NORDBO ROBOTICS

Manual Version 1.6
For Nordbo Controller Software Version 1.2

FT Tracker for Mimic

User Manual

Tracker Specific Manual

Copyright

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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.

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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 death, 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.

Nordbo Robotics is not liable for any damage or injury resulting from the use of the product.

2. Getting to Know Mimic with FT Tracker

2.1. Mimic with FT Tracker at a Glance

The FT Tracker for Mimic allows the user to record Trajectories by guiding the robot by hand.

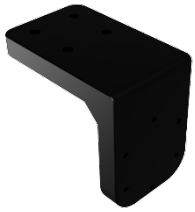
The FT Tracker consists of a force- torque sensor and a handle. With these attached to the robot, the user can track complex movements (illustrated in Figure 1).

The FT Tracker provides the Mimic software with the force-torque applied to the handle. The Mimic software converts the force-torque to a change in the position and orientation in 3D-space applied to the robot TCP.

Figure 1 - Recording a movement with Mimic FT

3. FT Tracker Information

3.1. Mimic FT Tracker Contents

Picture	Referred to as	Description
	1x USB Flash drive	Contains documentation and URCap (only for Mimic UR)
	1x FT Tracker for Mimic • 1x Mimic FT Standard Handle	The Tracker is the object that captures position and movements.
 	• 1x NRS-6050-D80-UR Kit (installed in the FT Tracker) 1x NRS-6050-D80 1x NRS-ETH-2 1x Flange Kit (3x flanges) 1x USB w. URCap	The FT Tracker is used to guide the robot by hand. NRS-6050-D80 is the force sensor. The NRS-ETH is the Tracker Controller.
	1x UR Flange for Mimic with FT	Standard flange that comes with the FT Tracker to get started. Enables mounting of the Tracker on a UR robot. Follows ISO 9409-1 (cobot interface).
	3x Vibration dampers	Limits noise produced by the setup.
	3x M4x16 Hexagon Socket	Used to mount Mimic FT Standard Handle with NRS-6050-D80 (preinstalled).

4. How to Setup Hardware

4.1. Setting Up the Tracker

Figure 2 depicts the complete hardware setup of the FT Tracker.

