Software manual
MTB Application Kit for FANUC CRX
SCHUNK Software Module

Superior Clamping and Gripping

SCHUNK ®

Imprint

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Technical changes:

We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management

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 Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains information about the SCHUNK software module for FANUC CRX cobots.

The software is used to easily integrate and control the following products in FANUC CRX applications:

- MTB Application Kit SG-JGP-P
- MTB Applikations-Kit DG-JGP-P
- MTB Application Kit KS-PGS3

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

In addition to these instructions, the documents listed under ▶ 1.4 [🗋 5] are applicable.

1.2 Symbol definition

The following symbols are used in this manual:

- ▪ Prerequisite for an action

1. Action 1
2. Action 2
   ✓ Intermediate results

✓ Final results

▶ 1.2 [🗋 4]: chapter number and [page number] in hyperlinks

1.3 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ DANGER

Danger for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.4 Applicable documents

- Assembly and operating manual for the product:
  - MTB Application Kit SG-JGP-P *c
  - MTB Application Kit DG-JGP-P **
  - MTB Application Kit KS-PGS3 **
- Assembly and operating manual of the sensor MMS 22-PI2 *
- Operating manual for FANUC CRX robots

The documents labeled with an asterisk (*) can be downloaded from **schunk.com**.

The documents labeled with an asterisk (**) can be downloaded from **schunk.com/mtb-downloads**.

2 Description of function

The software module is used for simple commissioning and programming of the SCHUNK MTB application kit in combination with FANUC CRX robots. The software module seamlessly integrates into the robot's visual programming environment. Configuration and manual control of most gripper functions are supported.

The software module has been tested using CRX control software V9.40P/17.

Before installing the software module, the robot controller must be updated to the latest software version V9.40 P/09 or higher! SCHUNK recommends installing the latest software version.

3 Connecting the product to the robot control system

Before connecting or commissioning the product, read the operating manual of the robot and observe the instructions in this manual!

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

⚠ CAUTION

Risk of injury from electric shock due to contact with live parts!

- Follow the operating manual for the robot.
- Before starting any work on the product: Switch off the energy supply and secure against re-connection.

CAUTION

Possible damage to product!

The product or the robot may get damaged if electrical cables are connected or disconnected during operation.

- Connect or disconnect electrical connections only when the device is switched off.

NOTE

Safety-relevant signals (e.g. emergency stop) must be wired externally, e.g. via safety relays, thus completely disconnecting the product from the power supply.

- Perform a risk assessment for the entire robotic application based on legal requirements to evaluate all safety-related aspects of the application.

- ▪ There is no power or compressed air supply on.

- ▪ Product is mounted on the robot. Compressed air hose and cable are connected to the product, see product assembly and operating manual.

1. Connect the wire strands of the M12 cable to the terminals of the control unit. For connection assignment, see the following table.

2. Connect logic and power supply.
   ✓ LED "Power" lights up green.

Connection assignment MTB to FANUC CRX

Pin	Wire strand	Signal	Robot interface	
			Register	**Assignment**
1	Brown	+24 VDC	Power *or* Digital Inputs	24V
2	Blue	GND	Power *or* Digital Inputs	0V
3	White	Sensor Gripper A, Position 1	Digital inputs	DI101
4	Green	Sensor Gripper A, Position 2	Digital inputs	DI102
5	Pink	Sensor Gripper B *, Position 1	Digital inputs	DI103
6	Yellow	Sensor Gripper B *, Position 2	Digital inputs	DI104
7	Black	Teach function, Sensor Gripper A	Digital Outputs	DO101
8	Grey	Teach function, Sensor Gripper B *	Digital Outputs	DO102
9	Red	Switching Gripper A	Digital Outputs	DO103
		Switching clamping force block	Digital Outputs	DO108
10	Violet	Switching Gripper B *	Digital Outputs	DO104
11	Grey/ Pink	Enable signal Gripper	Digital Outputs	DO105
		Enable signal clamping force block		DO107
12	Red/ Blue	Switching blow-off nozzle	Digital Outputs	DO106

* not relevant for single grippers

4 Installing the software module

Before installing the software module, the robot controller must be updated to the latest software version V9.40 P/09 or higher! SCHUNK recommends installing the latest software version.
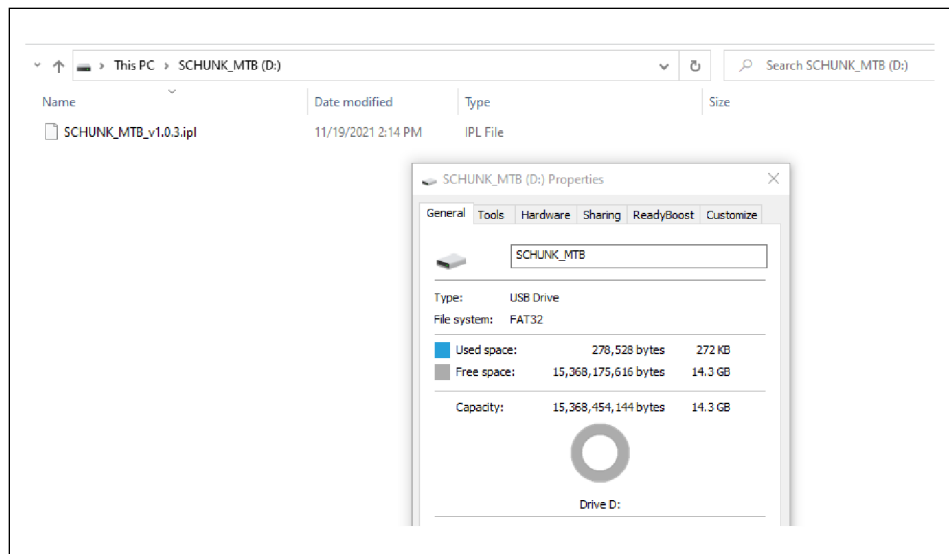
NOTE

To install the software, SCHUNK recommends using the enclosed USB stick.

