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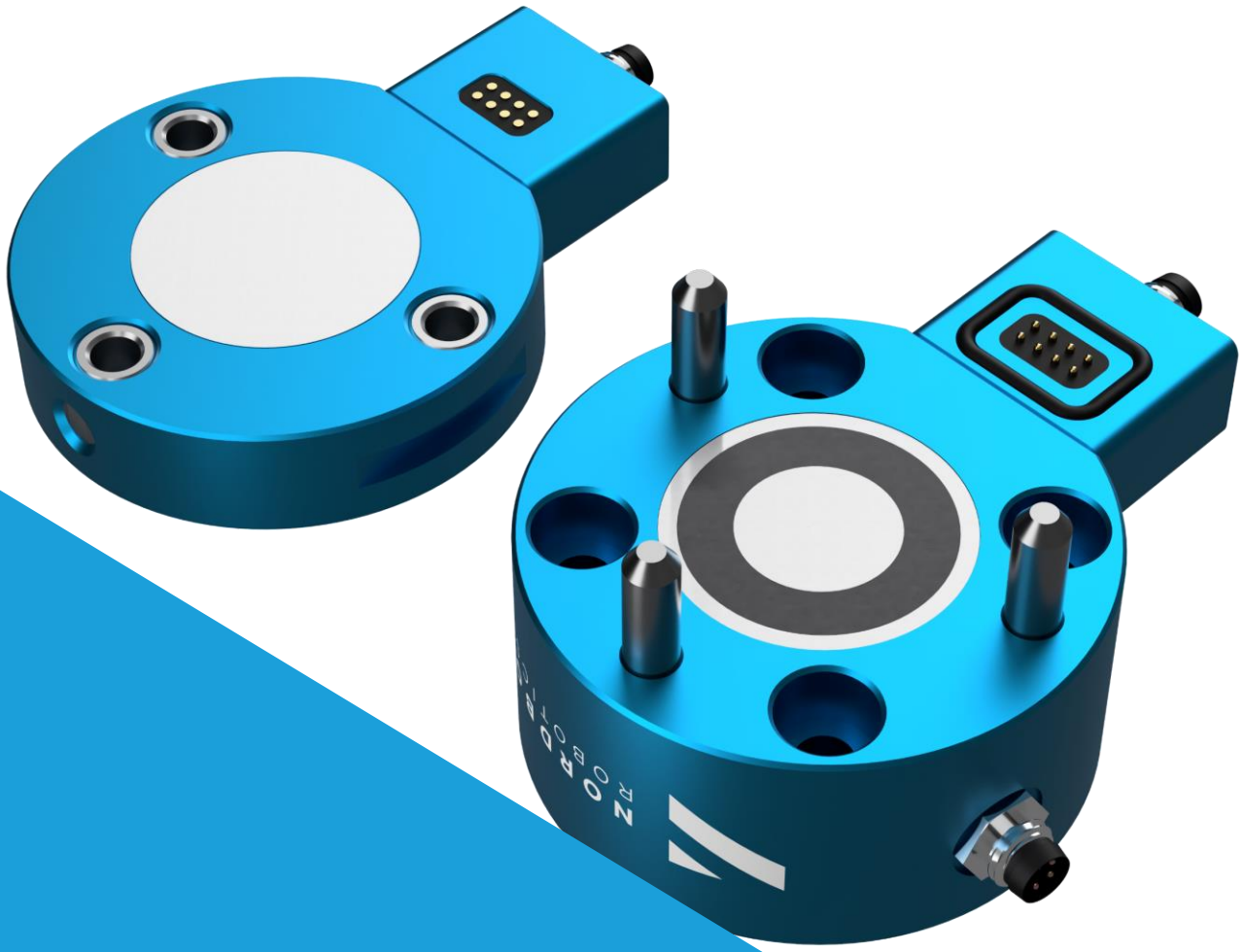

NTC-E10 for Universal Robots

User Manual

Ver. 1.2

Nordbo Robotics A/S
Agerhatten 27A Entrance 4
5220 Odense Denmark

info@nordbo-robotics.com
+45 81 81 98 81

NORDBO ROBOTICS

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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's control.

Contact

Nordbo Robotics A/S
Agerhatten 27A Entrance 4
5220 Odense, Denmark

Phone: +45 81 81 98 81
Mail: info@nordbo-robotics.com

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1. Introduction

1.1. Intended use

This document serves as a guide for integrating Nordbo Robotics' NTC-E10 magnetic tool changer in an application using a Universal Robots manipulator.

1.2. Prerequisites

It is recommended that the person executing the instructions of this installation guide has basic knowledge and skill in using Universal Robots' PolyScope and that the user has a basic understanding of the risks related to working with a robot. It is also recommended reader should also have basic knowledge in using a computer and altering its network settings. It is required that the person executing the guide's instructions have made a risk assessment of the application in which the product is integrated before using this manual.

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 mount the product on the robot, it is important to ensure that the robot cannot move. The robot must therefore be powered off before attempting to attach the sensor on 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 wire connectors of both the sensor and the converter can break if the user overtightens the cables' screw.

The NTC-E10 excluding the NTC-IO-M/F is water and dust resistant according to IP67 test standards.

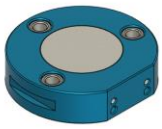
The sensor can be used within the specified measurement range. Using the sensor outside of its range is considered misuse. Nordbo Robotics is not liable for any damage or injury resulting from misuse.

2. Product information

2.1. NTC-E10 UR Bundle

The UR bundle consists of the items listed below.

1x NTC-E10-M (Robot-sided part)



1x NTC-E10-F (Tool-sided part)

