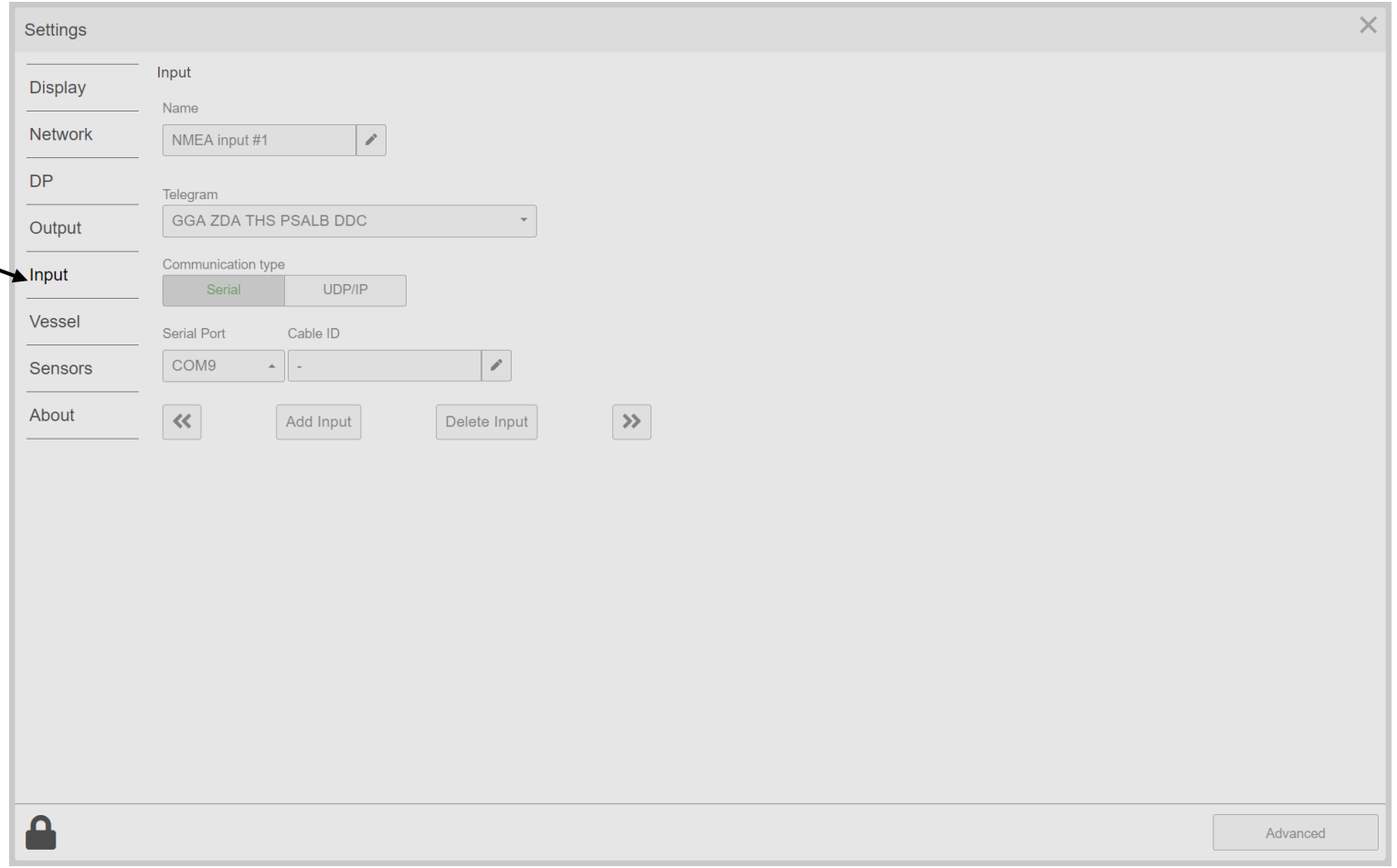


XPR

Settings Menu

Input settings: Configure automatic target selection from DARPS or DP

XPR will selects target and enter active/standby mode automatically

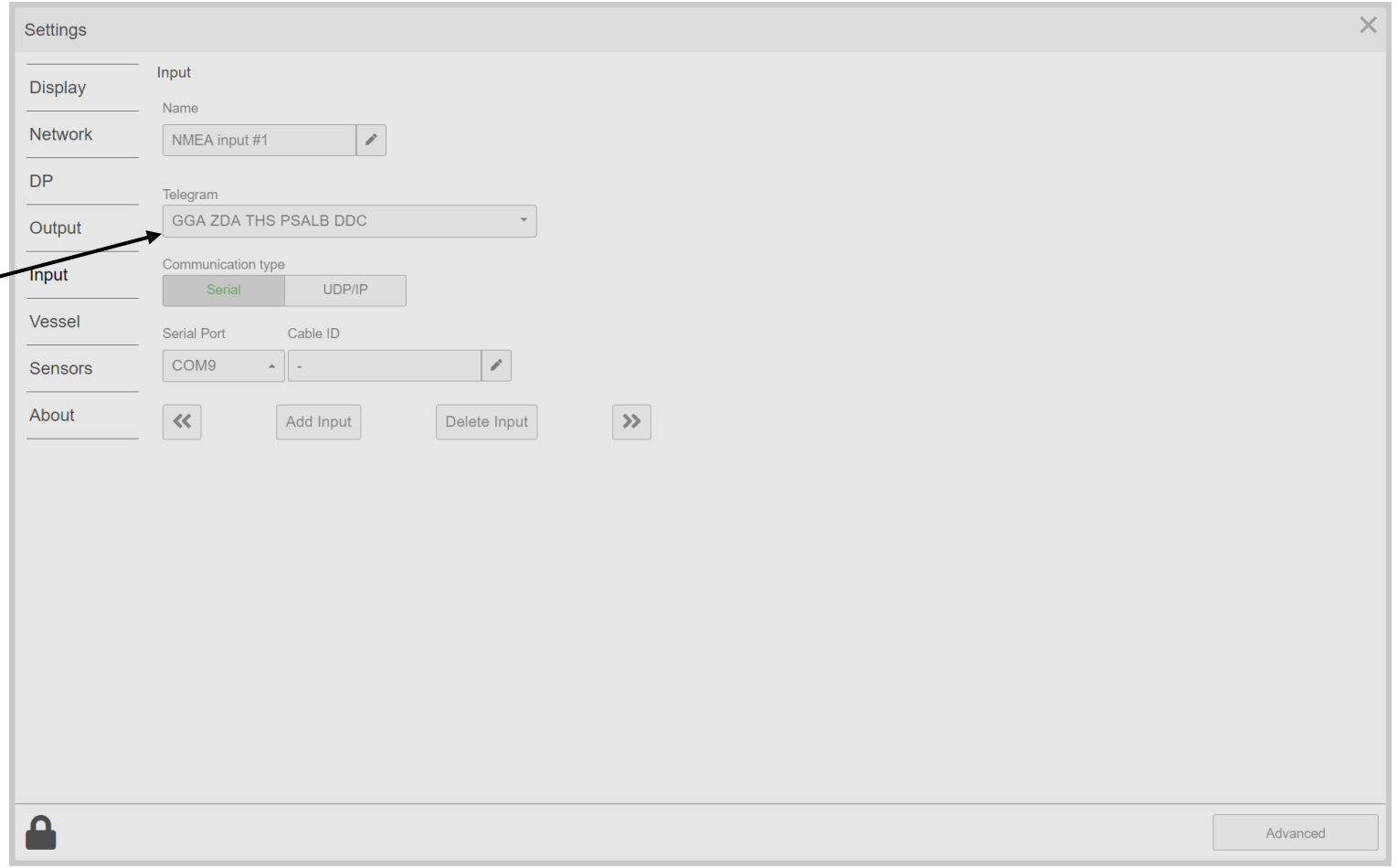


XPR

Settings Menu

Required input:
-PSALB, target selection
-GGA, position
-THS/HDT, heading

