NORDBO ROBOTICS

Manual Version 1.5
For Nordbo Controller Software Version 1.2

IR Tracker for Mimic

User Manual

Tracker Specific Manual

Copyright

Disclaimer

The information provided in this documentation contains general descriptions of the use, of one or more of Nordbo Robotics' products. Following this document's instruction for installation and use must not be considered a substitute for making a risk assessment and testing the specific application and setup. Neither Nordbo Robotics nor any of our affiliates or subsidiaries shall be held responsible for the consequences that arise from misuse of – or misunderstanding of – any information stated in this document.

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Warranty

Warranty void if products are opened. The warranty further excludes failure resulting from improper use or installation, normal wear and tear, abuse, accidents, neglect, fire, water, lightning, or other acts of nature, causes external to the product, or other factors beyond Nordbo Robotics control.

Contact

Nordbo Robotics A/S
Noatunvej 2
5000 Odense, Denmark
+45 81 81 98 81
info@nordbo-robotics.com
CVR/VAT: DK 34697728

Contents

Before you Begin

1.1. Intended Use

This document serves as a guide for the installation of Nordbo Robotics' Mimic joystick for a manipulator. This guide does not provide any information about risk assessment which must be carried out before initiating any robot movements.

1.2. Prerequisites

It is required that the person executing the instructions of this manual has a basic knowledge of working with software related to the specific manipulator being used. Furthermore, it is expected that the person using this manual understands the risks related to working with robots.

1.3. Safety Warnings

Following instructions must be read thoroughly by anyone intending to use this product.

WARNING! This symbol indicates that potentially hazardous, dangerous, or unwanted situations can arise from not following the instructions correctly. If safety instructions are not followed properly it may result in personnel injury, or equipment damage.

Before attempting to connect the hardware to the robot, it is important to ensure that the robot cannot move unintentionally. For maximum safety, it is recommended to power off the robot before attempting to connect the hardware for the Tracker to the robot.

The robot must always be **powered off** before attempting to connect wires to the robot's controller, or when connecting cables between any of Nordbo Robotics' products.

The product may be damaged if dropped on hard surfaces. Be aware that connectors can break if the user pulls or overtightens the cables.

The IR Tracker can be used within the specified measurement range. Using the IR Tracker outside of its specified range may create unexpected results (see Figure 3). Nordbo Robotics is not liable for any damage or injury resulting from the use of the product.

2. Getting to Know Mimic with IR Tracker

2.1. Mimic with IR Tracker at a Glance

Mimic with IR Tracker consists of a joystick with a tracker using infrared (IR) light for recording human motions and transfer to a robot (illustrated in Figure 1).

It comes with a standard joystick, where the IR Tracker can be mounted.

Mimic IR Tracker is a wireless tracking system. It provides the Mimic software with the joysticks position and orientation in 3D-space as well as the inputs of up to four buttons (see Figure 2).

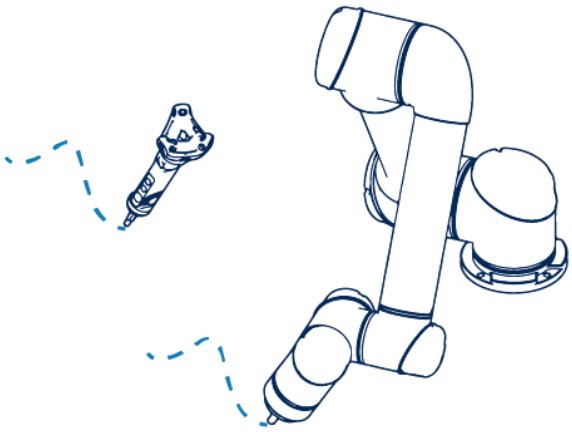


Figure 1 - Recording a movement with Mimic IR

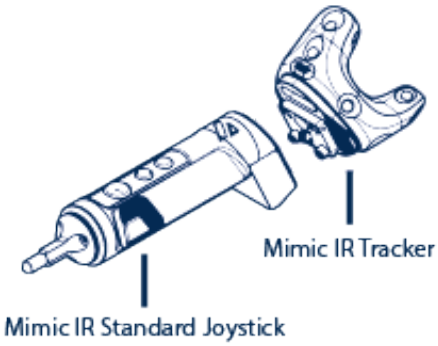


Figure 2 - Mimic IR Standard Joystick with Mimic IR Tracker

3. IR Tracker Information

3.1. IR Tracker Contents

Component	Referenced as	Description
	Nordbo Controller	Contains and runs the Mimic software needed to use Mimic with IR Tracker.
	Power Supply for Nordbo Controller	Powers the Nordbo Controller.
	1x USB Flash drive	Contains documentation and URCap (only for Mimic UR)
	1x HTC Tracker 3.0 (Referred to as Tracker) *(Additional can be purchased if needed)* Including x1 Tracker Mount (Mounted onto Tracker with a ¼" Camera screw with 1.27 mm pitch (following ISO 1222:2010)	The Tracker is the object that captures position and movements. Used to mount the Tracker on a Joystick.
	1x HTC Dongle (Referred to as Dongle)	Communicates wirelessly with the Tracker.
	1x HTC Dongle Cradle (Referred to as Dongle Cradle)	Cradle for the Dongle.

	1x USB Type-C cable	Connects the Dongle Cradle to the Controller. Also used to charge the Tracker.
	1x HTC Base Station 2.0 (Referred to as Lighthouse)	Emits the infrared light that the Tracker uses to track.
	1x Power Supply for Lighthouse	Powers the Lighthouse.
	1x Mimic IR Standard Joystick including 1x Joystick Pointer	A Joystick to mount the Tracker on. This is used as a tool to record robot movements.
 	1x Reference Frame Kit Including 1x Reference Plate and 1x Robot Pointer	Used to calibrate the Reference Frames.
 	4x M4-10 mm black stainless-steel bolts (for Joystick Pointer) 4x M6-10 mm stainless-steel bolts (for Robot Pointer)	Used to mount Joystick Pointer. Used to mount Robot Pointer.
	1x LAN-cable, 2 m	Used to connect Nordbo Controller and robot.

4. How to Setup Hardware

4.1. Setting up the Tracker

Figure 3 depicts the complete hardware setup of the IR Tracker.

Note: If the setup allows for it, it is recommended to place the Lighthouse in the ceiling for optimal setup.
See section **4.2 Lighthouse** for more information.