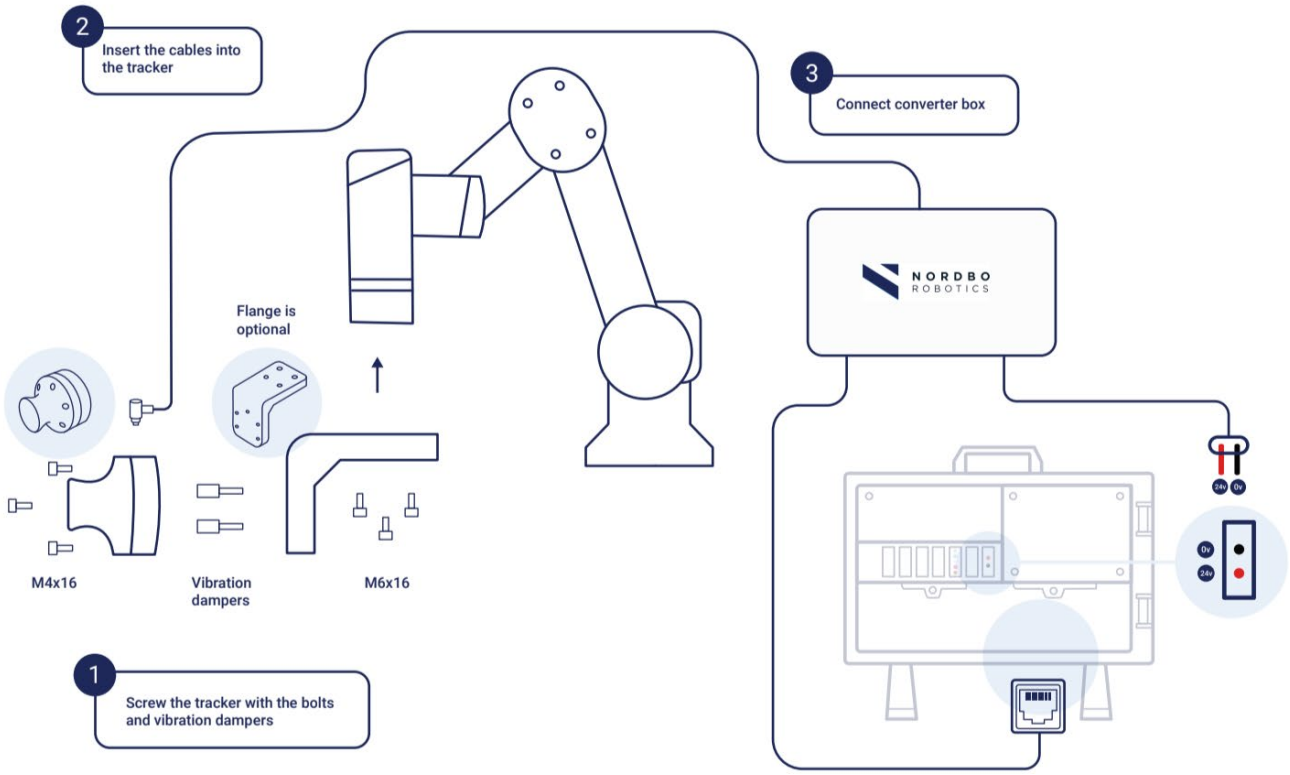


Figure 2 - The Mimic FT Tracker Setup

5. How to Configure the Software

5.1. Setting the Correct IP

Web Interface

The web interface is the main user interface for the FT Tracker. It can be reached by typing the IP address of the FT Tracker into a browser.

Default IP: 192.168.1.100

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 3). This information includes the version of the firmware currently running on the FT Tracker, the serial number of the FT Tracker and the status of the system.