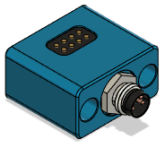
1x NTC-UR Cable

4x M6-15 mm

1x USB key with relevant manuals and software

2.2. I/O Connector (Optional)

1x NTC-IO-M



1x NTC-IO-F

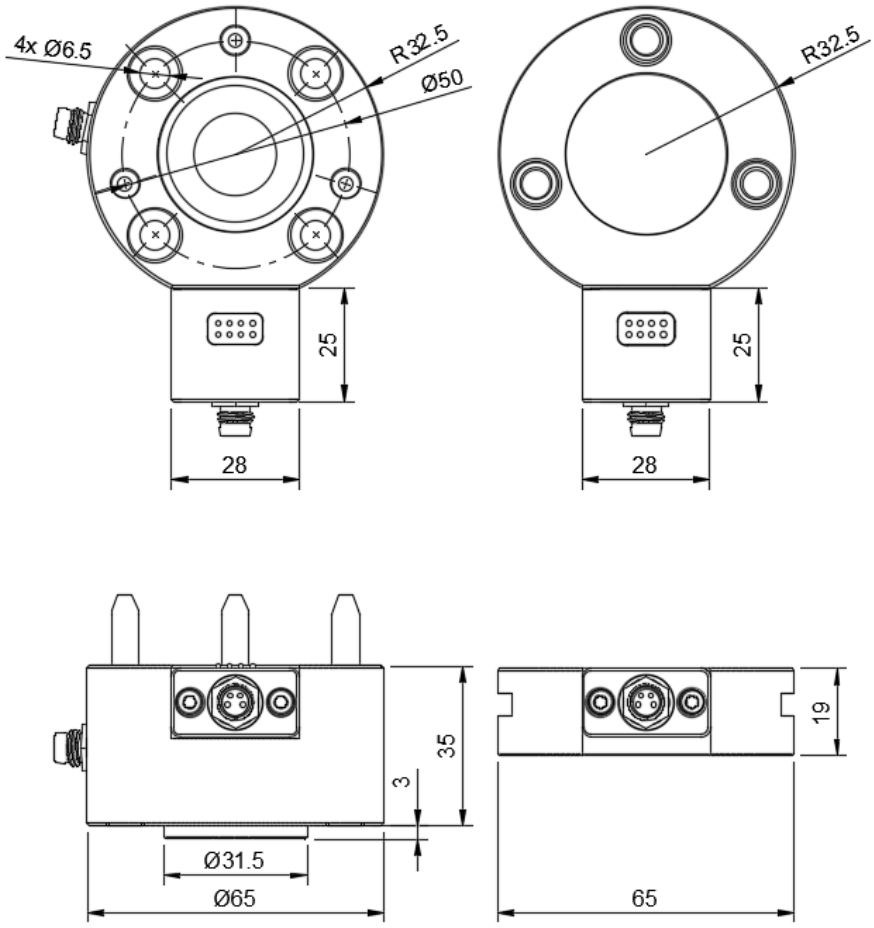
4x Metal pins

4x M3-30 mm

2.3. Technical specifications

Model	NTC-E10
Dimensions, Assembled (Diameter x Height)	Ø: 65, H: 57 mm (When mounted H: 54 mm)
Tool Changer I/O	24V, 1A (ON/OFF)
Weight (excl. NTC-IO)	531 g
Weight (incl. NTC-IO)	602 g
Minimum Clamping Distance	2 mm
Suggested Payload Limit	10 kg
Avg. Max Payload Capacity*	29 kg
Avg. Max Static Moment Capacity X, Y	5 Nm
(Optional) I/O 8-Pin Coupler, signal	24V, 1A
Positional Repeatability, X	0,001 mm
Positional Repeatability, Y	0,020 mm

2.4. Mechanical specifications: NTC-E10



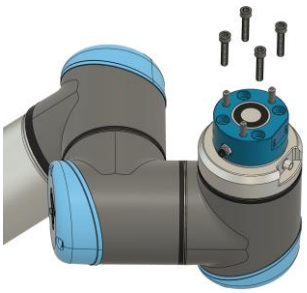
3. Installing the Tool Changer on UR

The following section describes the procedure for installing the tool changer on a UR3, UR5, or UR10 robot, and how to use the software tools created for it.

3.1. Mounting the NTC-E10 on a robot

To mount the sensor to the robot's flange the user will need the supplied bolts and necessary tools.

Warning! The user must make sure that the robot is turned off and unable to move at this step. Unintended robot movement may cause harm to personnel working with the robot.



Step 1

Mount the tool changers robot-sided part on the robot using 4x M6-15 mm bolts.

OBS.! The orientation of the tool changer must be exactly as illustrated.

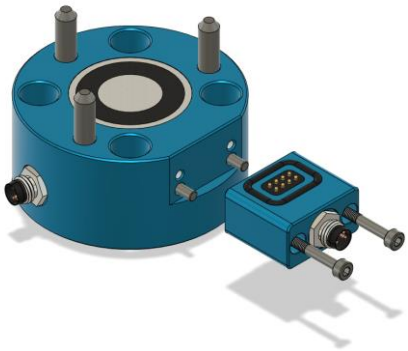
Step 2

Use the supplied wire to connect the robot's tool end I/O with the tool changer.

Step 3

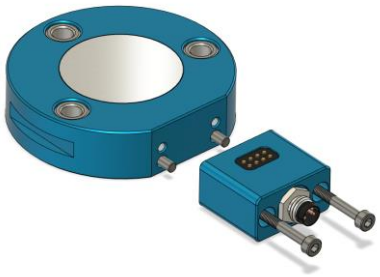
Mount the **tool-sided** part on all necessary tools using 4x M6-10 mm bolts per tool.

3.2. Mounting IO Quick Connect Add-on (Optional)



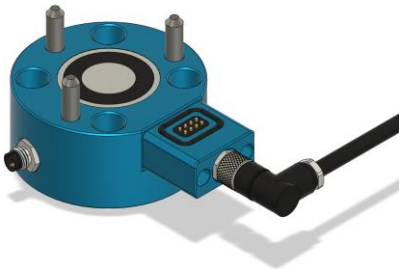
Step 4

Connect the IO on the **robot-sided** part, using 2x metal pins and 2x M3-30 mm bolts



Step 5

Connect the IO on the **tool-sided** part, using 2x metal pins and 2x M3-30 mm bolts



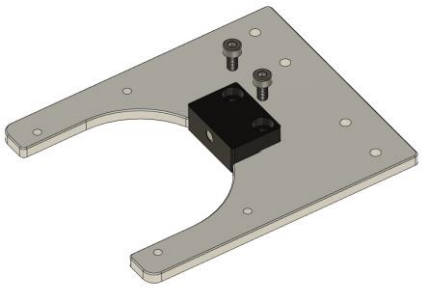
Step 6

Connect an 8-pin wire from the robot to the I/O module attached to the robot-sided part

Step 7

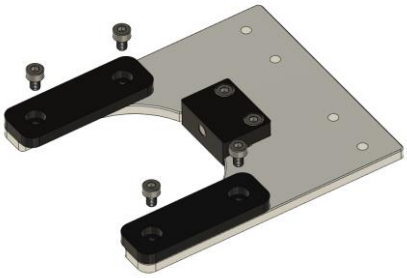
Connect an 8-pin wire from the I/O module on the tool-sided part to the I/O of the attached tool.

Mounting tool holders (Optional)



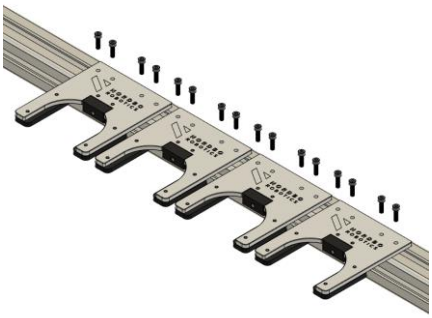
Step 8

Mount the magnet on the underside of the metal plate as illustrated using 2x M4-8 mm bolts. Notice that the Nordbo Robotics logo is not visible on this site.



Step 9

Mount the two square pieces using 4x M4-6 mm bolts.



Step 10

Mount the tool holder(s) with 4x M4 per tool holder.

3.3. Installing the UR Cap

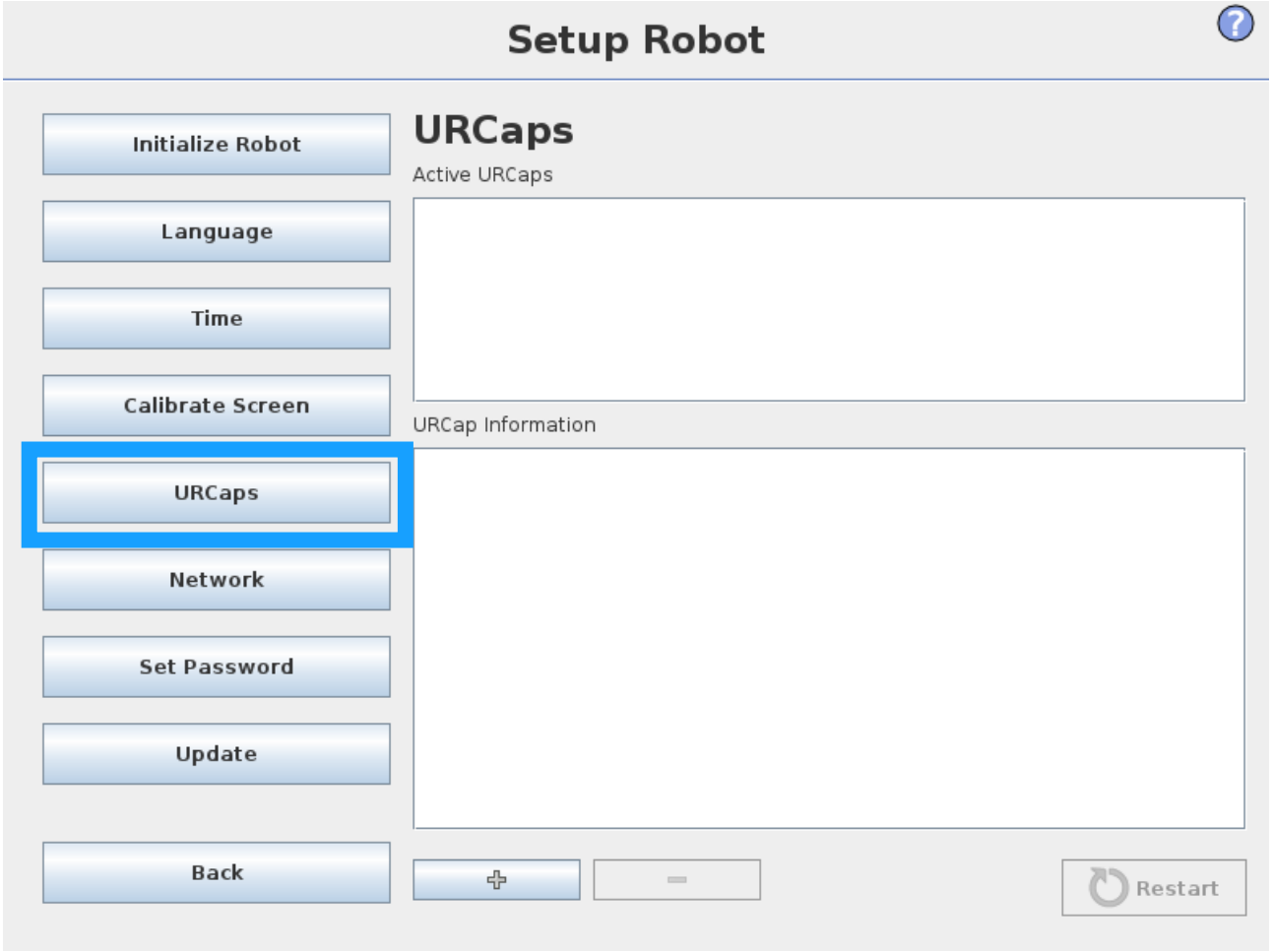
Before installing the URCap, please make sure the Polyscope software version equal to or newer than version 3.14.1 for CB or version 5.9.1 for e-series. The URCap may not function properly if installing on older versions than previously mentioned.