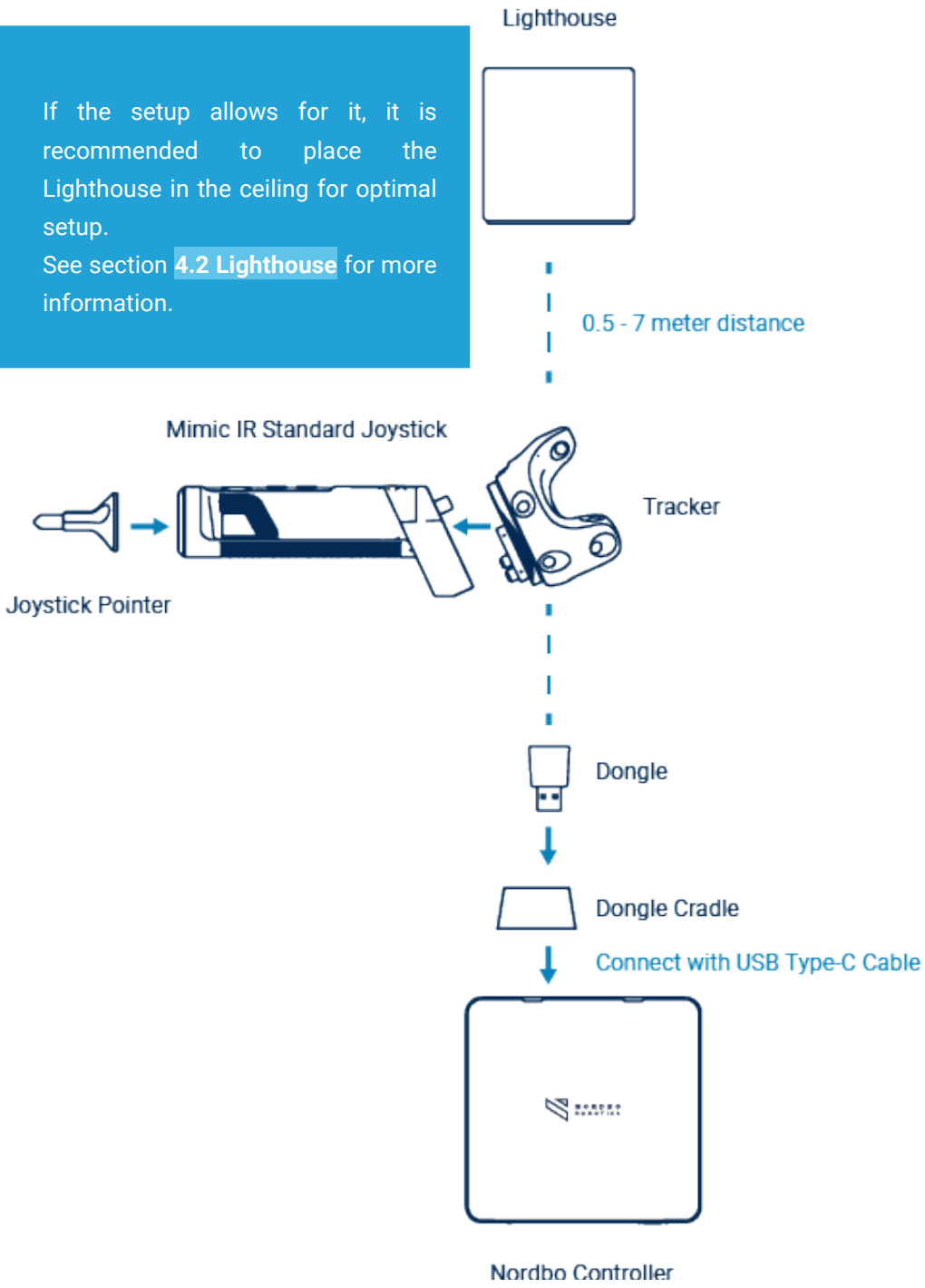


Figure 3 - The Mimic IR Tracker Setup

4.2. Lighthouse

The Lighthouse only needs to be plugged into power using the supplied power supply. The Lighthouse works by emitting infrared light. This light is used by the Tracker to determine its position. The Tracker must therefore be within line of sight of the Lighthouse to work (illustrated in Figure 4). The range of the Lighthouse is up to 7 meters, though using the full range may reduce the accuracy of the tracking. For more information and tips on how to setup the Lighthouse to achieve the best results, please refer to "VIVE Pro User Guide".

Only one Lighthouse can be used. Make sure that the Tracker is always only visible from one lighthouse while using the IR Tracker.

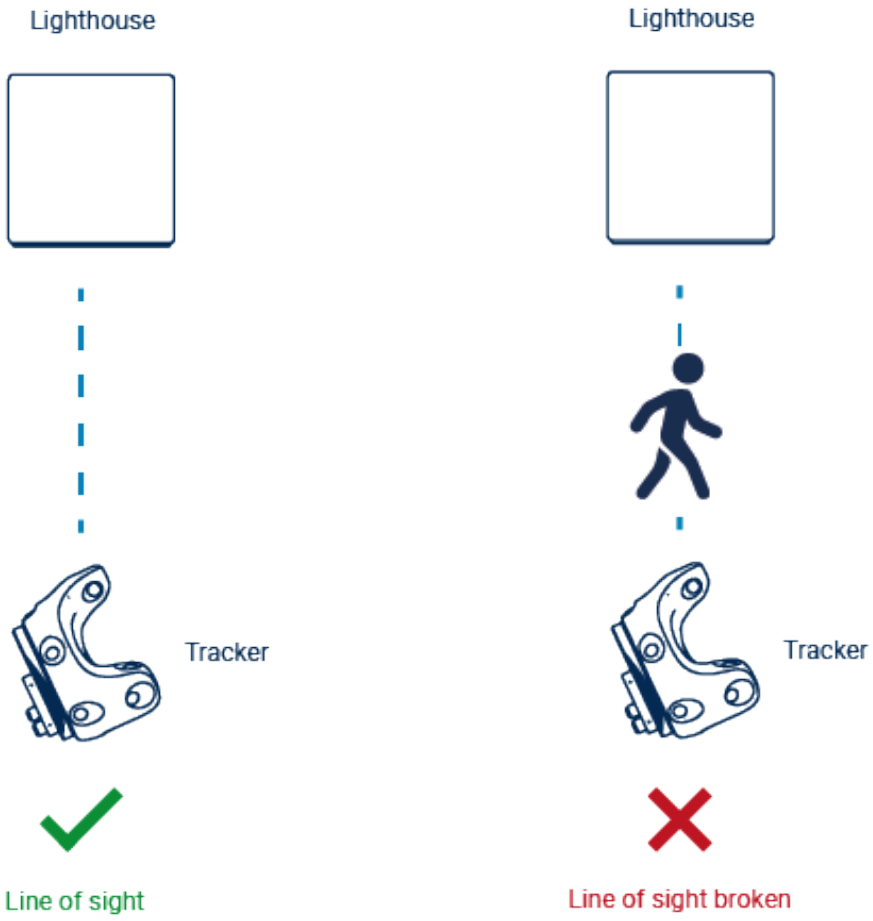


Figure 4 - Line of sight illustrated

WARNING! Moving the Lighthouse while powered on may damage the product and reduce accuracy.

4.3. Tracker and Dongle

The Tracker uses the light from the Lighthouse to determine its position. This information is then transmitted to the Nordbo Controller through the Dongle using Bluetooth. For more information about how to use the Tracker and Dongle, please refer to HTC's "VIVE Tracker (3.0) User Guide".