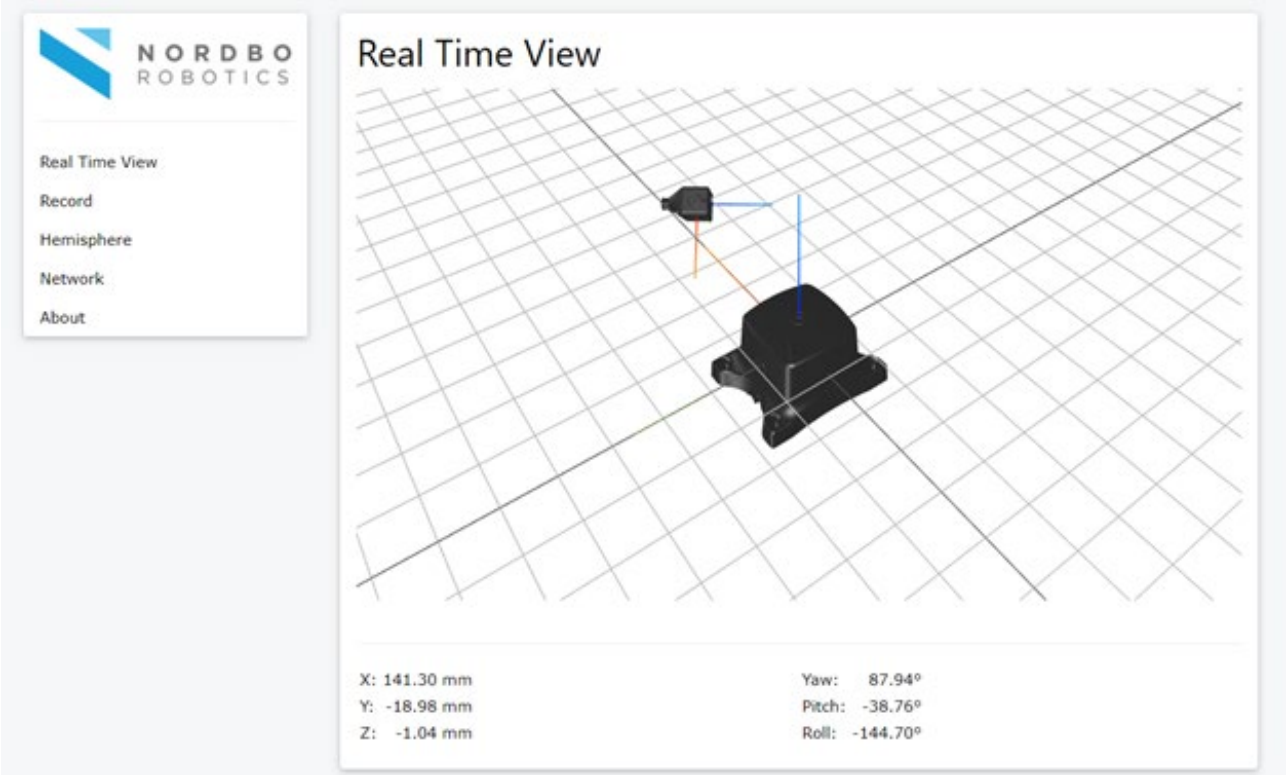


Figure 3 - Example of Web Interface (Real Time View)

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

Note:

NRC-ETH had default IP 192.168.0.100

NRC-ETH-2 has default IP 192.168.1.100

Step 1. Connect the FT Tracker's power supply 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.

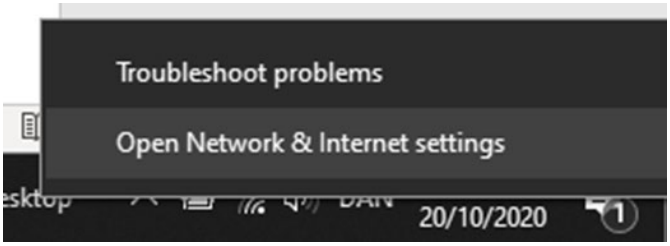


Figure 4

Step 3. Click "Change adapter options".