Step 1

Insert the supplied USB flash into the screen's USB slot.

Step 2

In the left menu, click the button URCaps



Step 3

Click the button marked with a plus (+)

Step 4

Locate the URCap on the flash drive.

Step 5

Locate and select the latest version of the URCap "**NTC-E.X.X.X.urcap"** on the flash drive and click "Open".

Step 6

Restart the robot to finish installing the URCap. Click the restart button in the lower right corner and wait for the robot to restart.

4. Setting up the Tool Changer

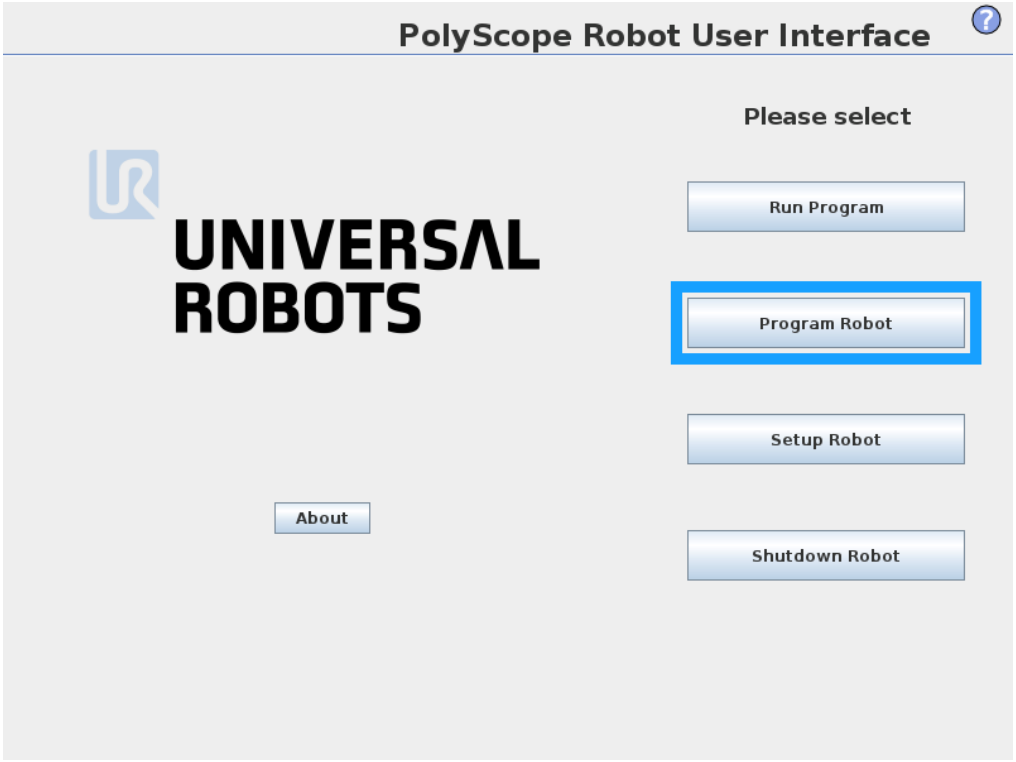
The following section describes how to install the NTC-E tool changer and how to create a program using the tool changing mechanism.

4.1. Setting up the NTC-E

Perform the following steps to install the NTC-E tool changer

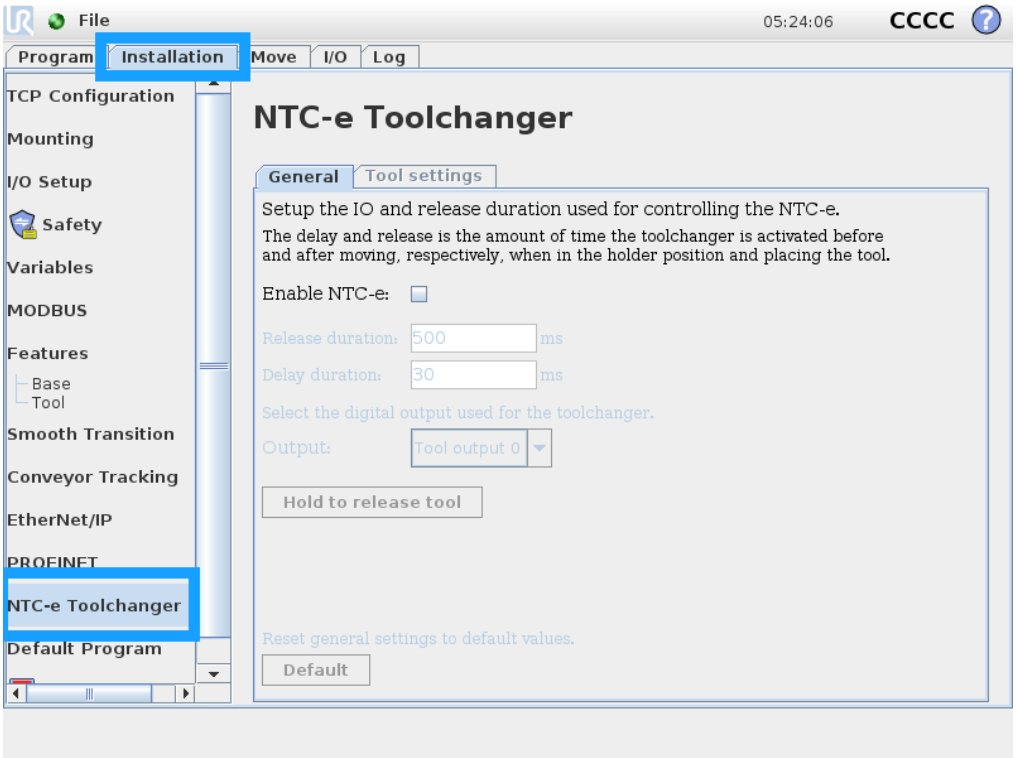
Step 1

Open "Program Robot"



