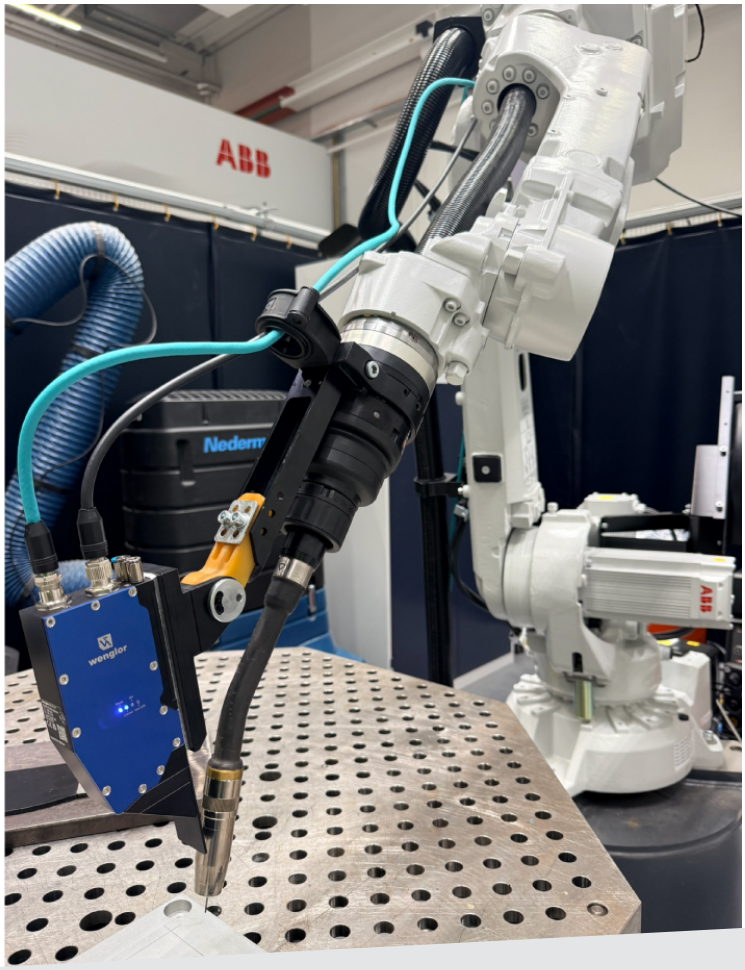
wenglor
the innovative family

Operating Instructions
Setup and Calibration
ABB with OmniCore



EN

Subject to change without notice
Available as PDF file only
Version 1.0
www.wenglor.com

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1 Introduction

The content of this document is intended to assist in the calibration of the wenglor system and an ABB robot with OmniCore controller.

The document provides step-by-step instructions for quickly and easily performing the necessary steps for calibration.

The instructions also use content and images from the ABB Application manual - Tracking and searching with optical sensors.

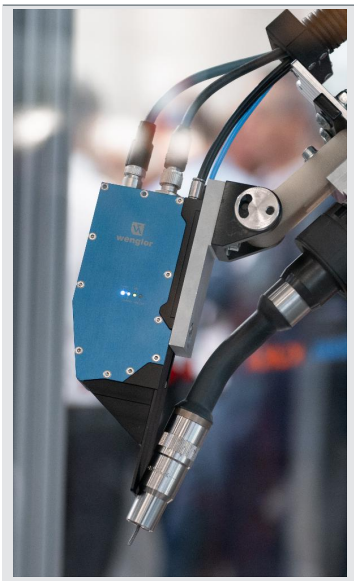
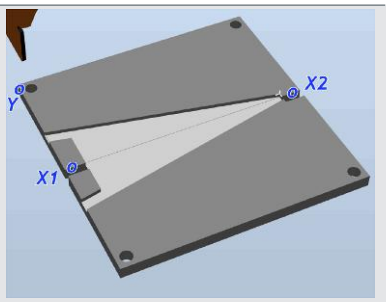
Document ID: 3HAC095098-001 / Revision: E

ROBOTICS

Application manual

Tracking and searching with optical sensors

2 Calibration Equipment

wenglor	ABB	Calibration Plate
MLZL141	ABB Robot	Calibration Plate type: ABB0
MVCV001	ABB OmniCore controller	
		
		

3 Software Requirement ABB

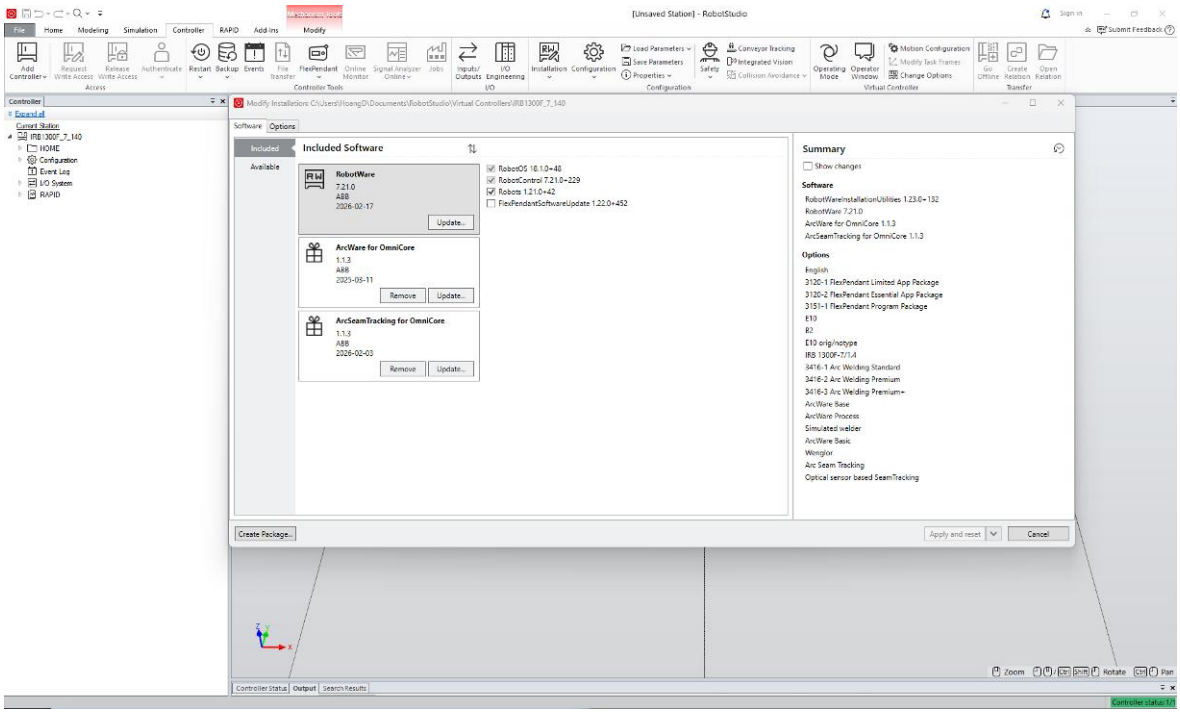
Use Modify Installation in RobotStudio to configure a robot system.

For more information, see operating manual - RobotStudio.

RobotWare 7.21.0 or higher, ArcWare for OmniCore 1.1.3 or higher and ArcSeamTracking for OmniCore 1.1.3 or higher are required.

License requirement: Arc Welding Premium +

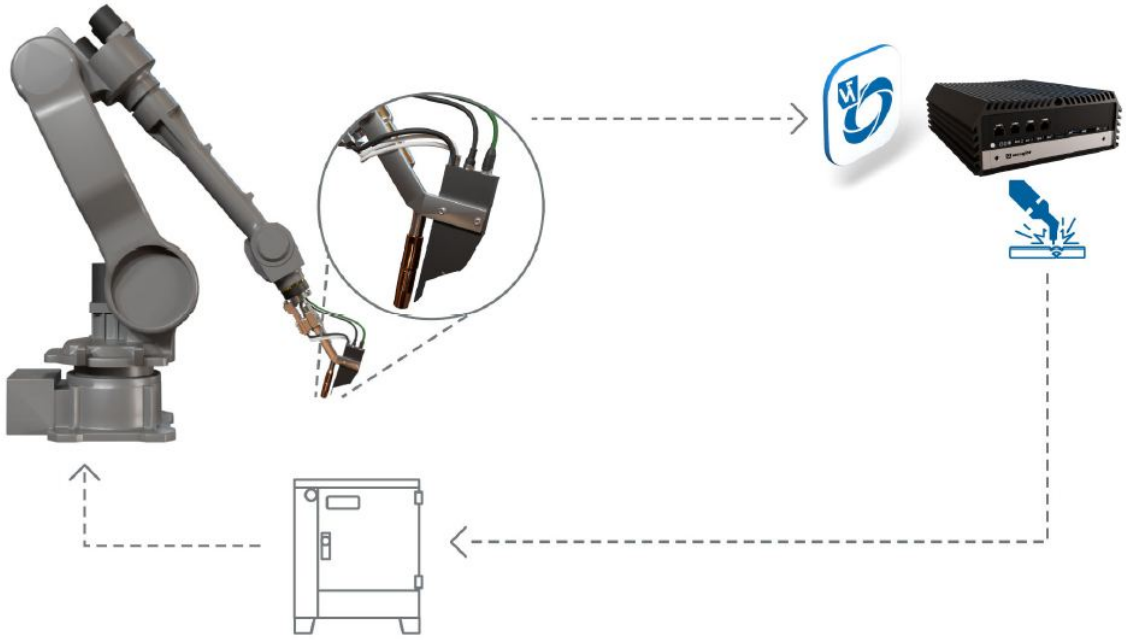
- Install or update the added software packages:
  - RobowtWare
  - ArcWare for OmniCore
  - ArcSeamTracking for OmniCore



4 Preparation of wenglor System

4.1 Connection Hardware

- wenglor Profile Sensor and the wenglor Machine Vision Controller must be connected to a power source (see notes in the operating instructions)
- The connection cable of the Profile Sensor is connected to one of the four CAM ports on the front panel
- An additional LAN cable is connected to one of the Ethernet Ports on the rear of the wenglor Machine Vision Controller and the LAN port in the robot controller
- To connect to the machine vision controller and a laptop, the second Ethernet port on the rear panel can be used