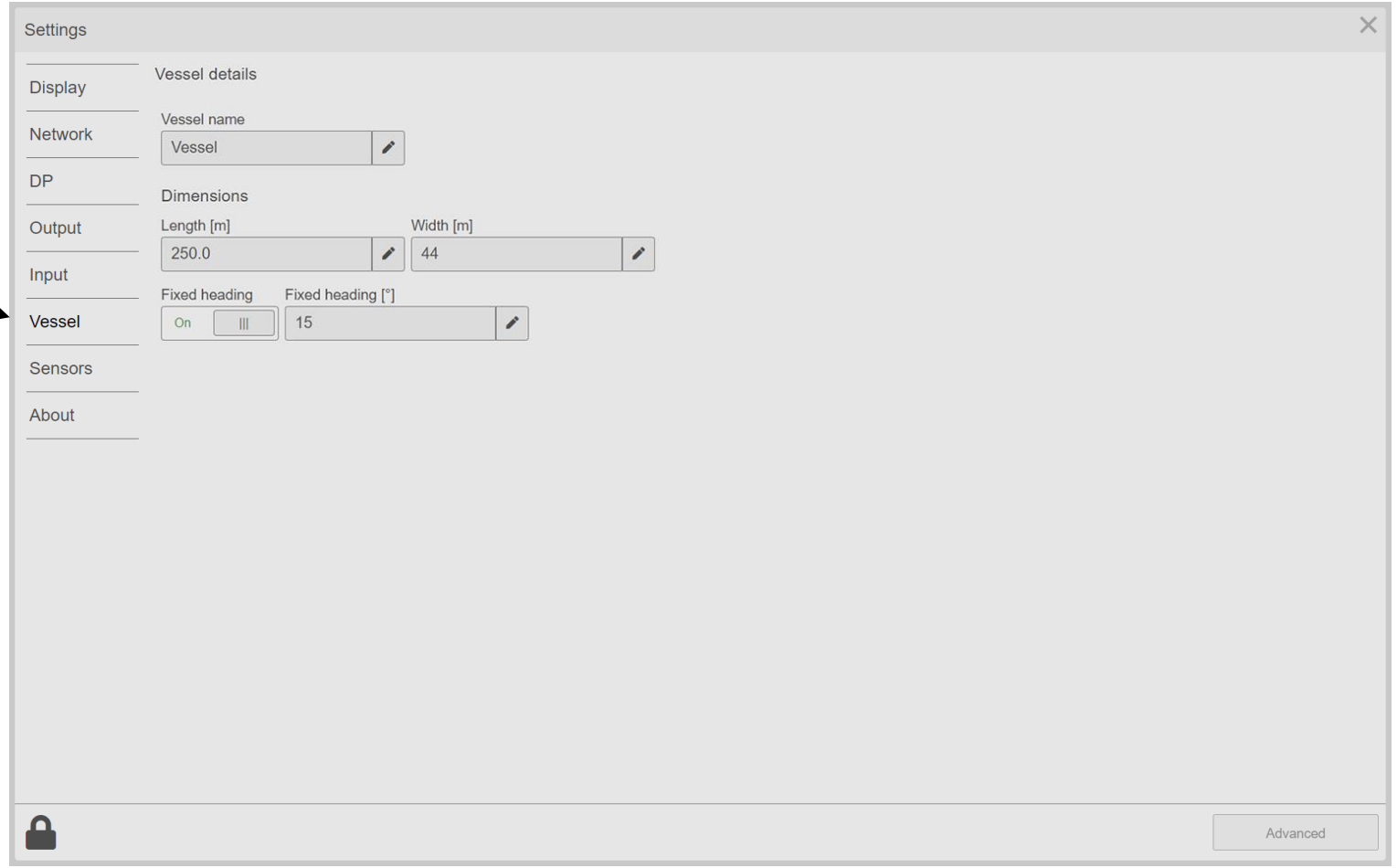
Optional input:
-ZDA, time and date



XPR

Settings Menu

Vessel setting:
- Name
- Length and width
- On/off fixed heading, if there is no gyro input.

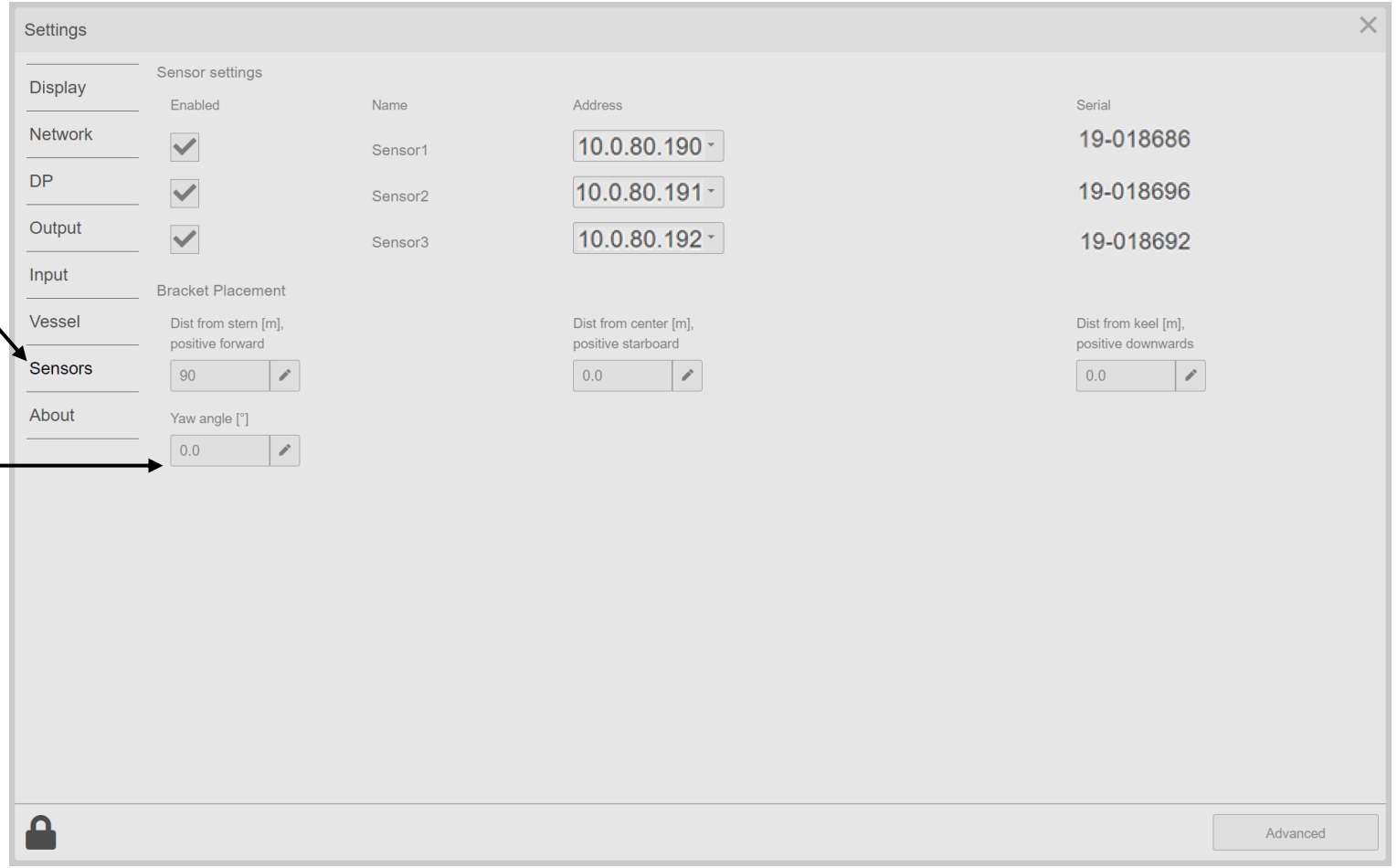


XPR

Settings Menu

Sensor setting:
Enable sensors with IP address and corresponding serial number is displayed