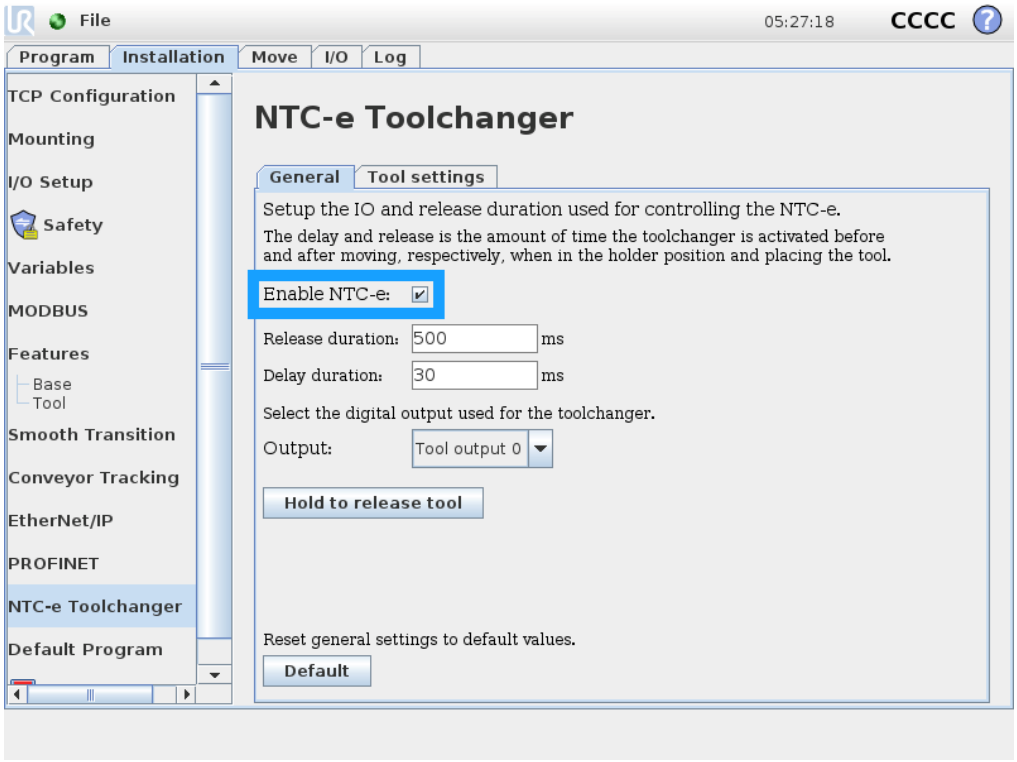
Step 2

Select the tab "Installation" and open "NTC-E Tool changer" in the left sidebar.



Step 3

Enable control of the tool changer by clicking the checkbox.



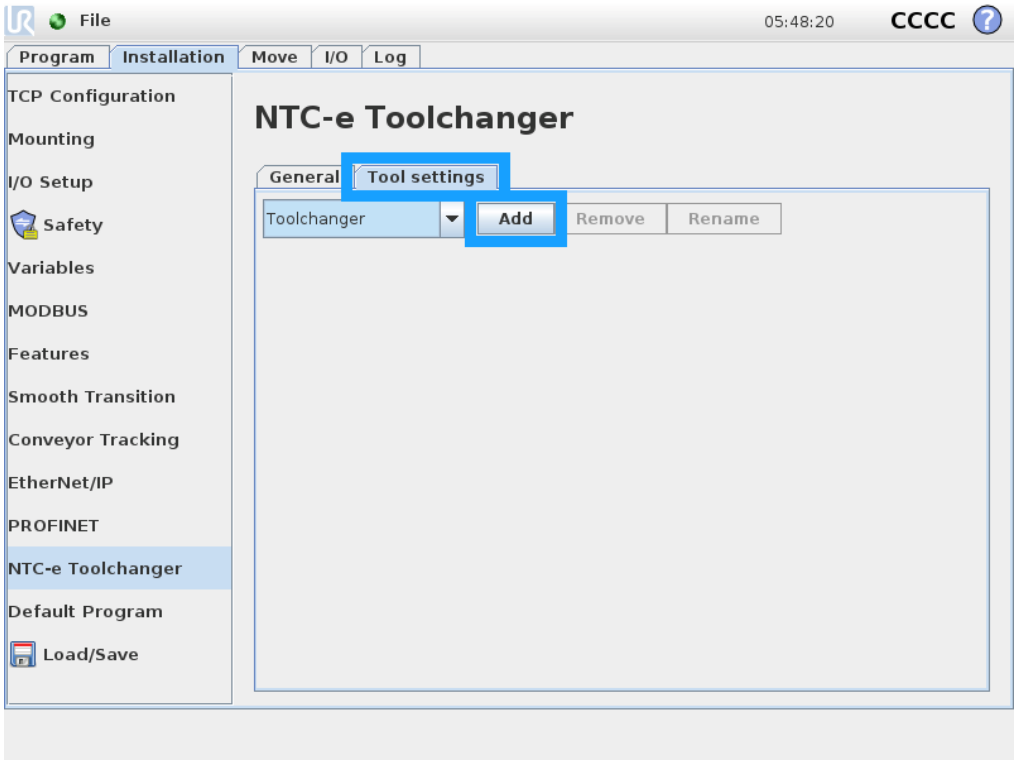
The default release and delay can be used in most use cases. If a different cable is used instead of the supplied cable is used, then the output used by the tool changer must be changed.

Optional test of the tool changer:

- Put a tool on the tool changer
- Is the magnet on?
- If yes, you must press the "Hold to release tool" button to pull off the tool.
- If no, verify that the correct outputs are used by the tool changer.

Step 4

Select the tab "Tool settings" and click "Add" to add a new tool.


File
05:48:20
CCCC
Program
Installation
Move
I/O
Log
TCP Configuration
Mounting
I/O Setup
Safety
Variables
MODBUS
Features
Smooth Transition
Conveyor Tracking
EtherNet/IP
PROFINET
NTC-e Toolchanger
Default Program
Load/Save
NTC-e Toolchanger
General
Tool settings
Toolchanger
Add
Remove
Rename

Step 5

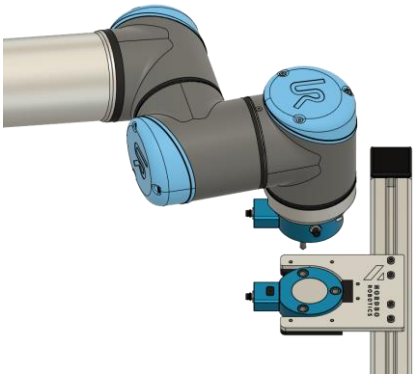
The position of the tool holder is programmed by moving the position where the tool changer is clamped while placed inside the tool holder. This can be achieved using two methods of different methods. One method is to place the tool sided tool in the tool holder and hereafter move the robot to its position until it clamps. Another method is to clamp the tool on the robot and guided it into the holder. The two methods are elaborate below.

OBS.! When dragging or jogging the robot inside the tool holder, align the robot as accurately as possible to reduce torque and friction when picking and placing tools.

Warning! Make sure the tool changer is placed with the correct orientation on the robot. If this is not the case