Preparing the USB stick

The USB stick must meet the following requirements:

- Formatted in FAT32 format
- Designation of the removable drive: "SCHUNK_MTB".

Designation of the USB stick

Installing the software module

NOTE

To avoid malfunctions, SCHUNK recommends installing the latest version of the software module.

■ The robot control system is updated to the latest version.

1. Download the latest version of the software module (*.ipl) at **schunk.com/mtb-downloads** and copy it to the USB stick.
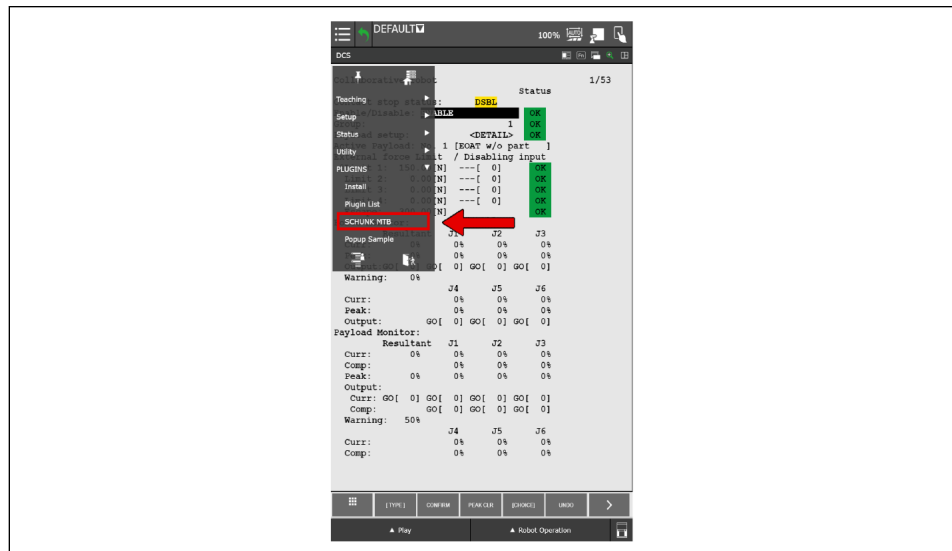
2. Connect the USB stick to the robot control system (not to the USB port of the Tablet Teach Pendant).
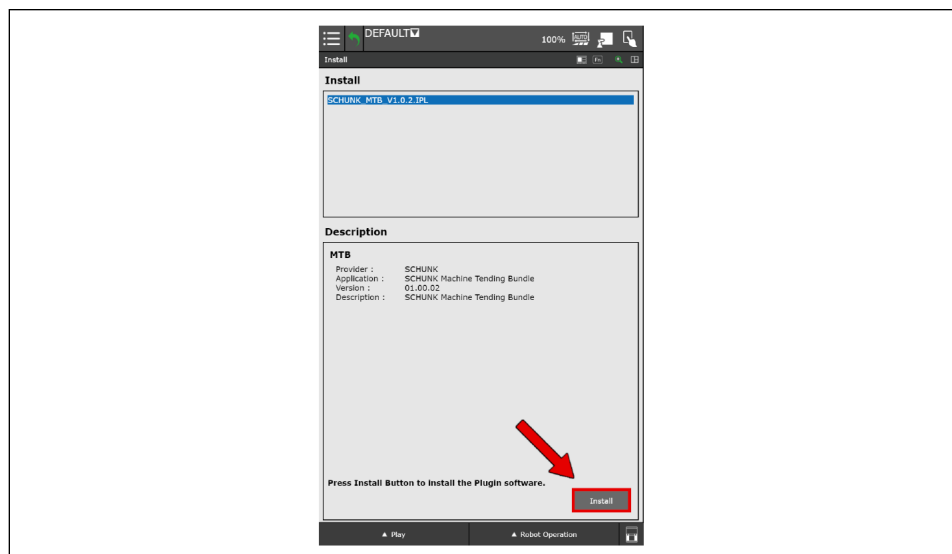

3. Select the "Menu" button at the top left of the Tablet Teach Pendant screen.
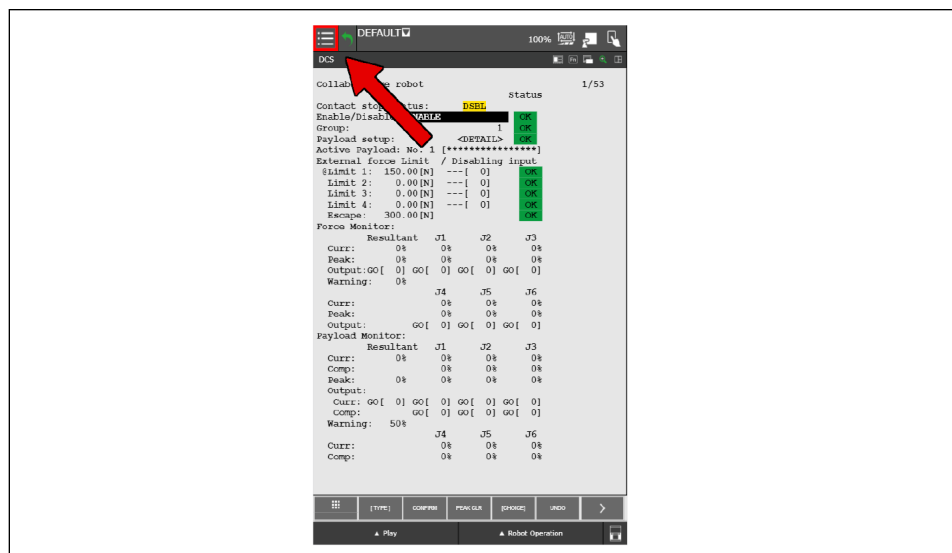
4. Select "PLUGINS" > "Install" in the menu.