4.4. Joystick and Tracker Mount

The default Nordbo Joystick for Mimic IR can be seen in Figure 5. Each button is mapped to an input on the Tracker.

ID	◊	□	△	○
Default Server Input	0	1	2	3
Tracker Pin	3	4	5	6

Figure 5 - Default mapping of the Joystick

4.5. Nordbo Controller

Connect the Nordbo Controller to power and the Dongle.

Note: For optimal performance, it is recommended to place the Dongle at least 45 cm away from the Nordbo Controller.

5. How to Configure the Software

5.1. Setting the Correct IP (only applies to Mimic UR)

Web Interface

The web interface is the main user interface for the Mimic IR Controller. It can be reached by connecting a computer and the Nordbo Controller with an ethernet cable and typing the IP address of the Nordbo Controller into a browser.

Default IP: 192.168.1.101

To the left of every page is a menu with links to every configuration page as well as an overview showing information about the system (see example in Figure 5).

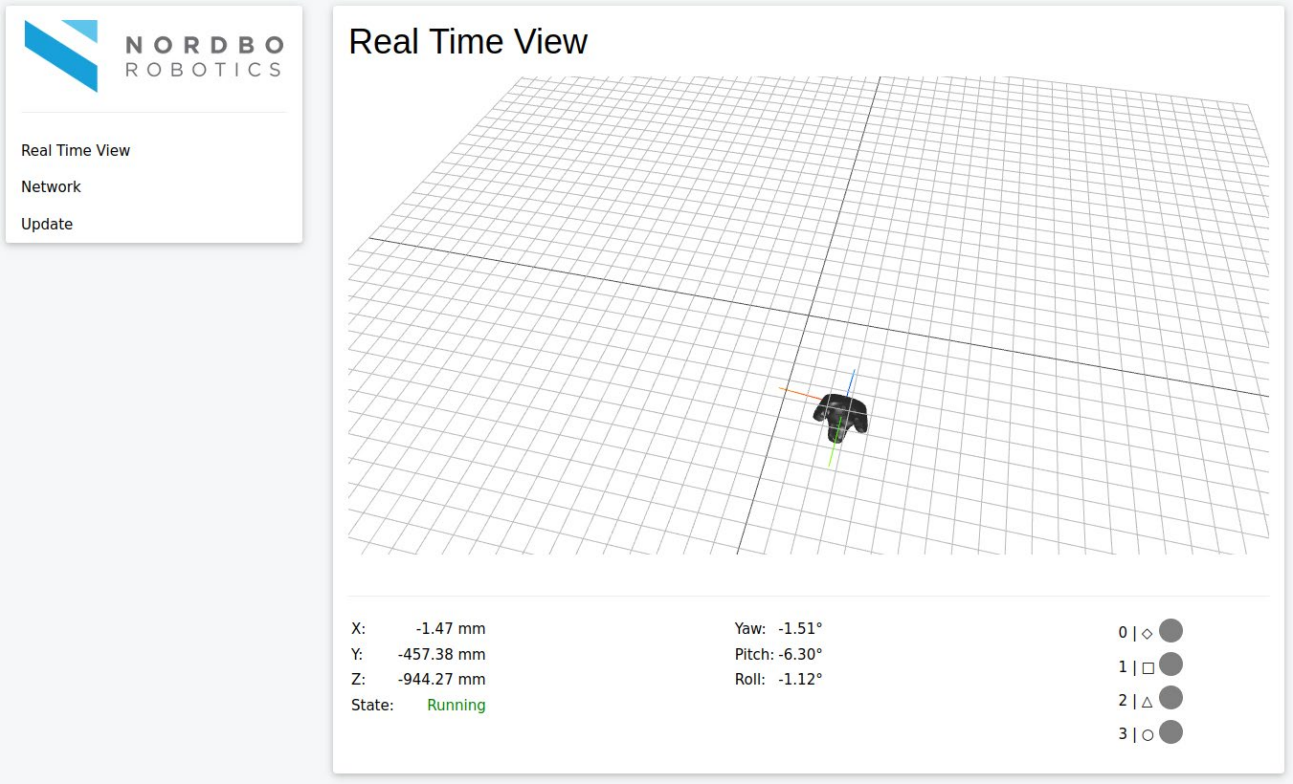


Figure 5 - Example of Web Interface (Real Time View)

Before the Nordbo Controller can be accessed, the network settings may need to be configured. The following section explains how to connect to the Nordbo Controller using a Windows PC.

Step 1. Turn on the Controller and connect to a PC using an ethernet cable.

Step 2. Open Network & Internet settings by right-clicking on the Wi-Fi/LAN icon in the menu.

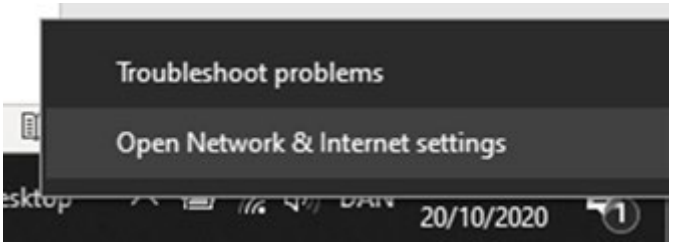


Figure 6

Step 3. Click ”Change adapter options”.