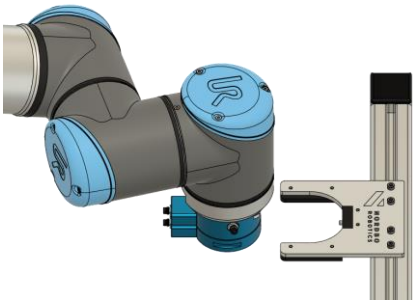
Method 1: Tool in the tool holder

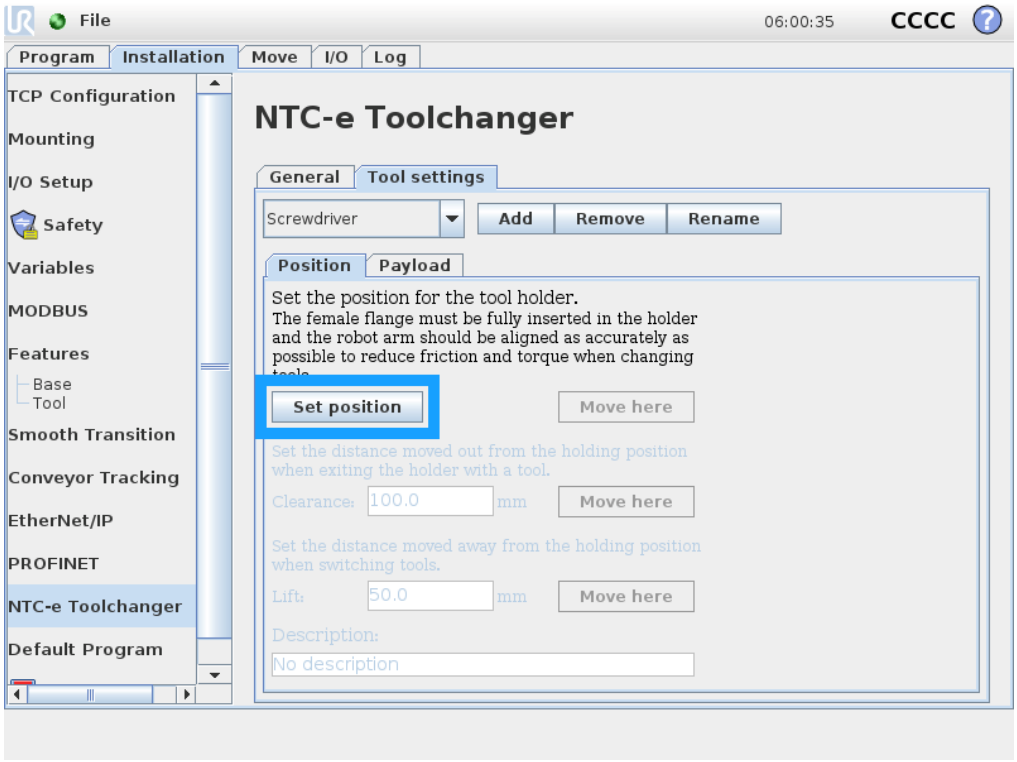
- Put the tool in the tool holder
- Click "Set position"
- Use free drive or jogging to guide the robot into the tool.
- Click "OK"



Method 2: Tool on the robot

- Put the tool on the robot
- Click "Set position"
- Use free drive or jogging to guide the seat the tool in the holder
- Click "OK"





Step 6

When the position of the holder is set, the clearance and lift distances can be changed.

- **Clearance:** The distance the robot is moving in/out when the tool is being picked/placed.
- **Lift:** The distance the tool changer moves away from the tool after being picked/placed in its holder.

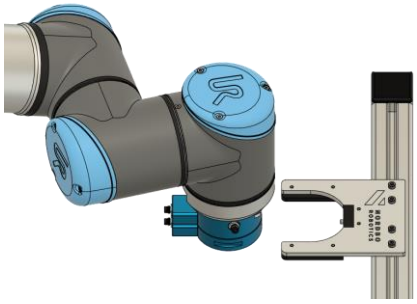


Figure 1: Clearance

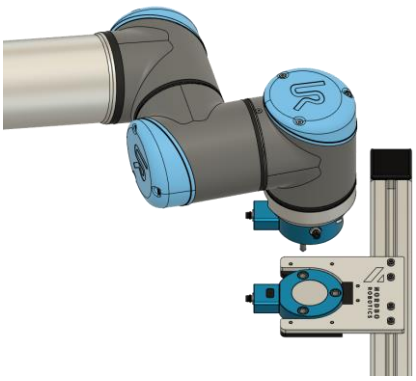
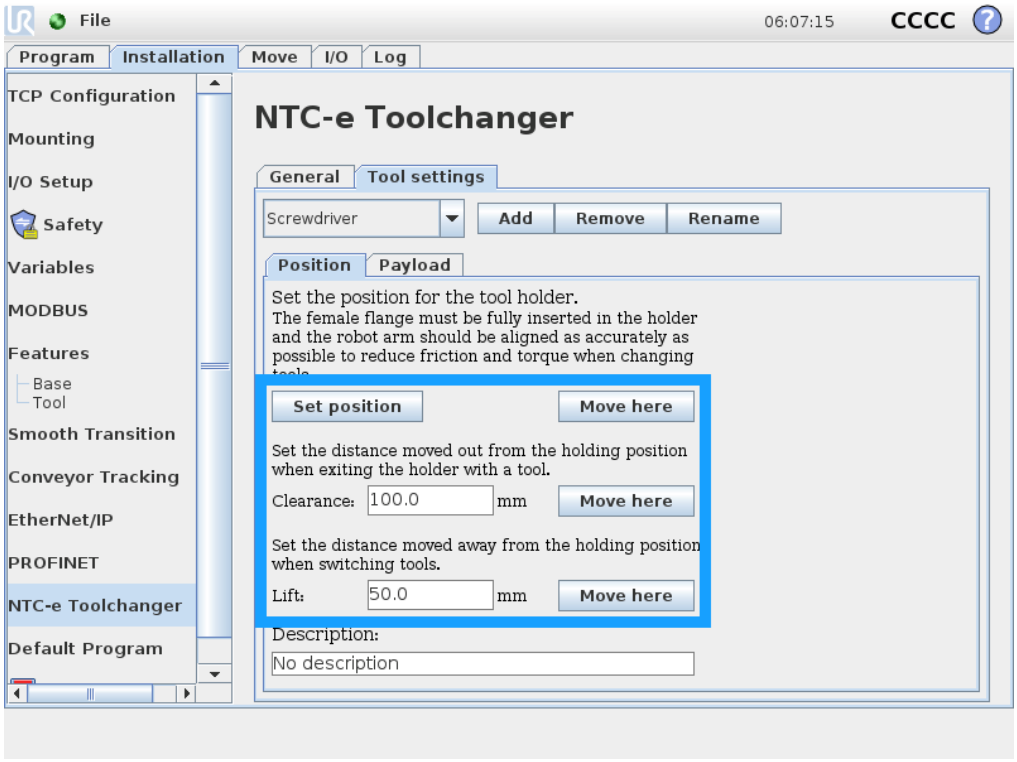


Figure 2: Lift

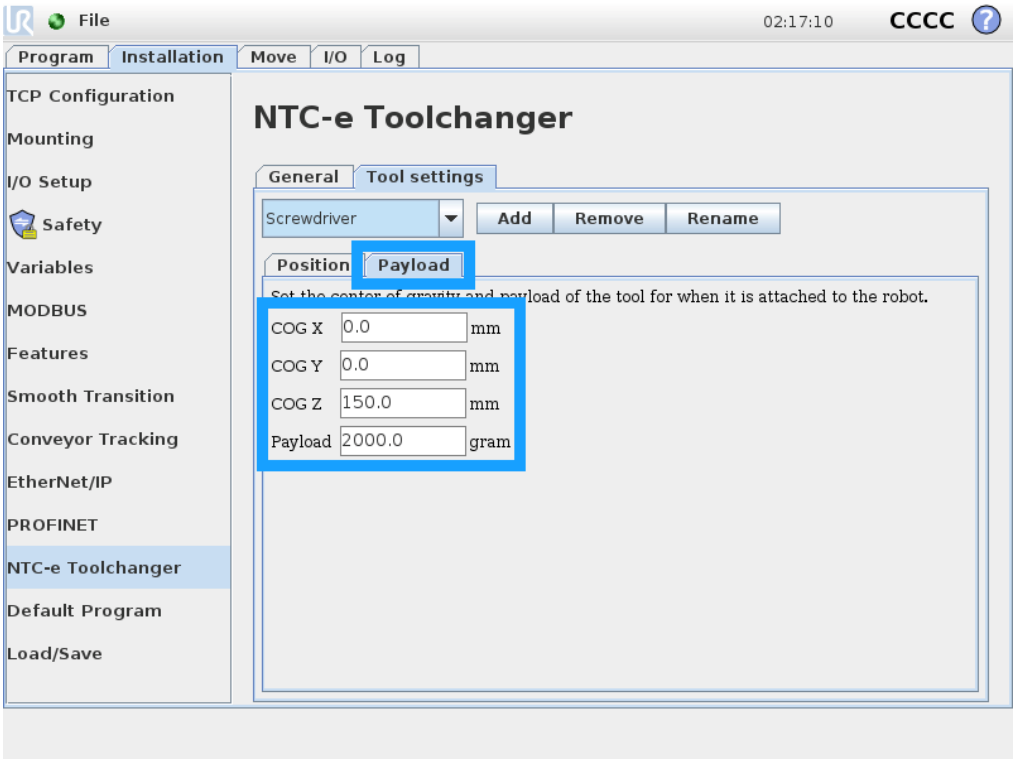
The robot can also move to the *holder position*, *clearance,* and *lift position* by using the "Move here" buttons.