Additional note

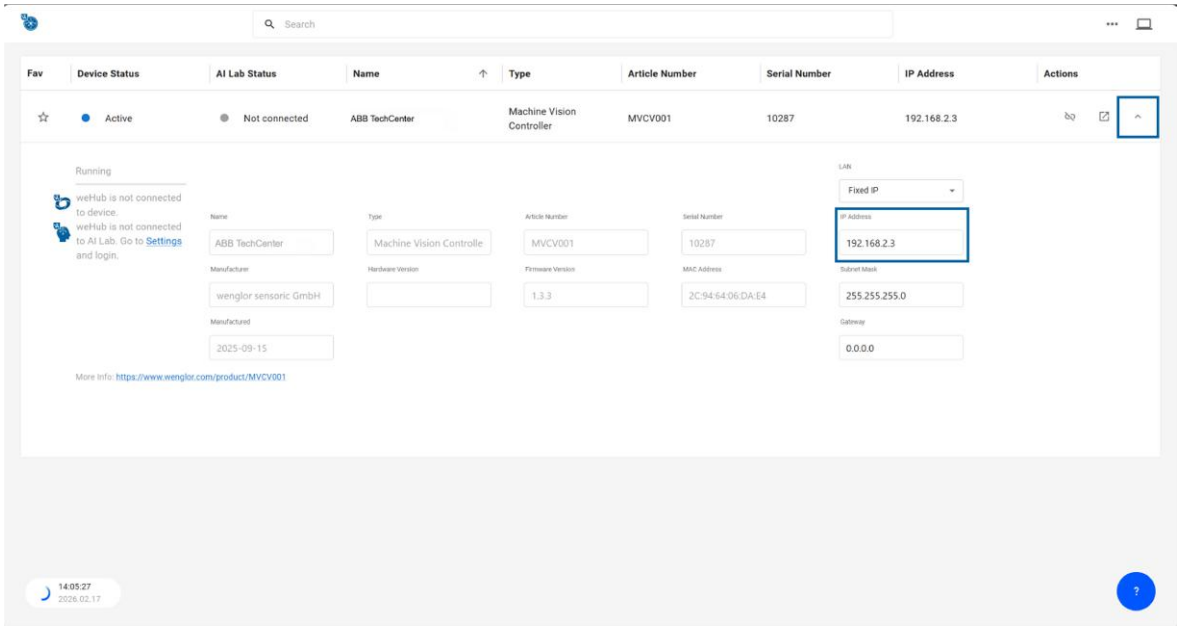
The wenglor Machine Vision Controller requires its own power supply unit and can´t be powered via the robot controller

4.2 Setting wenglor weHub

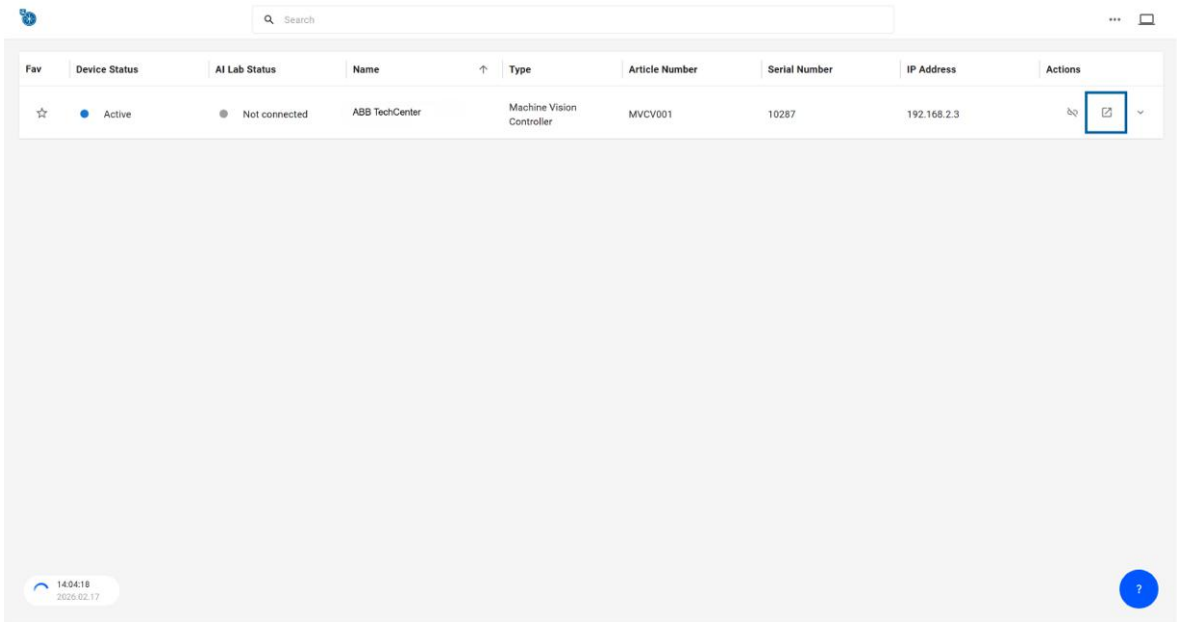
- Start wenglor weHub on the desktop



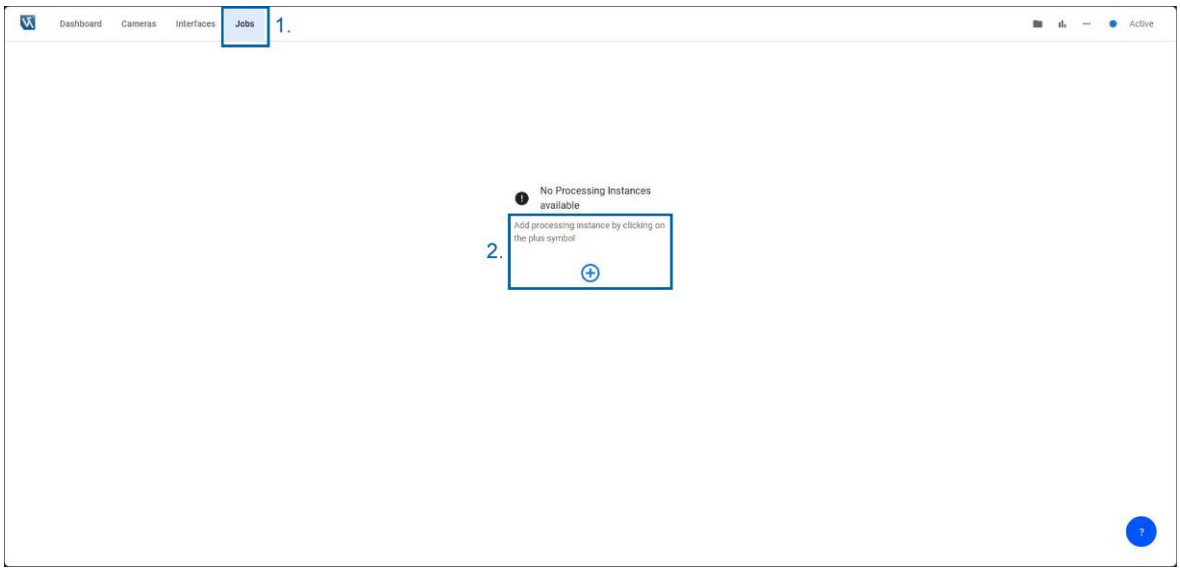
- Change the IP address of the wenglor Machine Vision Controller to be on the same network as the robot controller.



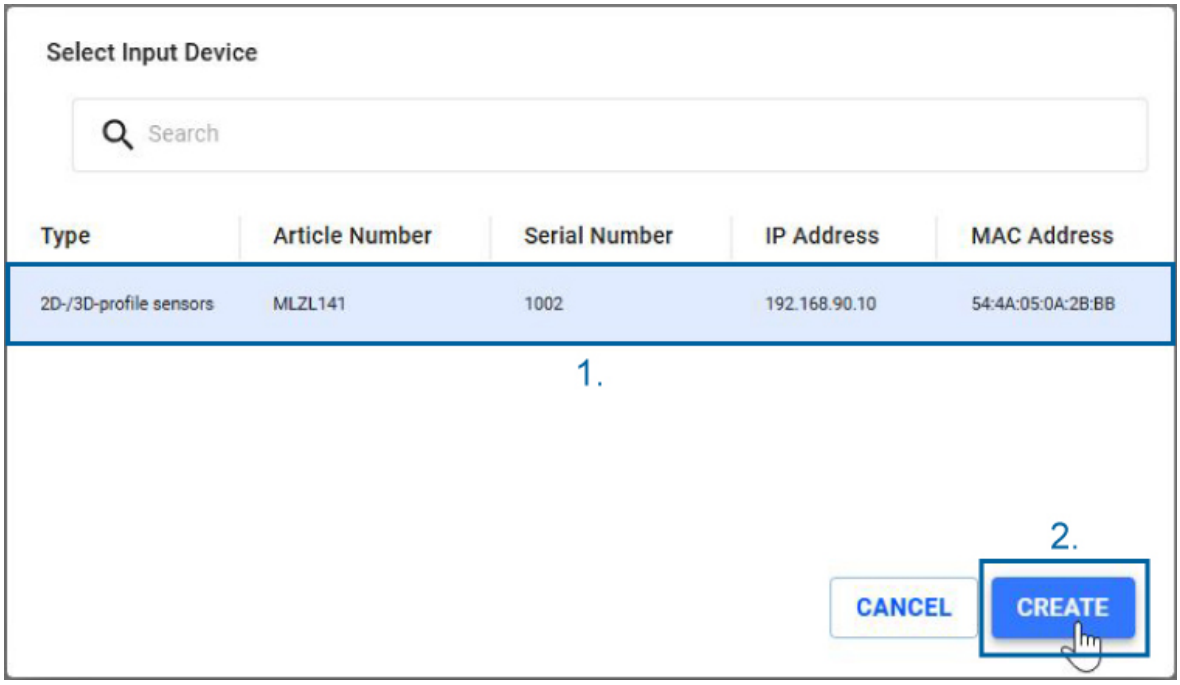
- Open the device by clicking on the corresponding icon.