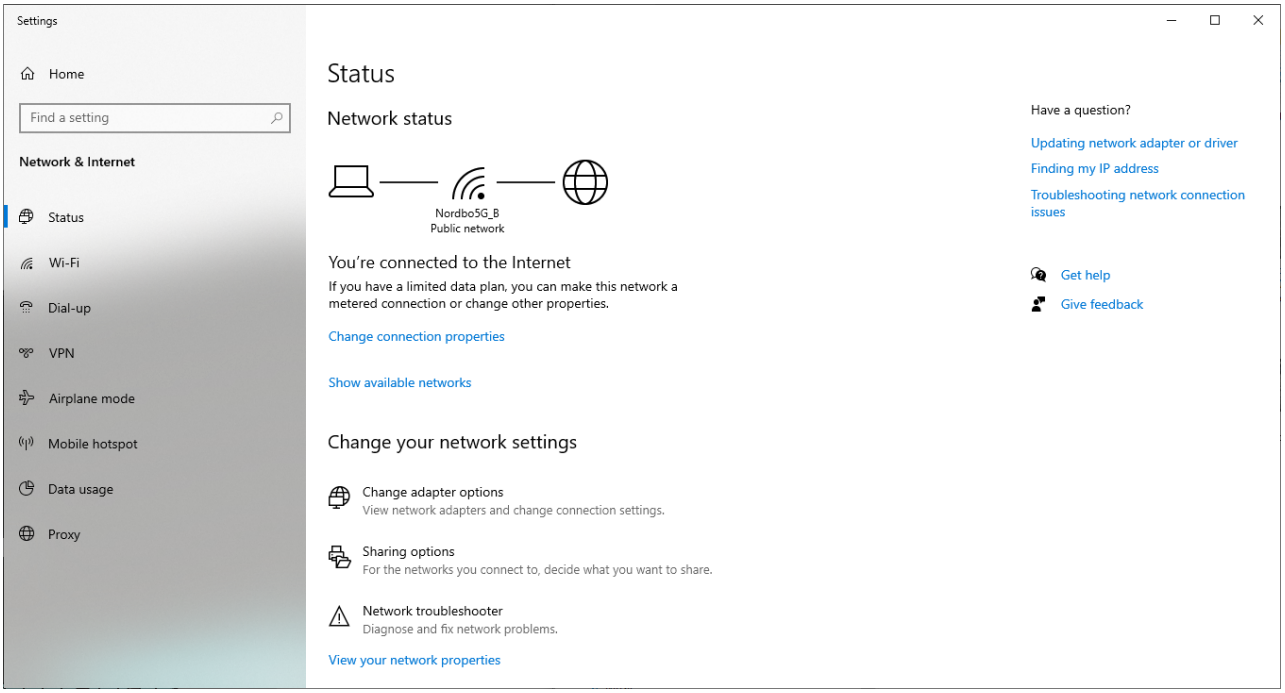


Figure 7

Step 4. Right-click on ”Ethernet 3” and select “properties.”

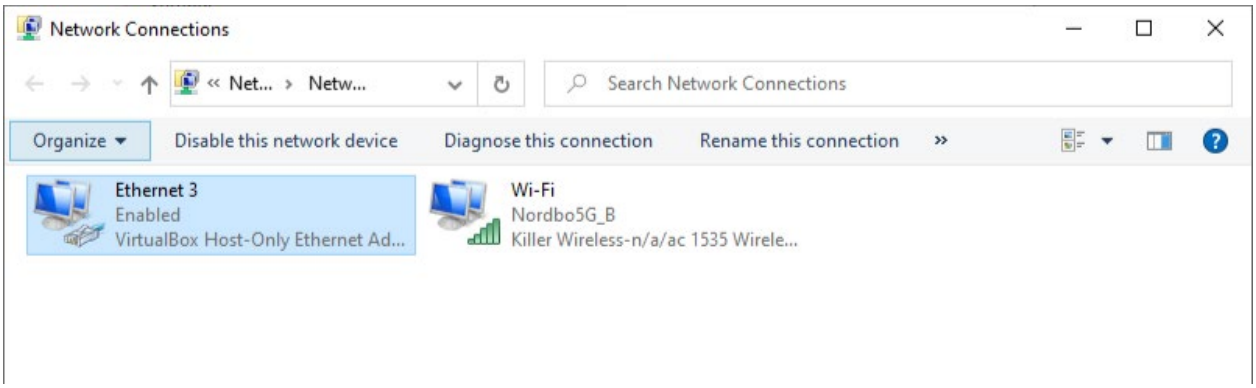


Figure 8

Note: “Ethernet 3” may have a different number than “3”.

Step 5. Select Internet Protocol Version 4 (TCP/IPv4) and click “Properties”.

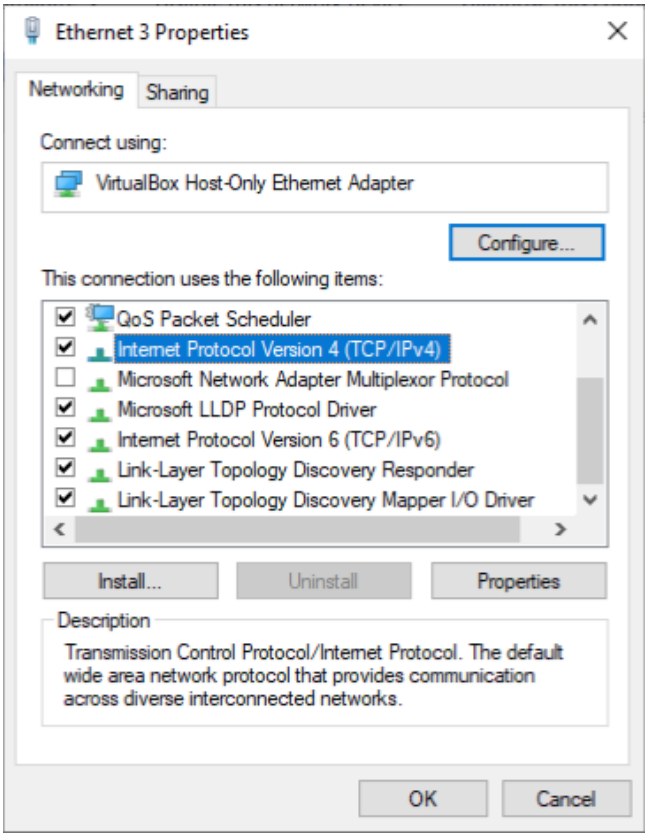


Figure 9

Step 6. Set the IP address

Set the IP address to 192.168.1.98

Set the Subnet mask to 255.255.255.0

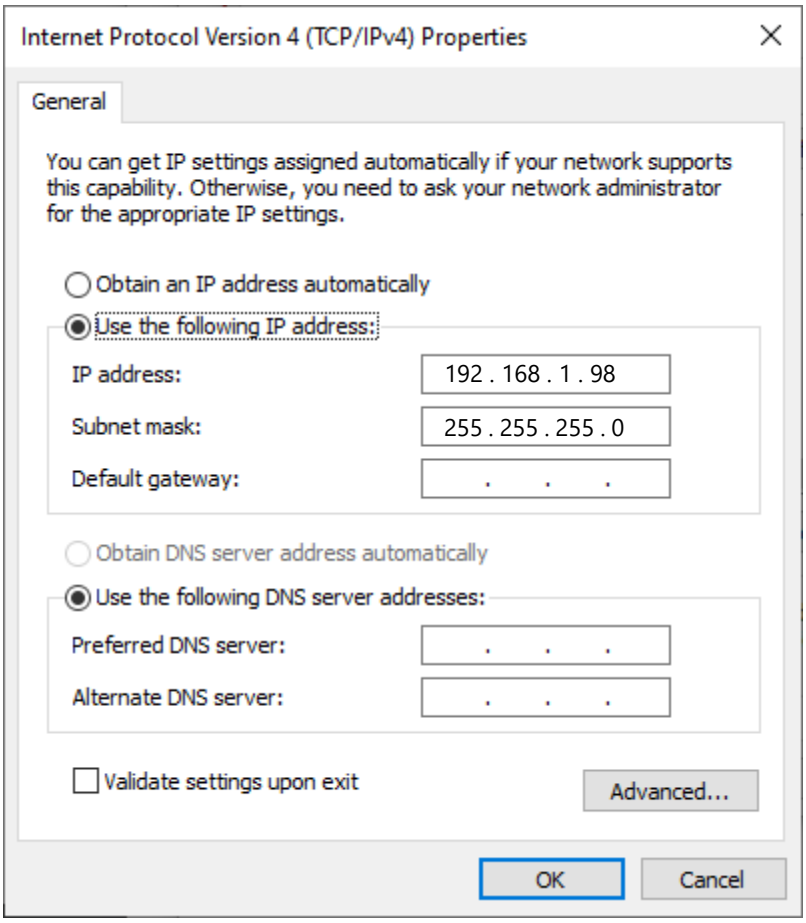
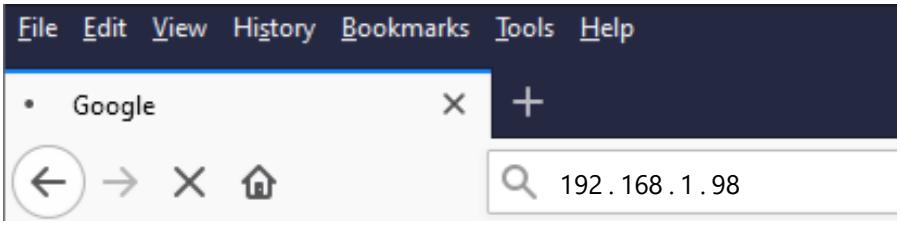