Configure bracket placement with yaw angle



XPR

Settings Menu

About menu:
Software version

Click on details to see more information about installed components

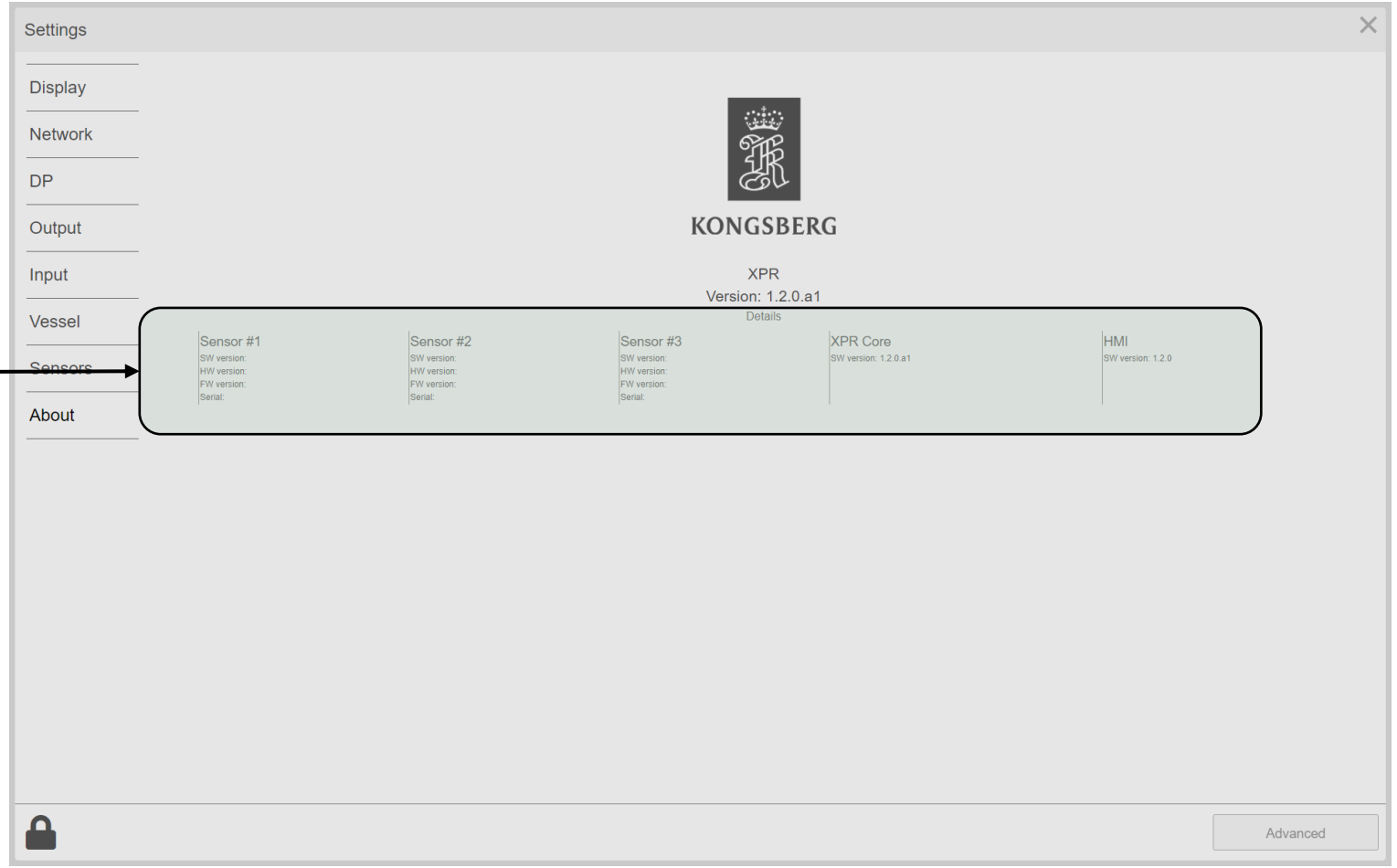
XPR

Settings Menu

Details on connected sensors.

SW Ver. of processing software and graphical user interface.

Relevant when calling support for assistance.

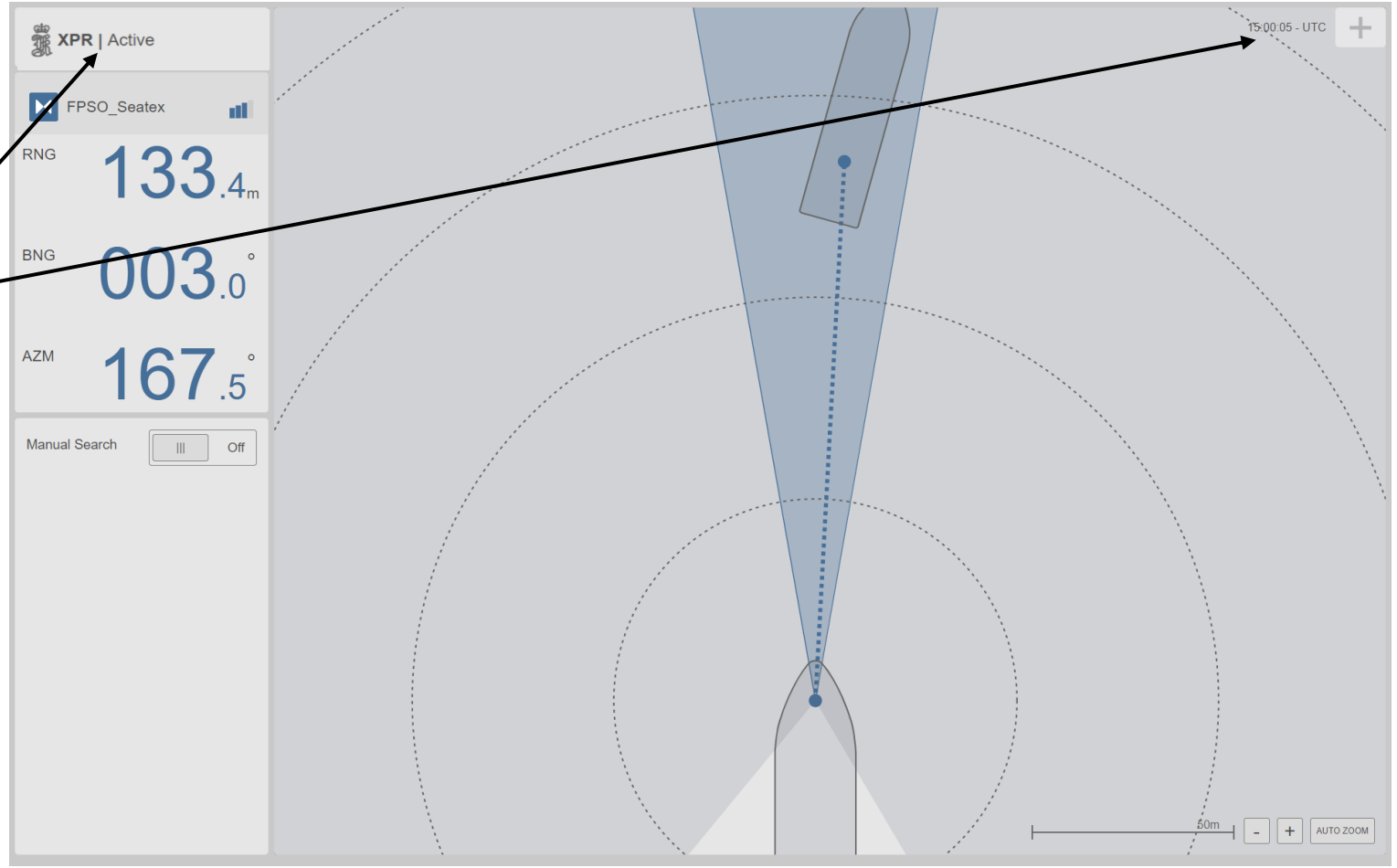


XPR

Settings Menu

After any changes, verify that the XPR is ready for operation.

- System status should show Active
- Time indicator should run



XPR Technical Training

Course Content

- XPR Technical Training
  - XPR System Description
  - XPR Configuration
  - XPR Maintenance
  - XPR Service/Troubleshooting

XPR

Maintenance – Backup and Restore

System backup and restore:

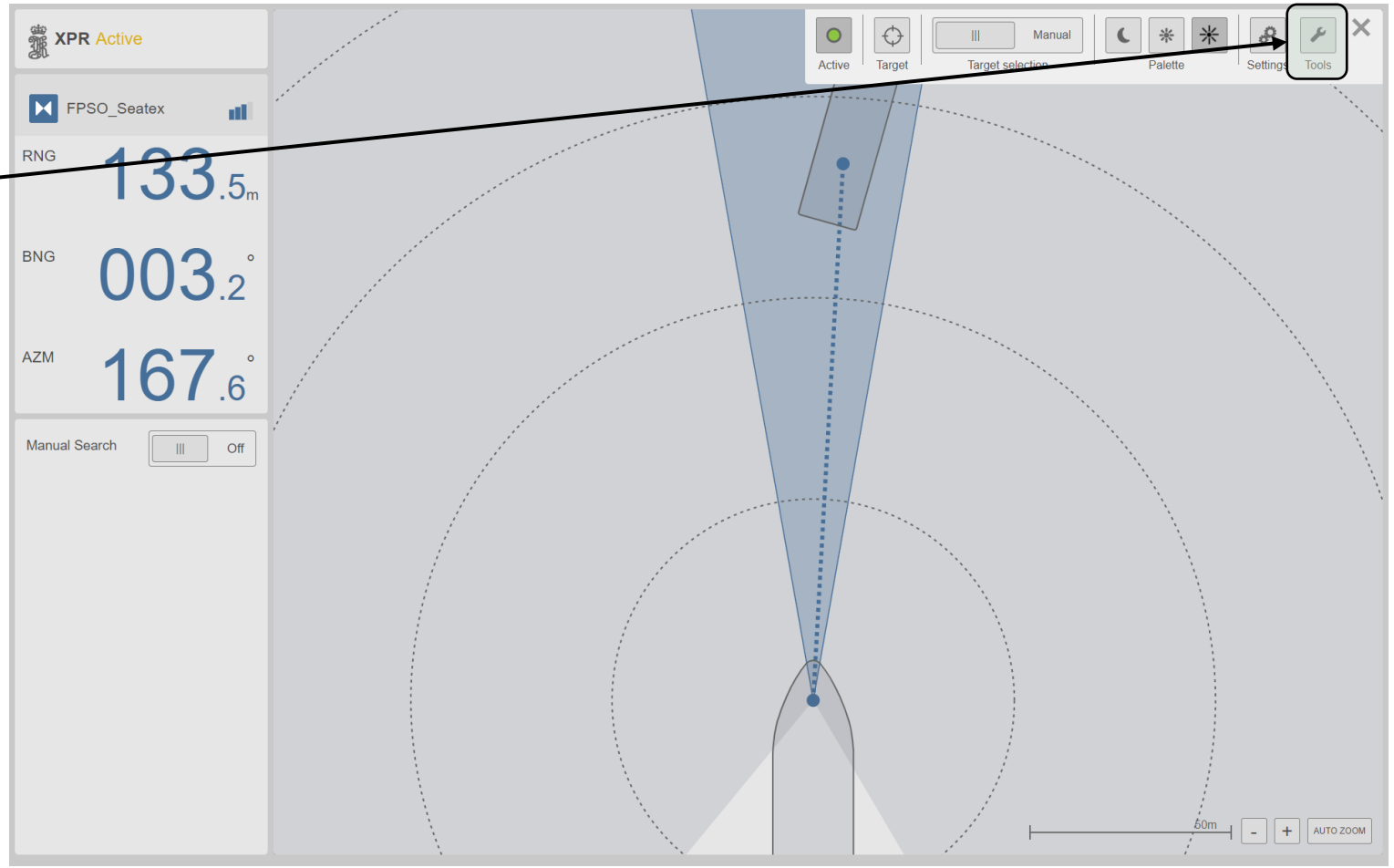
- Backup should be made after installation has been completed.
- Backup will include operating system, XPR software and all configured parameters.