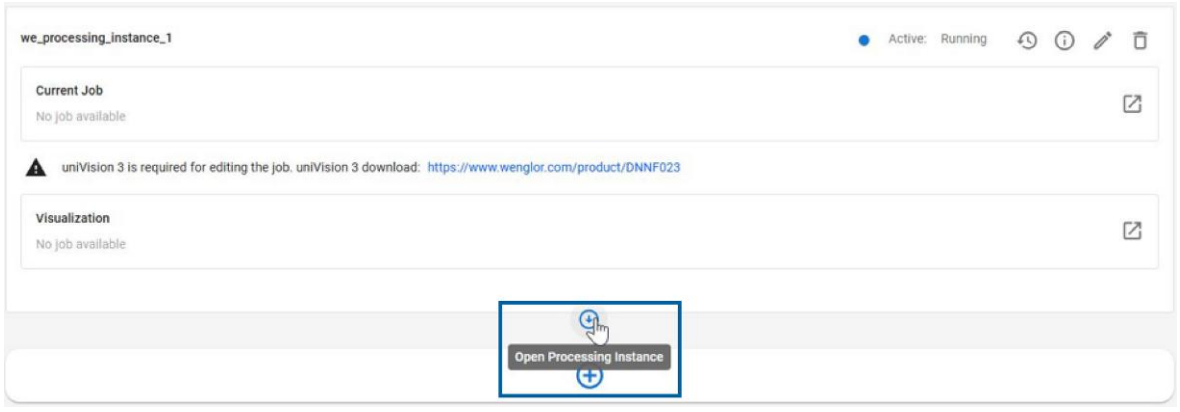
- Open Jobs and add a new processing instance by clicking on the “+” sign



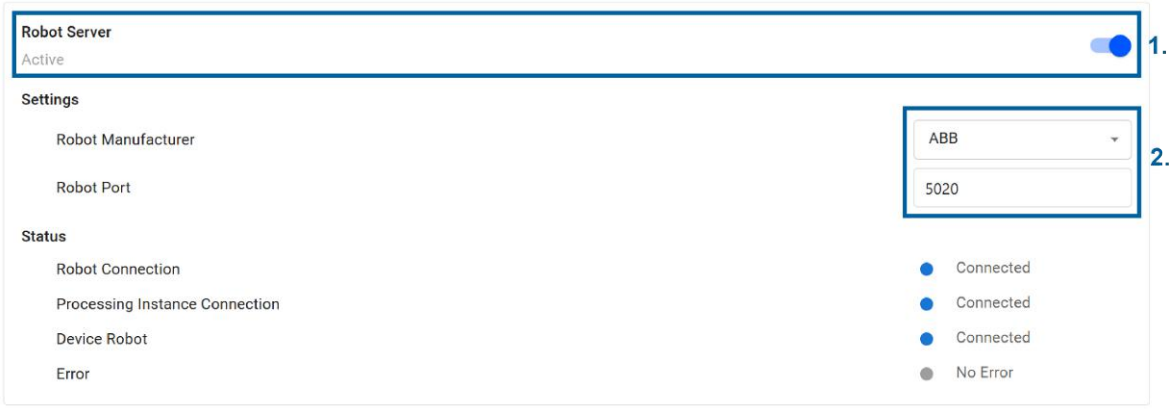
- Select the correct 2D/3D Profile Sensor in the device list and click on “CREATE”.



- Open the Processing Instance and scroll down to Robot Server.



- Activate the Robot Server and select ABB as Robot Manufacturer (Robert Port 5020 is default for ABB).



Status notes

The robot connection is established when the status shows “Connected.”

If the connection cannot be established, please check the following:

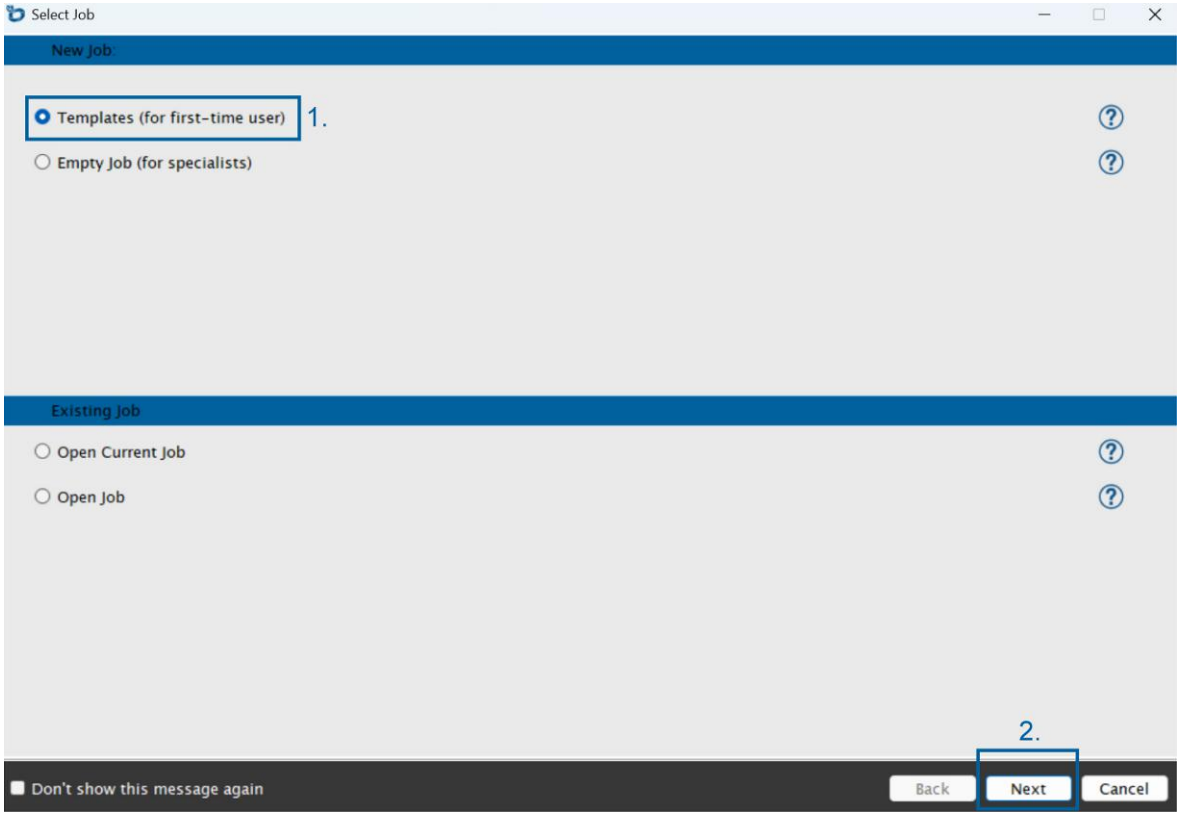
- Make sure the computer and the robot are connected to the same network.
- Verify that the IP address and robot port are correct.
- Restart the robot controller after entering the IP address of the wenglor controller in the teach pendant.
- Make sure the “Device robot weld seam tracking” license is valid and activated.

4.3 Parametrize Calibration Job

- Scroll up to top and start the uniVision Job parametrization by clicking on “Open Device”.



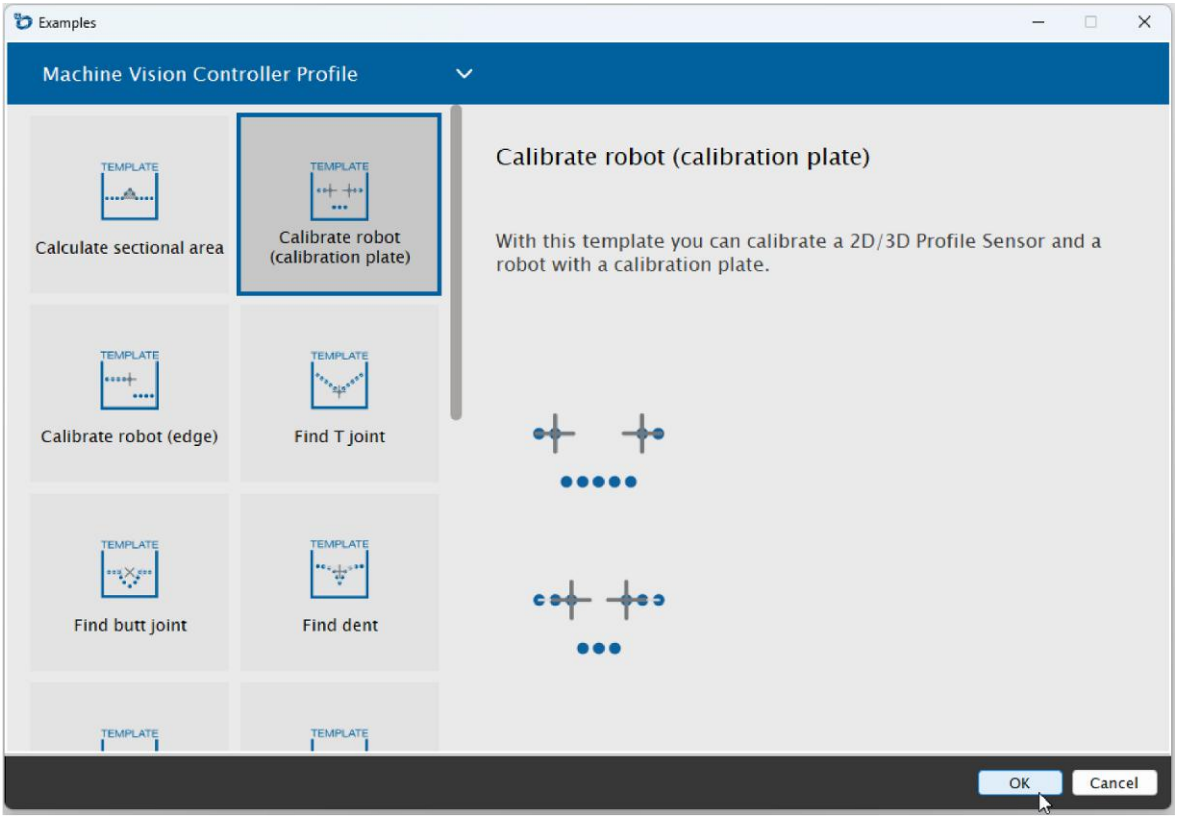
- Create the Calibration Job by using templates (for first-time-user) and click “Next”



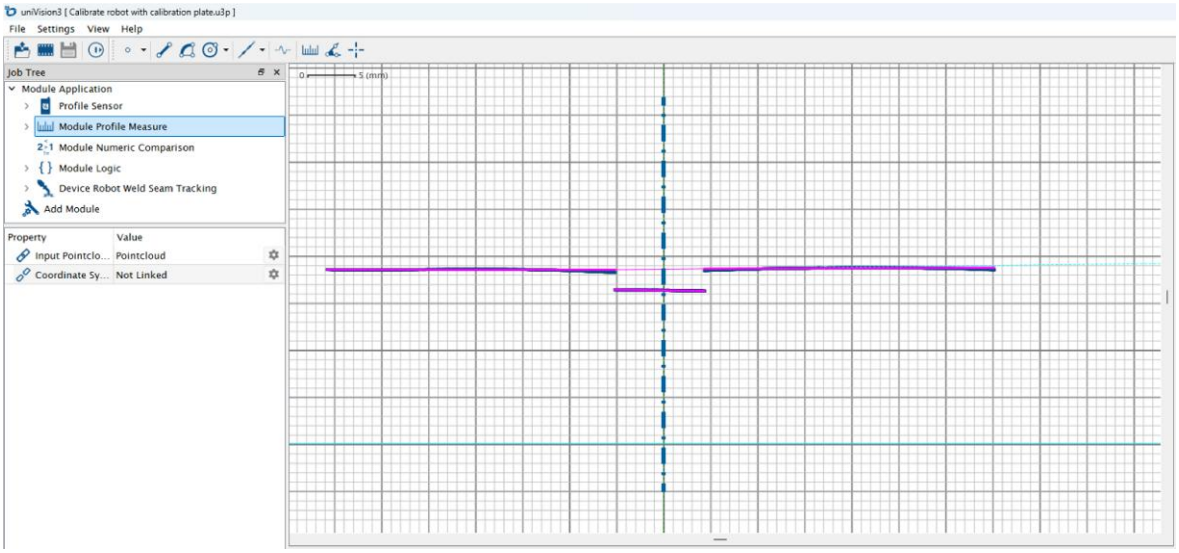
Template notes

If the template is used in job parameterization, the tracking point and validity are automatically linked in Device Robot and sent to the Robot Controller.