5. Select the "Install" button.

✓ The installation is executed.

6. Restart the robot controller as soon as the installation is complete.

4.1 Uninstalling the software module

1. Select the "Menu" button at the top right of the Tablet Teach Pendant screen.
2. In the "PLUGINS" menu > "select Plugin List".
3. Select "MTB" from the list.
4. Select "Uninstall" on the lower right-hand side.
5. Confirm selection.

   ✓ A message appears saying that the software module has been uninstalled.
6. Restart the robot control system.

5 Configuring and testing the software module

The following settings may be adjusted:

- Selection of configurable products (single gripper, double gripper, clamping force block)
- Selection of digital inputs and outputs
- Enabling/disabling the products
- Manual control or function test of the products

⚠ WARNING

Risk of injury due to sudden movements!

This can cause components to move unexpectedly when being dismantled, which may result in serious injuries.

- Keep a safe distance and wear suitable protective equipment.

■ Robot is switched on.

1. Switch on the compressed air supply. **WARNING! Activated digital inputs and outputs can lead to immediate movement of the gripper fingers or clamping jaws.**

2. Select the "Menu" button at the top right of the Tablet Teach Pendant screen.

3. In the "PLUGINS" menu > Select "SCHUNK MTB".
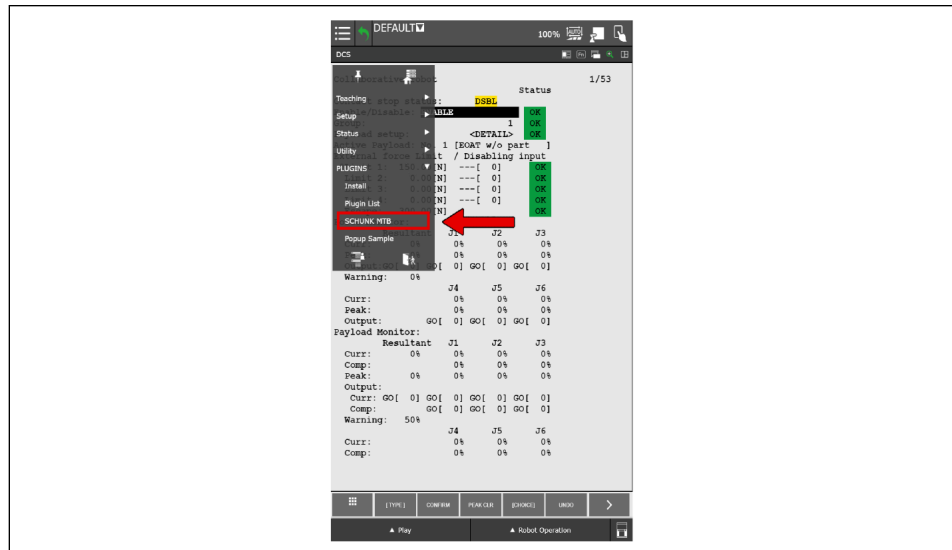
✓ The window displays the settings to be configured and a product image.

4. Select desired product configuration:
   – double gripper and clamping force block
   – double gripper
   – single gripper and clamping force block
   – single gripper
   – clamping force block

   ✓ Depending on the selection made, the content in the window changes.
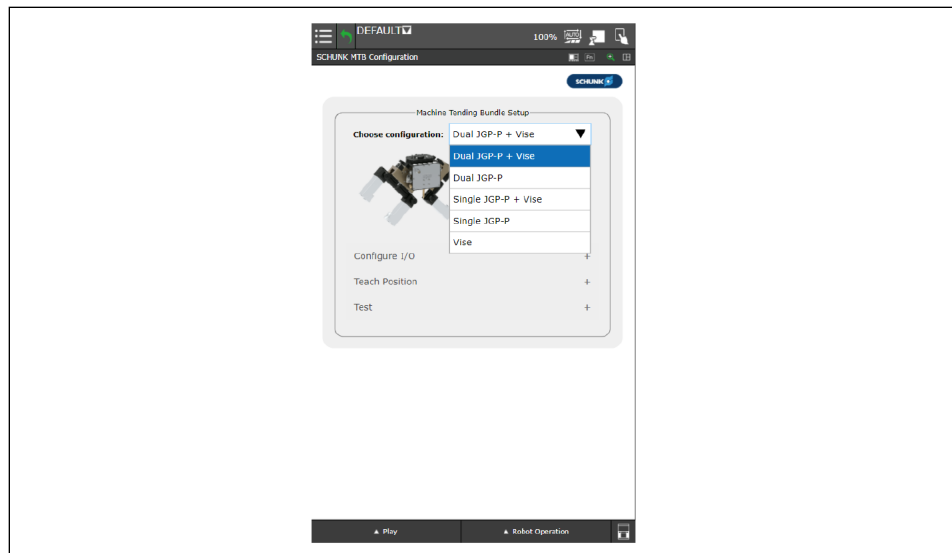
5. Select digital inputs and outputs with the arrow keys.
   IMPORTANT! If the signals are not correctly matched to the wiring, incorrect digital inputs and outputs are activated.
   (▶ 3 [🗋 8])
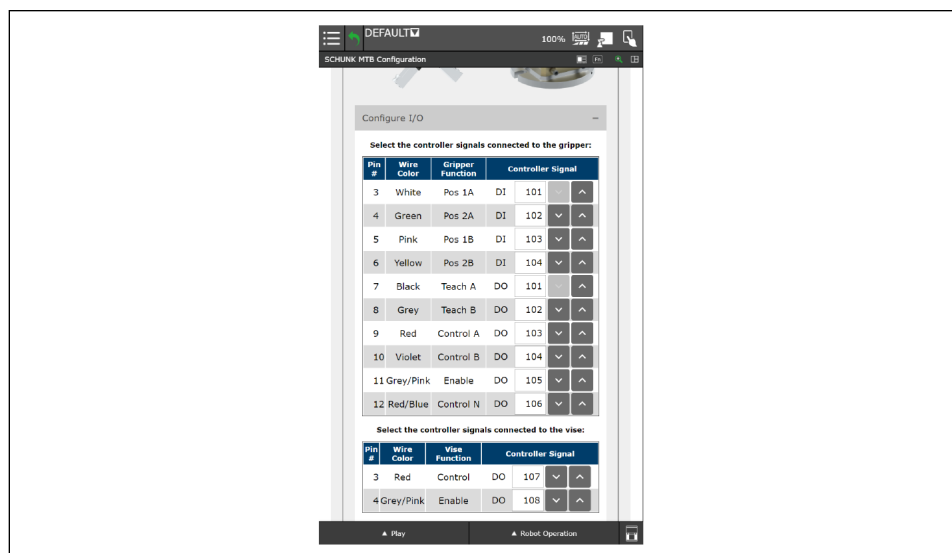
6. Select the "+" button next to "Test" to check the configuration.