Procedure to create backup located in the XPR Installation manual.

XPR

Maintenance – Software Update

Software update:
Located under the tool's menu.



XPR

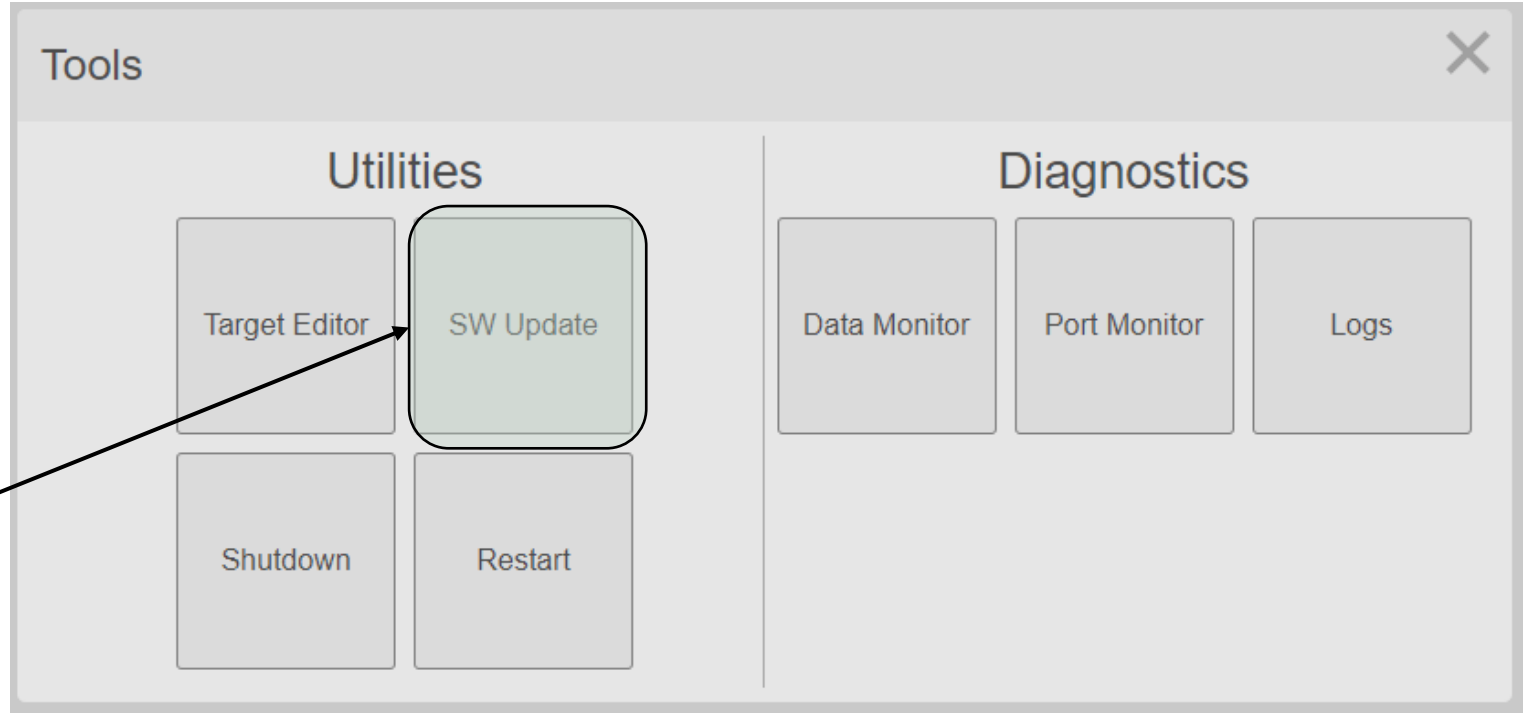
Maintenance – Software Update

Software update:

- Insert USB stick with new software into USB port in front of the Processing Unit.
- Select SW Update under Tools menu.

Further information will be received together with the new software.

System will restart after update is completed.



XPR

Periodic Maintenance

Periodic maintenance:

- It is important to keep the Sensor Unit cover clean to get accurate and reliable signal.
- Clean the Sensor Unit cover with a moist anti-static cloth on a regular basis.
- Inspect the Sensor Unit cable and cable gland, replace if necessary.
- Inspect the Sensor Unit screws are properly tightened.
- Check that there is no noticeable corrosion on metallic parts.

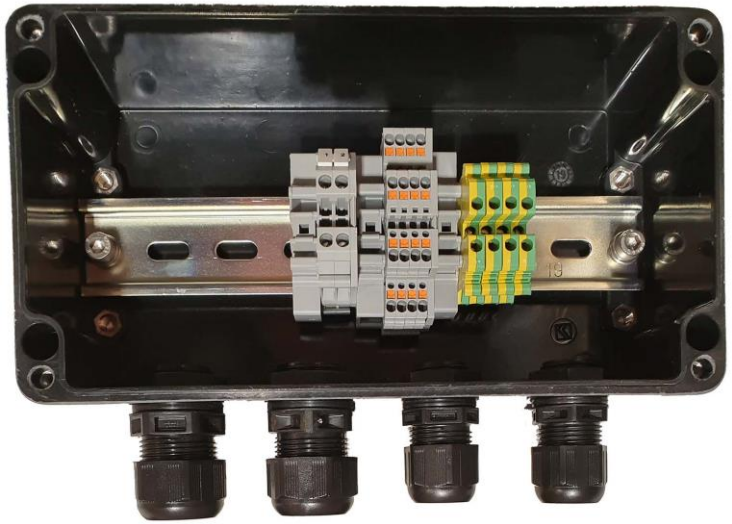
XPR

Periodic Maintenance

Periodic maintenance:

Caution: Make sure power in Remote Interface Cabinet is switched off before opening Junction Box.

- Check that there is no evidence of water and dust
- Check that there is no damage to wires and cables
- Check that terminals are tightened
- Check that the cable glands are properly tightened
- Check that the earthing connections are satisfactory
- Check that the integrity of the conduit system is maintained
- Check that there is no noticeable corrosion on metallic parts

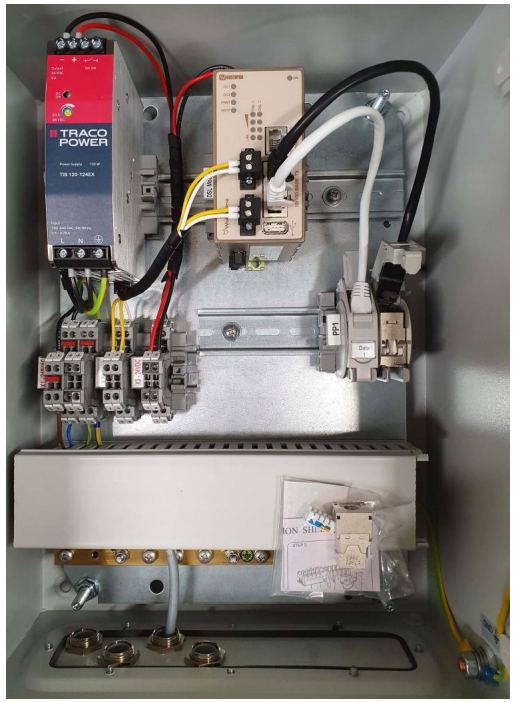


XPR

Periodic Maintenance

Periodic maintenance:
Inspecting the Remote Interface Cabinet, recommended inspection once a year.

1 – Check the door hinges for ease of movement.
2 – Check the door lock for ease of movement.
3 – Check the gasket in the contact edge area.
4 – Check all components and surfaces for external damage.
5 – Check for traces of corrosion.