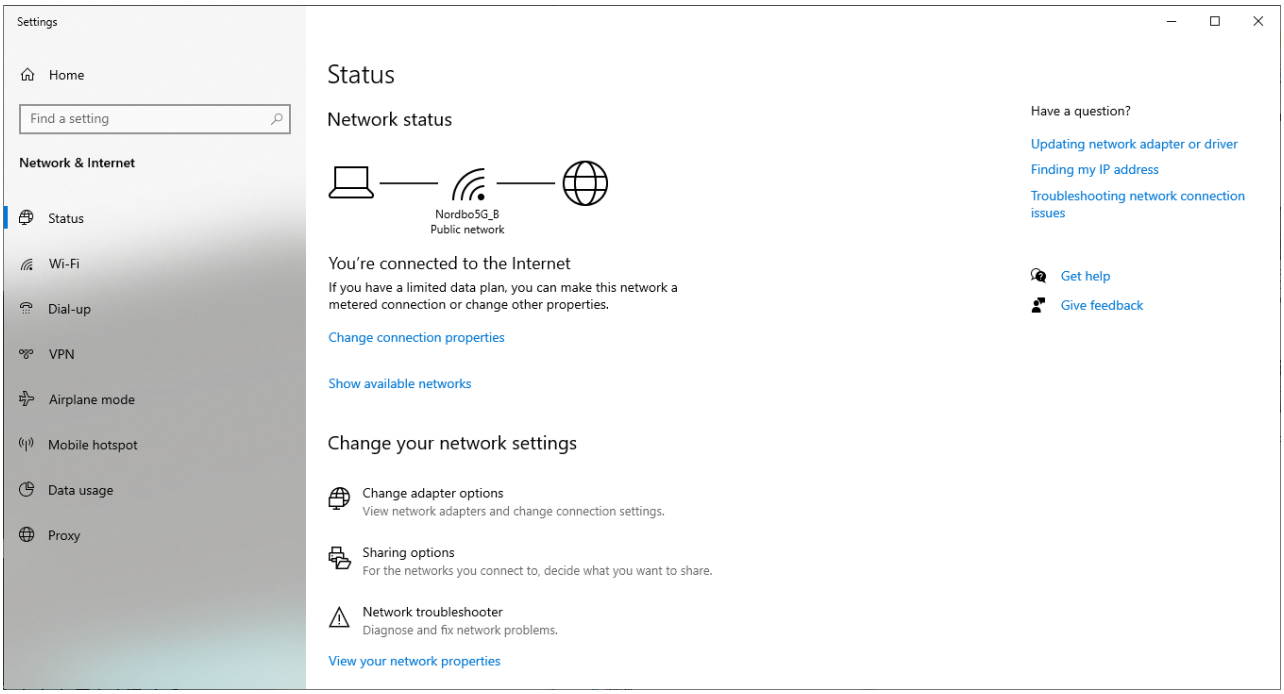


Figure 5

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

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

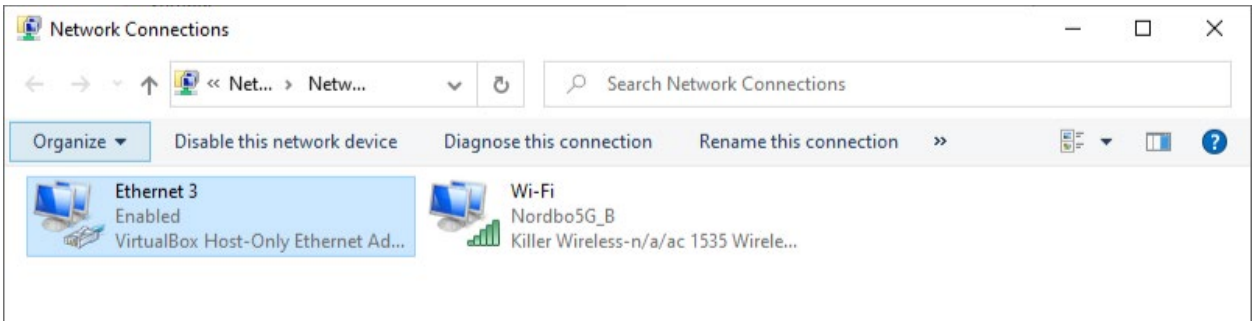


Figure 6

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

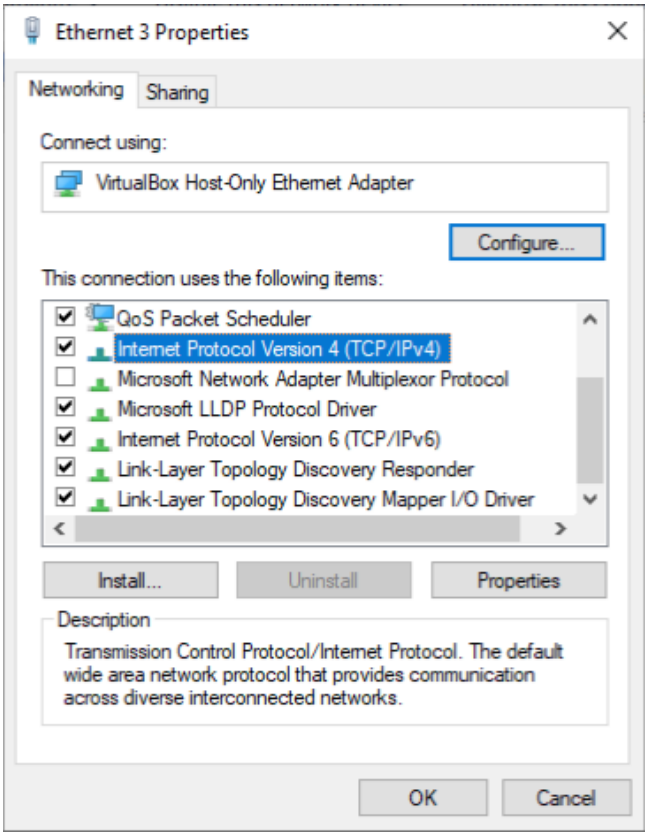


Figure 7

Step 6. Set the IP address

Set the IP address to 192.168.1.100

Set the Subnet mask to 255.255.255.0

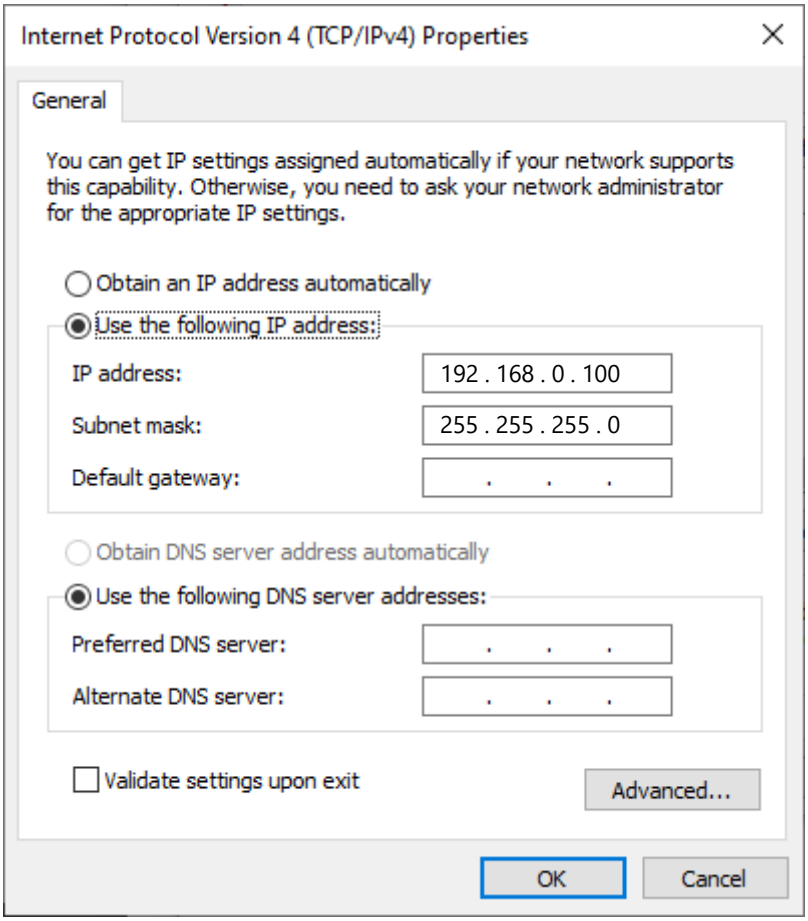


Figure 8

Step 7. Access the real-time view using a browser by typing the IP address 192.168.1.100.

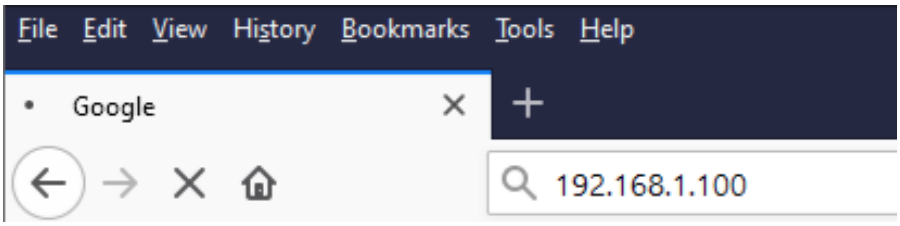


Figure 9

5.2. Real Time View

The landing page of the web interface is the Real Time View. This page allows the user to verify the functionality of the FT Tracker. A live graph displays the force and torque applied to the sensor. Below the graph is the current force torque value displayed.