7. **CAUTION! Risk of injury due to moving parts!** Activate the "Enable" button for the selected product.
Select "OPEN", "CLOSE" or "BLOW OFF" to test the settings.
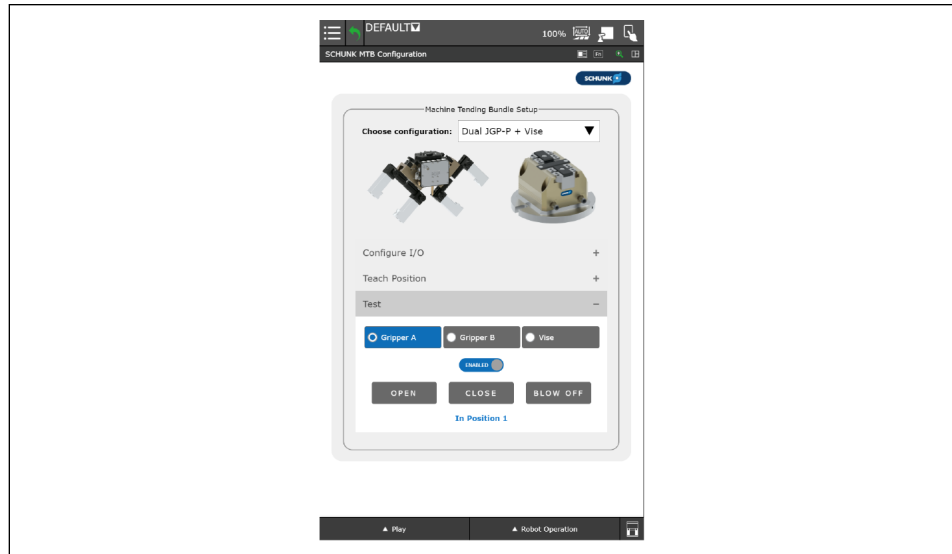
Optional: Teach sensor

The sensor can detect two positions of the gripper.

■ Digital channels are configured.

1. Press the "Teach Position 1" button.
2. **CAUTION! Risk of injury! Gripper fingers move at max. speed and force.** Select the "OPEN" and "CLOSE" buttons to move the product to the desired teach-in position
3. Press the "Begin Teaching" button to start the teach-in process.
   ✓ A progress bar shows the current status of the teach-in process. The LEDs built into the sensor signal the teach status. For details, see the Assembly and Operating Manual for the sensor.
4. Select the "OK" button.
   ✓ The current position is displayed under the "Teach position 1" and "Teach position 2" buttons.
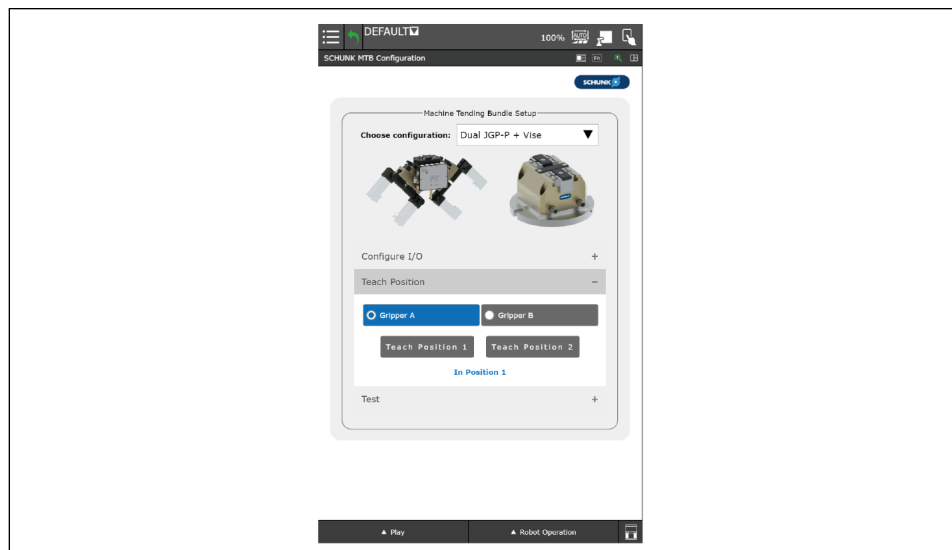
5. Teach sensor analog to second position.
6. *Depending on the selection made*: Repeat action steps for second gripper.
   ✓ The positions have been taught in.

6 MTB commands in the program

Once the software module is installed, all available commands are located in the "PlugIn" and "All" sections of the CRX program editor.


Refer to the FANUC CRX manuals for more information about programming using the visual editor.