Figure 10

Step 7. Access the real-time view using a browser by typing the IP address 192.168.1.98.

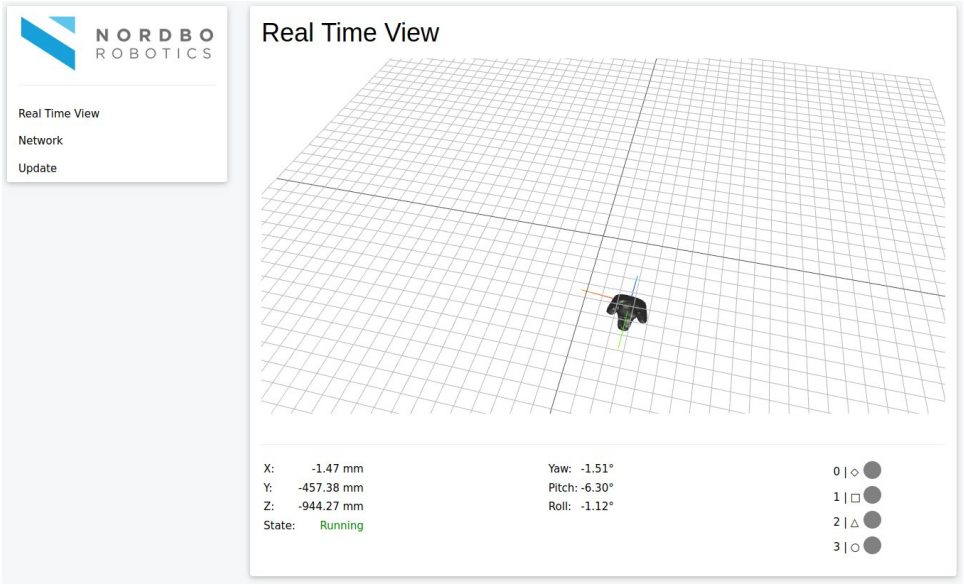


5.2. Real Time View

The landing page of the web interface is the Real Time View. This page allows the user to determine whether the Mimic IR Controller system is functioning correctly. A live 3D view of the Tracker can be seen. Moving the Tracker will show an identical movement in the 3D view.

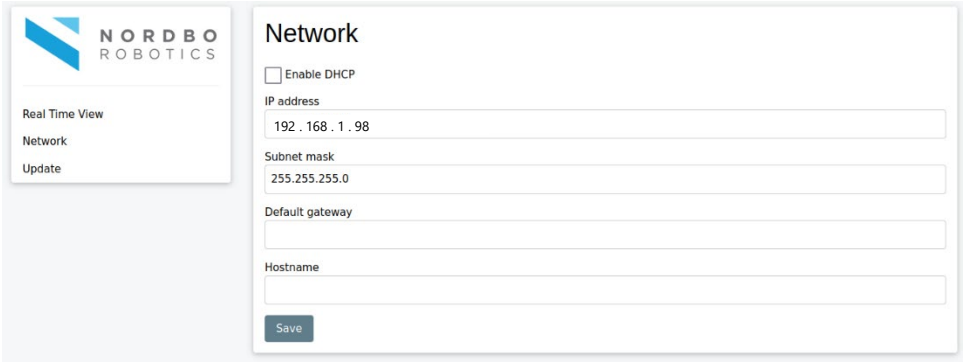
Below the 3D view is the:

- Current position of the Tracker
- Current state of the Nordbo Controller
- Current state of each button



5.3. Network

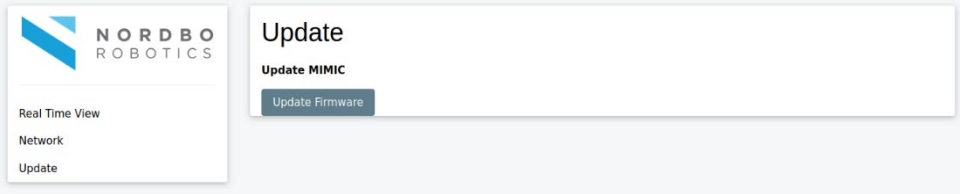
The Network page allows configuration of network settings for the Nordbo Controller. By default, DHCP is disabled and the IP address is 192.168.1.101. Enabling DHCP will disallow configuration of the IP address, Subnet mask and Default gateway. Click Save once complete to apply the configuration.



5.4. Update

The Update page is used to update the software of the Nordbo Controller. To update:

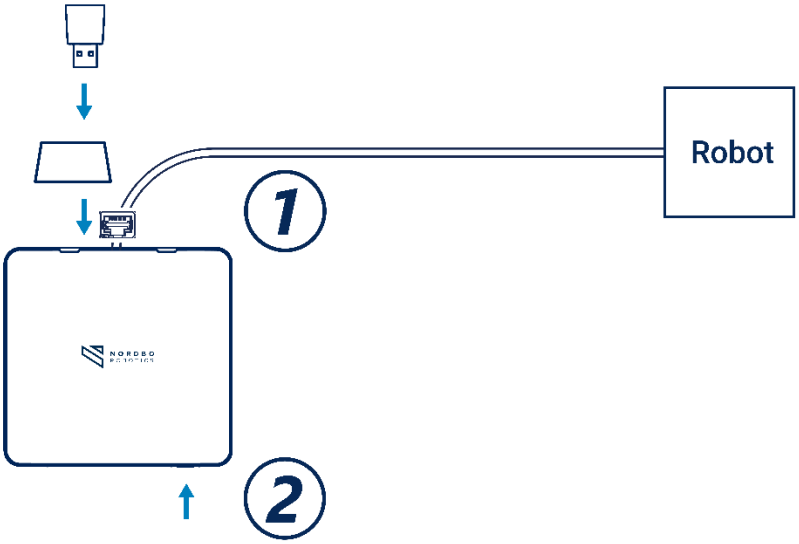
1. Click "Update Firmware"
2. Click "Browse"
3. Select the provided .deb package (nvr-server_x.x.x_amd64.deb)
4. Click “Update”
5. Wait for the green confirmation message. This may take a few minutes.
6. Restart the Nordbo Controller by turning it off and on.