OBS.! The "Move here" buttons do not activate the tool changer automatically. The tool changer must be manually activated by going to the "I/O" tab and activating the correct tool changer output. This is necessary if you want to pick/place tools manually while using "Move here" commands.



Step 7

The center of gravity (COG) and the weight of payloads should be set for each tool to ensure the robot can compensate for the dynamic load. Select the tab “Payload” and input the coordinates for the center of gravity and the weight of the payload.

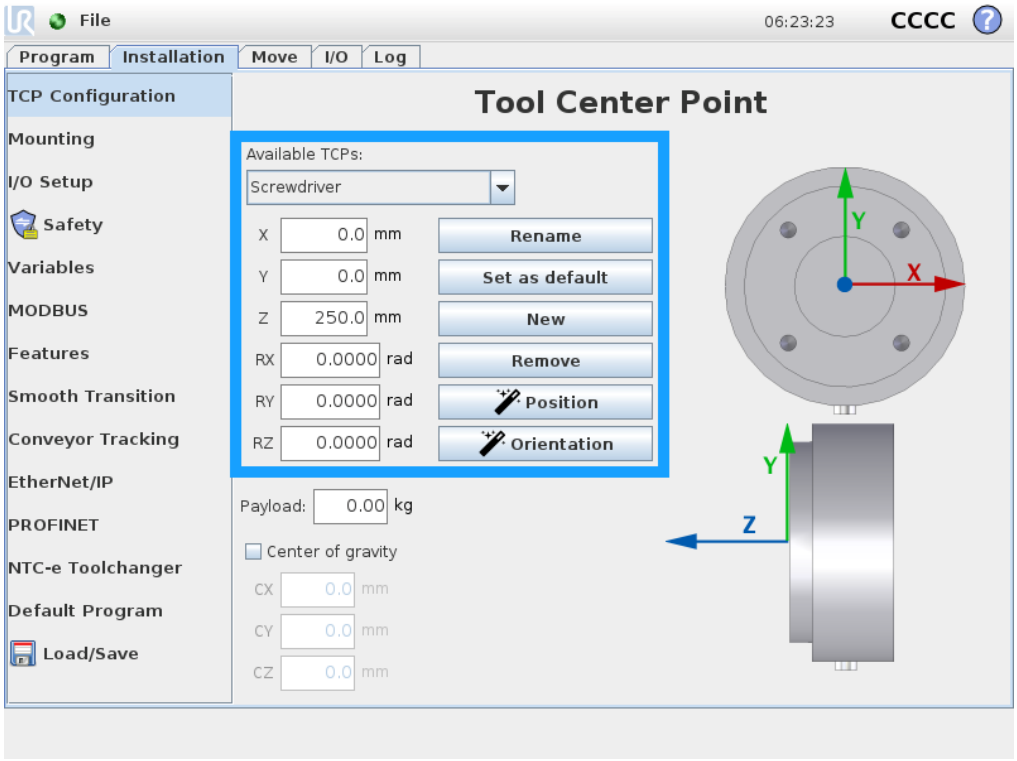


Step 8

Each tool must have a specific Tool Center Point (TCP). Select "TCP Configuration" in the left menu and add a TCP for each tool. This can be done by either using the wizards for "Position" and "Orientation", or by inputting the numbers manually.

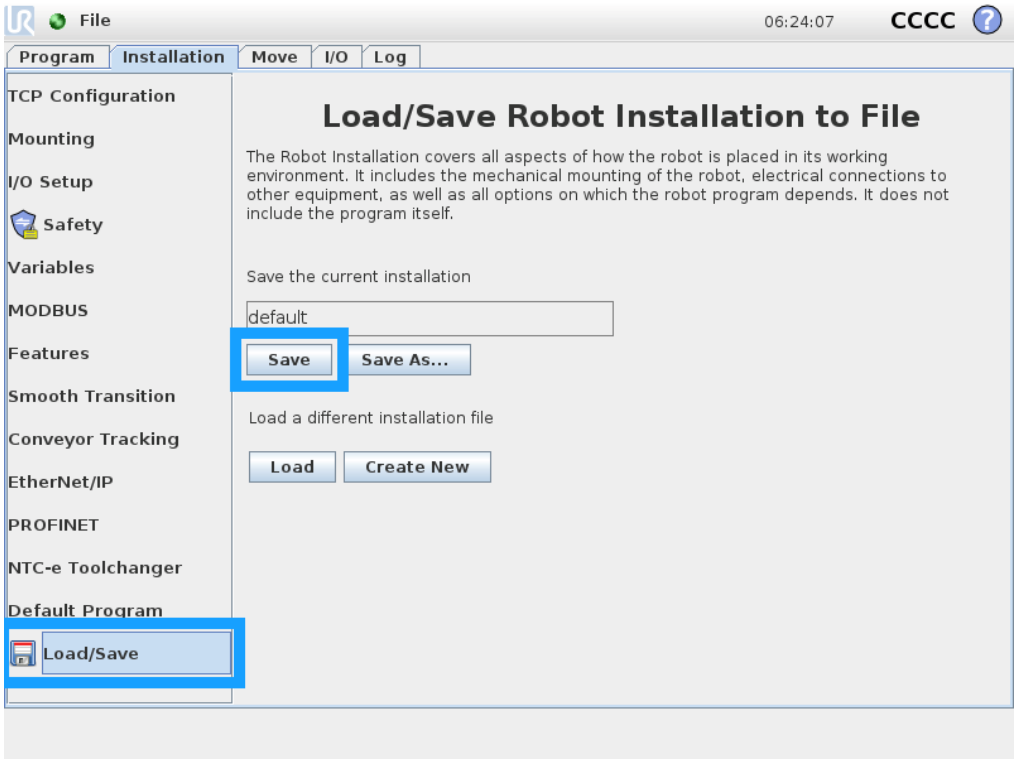
Note: It is recommended to use the same names as in step 4 when naming the TCPs.

OBS.! Payload and center of gravity in "TCP Configuration" is not used and should be ignored. Values added in this section will be overwritten by the values defined in the NTC-E URCap.



Step 9

Save the installation when all tools have been added and configured.