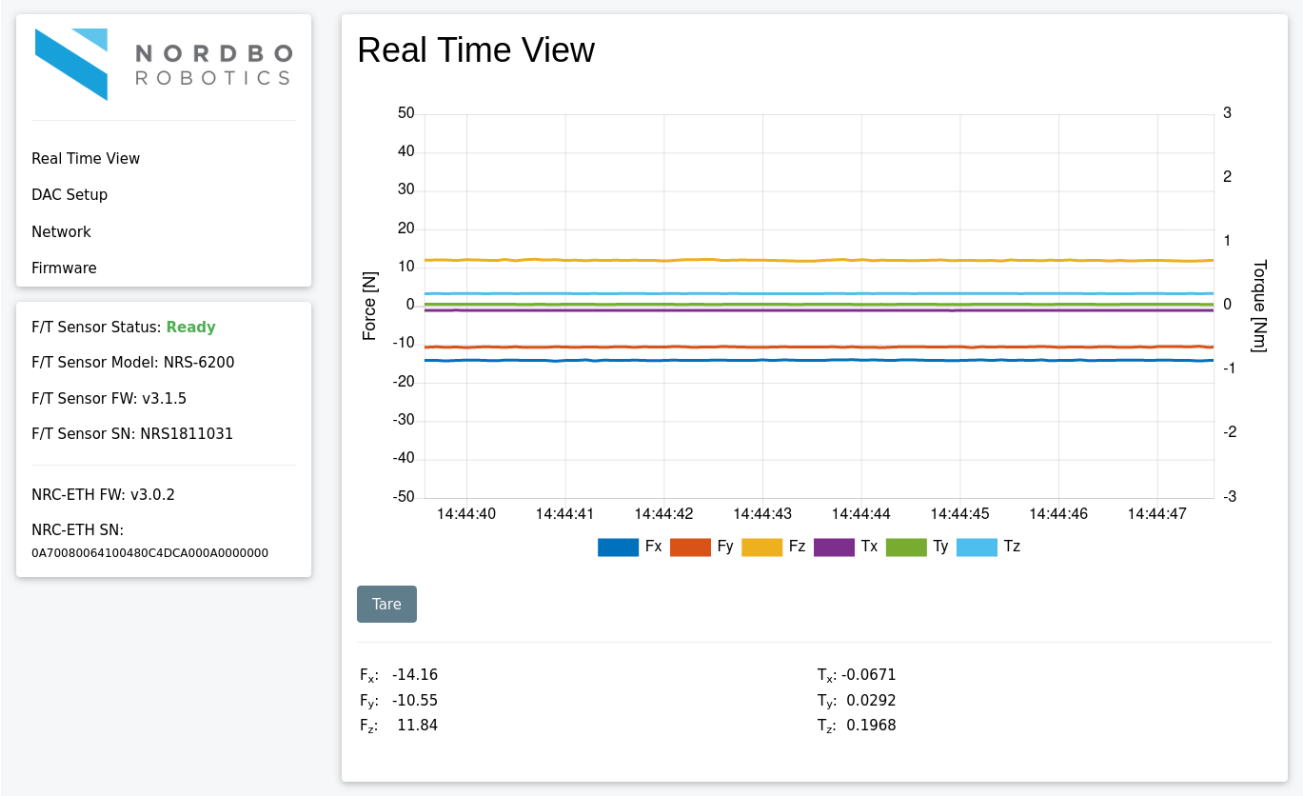


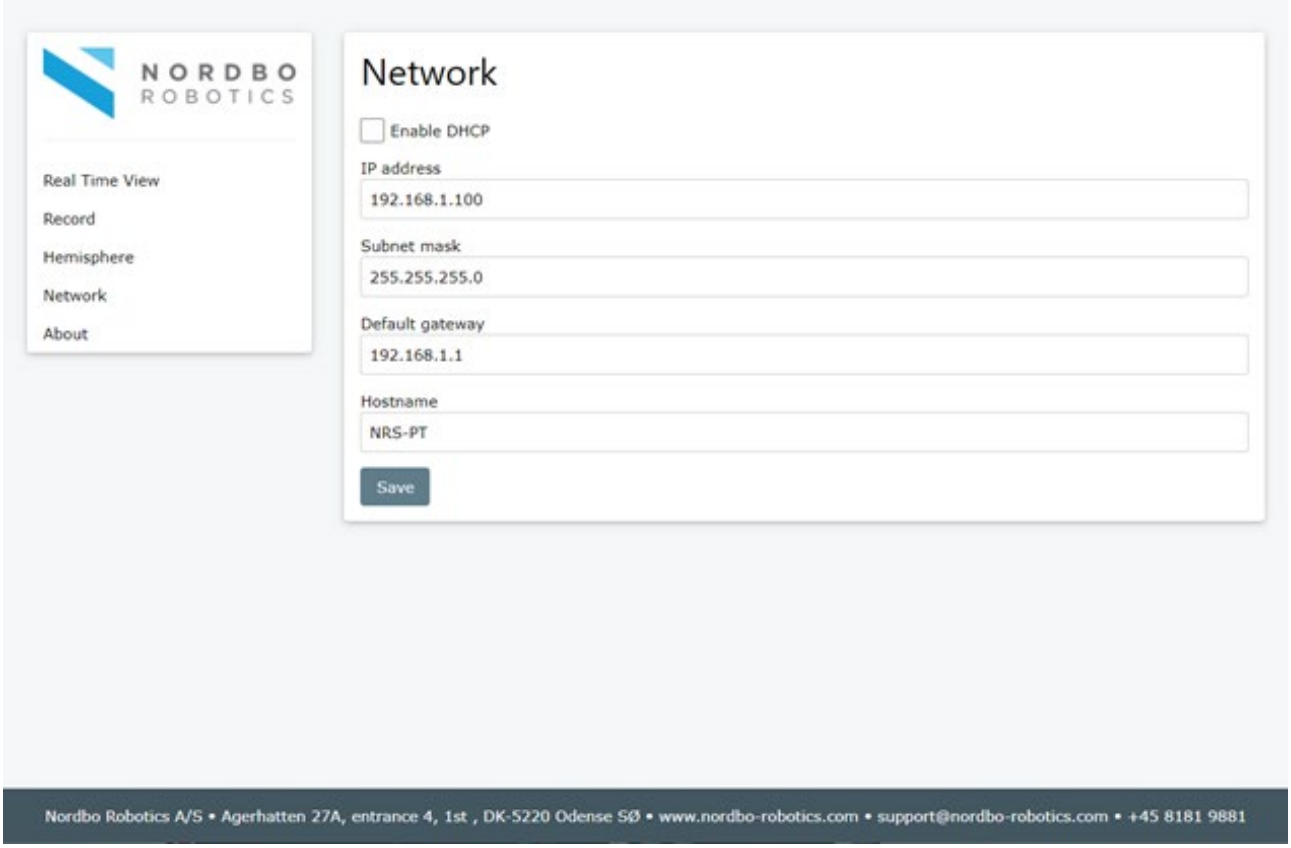
Figure 10

5.3. Network

The Network page allows configuration of network settings for the FT Tracker.

By default, DHCP is disabled and the IP address is 192.168.1.100. Enabling DHCP will disallow configuration of the IP address, Subnet mask and Default gateway. The default Hostname is NordboFT but can be changed through the interface.

Click Save once complete to apply the configuration.



6. How to Use the Mimic with FT Tracker

6.1. Usage

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

The senor measures the force and toque applied to it. The change in force and torque is converted to change in the robot TCP (Tool Center Point), and thereby a movement.

Figure 11

7. Specifications

7.1. Technical Specifications

Force Sensor (NRS-6050-D80) – Technical Specifications

Description		Metric
Compatibility		Windows, Linux, UR & Codesys
Diameter, Ø		80 mm