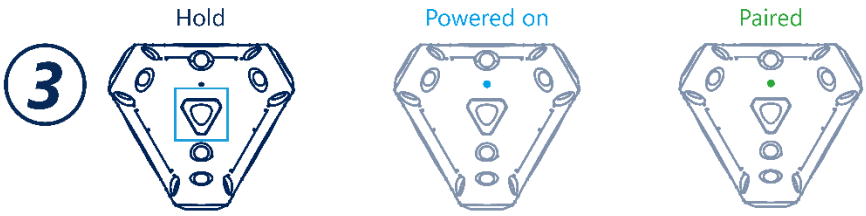


6. How to Use Mimic with IR Tracker

6.1. Starting the Software

1. *Connect Nordbo Controller to robot with ethernet cable*
2. *Power on Nordbo Controller*
3. *Turn on Tracker*
4. *You are ready to apply Mimic to your setup!*





Note: If all the steps were followed and Mimic IR has started successfully, the position and movements of the Tracker can be seen in the Web Interface.

6.2. Using Mimic IR

The IR Tracker is meant to be used together with the Mimic software platform.

Once started, the Tracker is tracked continuously while in line of sight of the Lighthouse. If at any point the Tracker cannot be seen from the Lighthouse, the tracking will stop. Once within line of sight again, the tracking will automatically continue.

The status of the buttons on the Joystick are transmitted wirelessly to the Nordbo Controller.

7. Specifications

7.1. Technical Specifications

Joystick

The TCP (Tool Center Point) is illustrated in Figure 11.

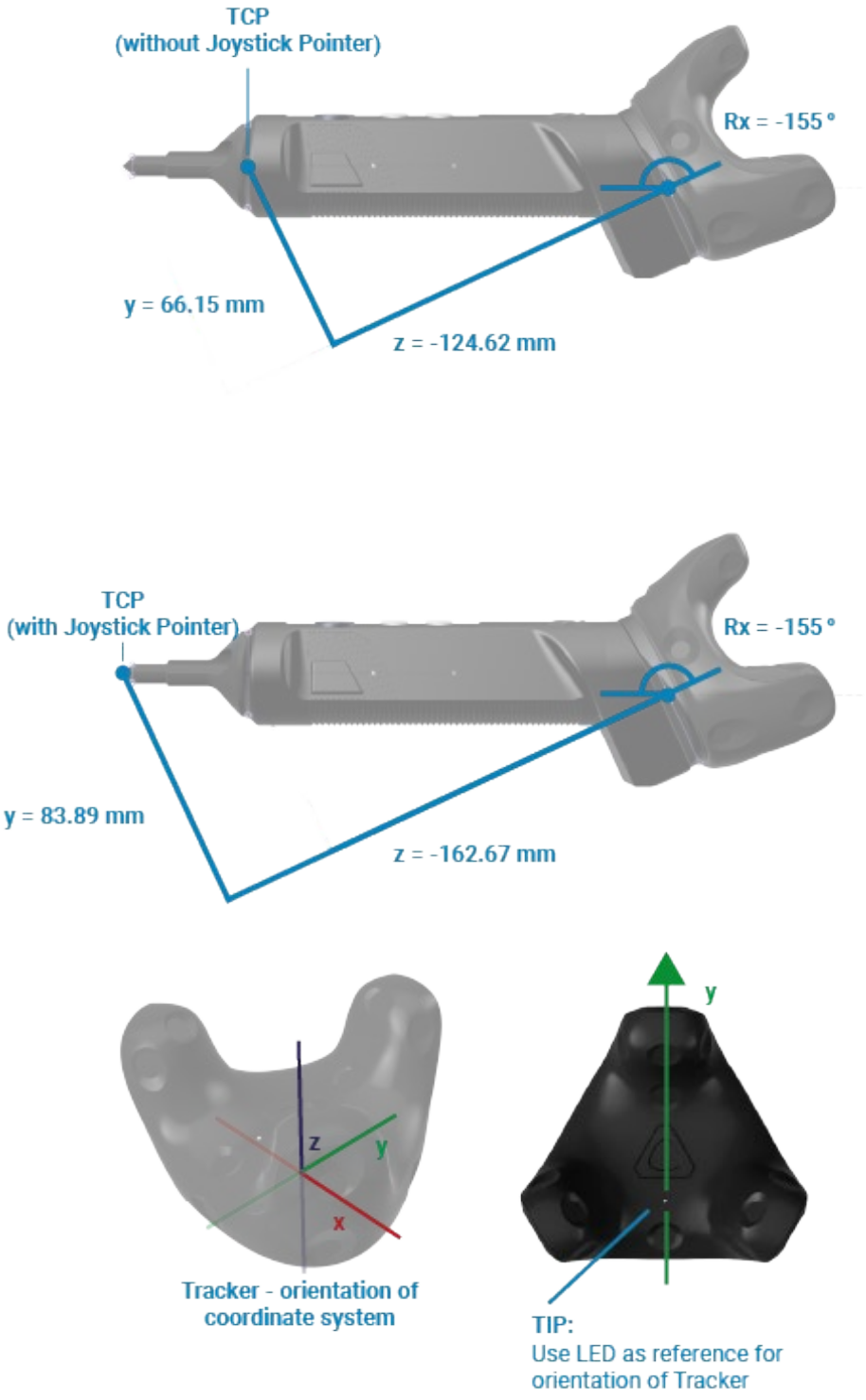


Figure 11 - Mimic IR Standard Joystick TCP

Tracker

Description	Metric	Note
Storage Temperature	0°C to 40°C	Avoid using the product after a dramatic change in temperature
Radio Type	2.4GHz wireless	-
Transmitter Frequency	2402 – 2480 MHz	-
Maximum Declared Output Power	4.5 dBm	-
Maximum Power Supply	5 Volts DC 1 Amp	-

The setup of the pins on the Tracker can be seen in Figure 12.

