



USBL User Manual

Boxfish ROV Underwater
Remotely Operated Vehicle



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1 Introduction to the Boxfish USBL system

Boxfish vehicles use the SeaTrac PinPoint Tracking System from Blueprint Subsea: <https://www.blueprintsubsea.com/seatrac/>.



Your USBL system is the X150 / X010 lightweight system rated to 300m or 1000m (depth rating depending on what you have ordered).

1.1 Components in the USBL system



Local beacon (X150 USBL beacon): The local beacon should be mounted at a fixed position below the surface. Power can be supplied to the beacon via the Boxfish Control Station, AC power or an alternative source (9V to 28V DC).



Remote beacon (X010 transponder beacon, 300m or 1000m version): This beacon will be mounted to and powered by the ROV. The X010 beacon is depth-rated for either 300m or 1000m. It will be connected to and powered by the ROV USBL port.



Remote beacon power cable: To provide power to the remote beacon via the USBL port on the ROV.



GPS receiver: A receiver with USB port to connect to either Control Station or separate laptop.



Local beacon power cable (will not be present for Boxfish Alpha or OEM): Cable to power the local beacon from the from the 12V EXT port of the Control Station (EXT port not present for Boxfish Alpha or OEM, so cable will not be included).

Local beacon AC power cable and adapter: If you do not power the local beacon from the Boxfish Control Station, a cable is provided that can provide power from an AC supply.

1.2 Viewing position of your vehicle

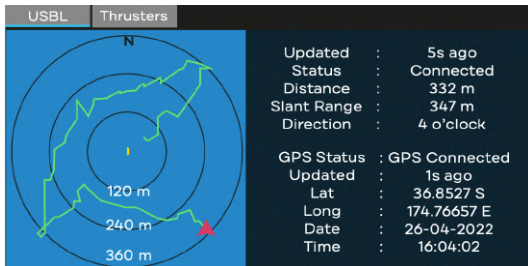
There are two options:

- Using the USBL widget on your Control Station. This gives a simple view of your ROV position relative to the local beacon.
- Using SeaTrac PinPoint application to view the position of the ROV. Manuals and software downloads are available at <https://www.blueprintsubsea.com/seatrac/support>.



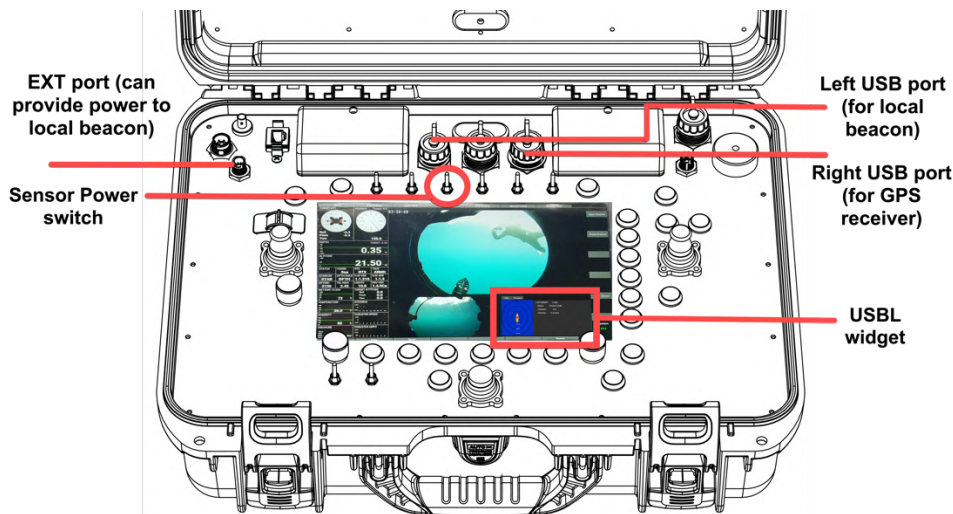
2 Using the USBL widget on the Boxfish Control Station

A small widget summarising data from the USBL system is available on the Boxfish Control Station so that you can see the position and trajectory of your ROV (relative to the fixed position of your local beacon), in real time.