The available commands and their parameters are described below.

Command	Activity
Enable	Select gripper or clamping force block
Disable	Select gripper or clamping force block
Close gripper	Select gripper A or B
Open gripper	Select gripper A or B
Close vise	Close clamping force block
Open vise	Open clamping force block
Blow off valve	Select on, off or set duration in seconds
Query	Validate gripping process and/or workpiece loss detection

1. Drag the desired command into the program. **CAUTION! Do not handle or interfere with moving parts.**
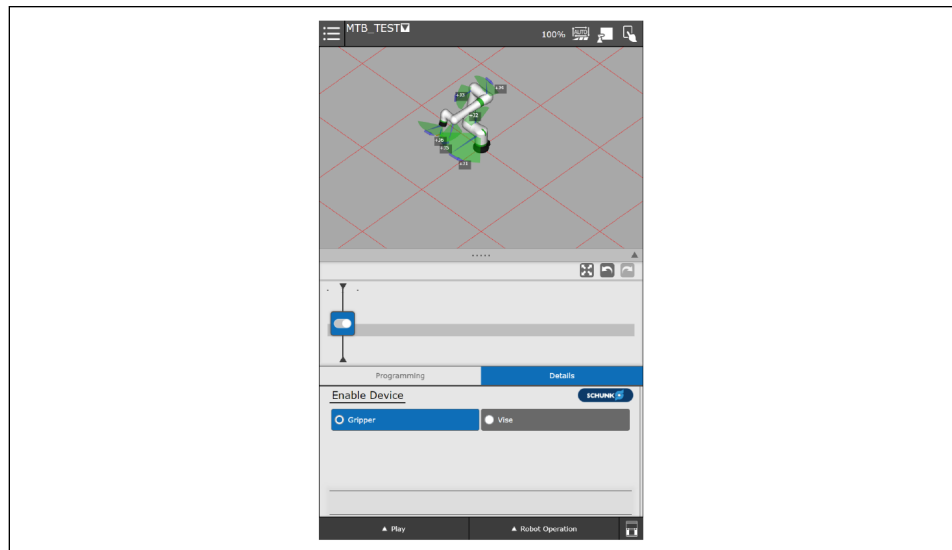2. Adjust parameters. To do this, select the command in the program and choose the "Details" tab.
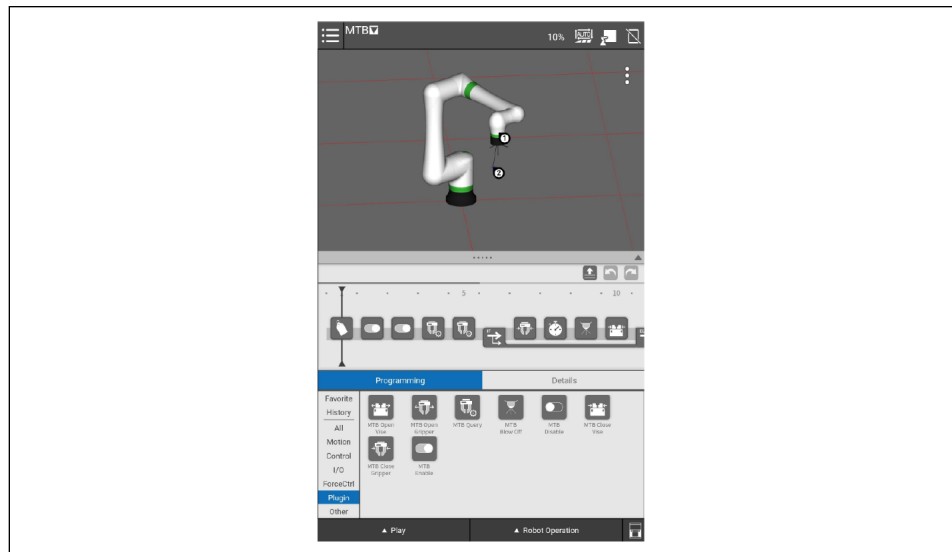
Possible commands for a machine loading application are shown in an example program, ▶ 7 [23].

6.1 Enable

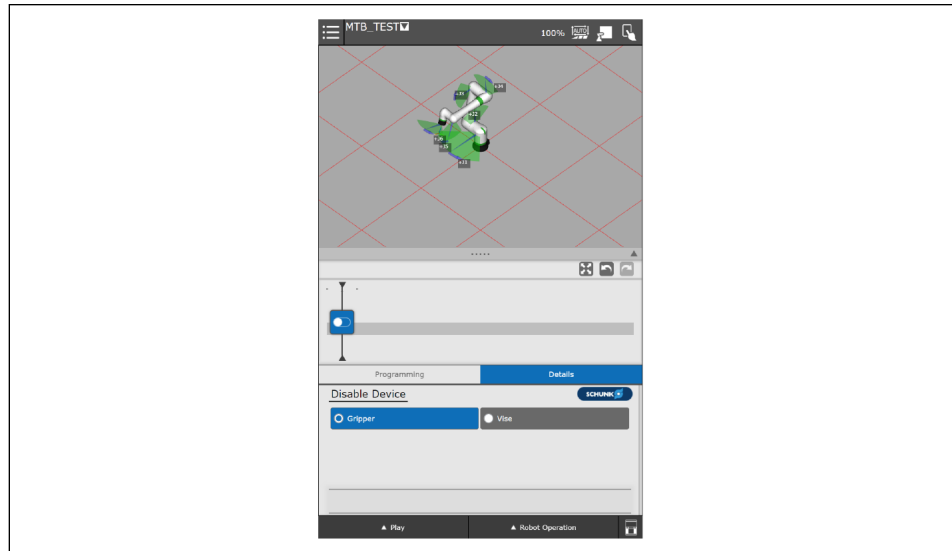This command is used to activate the correct device before performing an action.