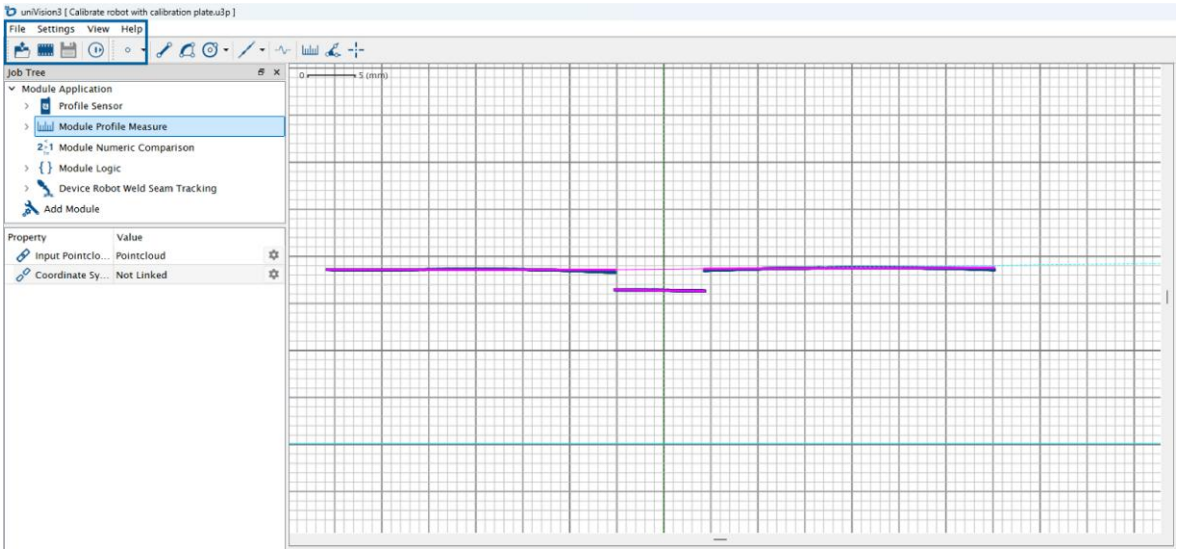
- For calibration with ABB use the template: Calibrate robot (calibration plate) and click “Ok”



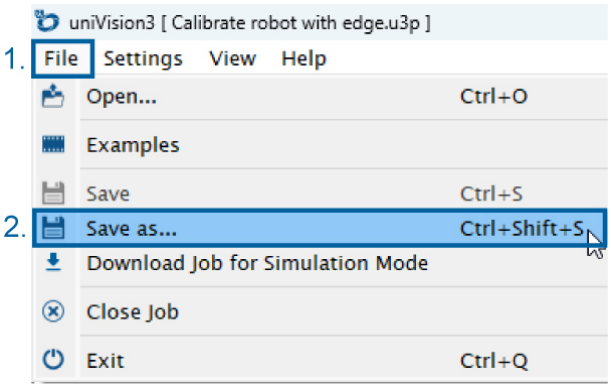
- Ensure that the calibration plate is exactly in the middle of the x-axis of the sensor coordinate system.
- The midpoint of the gap of the calibration plate must be close as possible to x 0.0.
- Calibration process needs 1x minus X value for the left edge point and 1x plus X value for the right edge point for each scan.



- Open File settings



- Safe the job as number 90

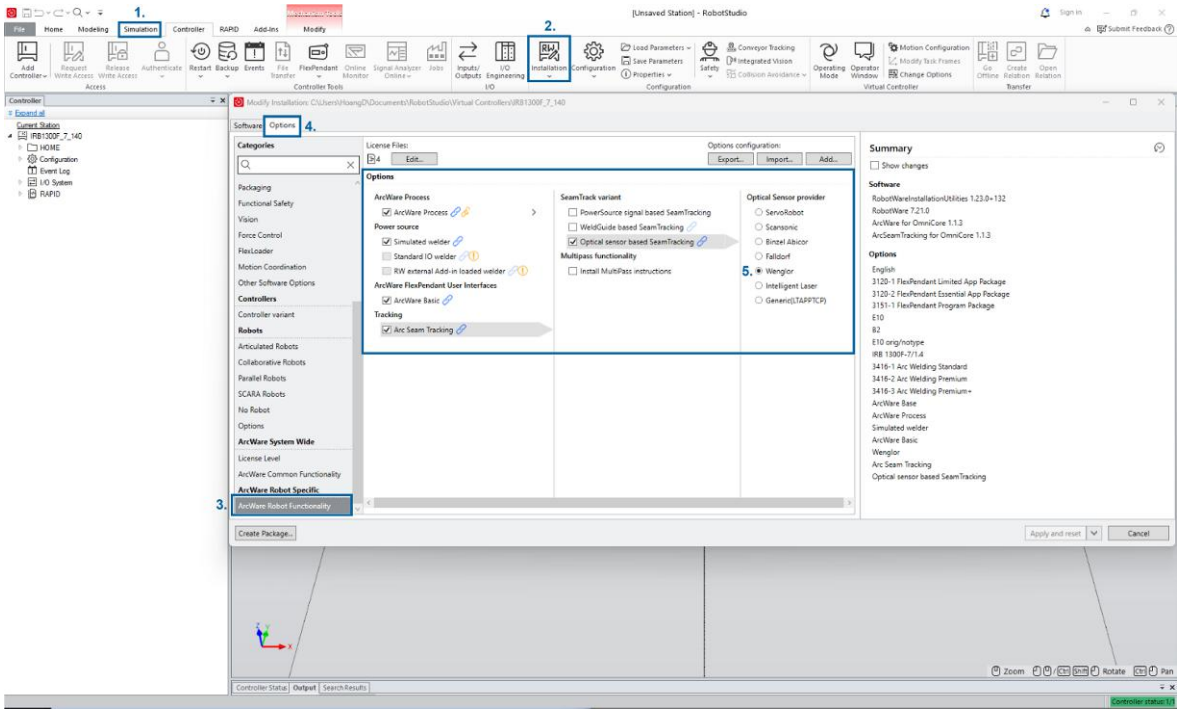


NOTICE

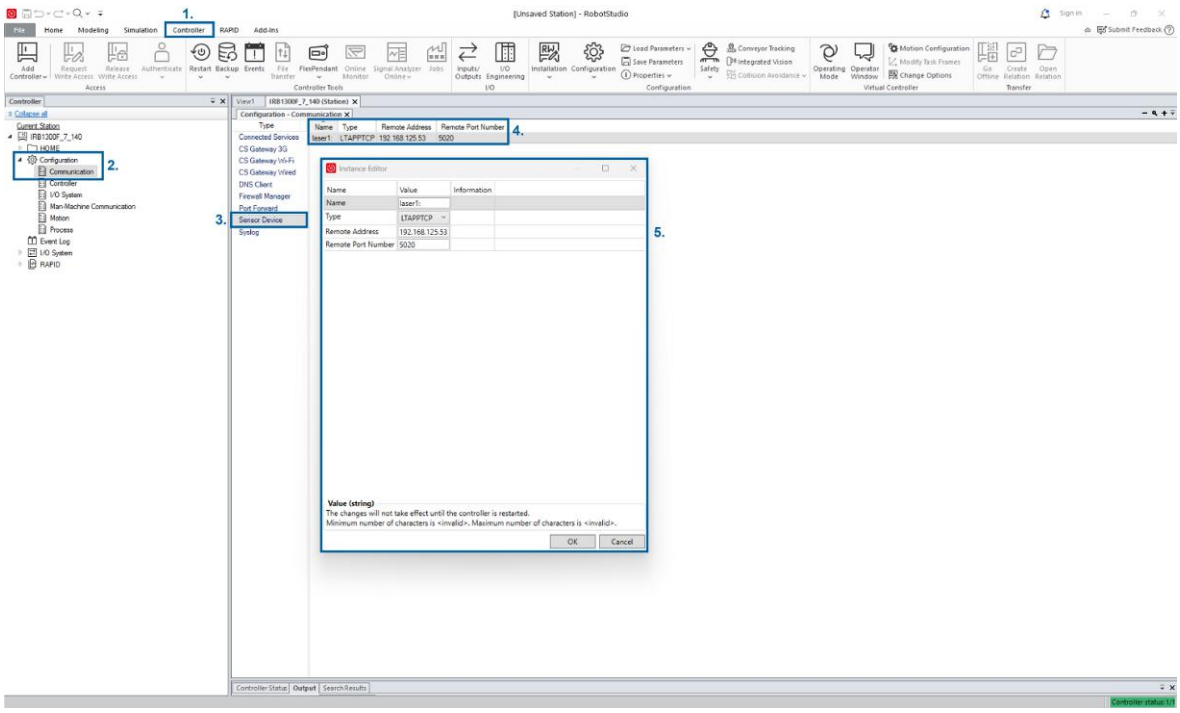
The template “Calibrate robot (calibration plate)” is a pre-configured job to determine the Tracking Point “left” and “right” while the calibration process. Do not save another job with number 91.