2.1 Overview of Control Station controls required for using the USBL widget

2.1.1 Boxfish ROV and Boxfish Luna



2.1.2 Boxfish Alpha and autonomous-capable vehicles





2.2 Procedure for using the Boxfish USBL widget

IMPORTANT!

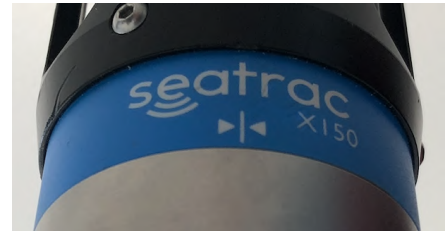
You must power on the Control Station BEFORE attaching USBL devices to the Control Station USB ports.

2.2.1 Connect Boxfish ROV components

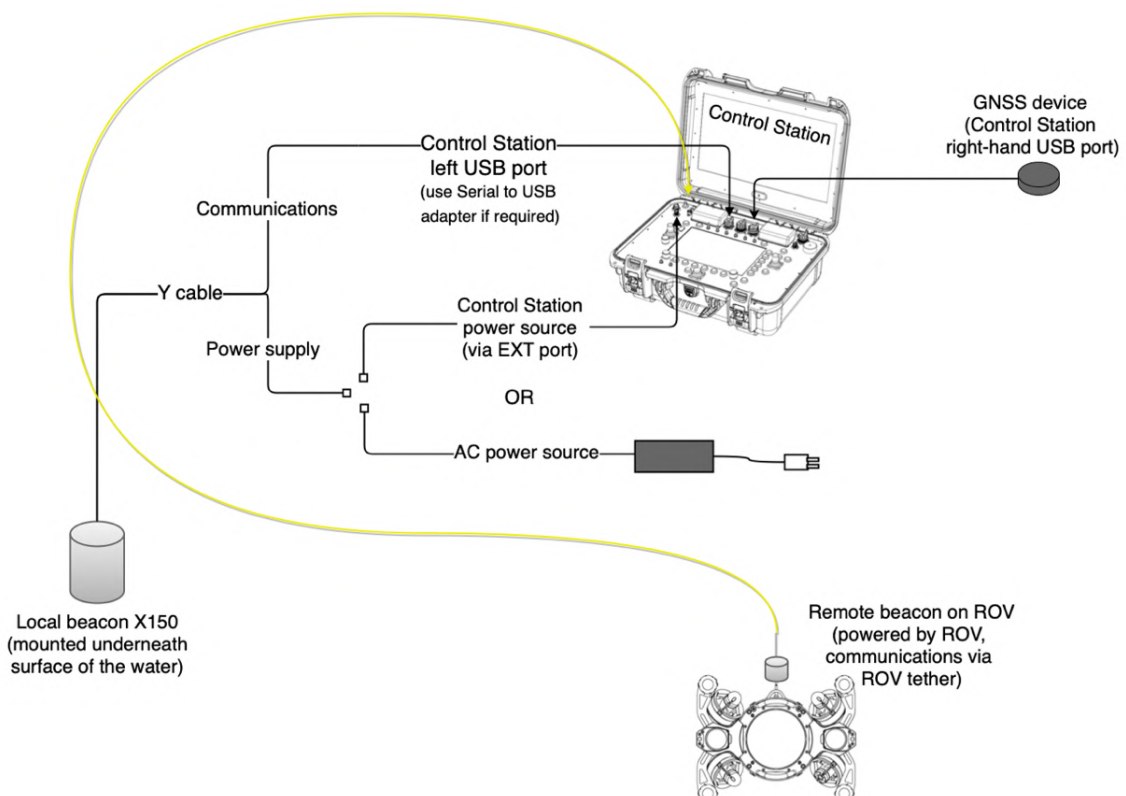
1. Connect Boxfish ROV, tether and Control Station.
2. Power on ROV and Control Station. Check all ROV components are communicating.

2.2.2 Mount local beacon

When mounting the local beacon underneath the boat, ensure that the bar between the two arrows is pointing in the same direction as the bow of the boat. This is so the visual representation of the boat will appear correctly oriented in the Boxfish USBL widget.