Parameter: Selection of the gripper or clamping force block

6.2 Disable

This command is used to disable the corresponding device after performing an action.

Parameter: Selection of the gripper or clamping force block

6.3 Close gripper

This command is used to grip a workpiece. The gripper fingers move from the "Gripper open" state to the "Gripper closed" state. The workpiece is gripped from the outside.
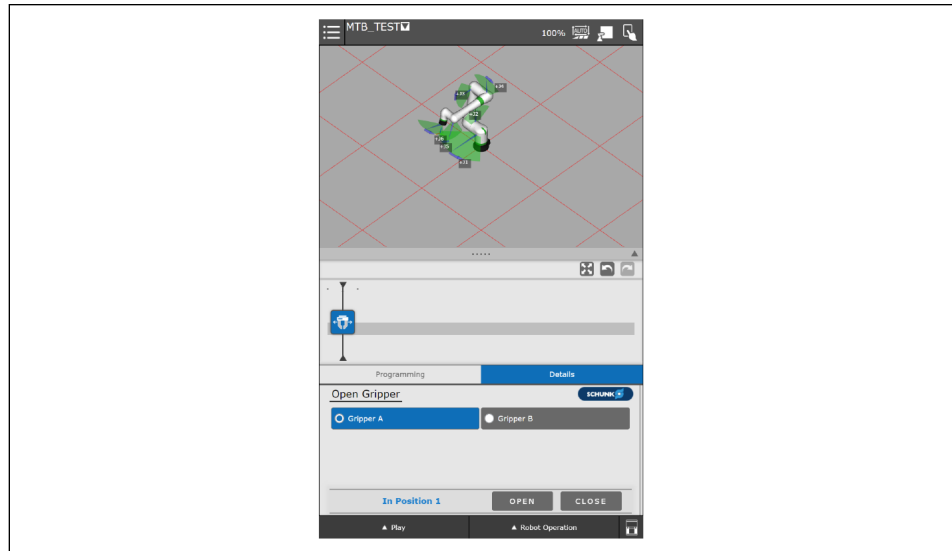
Parameter: Selection of gripper A or B
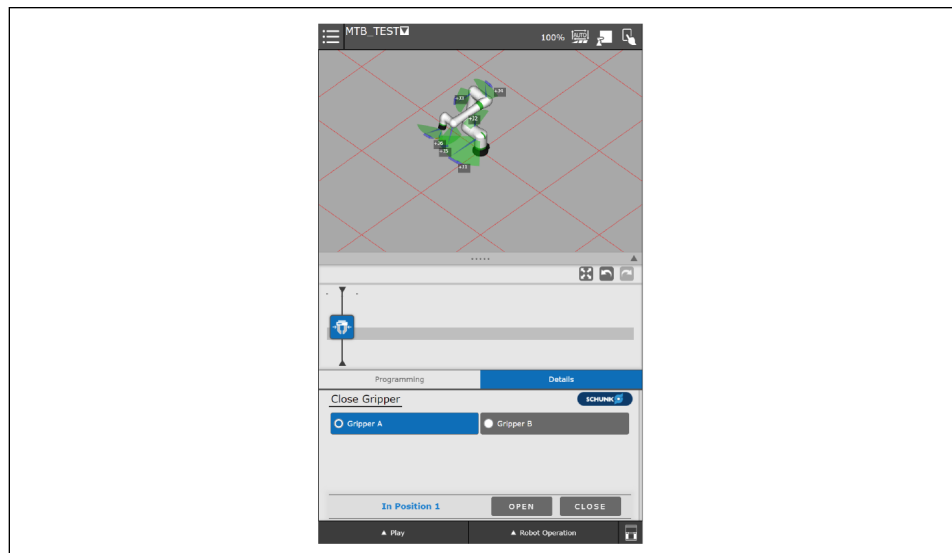
6.4 Open gripper

This command is used to release a workpiece. The gripper fingers move from the "Gripper closed" state to the "Gripper open" state. The workpiece is released.

Parameter: Selection of gripper A or B

6.5 Close vise

This command is used to clamp a workpiece. The clamping force block is changed from the "clamping force block open" state to the "clamping force block closed" state. The test buttons can be used to manually remove a workpiece.
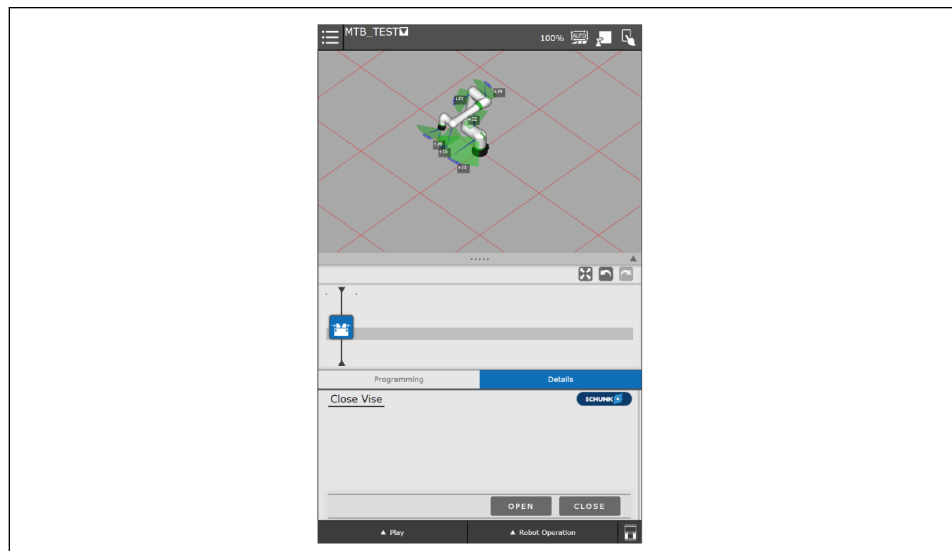
6.6 Open vise