Height, H		22 mm
Weight		300 g
Operating conditions, temperature		0° to 50°
Operating conditions, humidity		< 85%
Hysteresis		< 0,2 %
Crosstalk		< 5 %
Power requirement (CAN)		5 VDC @ 250 mA
Power requirement (Ethernet)		6-40 VDC @ 1000 mA
Sample rate		< 1000 Hz
Fx Fy	**Max force**	± 500 N
	Resolution*	0,015 N
	Overload	700 N
	Signal noise**	0,025 N
	Noise-free resolution	0,1 N
	Full scale non-linearity	< 4%
	Axis deformation	30 µm
Fz	**Max force**	± 500 N
	Resolution*	0,015 N
	Overload	1200 N
	Signal noise**	0,032 N
	Noise-free resolution	0,15 N
	Full scale non-linearity	< 4%
	Axis deformation	27 µm
Tx Ty	**Max torque**	± 10 Nm
	Resolution*	$0{,}32*10^{-3}$ Nm
	Overload	15 Nm
	Signal noise**	$0{,}35*10^{-3}$ Nm
	Noise-free resolution	$1{,}5*10^{-3}$ Nm
	Axis deformation	0,2°
Tz	**Max torque**	± 5 Nm
	Resolution*	$0{,}25*10^{-3}$ Nm
	Overload	15 Nm
	Signal noise**	$0{,}4*10^{-3}$ Nm
	Noise-free resolution	0,002 Nm
	Axis deformation	0,05°