5 Preparation wenglor sensor in RobotStudio

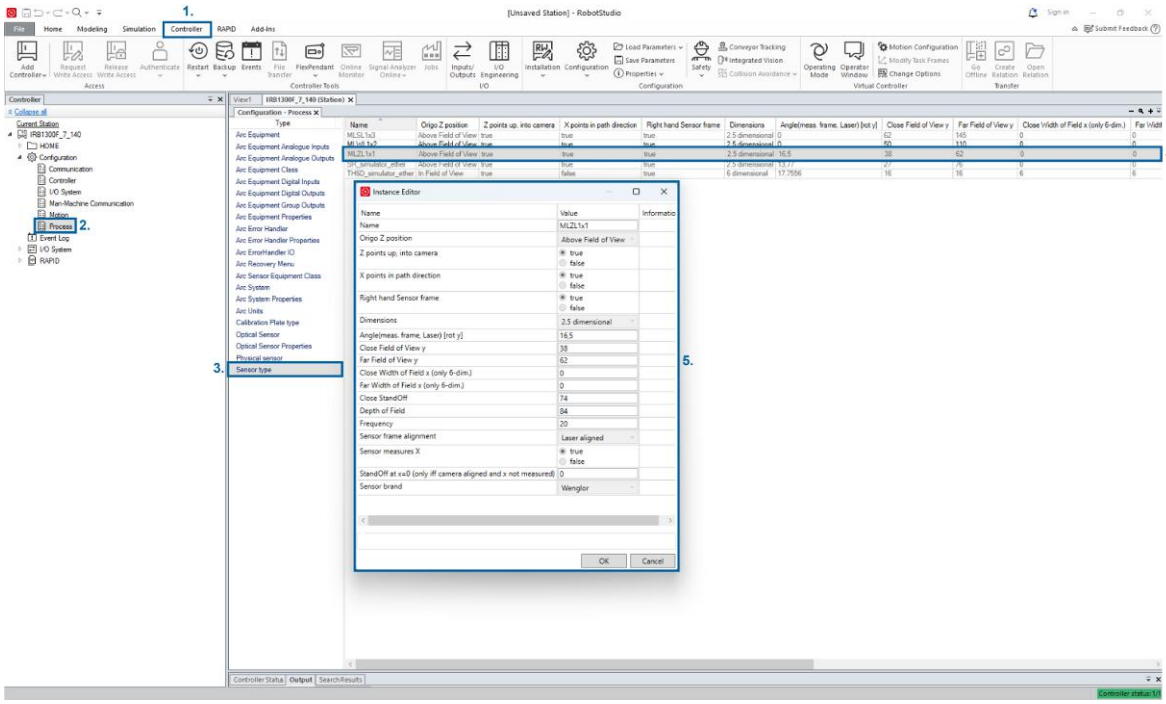
- On the **Simulation** tab, select **Installation** > **ArcWare Robot Functionality** > **Options** and select wenglor as brand for “Optical Sensor Provider”.



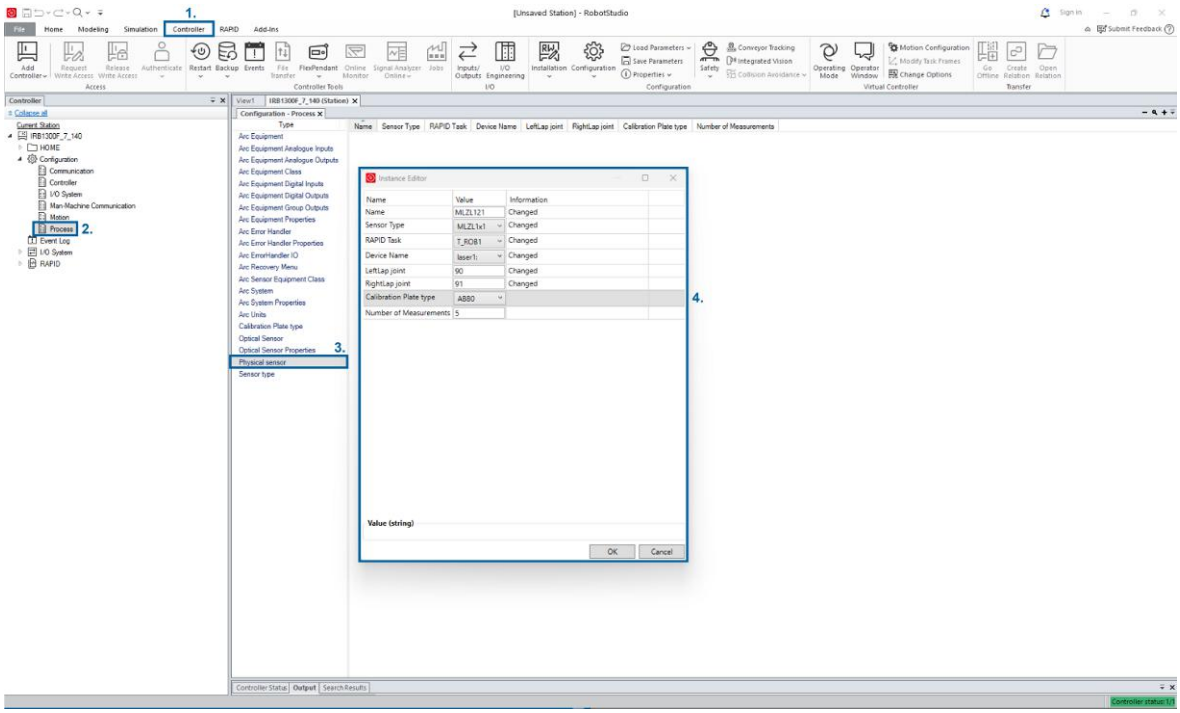
- On the **Controller** tab, select **Configuration** > **Communication** > **Sensor Device** to edit an existing or add a new Sensor Device.
- For wenglor use the protocol LTAPPTCP with the Remote Port Number 5020.
- Remote Address is the IP address of the MVC and must be in the same network as the robot controller.



- On the **Controller** tab, select **Configuration** > **Process** > **Sensor Type** and add a new Sensor Type.
- Please ensure in the Instance Editor the following properties for MLZL1x1.



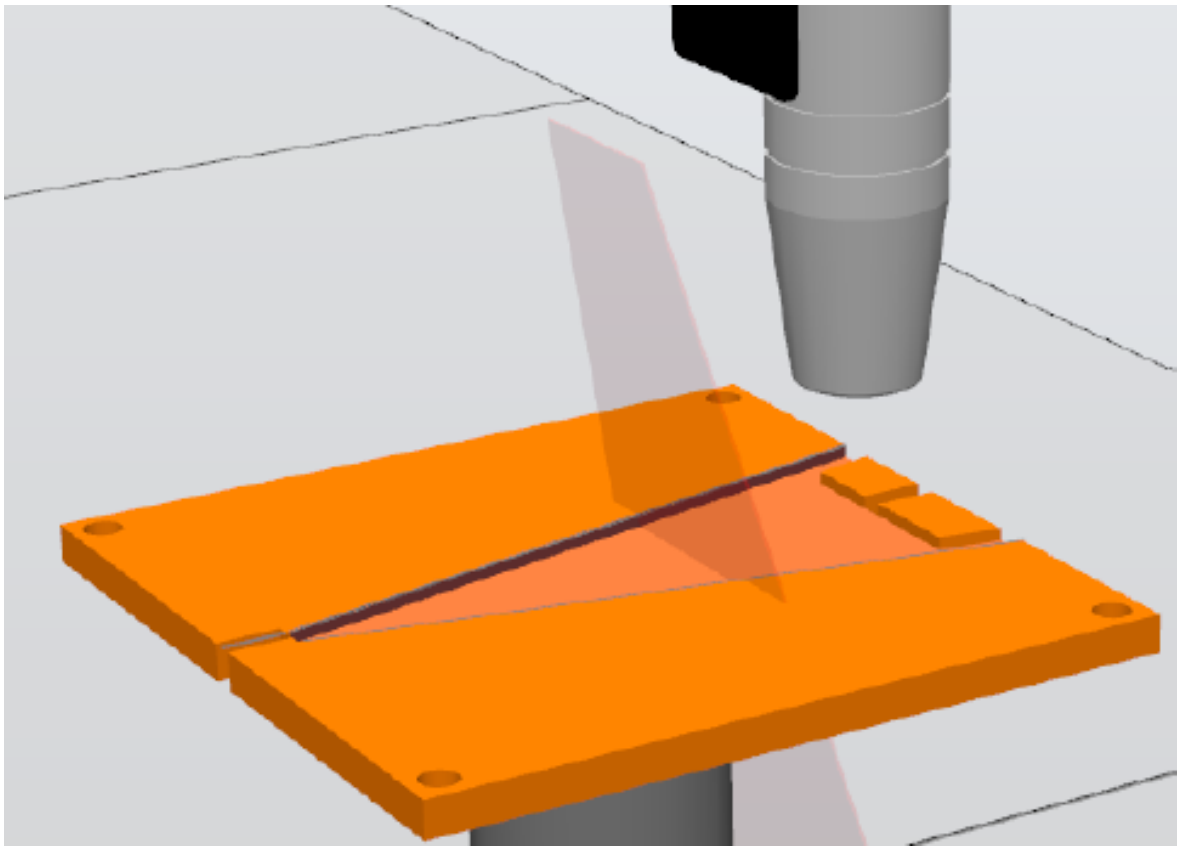
- On the **Controller** tab, select **Configuration** > **Process** > **Physical Sensor** and add a new Physical Sensor



- Name of the sensor e.g: MLZI121
- Sensor Type: MLZL1x1
- RAPID Task: T_ROB1 (default)
- Device Name: laser1:
- LeftLap joint: 90 (defined by wenglor)
- RightLap joint: 91 (defined by wenglor)
- Calibration Plate type: ABB0 or Scansonic1
- Number of Measurement: 5 (for accuracy during calibration)

6 Calibration Plate

6.1 Configuration Calibration Plate



The configuration data for Calibration Plate type describes the geometry of a calibration plate.

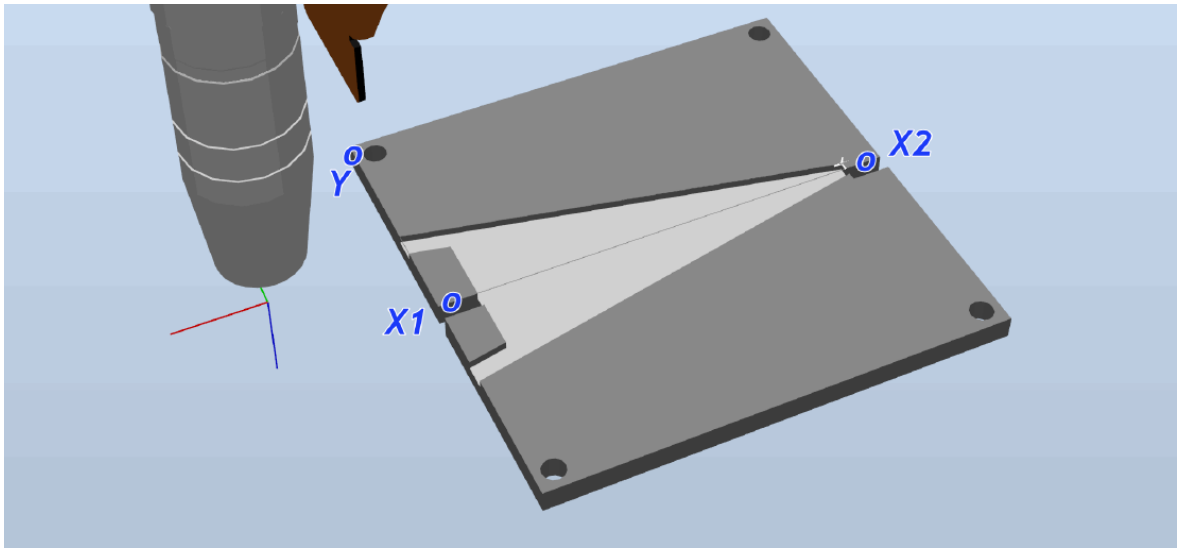
Optical sensor based SeamTracking installs two instances of the Calibration Plate types:

- ABB0: This type of plate can be ordered from ABB (Order no.: 3HAC032252-001)
- scansonic1

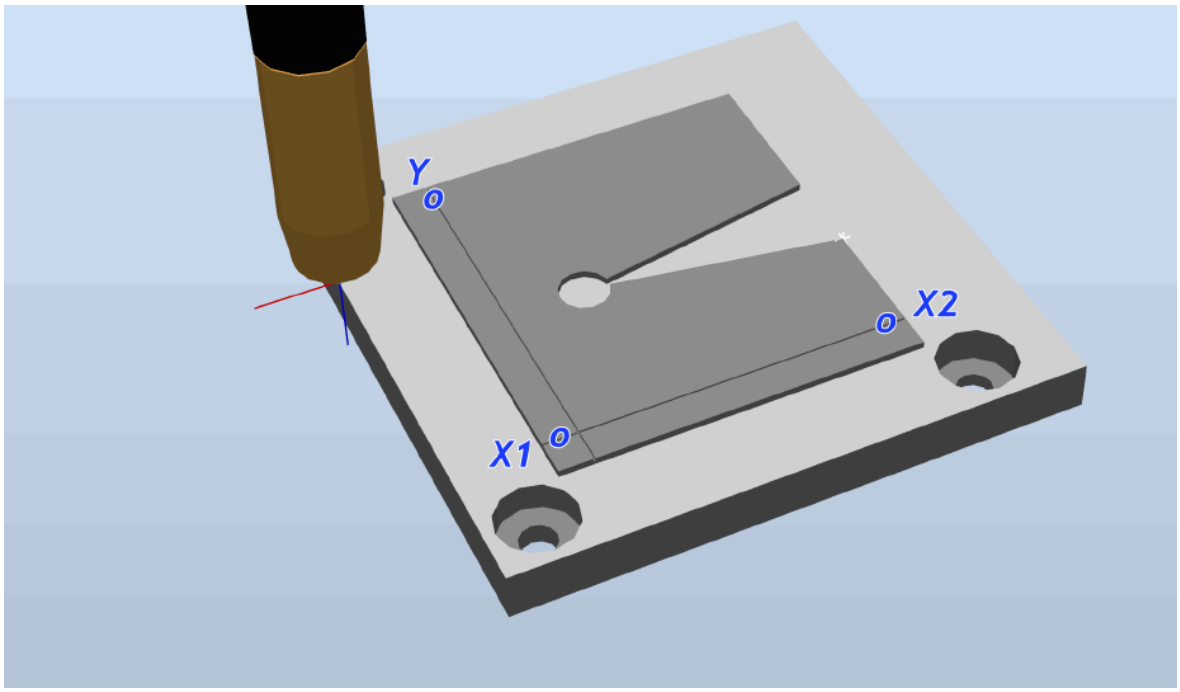
6.2 Defining a Work Object for the Calibration Plate

- A work object has to be defined for the used calibration plate.
- Use the 3-point method to define the origin of the work piece and thereby establish the plane.
- The workpiece is then used as described in the ABB calibration instructions; see the RAPID instructions on page 36.

- Placement of the 3 points for Calibration Plate type: ABB0



- Placement of the 3 points for Calibration Plate type: Scansonic



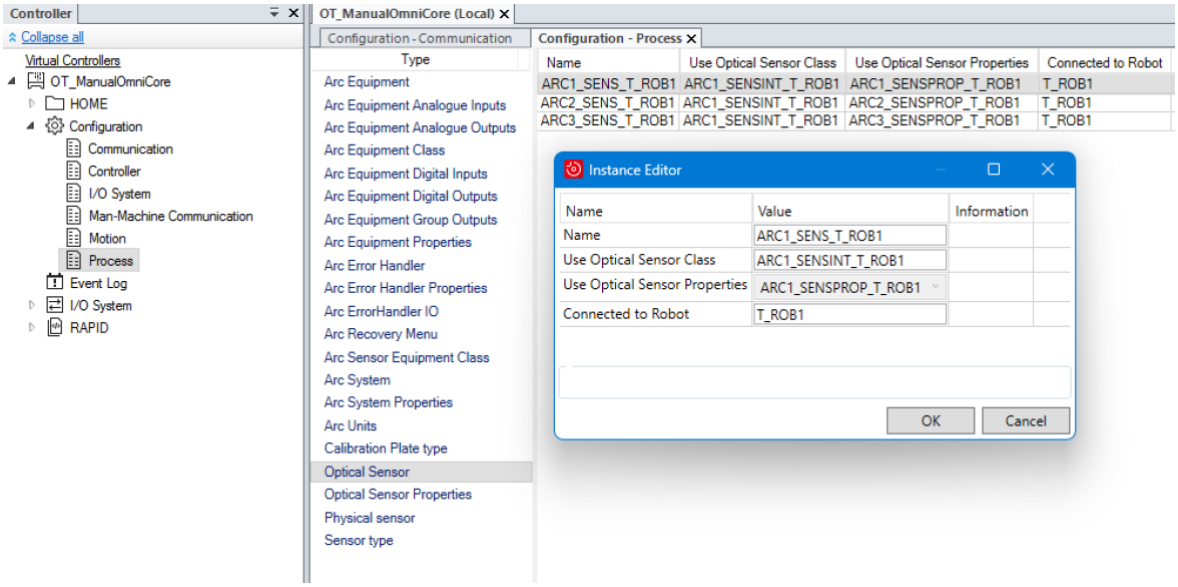
7 Configuration of Optical Sensor based Seam Tracking

In optical sensor-based seam tracking, the sensors are configured statically using the system parameter types “Optical Sensor” and “Optical Sensor Properties”.

This means that the controller needs to be restarted to activate any changes.

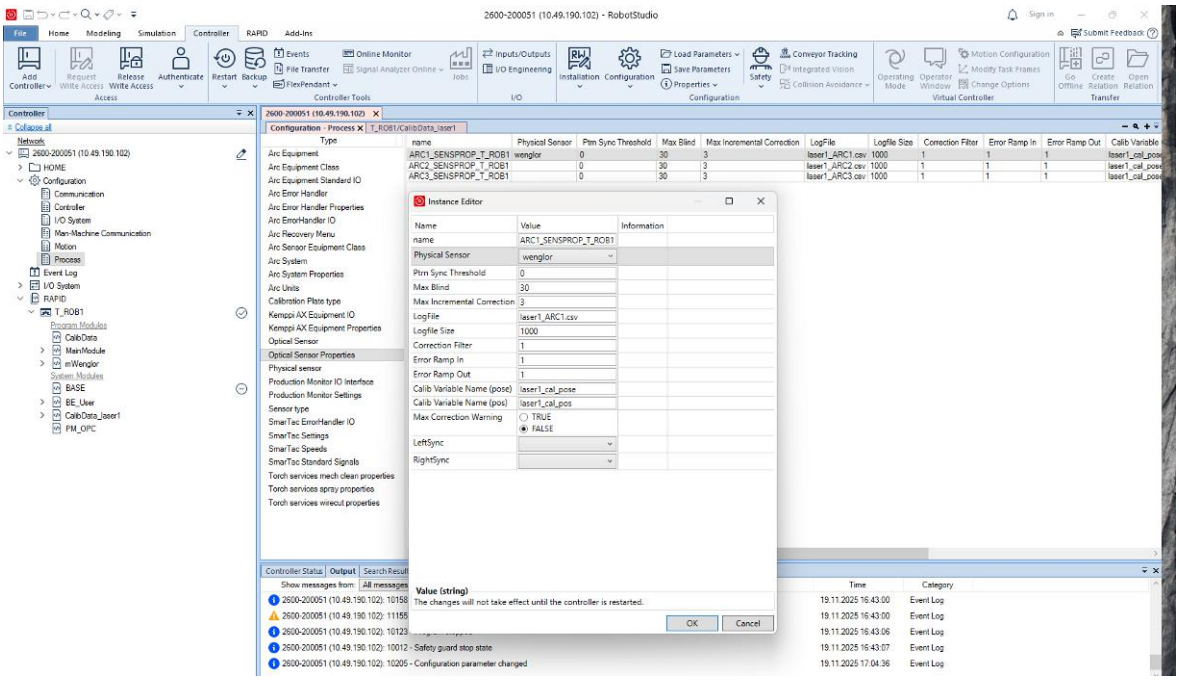
The “Optical Sensor” data establishes the connection between the “Optical Sensor Properties”, the “Arc Sensor Equipment Class”, and the “RAPID task” of the robot with which the sensor is to be used.

In the example below, “Optical Sensor” defines which “Optical Sensor Properties” are connected to Robot 1 in the controller.



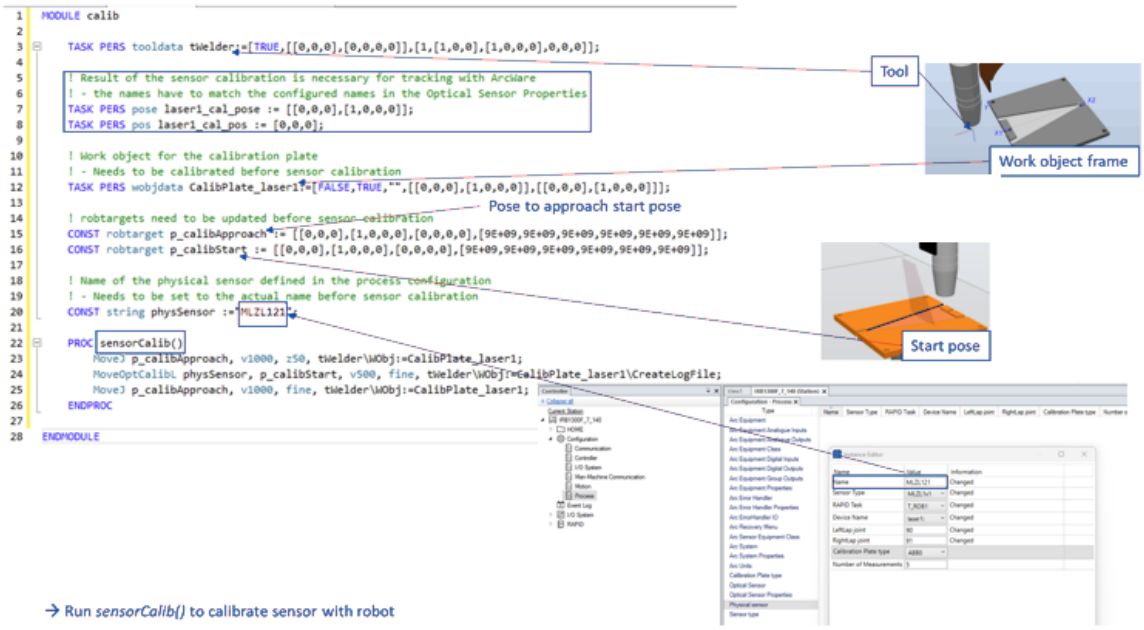
8 Optical Sensor Properties

The Optical Sensor Properties specifies a Sensor Device, where the sensor is connected and defines behavior and limits for the sensor.