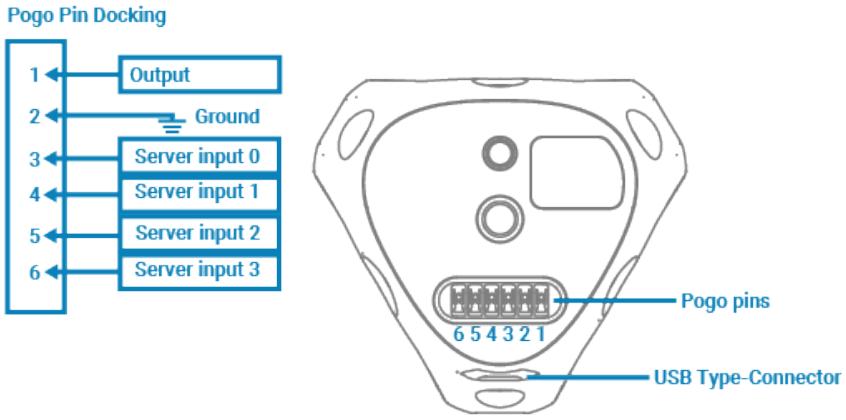


Figure 12 - Tracker Pin Setup

Dongle

Description	Metric	Note
Storage Temperature	0°C to 40°C	-
Radio Type	2.4GHz wireless	-
Transmitter Frequency	2402 – 2480 MHz	-
Maximum Declared Output Power	0.94 dBm	-

Lighthouse

Description	Metric	Note
Radio Type	2.4GHz wireless	-
Operating Frequency	2400 – 2483.5 MHz	-
Max EIRP	6.24 dBm +/- 1.5 dBi	-
Laser	Class 3B laser	Mitigated to Class 1 laser
Safety Distance While operating	20 cm	-
Horizontal Field of View	150°	-
Vertical Field of View	110°	-
Minimum Tracking Distance	0.5 m	-
Maximum Tracking Distance	7.0 m	-

SteamVR

Description	Metric	Note
Version	1.21.12	Do not update

7.2. Mechanical Dimensions

Tracker

Description	Metric	Note
Length	79.0 mm	-
Width	70.9 mm	-
Height	44.1 mm	-
Weight	75 g	-

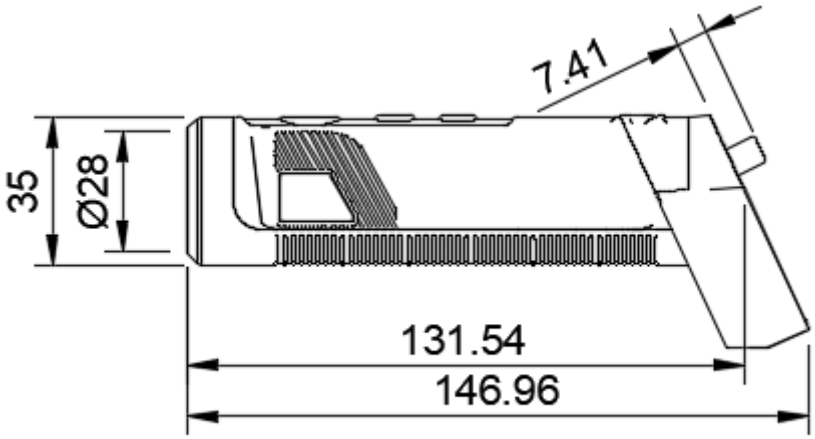
Dongle

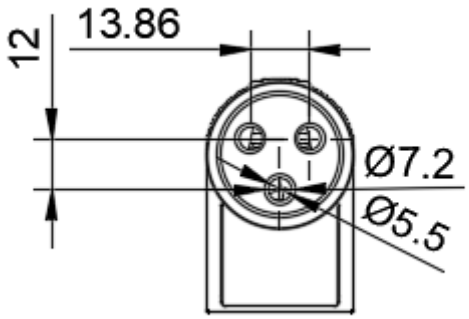
Description	Metric	Note
Length	46.8 mm	-
Width	28.0 mm	-
Height	47.2 mm	-
Weight	37.5 g	-

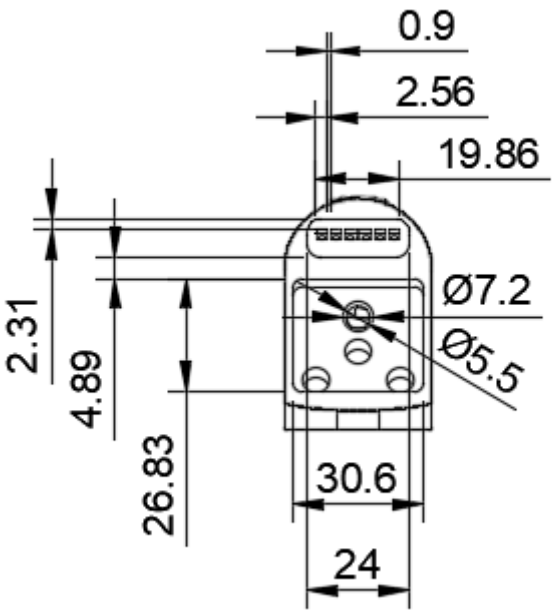
Lighthouse

Description	Metric	Note
Length	74.7 mm	-
Width	63.0 mm	-
Height	77.4 mm	-
Weight	0.64 kg	-