2.2.3 Connect USBL components to Control Station and power





The local beacon (X150) has a double-ended Y-cable. Connect the single end to the local beacon. Then:

1. **Left USB port on the Control Station.** Note: the provided USB to serial adapter if necessary.
2. **Power source**, from either:
 - a. Control Station **EXT** port, or
 - b. AC power, or
 - c. another device.

Note: Control Stations for Boxfish Alpha and autonomous-capable vehicles do not have an EXT port to provide power to the local beacon; therefore AC power or an alternative power source must be used.

Then, connect the GPS device to the right USB port.

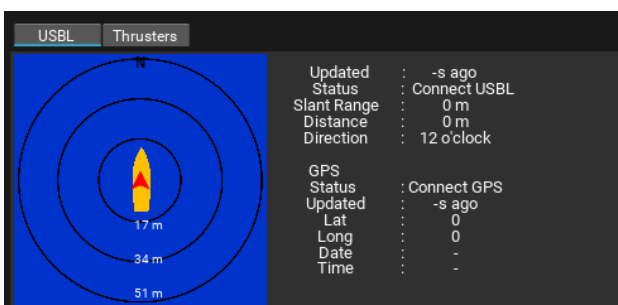
2.2.4 Turn Sensor Power ON

Turn on **Sensor Power** to supply power from the ROV to the remote beacon.

2.3 Use widget to view location of your ROV

You can view the location of the ROV (and GPS coordinates) via the USBL widget (**USBL tab**) on the bottom right of the telemetry screen. The next section describes the widget in more detail.

2.4 Information displayed on the Boxfish USBL widget



The widget displays a topological map with the following features:

- North is shown at the top of the map.
- The local beacon is represented by a yellow boat at the map centre. The bow of the boat is in the direction of the two arrows of the local beacon.
- The ROV/remote beacon is represented by the red arrow. The tip of the arrow is pointing in the direction the ROV is heading according to its onboard compass.



- The ROV trajectory is shown by the green trail, showing a smoothed path over the last 10 data points.
- Three concentric circles depict the ROV's range from the boat. These will dynamically zoom out if the ROV moves beyond the outer circle.



Data fields are displayed to the right of the map:

Field	Information
Updated	Signifies the time passed (in seconds) since the remote beacon/GPS was last heard. “-” signifies the beacon has not been heard yet.
Status	Shows the current state of the local USBL beacon/GPS device: Connected: The local USBL is connected to the Control Station. Connect ~: Local USBL is not connected to the Control Station (via the Serial to USB adapter). Connection Broken: Serial to USB adapter is connected to the Control Station, but local USBL is not connected to the adapter.
Distance and Slant Range	<ul style="list-style-type: none"> ■ Distance is the horizontal distance in metres between the local beacon and the point at the surface directly above the ROV. ■ Slant range is the Point to point distance between the ROV beacon and the local beacon in metres.
Direction	Direction of the ROV's location relative to the local beacon (boat). Make sure the local beacon's heading is same as the boat's heading. This can be ensured by pointing the LED on the local beacon towards the front end of the boat