9 Calibration Example

- For best results, the y-axis and z-axis of the sensor measurement frame should be aligned with that of the calibration plate in the start position.

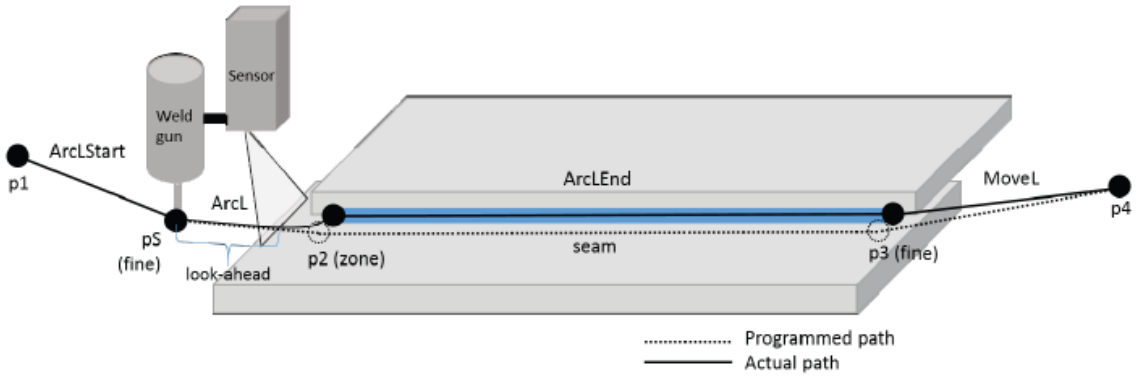


The calibration movement can be adjusted using the parameter of the function.

```
MoveOptCalibL SensorName ToPoint Speed Zone RobotTool
                    [\WObj] [\TLoad] [\AlignY] [MaxMoveDistX] [\MaxMoveDistZ]
[\CreateLogFile]
```

10 Tracking Example

- Use the provided RAPID code from ABB to track the joint.
- The defined “trackdata” handle the job number, these can also be changed via FlexPendant by navigating to the parameter. This could be easier for the user.

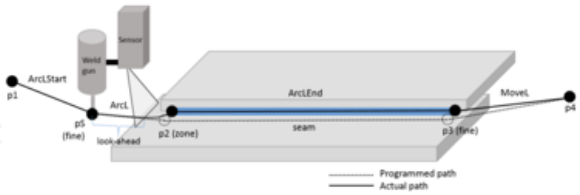


xx1700000362

To activate *Pre process tracking* you have to specify the optional argument `\PreProcessTracking` for the RAPID instruction `ArcXStart`. Below is a RAPID code example for optical seam tracking with *Pre process tracking*.

```
PROC LA_Arc()
  MoveJ p1, v1000, z50, tFroniusMTB400i_WR;
  ArcLStart pS, v1000, mySeam, weld10, fine,
       tFroniusMTB400i_WR\Track:=track4\PreProcessTracking;
  ArcL p2, v1000, mySeam, weld10, z50,
       tFroniusMTB400i_WR\Track:=track4;
  ArcLEnd p3, v1000, mySeam, myWeld, fine,
       tFroniusMTB400i_WR\Track:=track4;
  MoveL p4, v1000, z50, tFroniusMTB400i_WR;
ENDPROC
```

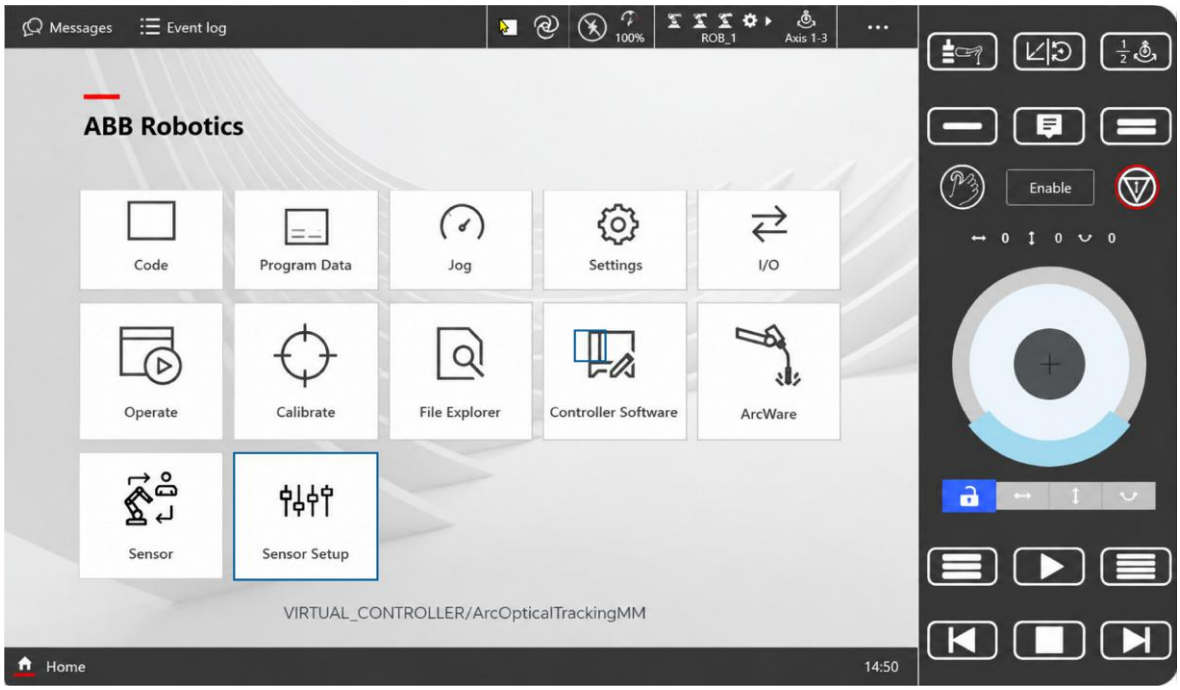
```
1  MODULE track
2
3      TASK PERS seamdata sm1:=[0,0,0,0,[0,0,0,0,0,0,0,0,0,0],0,0,0,0,[0,0,0,0,0,0,0,0,0,0],0,0,0,0,[0,0,0,0,0,0,0,0,0,0],0,0,[0,0,0,0,0,0,0,0,0,0],0];
4      TASK PERS welddata wd1:=[10,0,[0,0,0,0,0,0,0,0,0,0],[0,0,0,0,0,0,0,0,0,0]];
5      TASK PERS trackdata tr1:=[1,FALSE,20,[0,0,0,0,0,0,0,0,0,0],[2,0,0,0,0,0,0,0]];
6                                                                  joint_no → uniVision project
7      TASK PERS robtarget p1:=[[0,0,0],[1,0,0,0],[0,0,0,0],[9E9,9E9,9E9,9E9,9E9,9E9]];
8      TASK PERS robtarget pS:=[[0,0,0],[1,0,0,0],[0,0,0,0],[9E9,9E9,9E9,9E9,9E9,9E9]];
9      TASK PERS robtarget p2:=[[0,0,0],[1,0,0,0],[0,0,0,0],[9E9,9E9,9E9,9E9,9E9,9E9]];
10     TASK PERS robtarget p3:=[[0,0,0],[1,0,0,0],[0,0,0,0],[9E9,9E9,9E9,9E9,9E9,9E9]];
11     TASK PERS robtarget p4:=[[0,0,0],[1,0,0,0],[0,0,0,0],[9E9,9E9,9E9,9E9,9E9,9E9]];
12
13     PROC tracking()
14         MoveJ p1, v1000, z50, tWelder;
15         ArcLStart pS, v1000, sm1, wd1, fine,tWelder\Track:=tr1;
16         ArcL p2, v1000, sm1, wd1, z50,tWelder\Track:=tr1;
17         ArcLEnd p3, v1000, sm1, wd1, fine,tWelder\Track:=tr1;
18         MoveL p4, v1000, z50, tWelder;
19     ENDPROC
20
21 ENDMODULE
```