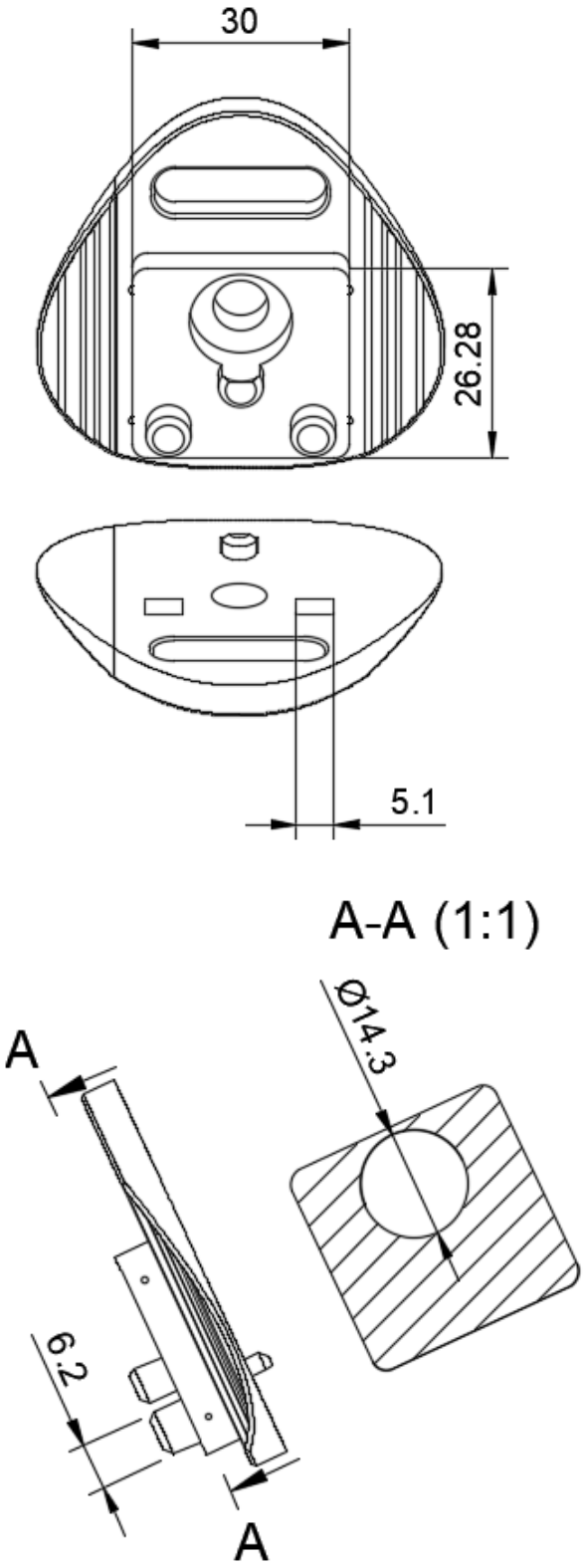
Mimic IR Standard Joystick







Tracker Mount



8. Support and Trouble Shooting

8.1. FAQ

Type	No.	Question	Answer
Common	1	Why does the tracking sometimes become imprecise or noisy?	If the tracking becomes imprecise or noisy, it could be one of the following reasons: • The Tracker is close to shiny materials. Reflections can affect the light-based tracking. • The dots (sensors) on the Tracker are visually blocked from Lighthouse, by a hand or another object. • The Tracker can be seen by two or more • Rotating the Tracker can cause less precise tracking. • The larger distance between the Lighthouse and the Tracker, the less precise the tracking. The distance between the Lighthouse and the Tracker is 0.5-7 meter. • The Lighthouse is fixated to an element that vibrates or moves. Any vibrations will disrupt tracking.
	2	Why does the tracking sometimes suddenly stop?	If the tracking suddenly stops, it could be one of the following reasons: • The Tracker is turned off. • The Tracker runs out of battery. • The Tracker is no longer visible from any Lighthouses. • If you remove the Tracker from the joystick, be aware that if you block too much of the Tracker with your hand the line of sight can also be broken • The Tracker is closer than 0.5 m to the Lighthouse. • The Tracker is further than 7.0 m away from all Lighthouses. • Try resetting the Tracker by powering it of, inserting the USB-C cable and hold the power button for 10 seconds.

Type	No.	Question	Answer

Tracker	1	How does the Tracker work?	The Tracker uses the infrared light from the Lighthouse to estimate its position. The light is captured by the small circular dots on the Tracker.
	2	How do I connect the Dongle to the Nordbo Controller?	1. Connect one end of the supplied USB cable to the Dongle cradle, and then attach the Dongle to the cradle. 2. Connect the other end of the USB cable to the Nordbo Controller.
	3	How do I charge the Tracker?	When the Tracker battery is low, the status light will blink red. It is recommended that you charge the Tracker. Charge the Tracker using the USB Type-C cable that came in the box. Connect the USB cable to a power adapter or connect the cable to a Nordbo Controller's USB port to charge the Tracker. When the Tracker is fully charged, its status light either shows white when off or green when on.
	4	How do I pair the Dongle with the Tracker?	Make sure the Dongle is connected to the Nordbo Controller. 1. In SteamVR, Click ☰ > Devices > Pair Controller. 2. Select "HTC Vive Tracker". 3. Press the Power button for around two seconds. The status light will blink blue. 4. Wait for the status light to turn green. 5. In the Controller Pairing window, click Done.
	5	What does the status light on the Tracker mean?	The status light shows: • Green when the Tracker is in normal mode. • Blinking red when battery is low. • Blue when the Tracker is turned on, but not paired. • Blinking blue when the Tracker is ready to pair with the Dongle. • Orange when charging.
	6	Why does the Tracker automatically turn off?	If the Tracker turns off by itself, it could be one of the following reasons:

			• The battery is drained. • Pairing has timed out after being idle for more than 30 seconds. • No movement has occurred for more than 30 minutes. You can set how long the Tracker waits idle before turning off. In SteamVR, click Settings > Startup/Shutdown, and then set the time in "Turn off controller after".
	7	Can the Tracker be used while charging?	Yes, the Tracker can be used while being charged.

Type	No.	Question	Answer
Dongle	1	How do I best place the Dongle?	• The Dongle should be inserted into the Cradle and placed at least 45 cm away from the Controller or other electronic devices that might cause interference. • The Dongle should not be hidden away in a metal cabinet or blocked by large metal objects.

Type	No.	Question	Answer
Lighthouse	1	How do I best place the Lighthouse?	For most applications the best point of view is somewhere above the workspace, looking down. It can also be placed at an angle that is not perpendicular or parallel with the floor.

Type	No.	Question	Answer
Lighthouse	1	How many Lighthouses can be used in a single setup?	One Lighthouse should be used in a single setup.
	2	How do I change the channel of a Lighthouse?	To change the channel of a Lighthouse: 1. Power on the Lighthouse. 2. Press the pinhole button on the backside of the Lighthouse. 3. If SteamVR is on, restart it for the changes to take effect. 4. Hover the mouse over the Lighthouse icon in SteamVR to see the current channel of the Lighthouse.

Type	No.	Question	Answer
Nordbo Controller	1	What is the password for the computer?	The default password is “nordbo”.
	2	What is the IP of the computer?	The default IP is 192.168.1.98

8.2. Support Requests

For questions, feature requests, and general support, please visit support.nordbo.io and create a ticket. We highly value feedback on our products and you can help us improve the product by sharing your experience.

9. Declarations and Certificates

CERTIFICATE OF CONFORMITY

Certificate No.: LTC220902-CHA-012

The Certification Body of **LTC CERTIFICATION LIMITED**

Certifies that

Applicant:	NORDBO ROBOTICS A/S
Address:	Noatunvej 2, 5000 Odense, Denmark
Manufacturer:	Hangzhou Amphenol Phoenix Telecom Parts Co., Ltd.
Address:	No. 98-5 (South), Road 19 Hangzhou Economic and Technological Development Zone, Zhejiang, China
Product Name:	Mimic
Model No.:	IR Tracker for Mimic UR, Mimic UR Kit
Rating(s):	DC 24V, 0.05kW
Testing Standard(s):	EN 55032: 2015+A1:2020+A11:2020, EN 55035: 2017+A11:2020, EN IEC 61000-3-2: 2019+A1:2021, EN 61000-3-3: 2013+A1:2019+A2:2021.
Report No.:	DN20220906-HAF21-CE-E

Technical documentation of the company and the product above have been observed and audit has been completed successfully by us. The **Electromagnetic Compatibility Directive 2014/30/EU (EMC).** have been taken as references for these processes.

The validity of the certificate can be checked through our website www.ltcfr.com .The CE mark shown below can only be used under the responsibility of the manufacturer with the completion of EU Declaration of Conformity and necessary technical documentation for all the relevant directive(s). This certificate only covers the product stated above and LTC must be noticed in case of any changes on the product.

Signature: Lazare Martin

Lazare Martin

Date of issue: September 7, 2022

Expiry Date: September 6, 2027

LTC APPROVED

CE

LTC CERTIFICATION LIMITED

Address: 37 rue des Mathurins 75008 Paris France

Email: info@ltcfr.com Website: www.ltcfr.com

NORDBO ROBOTICS

Nordbo Robotics A/S
Noatunvej 2
5000 Odense, Denmark
+45 81 81 98 81
info@nordbo-robotics.com
CVR/VAT: DK 34697728

www.nordbo-robotics.com