XPR

Periodic Maintenance

Periodic maintenance:
Cleaning of Processing Unit air inlet recommended every 6 months depending on the air quality in operation's location.
Steps:

- Remove cover.
- Remove the filter and clean it by washing or vacuuming.
- Replace the plastic cover with the cleaned filter.

XPR Technical Training

Course Content

- XPR Technical Training
  - XPR System Description
  - XPR Configuration
  - XPR Maintenance
  - XPR Service/Troubleshooting

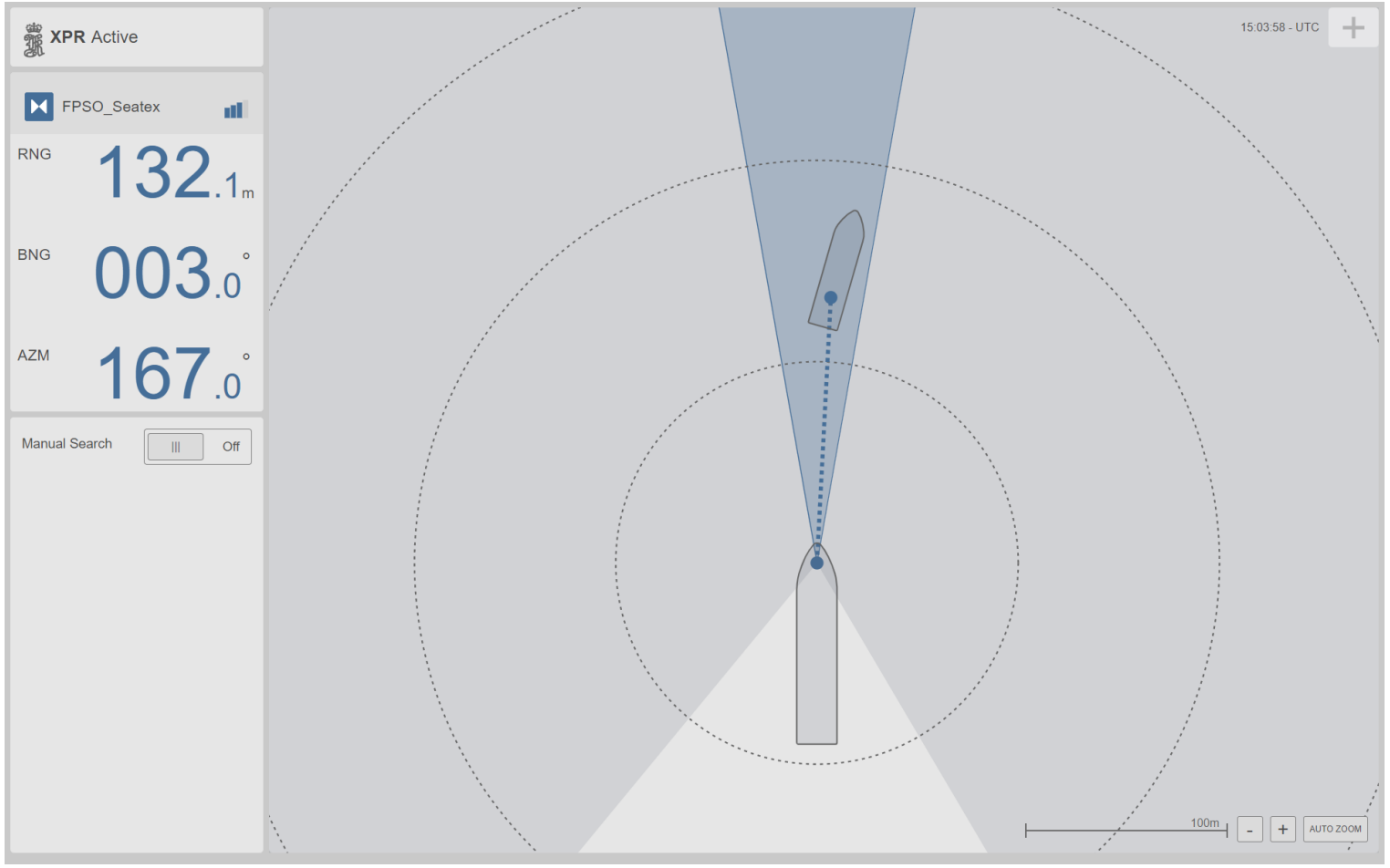
XPR

Service

Wrong heading of target

If target/remote vessel is shown 180-degree error in display, azimuth setting is wrong.

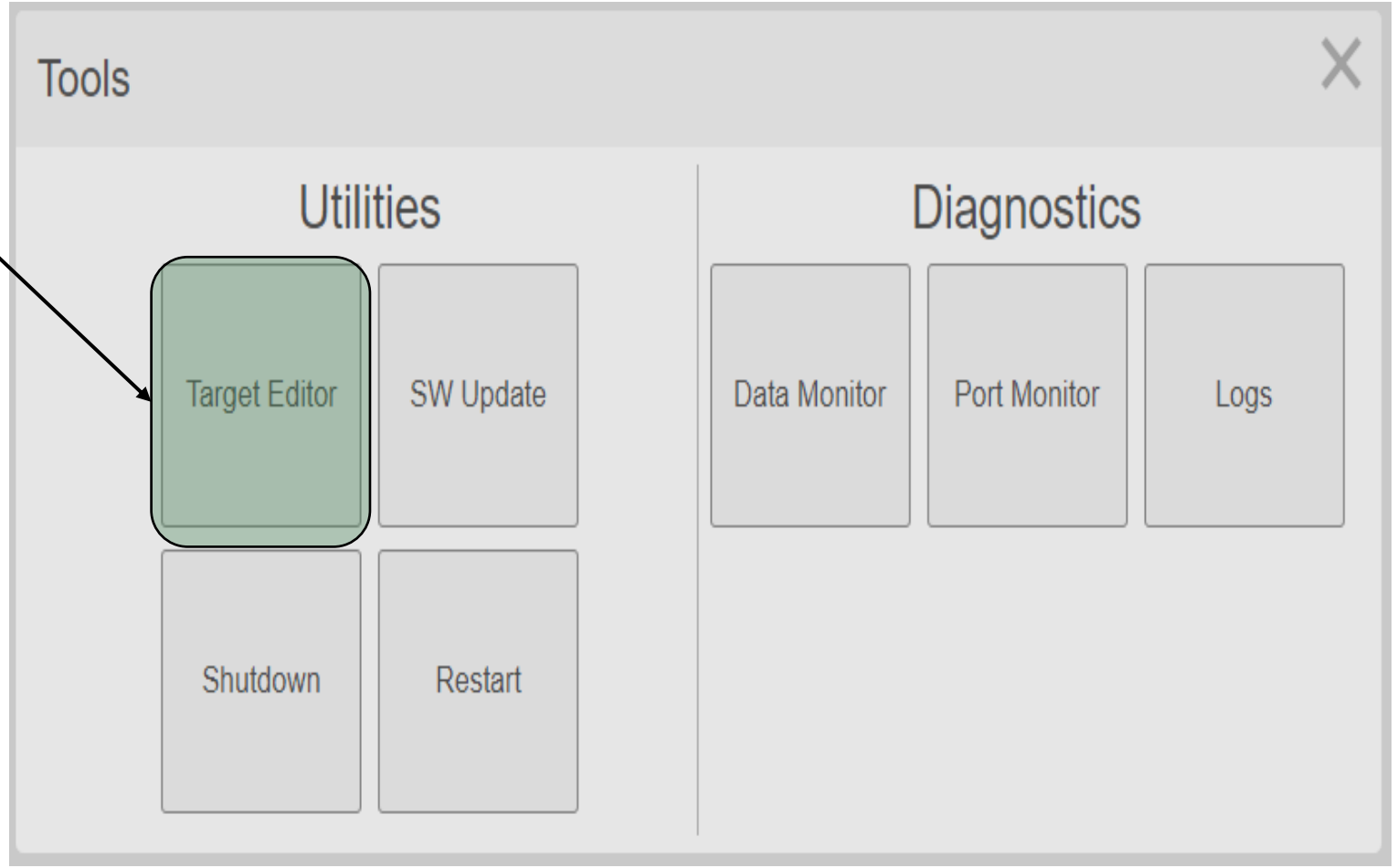
To change this target parameters must be changed.