**The resolution describes the minimal increment of the different axis. The range and resolution of the sensor may vary depending on factory calibration. It can be expected that a calibrated sensor has a measuring deviation below 3% but is depending on the temperature and humidity of the environment.*

***Signal noise is defined as the standard deviation of a one second signal without load*

Converter – Technical Specifications

Description	Metric
Model	NRS-ETH
Compatibility	Windows, Linux, UR & Codesys
Width, W	55 mm
Length, L	91 mm (incl. connectors)
Height, H	39 mm
Weight	115 g
Operating temperature	0° to 50°
Operating humidity	< 85 %
Power requirement (CAN)	5 VDC @ 100 mA
Power requirement (Ethernet)	6-40 VDC @ 500 mA

7.2. Mechanical Dimensions

Mimic FT Standard Handle

The TCP (Tool Center Point) is illustrated in Figure 12.This is need when the TCP needs to set, relative to the robot interface (see Figure 13). Figure 14 depicts the mechanical dimensions of the FT Tracker.

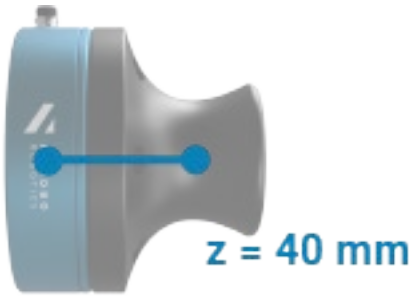


Figure 12 - Mimic FT Standard Handle TCP

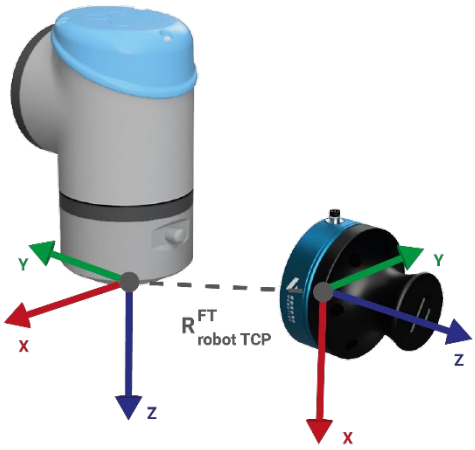


Figure 13 - Relation between robot interface and FT Tracker

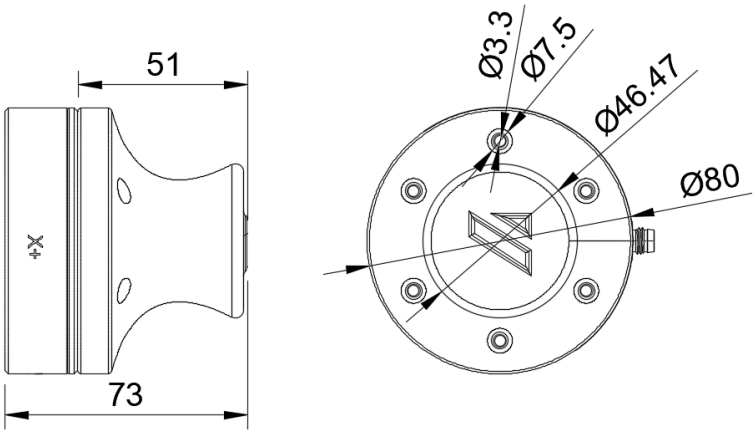


Figure 14 - Mechanical Dimensions of FT Tracker

8. Support and Troubleshooting

8.1. FAQ

Type	No.	Question	Answer
Common	1	How do I restart the FT Tracker?	To restart the FT Tracker, disconnect the power source and connect it again.

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.

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