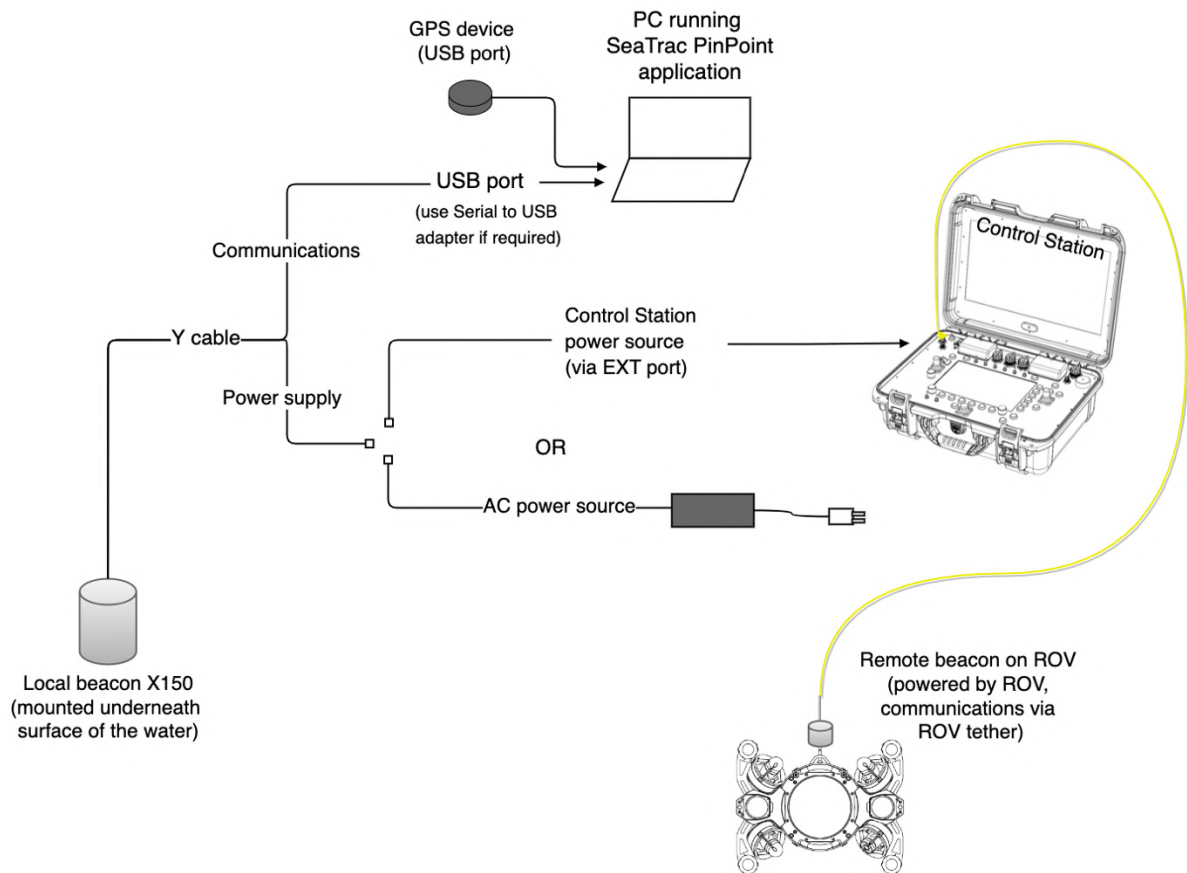
3 Using Seatrac PinPoint application on a separate PC

The manufacturers of the USBL system provide a free Windows application to display, log and play back positioning data. A separate laptop will be required to run the application.

Software and manuals are available at

<https://www.blueprintsubsea.com/seatrac/support>.

3.1 Connection diagram



3.2 Procedure for using SeaTrac PinPoint

1. Install PinPoint software from <https://www.blueprintsubsea.com/seatrac/support>.
2. Connect ROV, tether and Control Station and power on.
3. Switch on Sensor Power to supply power to remote beacon on ROV.
4. Connect the local beacon to power (Control Station EXT port or external power source) and to the laptop as shown above.
5. Connect the GPS receiver to the laptop.
6. Mount the local beacon underneath the boat, ensuring that the bar between the two arrows is pointing in the same direction as the bow of the boat. Open PinPoint and view USBL data.



4 Mounting remote beacon to ROV

This section explains how to mount the remote beacon to the ROV if you should need to remove it for any reason.

4.1 Mounting components

The remote beacon is shown below with its mount and fasteners.



You will also need the power cable, which will be contained in the USBL case.

4.2 Mounting location

Mount the remote beacon to the rear of the ROV and fasten with the provided fasteners.



4.3 Connect power cable

IMPORTANT!

Do not use force or twist connectors into the ROV ports, otherwise they may be damaged, requiring the ROV to return to our factory for repair.

1. Ensure the ROV is powered off and vacuum removed.
2. Connect the power cable to local beacon.



3. To connect the cable to the ROV, remove the port plug from the USBL port. Line up the notch on the 8-way connector with the groove on the USBL port and gently push into place. Screw the knurled nut into place.
4. Secure the cable to the ROV with a cable tie.
5. Test that the ROV can hold a vacuum.







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