XPR

Service

Select Target Editor

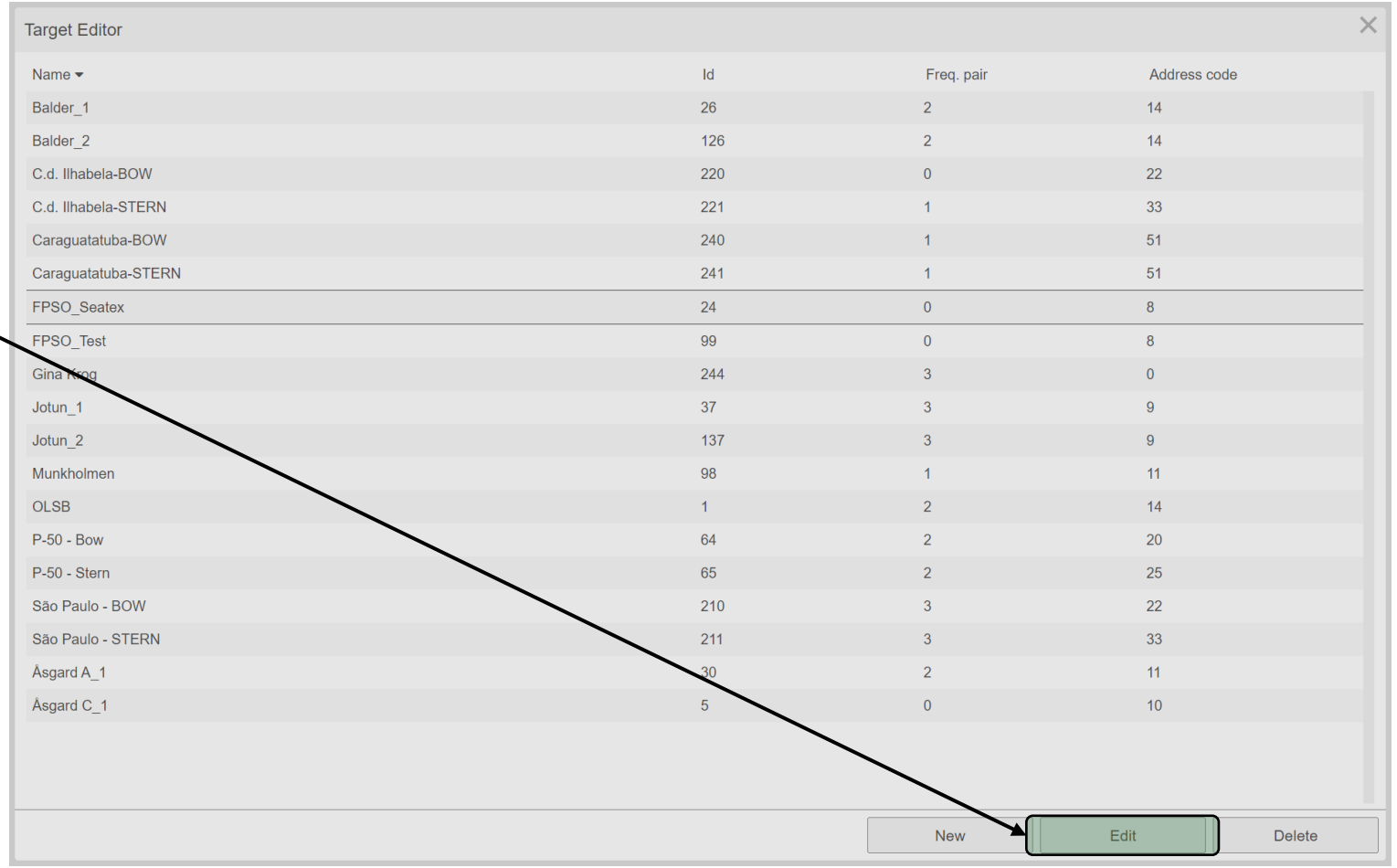


XPR

Service

A target is selected

Select Edit



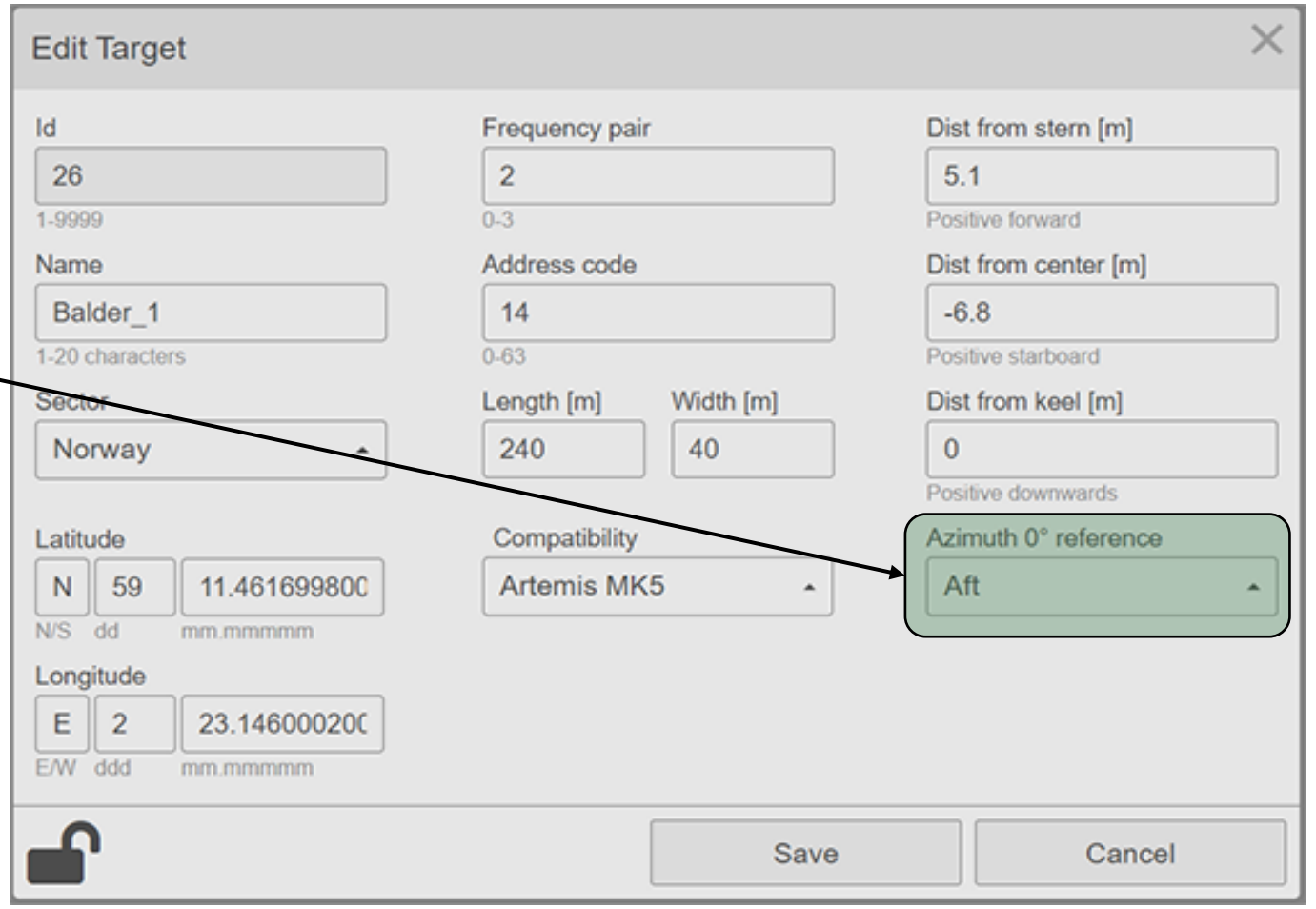
XPR

Service

Input password to enable target editing.