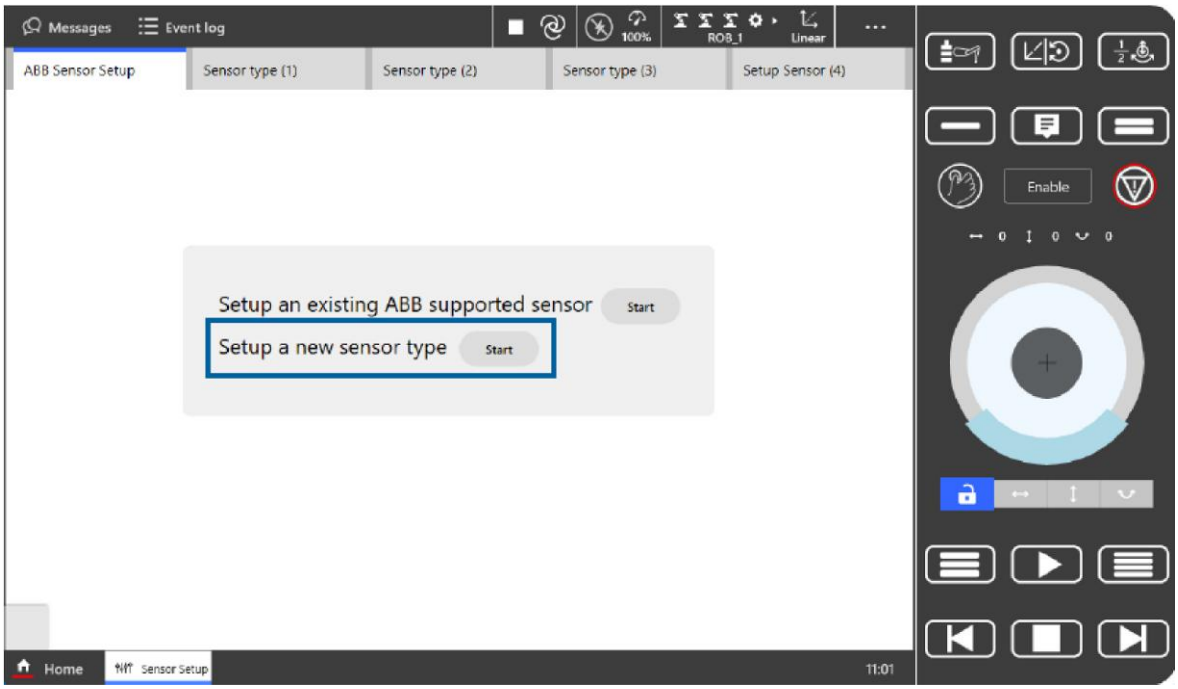


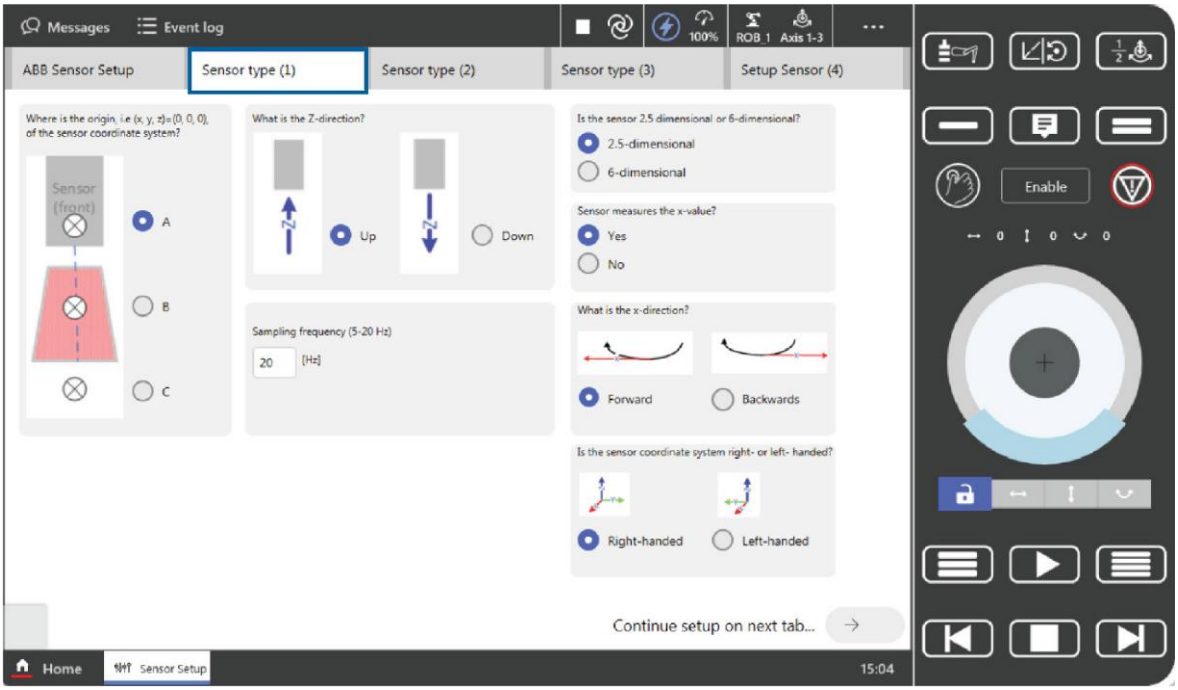
→ Teach points and run *tracking()*

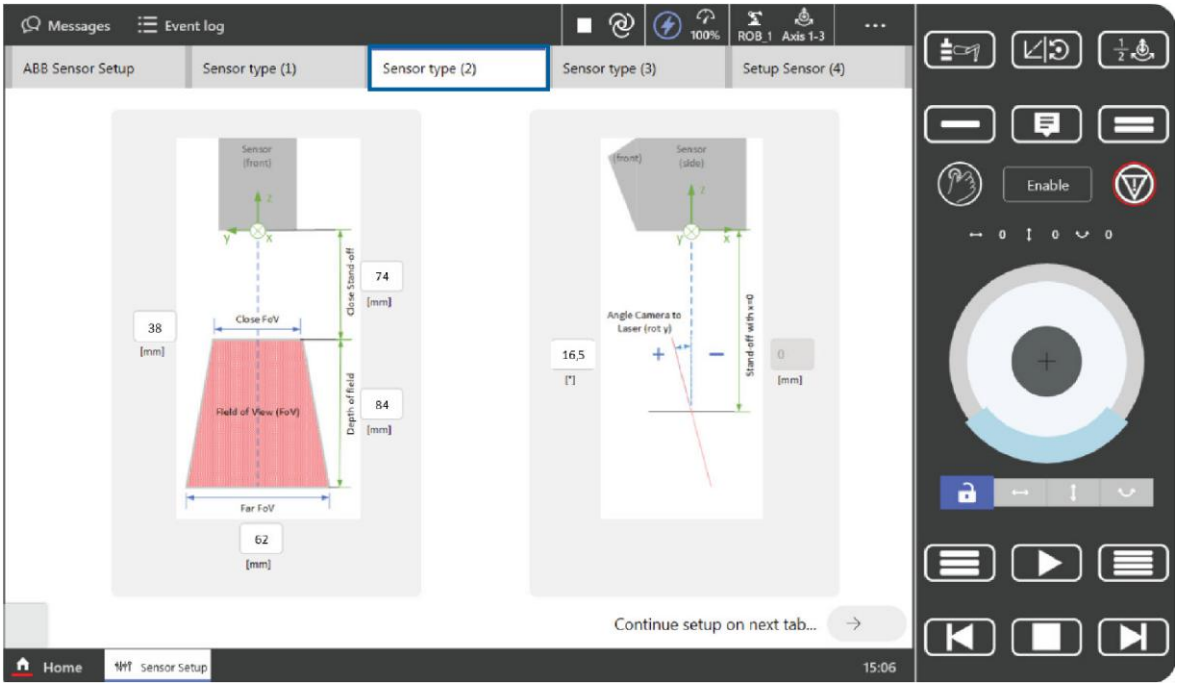
11 Configuration with Flexpendant

- If using FlexPendant, enter the parameter of the sensor.
- However, since the standard configuration is already available, you do not need to make any changes here.
- Select “Sensor Setup” -> “Setup a new sensor type”.

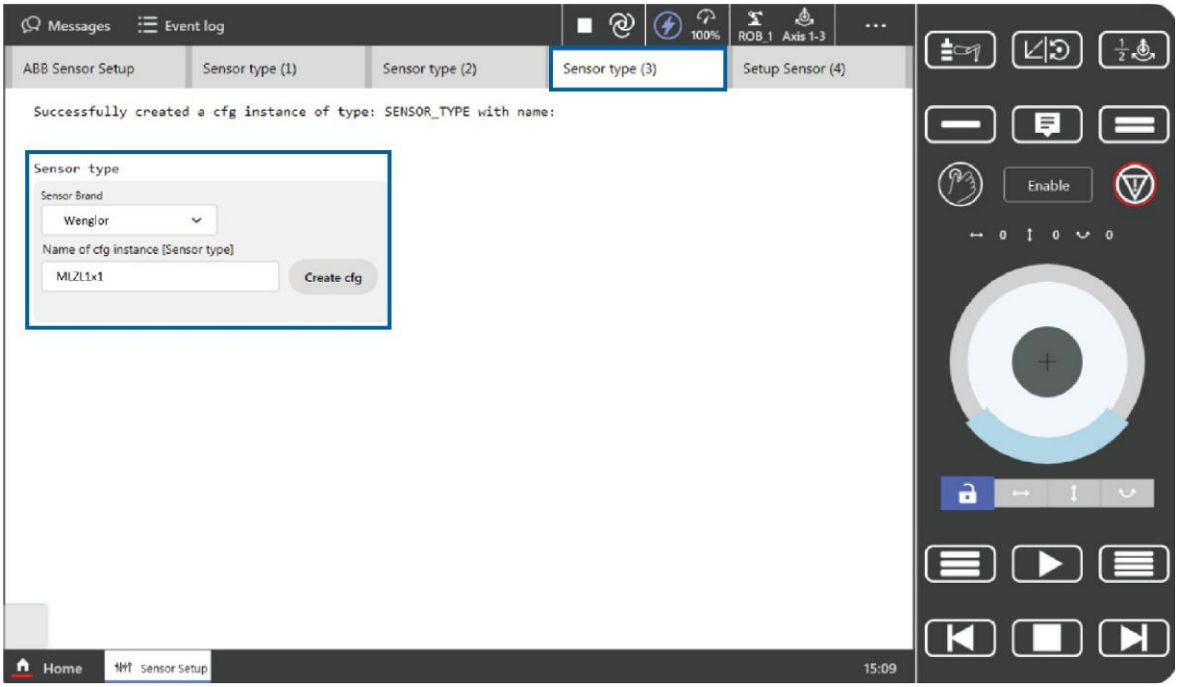





Messages
Event log
100%
ROB_1
Axis 1-3
ABB Sensor Setup
Sensor type (1)
Sensor type (2)
Sensor type (3)
Setup Sensor (4)
Where is the origin, i.e (x, y, z)=(0, 0, 0), of the sensor coordinate system?
Sensor (front)
A
B
C
What is the Z-direction?
Up
Down
Sampling frequency (5-20 Hz)
20
[Hz]
Is the sensor 2.5 dimensional or 6-dimensional?
2.5-dimensional
6-dimensional
Sensor measures the x-value?
Yes
No
What is the x-direction?
Forward
Backwards
Is the sensor coordinate system right- or left- handed?
Right-handed
Left-handed
Continue setup on next tab...
Home
Sensor Setup
15:04
Enable


Messages
Event log
100%
ROB_1
Axis 1-3
ABB Sensor Setup
Sensor type (1)
Sensor type (2)
Sensor type (3)
Setup Sensor (4)
Sensor (front)
Close Stand-off
74
[mm]
38
[mm]
Close FoV
Field of View (FoV)
Depth of field
84
[mm]
Far FoV
62
[mm]
Sensor (front)
Sensor (side)
Angle Camera to Laser (rot y)
16,5
[°]
Stand-off width x=0
0
[mm]
Continue setup on next tab...
Home
Sensor Setup
15:06
Enable

- Select “wenglor” as Sensor Brand and create a new cfg



Add physical sensor with wenglor configuration

- Since the sensor type is available, we can set it and the other parameters to add the sensor.
- Both options lead to the same result.
- Name of the sensor, e.g.: MLZL121
- Sensor Type: MLZL1x1
- RAPID Task: T_ROB1 (default)Device Name: laser1
- LeftLap joint: 90 (defined by wenglor)
- RightLap joint: 91 (defined by wenglor)
- Calibration Plate type: ABB0 or Scansonic1 Number of Measurements: 5 (for accuracy during calibration)