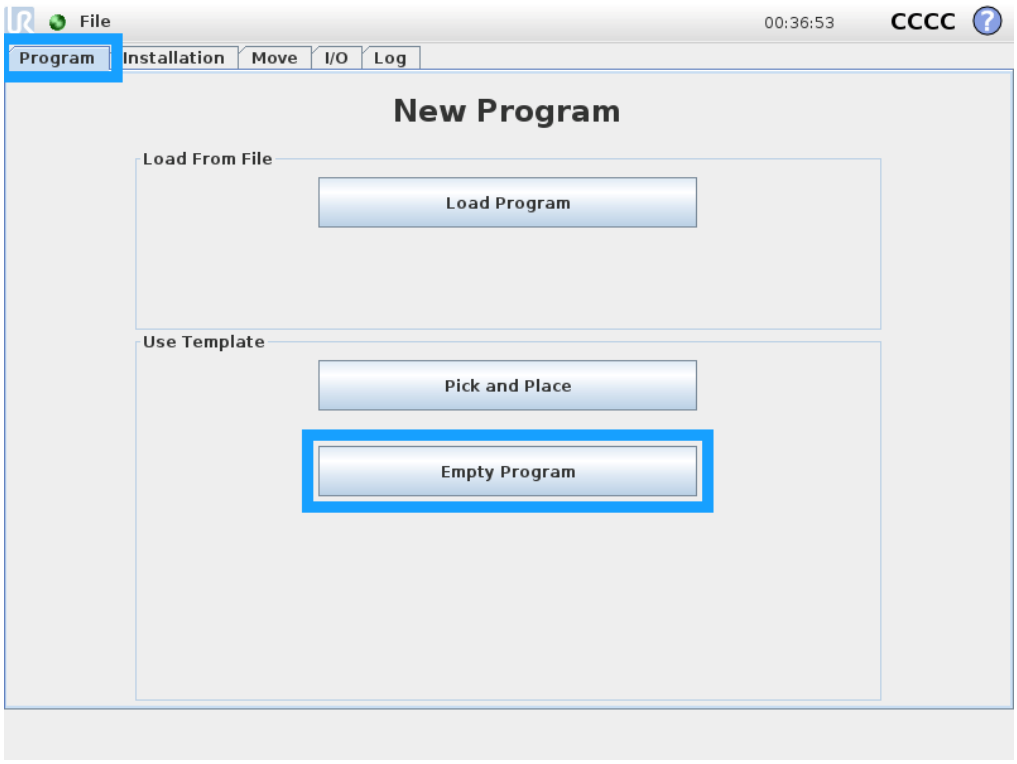
3.4 Creating a program using tool change

The following section explains how to create a program including the action of tool changing.

OBS.! Always make sure that all tools are already placed in their respective holders and that the robot can move to the holders without collisions when running a program with changing of tools,

Step 1

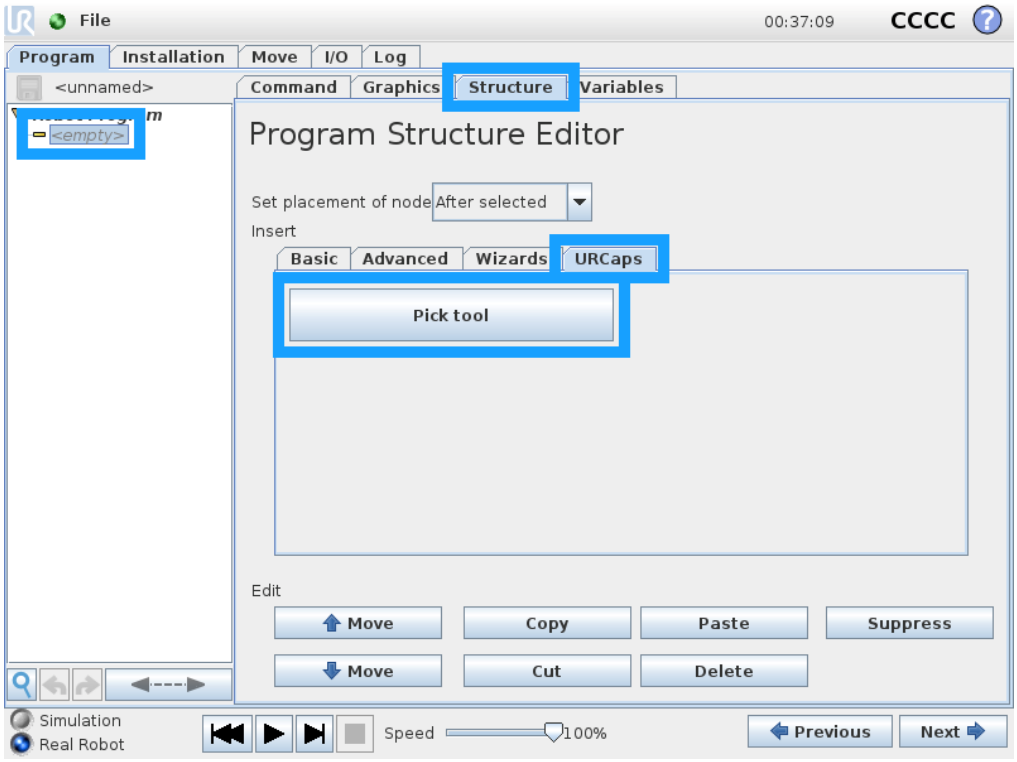
Create a new program by navigating to the program tab and choose the “Empty Program”.



Step 2

Create a pick command by performing the following:

- Select the "<empty>" line under "Robot Program" in the tree view to the left
- Select the tab "Structure"
- Select the subtab "URCaps"
- Click on the "Pick tool" to add a tool change operation to the program.

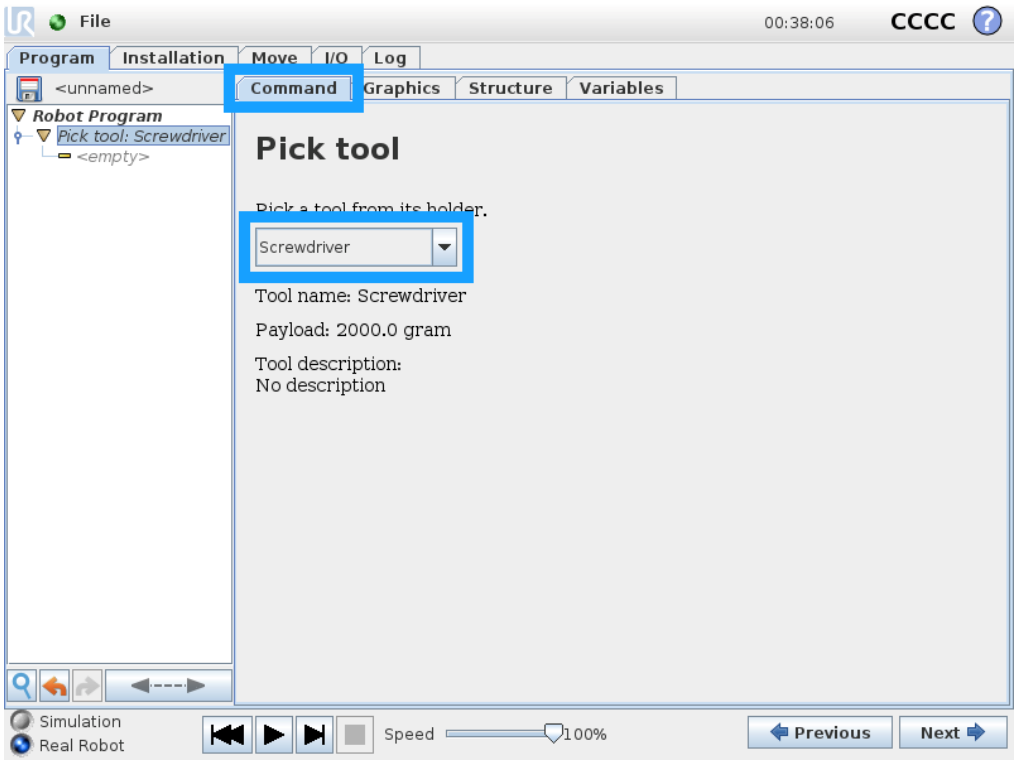


Step 3

Define what tool is being picked by performing the following:

- Select the tab “Command”
- Choose a tool using the dropdown

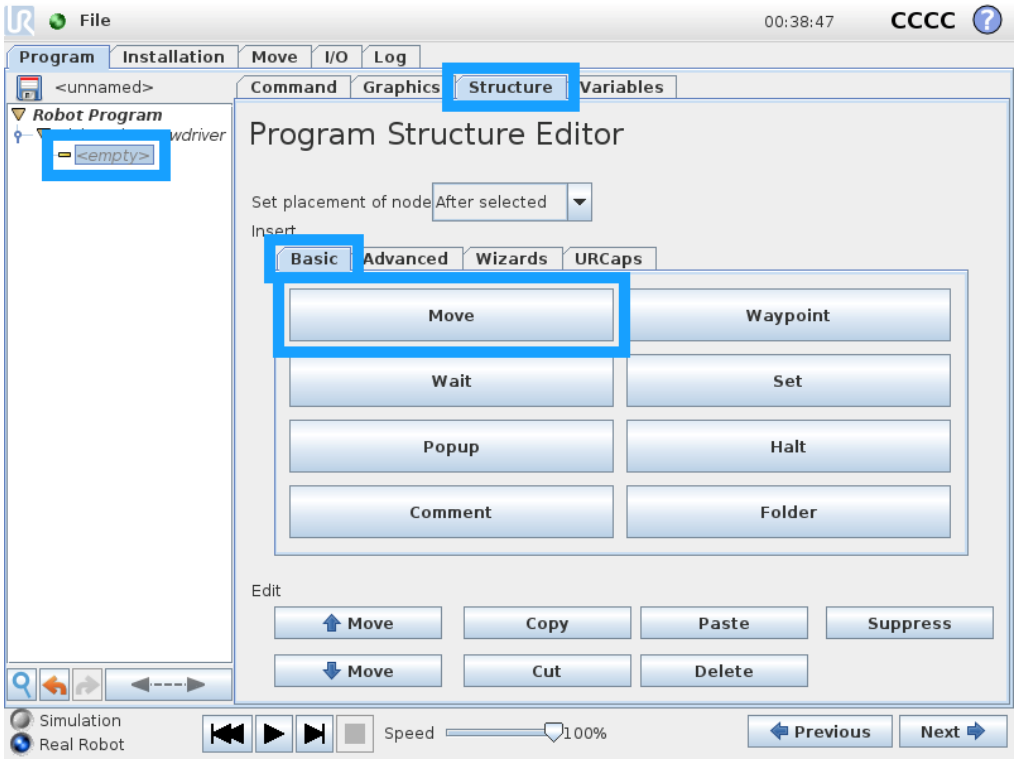
Note: A tool is picked when the program reaches the “Pick tool: …” node and automatically put back into its holder when all child nodes have been executed.



Step 4

The following steps explain how to use the active tool and perform movements:

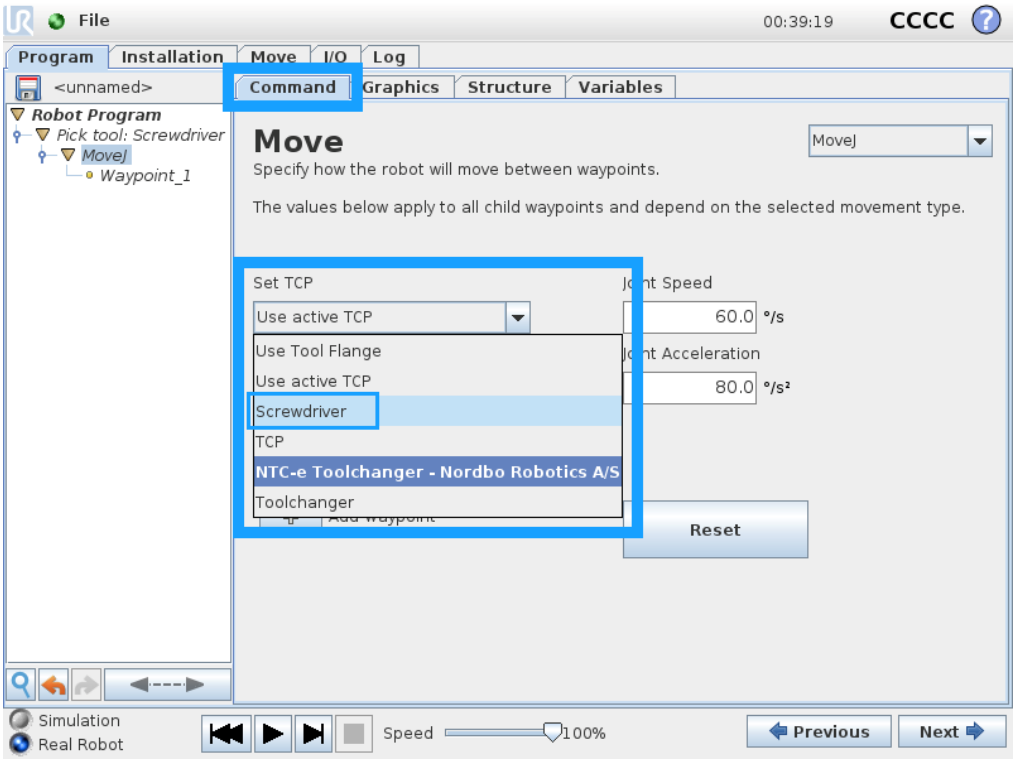
- Select the "<empty>" line under "Pick tool" in the tree view
- Select the tab "Structure"
- Select the subtab "Basic"
- Click on the "Move" button to add a move



Step 5

It is important to make sure the robot is using the right TCP before performing actions with a specific tool. This must be checked to make sure the robot moves correctly after picking tools and must be done before any waypoints are set for the move node.

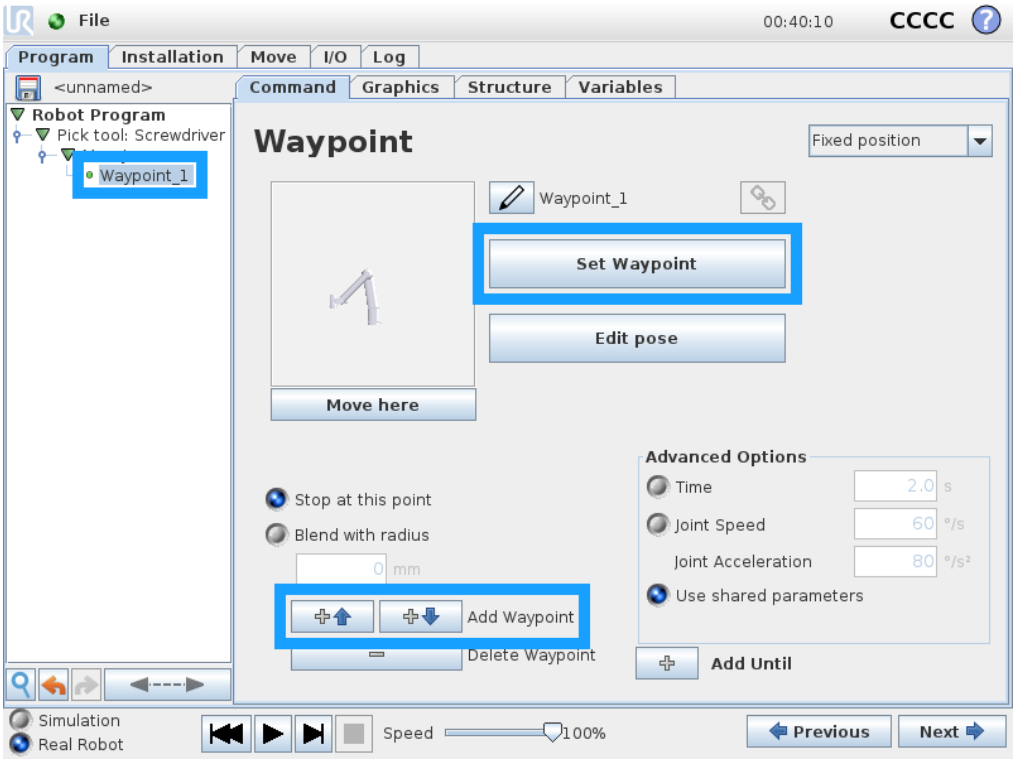
- Select the tab “Command”
- Click the “Set TCP” dropdown and choose the TCP for the tool selected in “Pick tool”



Step 6

Add additional waypoints and move nodes as needed.

OBS.! If making new move nodes then repeat Step 5.



5. Troubleshooting

The tool does not get signal after connecting

- Test the IO connectors. If not working contact Nordbo Robotics for support.

The tool changer does not clamp properly

- Clean magnet on the male part and the metal plate on the female part.

After picking a tool, the robot does not move as desired.

- Make sure the right tool center point (TCP) is selected in the move program.

Nordbo Robotics A/S
Agerhatten 27A Entrance 4
5220 Odense Denmark

info@nordbo-robotics.com
+45 81 81 98 81

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