Change the Azimuth reference

Click on Save.
The target should now show up correct in the display view



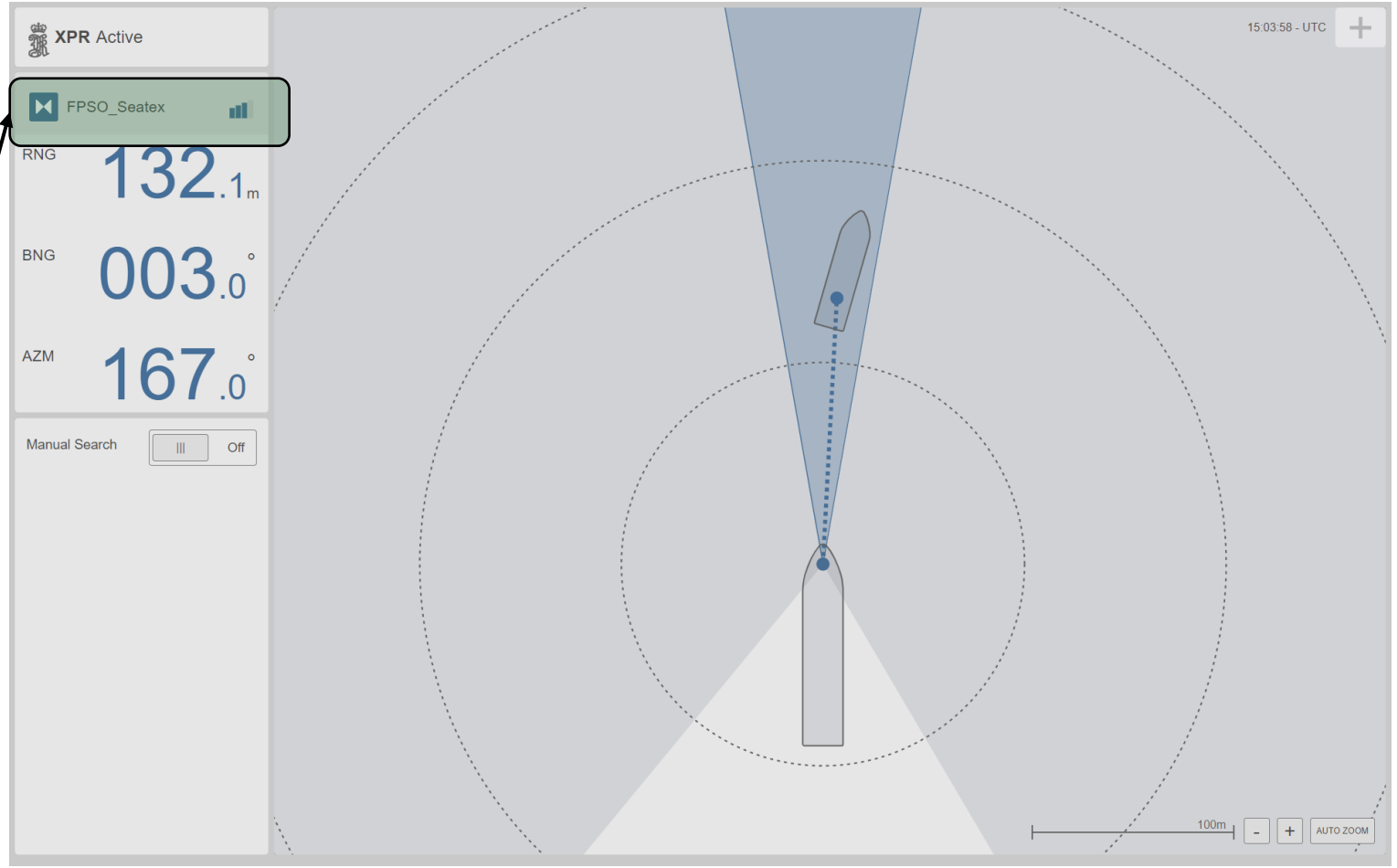
XPR

Service

Unstable signal from XPR

If experiencing unstable signal, check the signal, range and bearing history

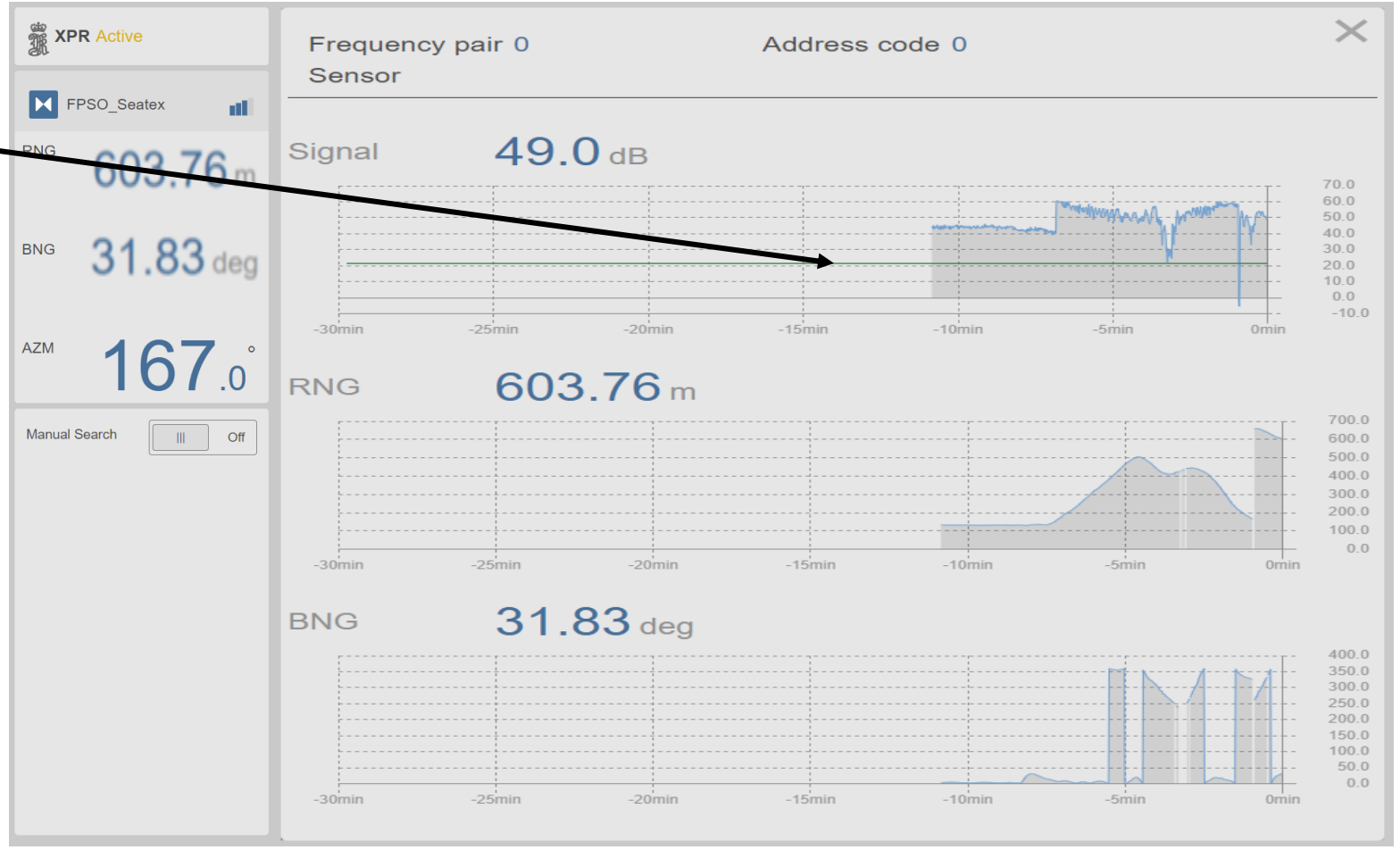
Click in this field to open Target history view



XPR

Service

Acceptable min. 20 dB

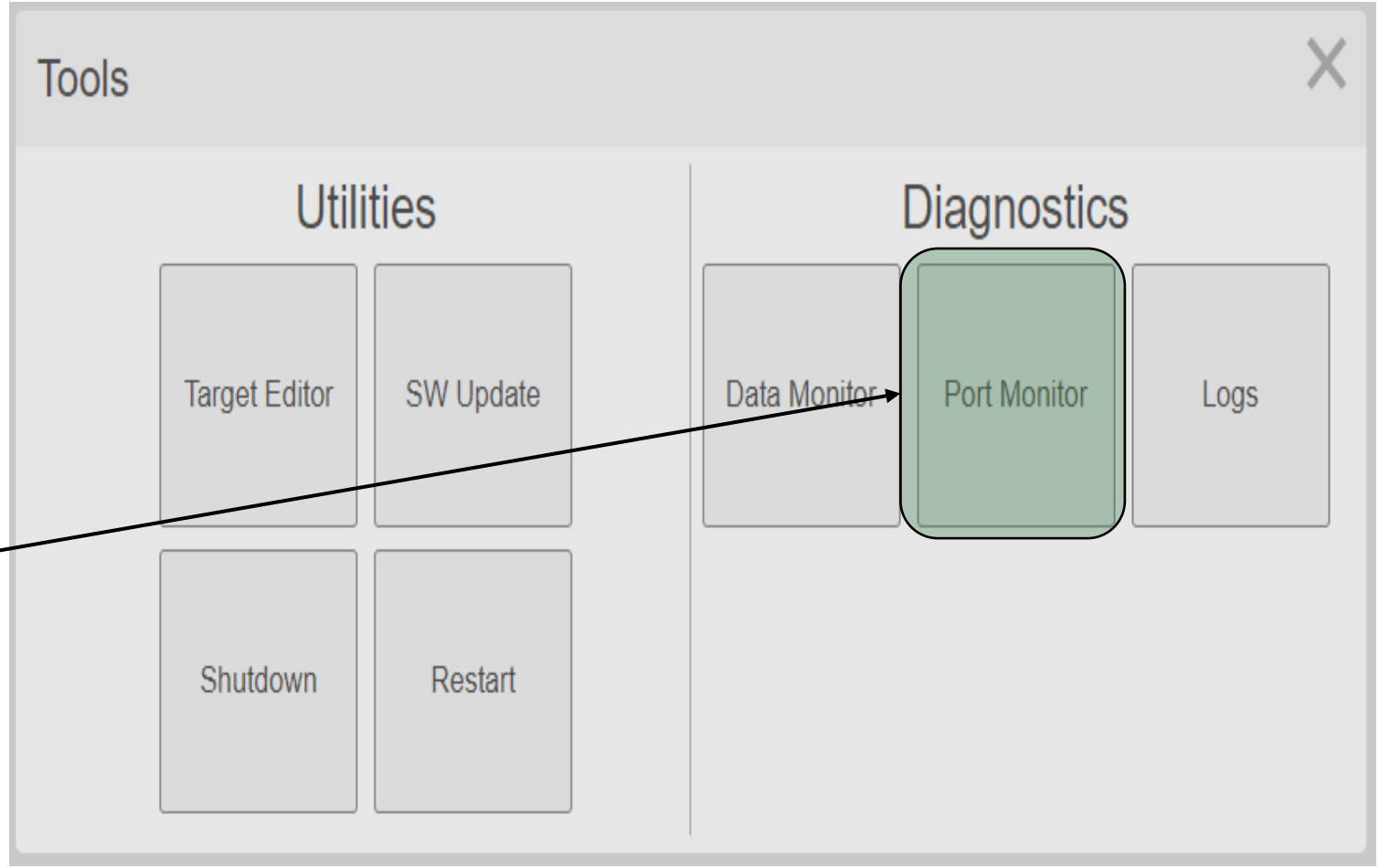


XPR

Service

If experiencing problems with data inputs or outputs, use the Port Monitor to view data send on the interfaces.