This command is used to release a clamped workpiece from a clamping force block. The test buttons can be used to manually remove a workpiece.
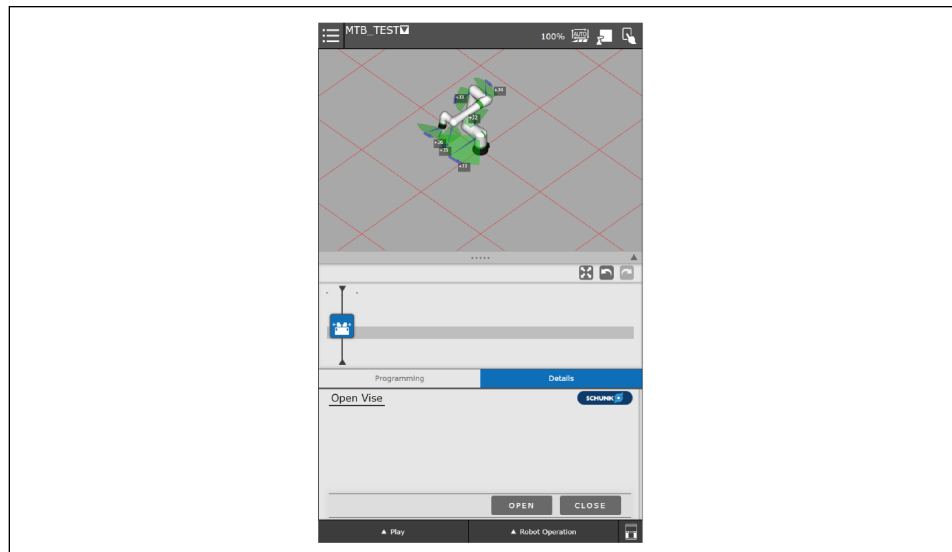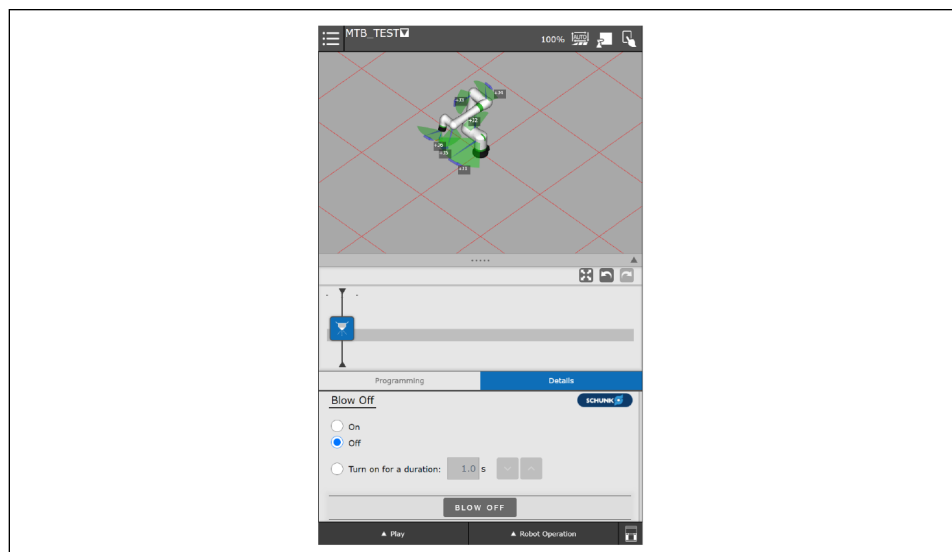

6.7 Blow off valve

This command is used to activate/deactivate the blow off nozzle.

Parameter:

- "On": Blow off nozzle is activated
- "Off": Blow off nozzle is deactivated
- "Turn on for a duration": The blow off nozzle is activated for a defined period of time. To enter the time span, tap in the white input field or use the arrow keys.

6.8 Query

This command determines the taught-in position of the gripper.

Note: teach-in of the positions is possible in the "Configuration" window: "Plugins" menu > "SCHUNK MTB" > Teach-in position, ▶ 5 [🗅 16].
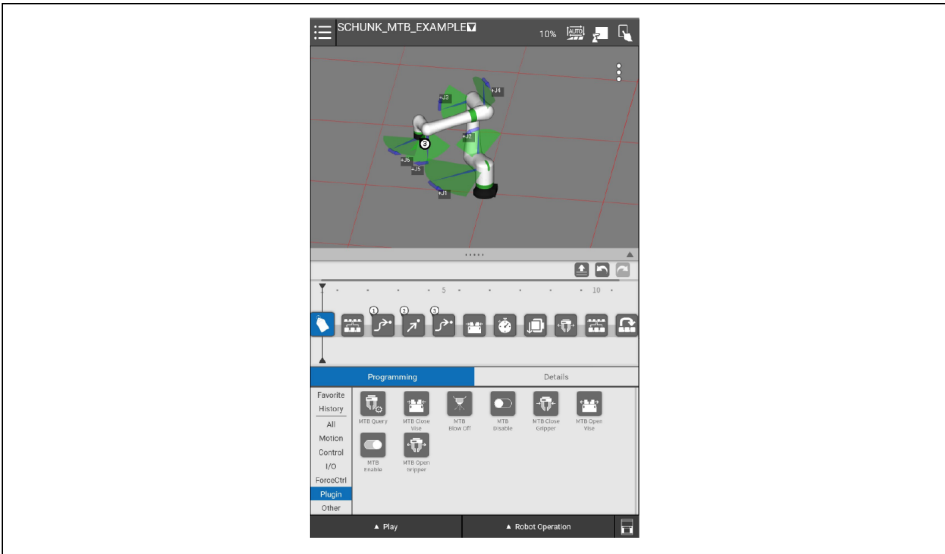
Parameter:

- Select the position to be monitored in the drop-down menu.
- Use the arrows to select the register number.
- If the current value is 1, the gripper fingers are in the taught-in position.
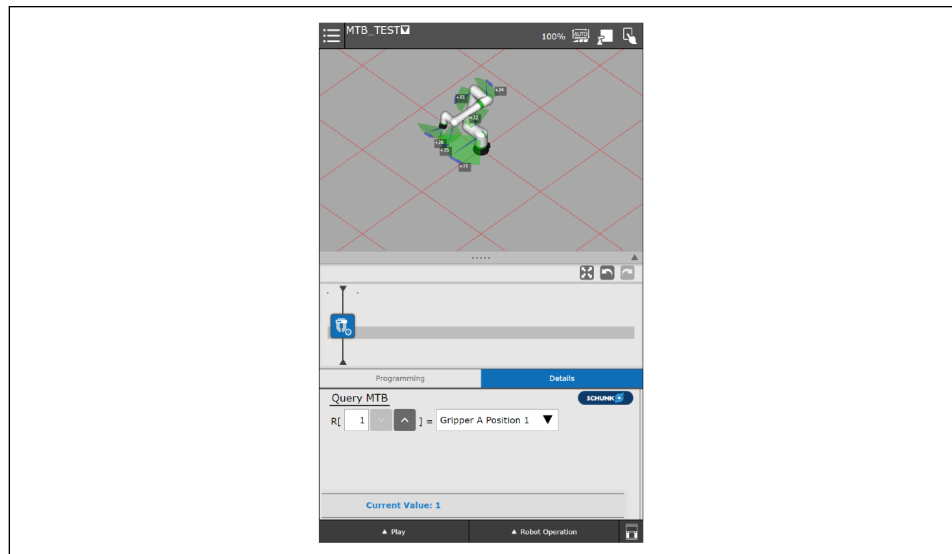
7 Example of a robot program

This example can be used as a guide to create your own usage applications.

Machine loading example

Label		Move the gripper to the starting position with the label "Label 1".

Call program		Call the pick program to grip a new workpiece from the feeder

Joint move		Move gripper in front of the CNC machine.

Linear Move		Linear movement for manually opening the door.

Joint move		Move the gripper in the CNC machine so that the workpiece is between the jaws of the clamping force block.

|		
Vise close		Close the clamping force block to clamp the workpiece.
Wait		Wait until the CNC machine resets the load request signal.
Set payload		Set a new useful load to indicate that gripper A will be empty.
Open gripper		Release workpiece. -Parameter: Gripper A
Call program		Call program to close the door and start the CNC machine
Jump to		Jump back to the start area for the next workpiece.

8 Troubleshooting

Error code	Description	Corrective action
SCHUNK-MTB-001	Internal plugin error	• Install latest software module and robot software. • Clear cache and restart robot control system manually.
SCHUNK-MTB-002	Invalid I/O configuration during teach-in	• Check digital inputs and outputs, ▶ 5 [🗋 13].
SCHUNK-MTB-003	Conflict with the teach signal	• Check digital inputs and outputs, ▶ 5 [🗋 13]. • Teach-in the sensor again after the LEDs on the sensor have stopped flashing, ▶ 5 [🗋 16].
SCHUNK-MTB-004	Sensor does not respond	• Check digital inputs and outputs, ▶ 5 [🗋 13]. • Check power supply. • Check sensor connection. • Teach-in the sensor again after the LEDs on the sensor have stopped flashing, ▶ 5 [🗋 16].
SCHUNK-MTB-005	Position not set	• Check sensor connection.
SCHUNK-MTB-006	Position 2 not recognized	• Check digital inputs and outputs for position 2 on gripper A or B, ▶ 5 [🗋 13]. • Check sensor connection.
SCHUNK-MTB-007	Invalid command for the "clamping force block" configuration	• Check configuration, ▶ 5 [🗋 13].
SCHUNK-MTB-008	Invalid command for "single gripper" and "double gripper" configuration	• Check configuration, ▶ 5 [🗋 13].

Example SCHUNK-MTB-004
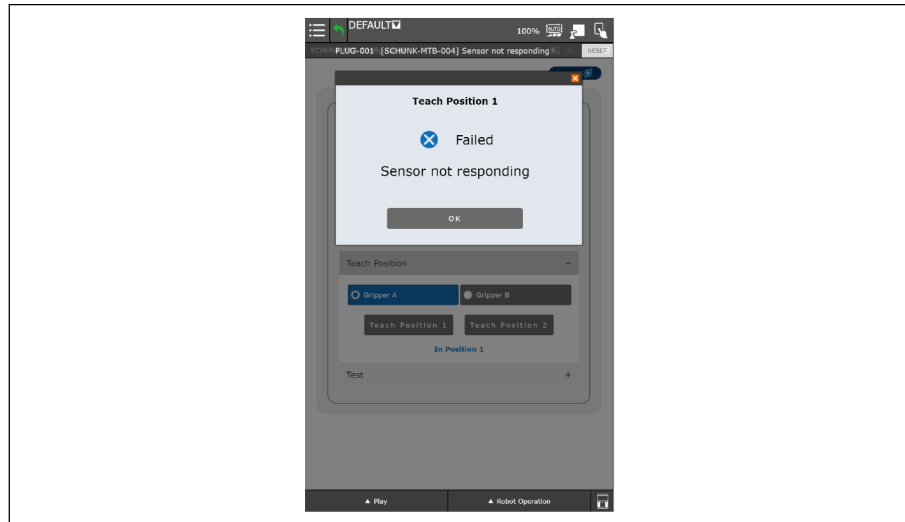
Example: Error PLUG-001 [SCHUNK-MTB-004]

The error indicates that the sensor is not responding during the teach-in process.

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