The Port Monitor is selected in the tools menu.

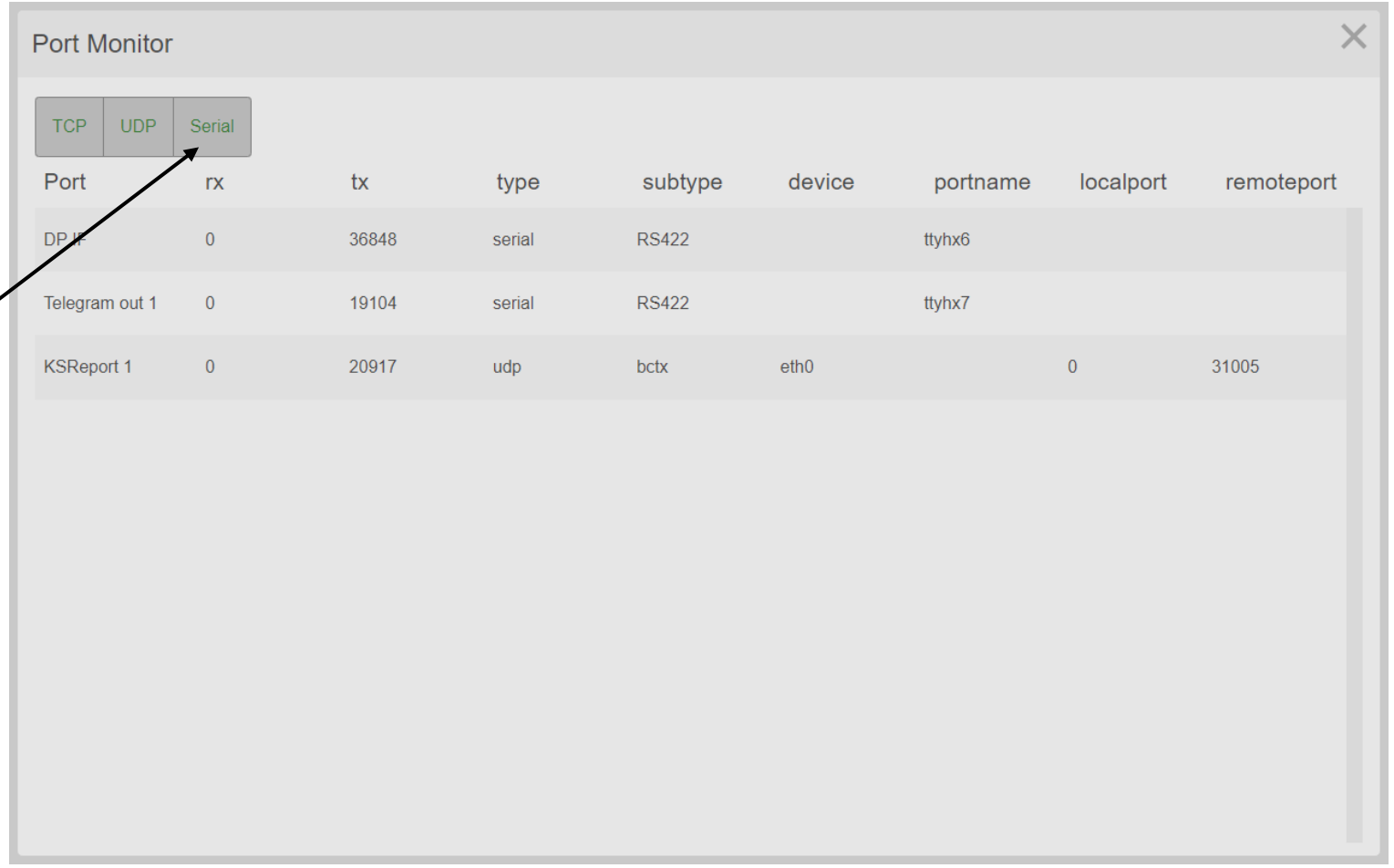


XPR

Service

The Port Monitor will list all interfaces configured in the XPR system

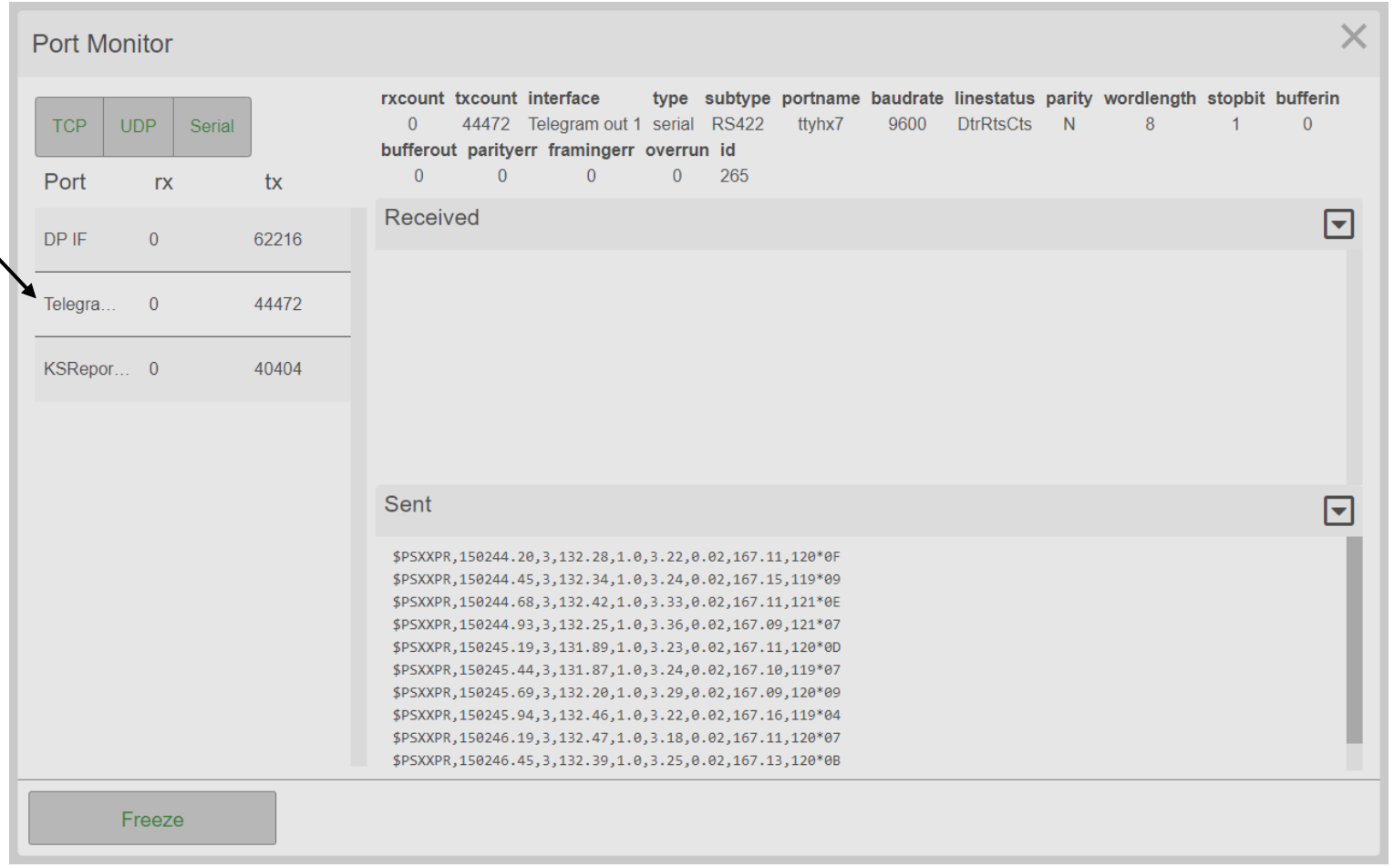
Click on serial to look at only Serial interfaces



XPR

Service

Click on desirable interface/Port to view data activity on this interface.



KONGSBERG

End of Training